

BRITISH COLUMBIA DAM EMERGENCY RESPONSE PLAN



Squawkbird Lake Dam Failure 2005-08 09

Ministry of Forests, Lands, Natural Resource Operations and Rural
Development
Water Management Branch
Dam Safety Section

Binder #

Preface

The *BC Dam Emergency Response Plan* defines the scope and structure of provincial involvement when responding to a dam emergency. The Ministry of Forests, Lands, Natural Resource Operations and Rural Development is the key (lead) agency that is responsible for provincial preparedness and response management for dam emergencies. This responsibility is designated under the *Emergency Program Act* and its *Emergency Program Management Regulation* (Schedule 1) and Section 2 of the *Environment Management Act*.

Provincial involvement may be jointly shared with federal agencies, local government, First Nations and industry, or may be a singular provincial government endeavour. This plan is intended to operate concurrently and in cooperation with the plans of other responding jurisdictions and dam owners.

This plan complies with the requirements of the *BC Emergency Response Management System* standard. This standard is based on the international Incident Command System.


Statement of Authority

This document is the Province of British Columbia's *Dam Emergency Response Plan*. The plan is to meet the intent of Section 6 of the *BC Emergency Program Management Regulation* (BC *Emergency Program Act*) that pertains to the role of ministers in relation to hazards. The regulation states, "A minister referred to in Schedule 1 is responsible for coordinating the government's response to the occurrence of any of the hazards for which the minister is designated as the key minister in that schedule."

This plan addresses dam emergencies for which the Ministry of Forests, Lands, Natural Resource Operations and Rural Development is the key provincial agency for such hazards pursuant to the *Emergency Program Act* and Schedule 1 of the *BC Emergency Program Management Regulation*.

This plan also addresses the Ministry of Forests, Lands, Natural Resource Operations and Rural Development responsibilities under Section 2.0 of the British Columbia's *Environmental Management Act*.

The *BC Dam Emergency Response Plan* may be invoked under Section 7.0 of the *BC Emergency Program Act* or Section 5.0 of the *BC Environment Management Act* where the Minister considers that an emergency exists and immediate action is necessary.

Signed: 

Director, Management and Standards Branch,
Ministry of Environment

Date: February 28, 2006

TABLE OF CONTENTS

Preface	i
Statement of Authority	ii
List of Revisions	v
Acronyms	vi
Distribution List	vii
SECTION 1.0 - PURPOSE AND SCOPE	1
1.1 - Purpose	1
1.2 - Scope	1
1.3 - Objectives	1
SECTION 2.0 - EMERGENCY RESPONSE STRATEGY.....	5
2.1 – Introduction	5
2.2 - Dam Safety Hazard Levels	6
2.3 – Emergency Response Procedures	7
2.3.1 Communication Plan	7
2.3.2 Media Contacts	8
2.4 – Response Procedure Details	10
Remember these ICS Principles.....	23
SECTION 3.0 - RESPONSE ORGANIZATION	24
3.1 – BCEMS	24
3.2 - Incident Command System	27
3.3 – Incident Management Team	27
3.4 – Provincial Support	27
3.5 - Relationship to other Dam Emergency Plans	28

Appendix A – Emergency Contact Names and Numbers

Appendix B – Sample Dam Incident Report

Appendix C – Source of Earthquake, Weather and Highway Information

Appendix D – Hazard Response Organisation

Appendix E – PECC Organisation (BCEMS)

Appendix F – Check List of Individual Duties

Appendix G – Duties of Provincial Ministries and Agencies

Appendix H – Emergency Dam Assessment

Appendix I – BC Flood Plan

List of Revisions

Date	Section	Comments	Prepared by:
Feb 2006	All	Update entire document to reflect change to FLNRORD; update contacts	S Morgan DSO
Mar 2007	Pgs i-vii, Pgs 5, 7, 14, 15, Appendix A, Appendix I	Update Introduction Section, minor revisions, update contact list, link to BC Flood Plan	S Morgan DSO
Mar 2008	Appendix A	Update Key FLNRORD Personnel & Owners	S Morgan DSO
Feb 2009	Pg vii Appendix A	Update distribution list, Update Key FLNRORD Personnel & Owners	S Morgan DSO
Oct 2009	Appendix A2	Update Ministry Contacts	S Morgan DSO
May 2011	Pg vii Appendix A1, A2, & I	Update distribution list, DSO contact list, ministry emergency contact list & link to BC Flood plan	S Morgan DSO
Feb 2012	Pg vii Appendix A1 & A2	Update entire manual to reflect Ministry name, Update distribution list, update format of manual, update contacts, include C&E contacts	S Morgan DSO
May 2013	Pg vii Appendix I	Update distribution list 2013 BC Flood Emergency Flood Plan	S Morgan DSO
Jan 2017	All	Minor update for DSO Training – PEP, EPP, BCERMS & Step 18. Still requires a further update re the DEP template.	W Jolley DSS
Oct 2017	Pg vii	Added North East Region – Copy 27	W Jolley DSS
Feb 2019	All	Update Ministry name, minor edits	S Morgan DSO

Acronyms

BCEMS	BC Emergency Management System
BC	British Columbia
CELL	Cellular telephone number
DEP	Dam Emergency Plan
DSO	Dam Safety Officer
EMBC	Emergency Management BC
EESB	Environmental Emergency Services Branch
EOC	Emergency Operations Centre
FAX	Facsimile
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
IC	Incident Commander
ICP	Incident Command Post
ICS	Incident Command System
MOC	Ministry Operations Centre
MOTH	Ministry of Transportation and Highways
MPSSG	Ministry of Public Safety and Solicitor General
MROC	Ministry Regional Operations Centre
PECC	Provincial Emergency Coordination Centre
PREOC	Provincial Regional Emergency Operations Centre
WMB	Water Management Branch

Distribution List

Copy No.

Headquarters

- 1 Comptroller of Water Rights
- 4, 5 Head, Dam Safety Section, Victoria
- 2, 3 Dam Safety Officer, Victoria
- 6, 7 Dam Safety Officer, Victoria
- 17, 23 Manager, Dam Safety Section, Victoria
- 19, 20 Dam Safety Specialist, Victoria
- 21, 22 Dam Safety Specialist, Surrey

Regions

- 8 West Coast Region
- 9 South Coast Region
- 10 Thompson Region
- 11 Okanagan Region
- 12 Kootenay/Boundary Region
- 14 Cariboo Region
- 13 Omineca/Skeena
- 18 Skeena Region
- 24-26 OGC – Ft St John
- 27 North East Region

Others

- 15 Director of Operations, EMBC
- 16 Emergency Operations Manager, RCMP "E" Division HQ
Emergency Operations Manager
Operational Readiness & Response
RCMP "E" Division HQ,
5255 Heather Street, Vancouver, B.C. V5Z 1K6

SECTION 1.0 - PURPOSE AND SCOPE

1.1 - Purpose

The purpose of the *BC Dam Emergency Response Plan* (the Plan) is to provide for safe, timely, effective, and coordinated response to a dam incident, dam alert, or dam breach. The Plan is to work in concert with dam owners, other responding government agencies (provincial, federal, and local), First Nations, industry, and communities.

1.2 - Scope

The *British Columbia Dam Emergency Response Plan* is a provincial-level plan that:

- outlines the organisation, procedures and duties of the provincial government in response to a dam incident in British Columbia;
- identifies the role of the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) as key (lead) provincial agency for responding to dam incidents in cooperation with other responding jurisdictions and/or dam owners;
- provides the organisation, missions, and duties for an Incident Management Team based on the *BC Emergency Management System* (BCEMS);
- lists resource documents and internet sites that could be used to support response efforts; but
- does not provide detailed information on incident management above the Site Support Level 1002 of the *BCEMS* but directs the user to the separate documents for this information.

1.3 - Objectives

- The Comptroller of Water Rights is responsible for coordinating a program to ensure that dam owners meet their dam safety responsibilities.

- The Comptroller and regional water managers shall be respectively responsible for the administration of the Victoria and regional components of the program, which should be mutually responsible.
- In the event of a dam related emergency FLNRORD will be the lead provincial agency responsible for minimising downstream effects, supported by EMBC, local authorities, and other agencies.
- In a dam owner's Dam Emergency Plan the dam owner should assume a leadership role for emergency response. FLNRORD will monitor the situation and help the owner as requested. If the owner is not dealing with the situation appropriately; FLNRORD may have an emergency declared and take over incident command.
- The Plan will call on other designated FLNRORD personnel (regional water managers, dam safety officers, regional dam safety officers, deputy inspectors of dikes, conservation officers, etc.) as required.
- FLNRORD will focus its efforts on preventing the uncontrolled release of a reservoir through a dam breach.
- Local government(s) with assistance from the Emergency Management BC will coordinate response below the dam, in accordance with the local authority's emergency response plan. If the situation is beyond the control of local authorities, they can declare a state of local emergency by bylaw or order under the ***Emergency Program Act***.
- In areas outside local jurisdiction the Emergency Management BC will coordinate the response.
- The intent is to respond immediately to any problems affecting public safety.
- Where the province needs outside help to deal with a disaster, they would declare a provincial emergency. The minister responsible for the *Emergency Management BC* (EMBC) or the Lieutenant Governor can declare this state of emergency under the *Emergency Program Act*. Alternately, the minister of the environment can declare an Environmental Emergency under the *Environment Management Act*, providing the minister power to undertake actions and bill responsible parties later.

- Following an extreme natural event, such as a flood or earthquake, a priority of FLNRORD shall be to ensure that owners in the affected area prepare a structural analysis of their dams. A priority of Dam Safety Officers (DSO's) as part of the FLNRORD response will be to monitor remedial actions.

SECTION 2.0 - EMERGENCY RESPONSE STRATEGY

2.1 – Introduction

FLNRORD will assess the situation to determine the severity of the situation and the level of response required. FLNRORD will coordinate the hazard response activities, around provincial jurisdiction, with the dam owners and EMBC. In areas of local government jurisdiction, the local government will coordinate the response. For a layout of the provincial response structure and how the response varies for different emergencies see Section 3.0 - Response Organisation.

For potential dam emergencies occurring at the same time as a flood event, they would be most efficiently coordinated as flood related occurrences as part of the British Columbia Flood Plan. Dam incidents that result from earthquakes would be coordinated with the British Columbia Earthquake Response Plan.

The Province holds dam owners responsible for safe operation, emergency preparedness, and response to situations that could affect the safety of the dam. The *British Columbia Dam Safety Regulation* under the *BC Water Act* places the onus on dam owners to have a well-developed emergency response plan.

In the case of an emergency at a dam site FLNRORD will, as required:

- establish a Ministry Operation Centre (MOC);
- provide the owner adequate opportunity to respond to and deal with the situation at the dam;
- provide advice and assist in making strategic and tactical decisions regarding emergency response actions;
- augment the owner's effort with provincial resources and staff, subject to mutual agreement and cost-recovery for services provided;
- liaise with FLNRORD Communications Branch and Executive to ensure timely information exchange;
- facilitate the preparation of joint Situation Reports and media releases; and
- issue orders under the *Water Act* as required.

In cases where the owner is unable or unwilling to respond in an adequate response capacity FLNRORD, in addition to the above, may as required:

- with consent of the dam owner assume site incident command; or

- have an emergency declared under the *Emergency Program Act*, or declare an emergency under the *Environment Management Act*, and assume site incident command.

In cases where FLNRORD assumes incident command; FLNRORD will make strategic and tactical decisions regarding emergency response actions; and attempt to involve the owner in responding to and dealing with the situation at the dam.

The dam response efforts will be undertaken with the response priorities prescribed in the BC Emergency Management System (BCEMS) as follows:

1. provide for the safety and health of all responders;
2. save lives;
3. reduce suffering;
4. protect public health;
5. protect government infrastructure;
6. protect property;
7. protect the environment; and
8. reduce economic and social losses.

2.2 - Dam Safety Hazard Levels

The Emergency Response Plan identifies four Dam Safety Hazard Levels to allow for clear communication of the actual hazard level. The hazard levels, defined below, are “No Dam Incident”, “Dam Incident”, “Dam Alert”, and “Dam Breach”.

No Dam Incident: This classification level is for reports that are received regarding a situation that does not impact the safety of the dam. This could be an erroneous report or a report about an abnormal condition that could be interpreted by others as a threat to a dam (for example a nearby landslide which does not threaten the dam or reservoir).

Dam Incident: A dam incident occurs when an abnormal condition is observed at a dam or the dam performs abnormally but the abnormal condition or performance is not expected, at the time it is observed, to lead to a breach of the dam.

Dam Alert: A dam alert occurs when an abnormal condition is observed at the dam or the dam performs abnormally, and, without swift and effective intervention, a breach may occur.

Dam Breach: An actual breach of the dam has occurred, or severe abnormal conditions or performance of the dam is occurring that has a significant probability of leading to a breach of the dam.

For each hazard level a different emergency response is required. The responses are identified in the following Section 2.3 - Emergency Response Procedures.

2.3 – Emergency Response Procedures

The response of FLNRORD to a dam related emergency would likely be initiated in one of two ways; either by a report of a dam problem, or a report of an extreme natural event such as a flood or earthquake.

The method of responding to an emergency is outlined on the following flowchart - Emergency Report Procedures (Figure 2-1). The flowchart begins with the incident report and leads step by step through the response procedures. **Each step of the procedure may take less than a minute or many hours to undertake.** The flowchart outlines the steps of the planning process for both single site and region wide problems. Each step is explained in more detail in Section 2.4 - Response Procedure Details.

2.3.1 Communication Plan

The flowchart contains a communication plan outlining emergency contacts. The contacts listed in the plan are by functional position because the people filling the position will change over time. The actual contact names and numbers for the people filling the various functional roles can be found in Appendix A- Emergency Contact Names and Numbers.

If the named contact cannot be reached, an alternate person within the organisation shall be contacted. After initial notification it is important to keep these people informed of the status and latest developments involving the dam. The contact names and numbers should be updated on a semi-annual basis.

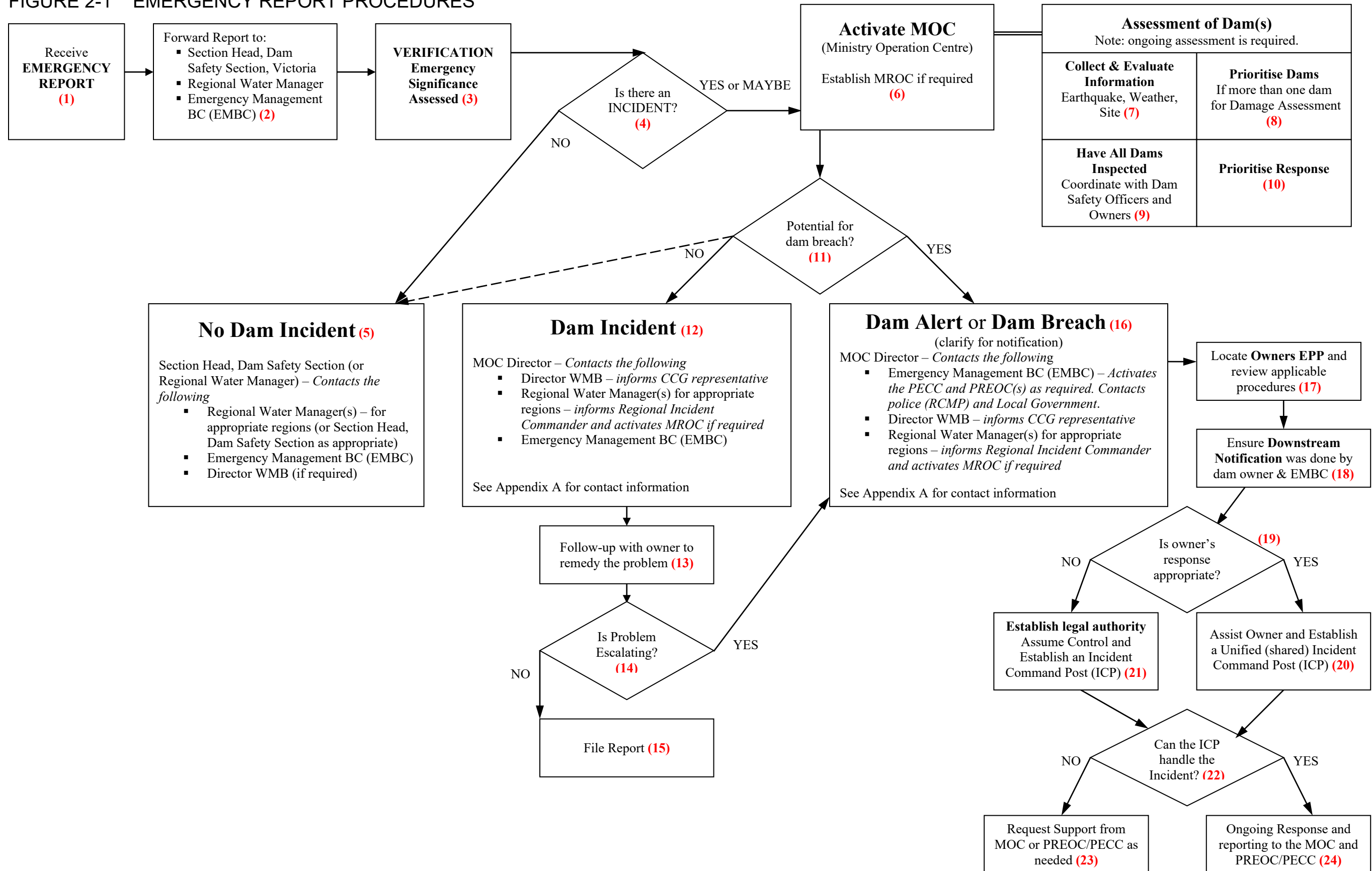
2.3.2 Media Contacts

In emergencies, the provision of appropriate, timely and accurate information to the public is an essential part of a response dedicated to protecting lives and property. In general, emergency announcements through the media will be the responsibility of EMBC, the police, and local officials. Thus, it is important, that incident commanders clearly communicate information to the appropriate parties be it the MOC, EMBC, EOC, police, or local officials.

Where possible it helps to have a joint communication plan for EMBC, FLNRORD, and the dam owner. If possible, this plan should be coordinated with the FLNRORD Communication Branch.

EMBC in consultations with BC Public Affairs Bureau, Communications Division, is mandated to maintain and implement a British Columbia Emergency Public Information Plan, which complements other provincial emergency response plans. The BC Emergency Communication Plan identifies Public Information Officer(s) that report directly to the director of PECC and the director(s) of any established PREOC. When invoked this information plan overrides all other communication plans, policies and procedures. Information on the plan is available from EMBC.

FIGURE 2-1 EMERGENCY REPORT PROCEDURES



2.4 – Response Procedure Details

(1) - Receive EMERGENCY REPORT

A problem or emergency at a dam site may be observed by the owner, maintenance staff, public service personnel, local government, or the public. The information could reach FLNRORD headquarters directly or via the Regional FLNRORD office, the Emergency Management BC (EMBC), or other government agency.

For any emergency report the following information should be obtained:

1. Name, position of observer (i.e. job responsibilities), telephone number, and location they are calling from.
2. Description of problem.

For a dam alert this would include:

- description of slides, sloughs, subsidence, movement, cracking, seeps, drainage, etc.,
- location and extent,
- likelihood of deterioration,
- effects on adjoining structures,
- reservoir and tailwater elevations,
- prevailing weather conditions, and
- other facts believed to be pertinent.

For a breach this would include:

- type and location of breach,
- magnitude of cracks or gaps,
- rate of enlargement,
- uncontrolled flow release,
- estimated rate of increase in flow, and
- known or estimated time of commencement of breach.

3. Verification of an observer's call:

This would include:

- recognition of caller,
- caller's demonstrated knowledge of owner's procedures, personnel, systems, etc.,
- corroborative evidence from current environmental conditions,
- contacting the caller's supervisor or another member of staff (but only if there is serious doubt about validity of the report as time is of the essence).

(2) - Forward Report to: Section Head Dam Safety Section Victoria, Regional Water Manager, and Emergency Management BC (EMBC)

Forward all dam incident reports to the:

- Section Head, Dam Safety Section, Victoria
- Regional Water Manager(s) – for appropriate regions, and
- Emergency Management BC (EMBC)

Managers will contact the appropriate support staff including the Dam Safety Officers. Reports need to be forwarded to the Emergency Management BC to keep them aware of potential problems. In addition, it may be possible to utilise EMBC resource's in investigating reported problems. For example, EMBC may have contact closer to the site than FLNRORD.

The report could be as simple as “We have this report of _____ at _____ dam located _____. We are currently investigating the situation and will inform you when we know more.”

For contact information see Appendix A – Emergency Contact Names and Numbers.

(3) - VERIFICATION (Emergency Significance Assessed)

Reports of problems at a dam as well as flood and earthquake information need to be verified. For reports about dam problems the owner should be contacted immediately (unless the owner made the report), as they may be able to verify the status at the dam. In addition to verification, this allows the owner to implement their Dam Emergency Plan and undertake remedial measures such as operational changes or repairs.

Owner contact information is available in the following locations:

- The dam owner's Dam Emergency Plan(DEP), for major dams these are kept (as available) in the MOC room in Victoria. For regional dams, an DEP may be available in the regional Water Management offices.
- FLNRORD's dam database.

If the owner cannot be contacted, a site inspection should be undertaken as soon as possible to determine conditions at the dam. For inspections, it may be more efficient to have the owner's consultant, a dam safety officer, or a conservation officer undertake the inspection and report their findings to the FLNRORD office. All reported problems need follow up until they are satisfactorily resolved.

(4) - Is there an INCIDENT?

In addition to a report about a specific dam, an incident could include a major flood or earthquake that could potentially lead abnormal operation or downstream flooding.

If the reported problem has not resulted in an incident, see the “NO DAM INCIDENT” box. For all reported incidents or possible incidents, further investigation is required, see box 7, “Establish MOC”.

(5) - NO DAM INCIDENT

If there is no dam incident the Section Head, Dam Safety Section, or Regional Manager, needs to file a report outlining the initial reported problem and the steps taken to ensure that an incident was not occurring. Copies of the report to should be forwarded to the Regional Water Manager (or Section Head, Dam Safety Section) and EMBC. If a reported problem was an incident that has been resolved, it is still a dam incident and follow-up with the owner is required.

(6) - Activate MOC (Ministry Operation Centre) - Establish MROC if required

Set up the Ministry Operation Centre (MOC). A permanent location exists for the MOC, in the FLNRORD Victoria office where copies of the Operation, Maintenance and Surveillance Manuals, and other pertinent information for major dams are available. If the deficiency investigation is expected to be of routine nature the MOC could be set up in the home of the MOC director.

One person from FLNRORD headquarters (preferably the Manager or Section Head) should be designated as the MOC Director. As MOC Director they are responsible for coordinating the response between the field personnel, the Director of Water Management, the Regional Water Managers and the Emergency Management BC.

The MOC Director needs to be kept informed of all developments so that he can respond appropriately to the developing situation. Available FLNRORD staff should contact, or travel to, the MOC (if not already there). Contact with the MOC should be maintained at all times.

When regional coordination is required; Regional Manager(s) may step up Ministry Regional Operation Centre(s) (MROC).

In all cases EMBC needs to be notified of the situation and they may activate the Provincial Emergency Coordination Centre (PECC) and one or more Provincial Regional Emergency Operations Centre(s) (PREOC). The MOC (and MROC) requires communication links with the PECC (and the relevant PREOC) as the circumstances warrant. See Section 3.0 – Response Organisation for details.

Note: For problems at a dam leading to emergency situations FLNRORD is the key (lead) agency. If this is the case, FLNRORD needs to notify EMBC and request assistance as required.

However, in the case of events such as flood or earthquake other agencies are the key agency. For flood events the Ministry of Transportation and Highways (MOTH) is the lead agency with the intended actions outlined in the British Columbia Flood Plan. For earthquake the Ministry of Public Safety and Solicitor General (MPSSG) is the lead agency with the intended actions outlined in the British Columbia Earthquake Response Plan.

In the event of a flood or earthquake, the lead agency named above is responsible for coordinating the overall emergency response; however, FLNRORD is still responsible for coordinating the response at the dam site.

(7, 8, 9, 10) - Assessment of Dam(s) Note: ongoing assessment is required

This step includes several tasks listed in steps 8 to 11 below. For a single site incident these tasks could be completed in a matter of minutes, for larger incidents it could be a long complex process. However, in all cases it should be noted that assessment like communications is an ongoing process and assessment needs to be ongoing during all stages of the process.

(7) - Collect and Evaluate Information – Earthquake, Weather, Site

Two extreme natural events, earthquakes and flooding, present the greatest potential danger to dams in British Columbia.

EARTHQUAKE

The Geological Survey of Canada, Pacific Geoscience Centre at Pat Bay can convey information on earthquakes in B.C. They can supply the earthquake magnitude and epicentre location information immediately after the event. See Appendix C “Source of earthquake, weather, and local information” for contact information.

A British Columbia Earthquake Response Plan is being produced, which will include provision for the notification of all damage assessment personnel as soon as possible after the event. The Emergency Management BC also receives reports of earthquakes throughout the Pacific Rim as part of the Tsunami Warning system. This information will be for offshore earthquakes only.

FLOODING

Information on weather is available from Environment Canada. See Appendix C “Source of earthquake, weather, and local information” for contact information.

Many major dams have been designed to withstand the calculated maximum probable flood. Smaller dams and dams under construction or repair, with cofferdams or temporary facilities, are not designed to withstand very large floods. These structures should be given special attention during flood events.

SITE INFORMATION

Local information on the effect of the extreme event could be useful for planning which dams need to be included in the damage assessment.

i. Regional FLNRORD office(s)

Personnel from the Regional FLNRORD office(s) may have received damage reports from local authorities or dam owners. The Regional Dam Safety Officer(s) may have had contact with regional dam owners or have emergency response procedures for these regional dams. Maintaining close communications with the Regional Water Manager(s) will be an important function for the MOC Director.

ii. Ministry of Transportation and Highways

The Ministry of Transportation and Highways maintains a 24-hour emergency service for updating highway condition information. They receive regular

updates from around the province about local conditions and should be able to supply information on the severity of flooding or earthquake damage. See Appendix C “Source of earthquake, weather, and local information” for contact information.

iii. Dam Owners

Dam owners may know whether their dam(s) has sustained any damage or they may be able to undertake a damage assessment. Dam owners should be requested to remain in contact with the MOC. Conditions at the dam may require that outlet or spillway gates be opened (or closed) or that emergency repairs be undertaken.

(8) - Prioritise Dams for Damage Assessment

i. Prioritise Dams for Damage Assessment

Earthquake

Plot the epicentre of the earthquake on a large map. List the dams in the order to be inspected by considering their proximity to the epicentre and their ability to withstand seismic loading. Compile available information (maps, information sheets, plans, instrumentation readings) to be taken on the inspection.

Flooding

Plot the extent of the affected area on a large map and identify the dams to be inspected. Consider; any construction work which may be temporarily blocking spillways or outlets, flashboards on spillway crests, spillway channel damage not yet repaired or low-level outlet sluices which have out flow restrictions.

ii. Coordinate with Regional FLNRORD offices and Dam Owners

Contact Regional Water Manager(s), or Regional Dam Safety Officer(s), to share concerns and information. Develop overall dam priorities and coordinate inspection procedures. Dam owners are often the best source of information, as they should be examining their own dams. If possible contact dam owners to ensure they are examining their own dams and have their inspection reports forwarded to the MOC.

iii. Helicopter Flight Plan

It may be advantageous to plan a joint damage assessment of dams by sharing a helicopter or by soliciting the assistance of other regional staff. Plan a helicopter flight that will cover all the dams on the list and arrange to pick up the Regional Dam Safety Officer(s). For major emergencies, the PECC or PREOC Chief of Planning may establish helicopter priority.

(9) - Have All Dams Inspected - Coordinate with Dam Safety Officers and Owners

If a reliable dam status report is not available from the owner, FLNRORD should undertake dam inspections as conditions allow. The dam inspection team should:

- interview the owner and others at the site,
- undertake an inspection, first of the affected area; and
- then all components of the dam.

Any changes in the condition of the dam, such as cracks or increased seepage, should be recorded. Identify any areas to be inspected later such as underwater features or outlet sluice pipes and spillways, which may be inaccessible due to high flows. If settlement due to seismic loading is suspected, then a survey should be undertaken as soon as possible to determine the extent of the deformation. Seepage weirs and piezometer levels should also be read as soon as possible. An emergency dam assessment form is included in Appendix H.

A status report on each dam should be sent to the MOC as soon as possible after each damage assessment. It is important for field personnel not to forget to call the MOC if the problem is only a minor deficiency or a false alarm.

If a problem is encountered at one dam, it is important to ensure that all other dam assessments are completed (i.e. triage). Thus, before staying at a dam to address a problem, arrangements need to be made to ensure that all other structures will be inspected. This is important to determine that all the most serious problems are discovered.

(10) - Prioritise Response

The dam response efforts will be undertaken with the response priorities prescribed in the BC Emergency Management System (BCEMS) as follows:

1. provide for the safety and health of all responders;
2. save lives;
3. reduce suffering;
4. protect public health;
5. protect government infrastructure;
6. protect property;
7. protect the environment; and
8. reduce economic and social losses.

Thus, it follows that dams with more threatening circumstances and higher hazard ratings need to be dealt with first. Each site needs to be dealt with on an individual basis as a component of the overall process.

(11) - Potential for dam breach?

If there is potential for, or there is, a dam breach, see the section DAM ALERT or DAM BREACH, otherwise see the section DAM INCIDENT.

(12) - DAM INCIDENT

Dam Incidents include damage such as embankment erosion, spillway undermining, minor sloughing or earth movement which do not immediately endanger the dam should be repaired or stabilised as soon as possible. The situation should be monitored on a regular basis until the dam is in satisfactory condition.

All dam incidents need to be communicated to the MOC. The MOC Director will contact the Director of the Water Management Branch, the Regional Water Manager(s), and EMBC. The Director of the WMB will inform the Central Coordination Group (CCG) representative. Regional Water Manager(s) for appropriate regions will inform the Regional Incident Commander and activate the MROC as required.

Even in a case of widespread emergencies this communication is important as it could allow a dam to be taken off the list of structures requiring immediate attention and allow emergency efforts to be focused elsewhere.

(13) - Follow-up with owner to remedy the problem

Dam incidents require follow-up with dam owners until the deficiencies have been fixed.

(14) - Is the Problem Escalating?

If the problem escalates, a dam incident could become a dam alert or dam breach; see the DAM ALERT or DAM BREACH section.

(15) - File Report

File an incident report and keep an ongoing file until the deficiency is addressed.

(16) - DAM ALERT or DAM BREACH (clarify for notification)

It is important to clarify the difference between a Dam Alert and a Dam Breach. Poor communication could lead to unnecessary panic or inappropriate response.

All dam alert and dam breach situations need to be immediately communicated to the MOC. The MOC Director will contact EMBC, the Director of the Water Management Branch, and the Regional Water Manager(s). The EMBC will activate the PECC and PREOC(s) as required. EMBC will also contact police (RCMP) and local governments. The Director of the WMB will inform the Central Coordination Group (CCG) representative. Regional Water Manager(s) for appropriate regions will inform the Regional Incident Commander and activate the MROC as required.

Local government is responsible for activating their Emergency Preparedness Plans and initiating evacuation procedures as required. In areas outside local jurisdiction, the police (RCMP) are responsible for evacuation procedures.

(17) - Locate Owners DEP and review applicable procedures

If there is a Dam Emergency Plan (DEP), refer to the DEP. The DEP should have been developed with input from local government and other downstream agencies. It should outline the responsibilities and actions of the owner and various supporting groups in the event of an emergency.

If there is an DEP, refer to the DEP and follow outlined procedures if they are applicable to the situation.

(18) - Ensure Downstream Notification: Ensure was done by dam owners and EMBC

Under the Dam Safety Regulation, the dam owner is required to notify “persons in the immediate vicinity of the dam” (DS Reg. Sec. 14). The dam owner’s Dam Emergency Plan (DEP) should direct the owner to contact:

- Local Emergency Authority,
- persons in the immediate vicinity of the dam
- Emergency Management BC (EMBC), and
- Dam Safety Officer, Victoria or Regional (FLNRORD).
- Dam Owner’s Technical Expert (Dam Alert primarily)

These lines of communication need to be maintained throughout the emergency.

The MOC needs to confirm that the owner has contacted the agencies and persons described in their DEP or as per the DEP template. If this cannot be confirmed, the MOC needs to ensure that the local emergency authority or EMBC is contacting downstream communities.

Based on the status of the dam, or reports of dam status, it may be advisable to start a precautionary alert to prepare for evacuation of inhabited areas that could be subject to inundated in the event of dam breach. Evacuation of inhabited areas will be coordinated by EMBC, police, and local emergency programs. It should be noted that EMBC does not have legal authority to do evacuations in areas of local government jurisdiction.

(19) - Is the Owner Response Appropriate?

The responsibility of the FLNRORD at this point is to ensure that the emergency response is proceeding in an appropriate manner. If the owner is taking

appropriate action, FLNRORD will provide support to the owner by offering site planning and logistics, and assistance in maintaining liaison with EMBC and local authorities. Only in cases where the owner is not responding or responding in an inappropriate manner, should FLNRORD consider taking control.

CAUTION!

Unless requested by the owner, there must be a very good reason and appropriate authority to take over control. The reasons for taking control need to be carefully considered and well documented. Authority needs to come from the declaration of an emergency. To avoid the possibility of taking on some liability for the incident, the decision to take over control should be based on the criteria such as those listed below. Again, if possible it is best to work with the owner.

FLNRORD should assess the dam owner's ability to handle the situation by determining the following:

- Owners appreciation of the seriousness of the situation (overreaction as well as complacency),
- Appreciation of the consequence of failure,
- Appreciation of the technical complexity,
- Resources available to do the necessary remedial work,
- Is the owner familiar with their Emergency Preparedness Plan, and
- Is the DEP applicable for this situation?

Determine how the incident response should be coordinated. There are three possibilities:

- owner leads the response (using their DEP),
- unified command with the owner and the FLNRORD representative (see section 20), or
- FLNRORD representative assumes command (see section 21).

(20) - Assist Owner and Establish a Unified (shared) Incident Command Post (ICP)

The following are the basic features of unified command:

- single integrated incident organisation
- co-located within the same facility (vehicle)
- integrated planning process – action plan
- shared planning, logistical, finance functions
- coordinated resource ordering

Also see the following section on the basic steps in establishing incident command.

(21) - Establish Legal Authority - Assume Control and Establish an Incident Command Post (ICP) (21)

There are two ways in which FLNRORD should take over control of the emergency response. The first is if the dam owner requests FLNRORD to take over and lead the emergency response. The second is if the owner is not responding or responding in an inappropriate manner, and a state of emergency has been declared. In both cases, it helps to keep the owner involved in the emergency response if it is possible.

The following are the basic steps in establishing incident command:

- Size up the situation
- Determine if human life is at immediate risk
- Establish the immediate objectives
- Determine if there are adequate resources on scene/ordered
- Develop an action plan
- Establish an initial organisation
- Consider if span of control will be exceeded
- Determine if any there are any environmental issues that need to be considered
- Monitor work progress
- Review and modify objectives and adjust the action plan as necessary

Possible actions that need consideration include:

- actions which can reduce or eliminate risk of a breach, and
- actions to minimise impact of any downstream flooding.

Note: if the FLNRORD representative assumes command it is advisable to consider assigning the owner (and staff) to a position that they can handle such as Operations Section Chief.

The following basic steps should be followed once Incident Command is established:

- Establish communications with the MOC¹ and the PREOC² (PECC)

¹ For technical support and authority under the Water Act if necessary

² For Emergency Site Support

- Map the scene, record the events to date (see example in Appendix – X)
- Establish an ICS response structure and determine the required resources.
- Prepare a situation report with:
 - Status of the dam
 - Action plan.
 - Projected outcomes and expected time of completion of remedial work.
 - Requested resources: heavy equipment, personnel, engineering expertise, testing and investigation equipment, observers, etc.
- Staffing plan for relief at the end of shift.
- Demobilisation plan.
- Ensure that a plan for any necessary follow-up work is developed with appropriate time lines for completion.

(22) - Can the ICP handle the Incident?

If the ICP (site response team) cannot handle the incident they need to request support. The owners should first request support from within their own organisation. If this is not available, the ICP should request support from the MOC or PREOC/PECC as needed.

(23) - Request Support from MOC or PREOC/PECC as needed

If the site Incident Command Post needs help dealing with the situation on site or with downstream issues they need to contact the MOC or EMBC for additional support. Areas of support could include technical expertise in assessing the situation, locating and mobilisation of additional heavy equipment, and coordinating downstream evacuations.

(24) - Ongoing response and reporting to the MOC and PREOC/PECC

It is important to keep the lines of communication open at all times. Even if the situation at the dam is under control and progressing as planned, this needs to be communicated.

Remember these ICS Principles

- Establish an Incident Command Post
- Develop initial organisation using the ICS structure: Command, Operations, Planning, Logistics and Finance & Administration.
- Assign a person or persons for Command Staff duties, i.e. Public Relations, Liaison and Safety Officers who can attend to details leaving the IC to attend to critical tasks.
- Monitor and maintain good span of control (5 is best, maximum 7 reporting to one person)
- BCERMS Response Objectives set out in priority as follows:
 - Provide for the safety and health of all responders,
 - Save lives,
 - Reduce suffering,
 - Protect public health,
 - Protect government infrastructure,
 - Protect property,
 - Protect the environment,
 - Reduce economic and social losses.

SECTION 3.0 - RESPONSE ORGANIZATION

3.1 – BCEMS

FLNRORD employs the *BC Emergency Management System* (BCEMS) as the response organisation for a major dam alert or dam breach. The Dam Incident Management (Response) Team is structured according to the Site-level 1001 Standard of the BCEMS. FLNRORD's Ministry Operations Centre and Regional Emergency Operations Centres are structured according to the Site Support level 1002 standard. The foundation of these site and support standards, and of the BCEMS itself, is the internationally recognised Incident Command System (ICS). The Ministry's Agency Executive oversees both these site and support levels.

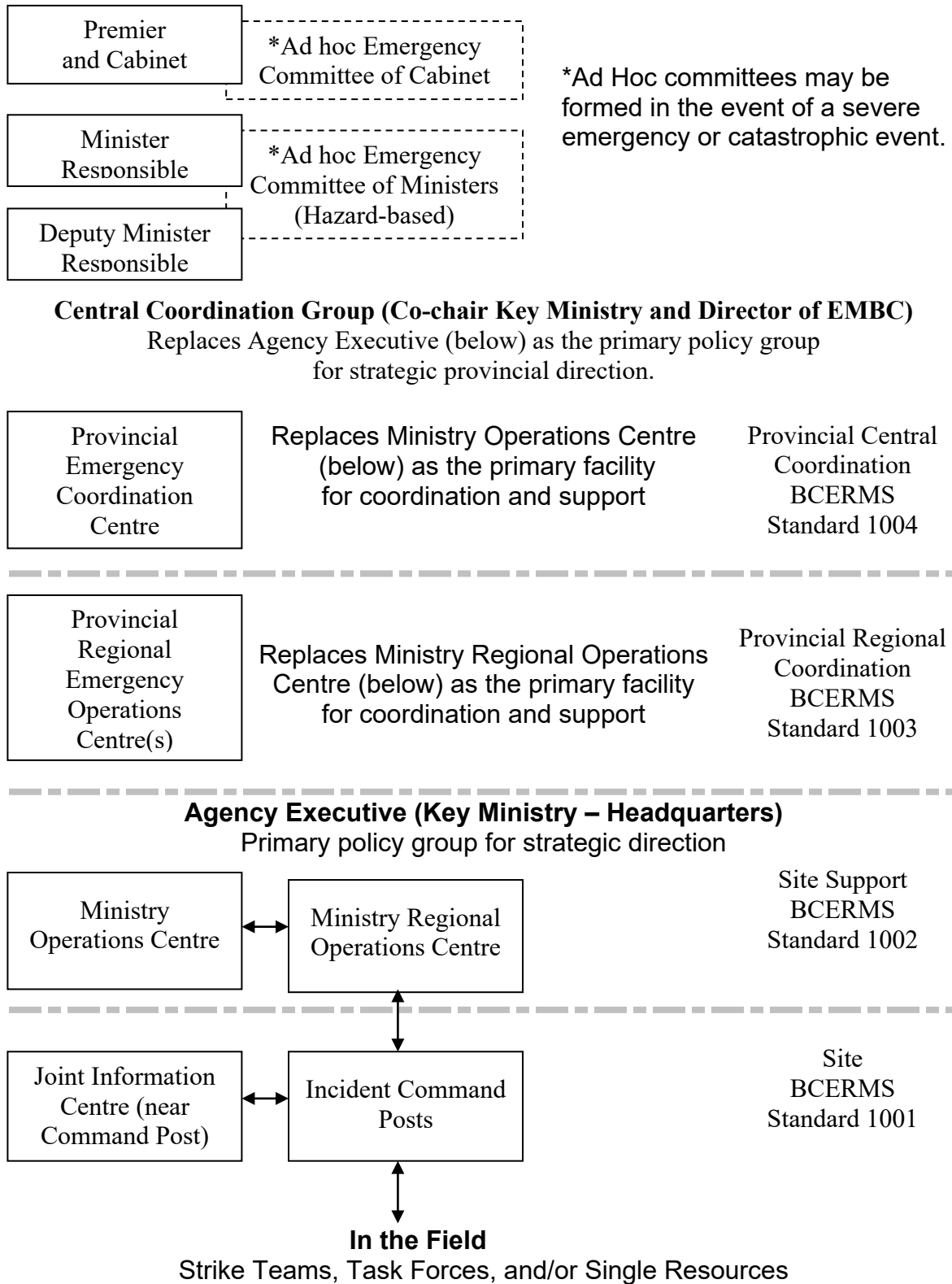
The building of the response organisation to address major emergencies will be done in accordance with the BCEMS as shown in Figure 3-1. The organisational levels are built from the bottom-up with clear lines of authority maintained by the FLNRORD to meet the intent of Section 6 of the Emergency Program Management Regulation.

The various levels of the organisation have different responsibilities. At Site the field response is operational in nature with the highest number of response personnel. The field response is limited to leaders providing supervision to field workers. The Incident Command Post (ICP) is management in nature and is the first direct line of communication/authority to field response. It is the location of the incident management team and of unified command with dam owner, FLNRORD, and local government.

Site Support such as the Ministry Operations Centre (MOC) and the Ministry Regional Operations Centres (MROC) are support in nature. They are established by the Key Ministry to assist in the incident by receiving and tracking requests, acquiring extra-ordinary resources (provincial, national, and international), situation reporting to executive, and liaison with assisting/cooperating agencies. The Agency Executive is strategic in nature to provide strategic policy direction and liaison with the Minister, senior staff of other agencies, and the dam owner's chief executive officer. It makes decisions on levels of response organisation above site support and ensures that lines of accountability and authority are retained as a key provincial agency.

Above the Site Support level there is a lateral shift in response support and coordination (See Figure 3-1). At this provincial coordination level, the Provincial Emergency Coordination Centre (PECC) and the Provincial Regional Emergency Operations Centres (PREOC) are coordination and support in nature. They are established by the Emergency Management BC on request of a key Ministry's Agency Executive. They are invoked if additional provincial support is required or there is a need to consolidate supporting efforts for other assisting and cooperating provincial agencies into one central facility. A Central Coordination Group (CCG) is invoked if a PECC or PREOC is established or the CCG can be formed at the request of the key Ministry's Agency Executive. The CCG is strategic and policy in nature and serves the same function for the province as the Agency Executive.

Figure 3-1 British Columbia Emergency Response Management Structure



3.2 - Incident Command System

The ICS organisation is comprised of five functional sections: Command, Operations, Planning, Logistics, and Finance. In the event of a dam emergency, units with specific responsibilities support these functional sections. For a general description of the functional sections see Appendix D – Hazard Response Organisation. The organisational structure of the PECC is shown in Appendix E - PECC Organisation (BCEMS). The organisational structure of other emergency centres is similar to the PECC.

Only those ICS positions required for safe and effective response need to be invoked for any emergency. In smaller scale emergencies, a single person often does handle all the functions, at least for a limited period of time. The same is true even of a larger scale emergency at the initial stage of activation and mobilisation. As the response expands to meet the requirements of the emergency, a person is assigned to each component section, and then that person gains additional personnel who are assigned individual functional responsibilities, as their sections become more active.

3.3 – Incident Management Team

Invoking of the *BC Dam Emergency Response Plan* initiates BCEMS, and the Incident Command System within. Individual functions within the incident management teams for Site and Site Support level are outlined in Appendix F – Checklist of Individual Duties. The purpose of checklist is to provide common responsibilities and safety instructions to all responders requested to be part of an Incident Management Team. Each responder is provided their mission, reporting relationship, and initial duties. Responders should review their checklist in the context of their section purpose and organisation context discussed in the previous section.

3.4 – Provincial Support

Other provincial ministries provide potential support and services in responding to a major dam emergency. The type of support services provided by selected provincial agencies is outlined in the Emergency Program Management Regulation (Schedule 2). The support that could be solicited from and/or coordinated by these agencies is noted in Appendix G. The contact and coordination of these agencies is through the PECC.

3.5 - Relationship to other Dam Emergency Plans

Responses to dam emergencies can cross-jurisdictional boundaries (federal and provincial) and international borders (United States and Canada). The dam owner has the primary responsibility to invoke their response (emergency preparedness) plan and deploy their resources. The Province's primary role is to monitor the response, establish protection priorities, and to augment the response efforts with government staff and resources, if required. As such, the *BC Dam Emergency Response Plan*, through the application of the Incident Command System (ICS), is structured in a manner to ensure effective integration of provincial responders and resources with that of the dam owner and other government resources. As well, the ICS structure and protocols assist to ensure provincial interests will be fully addressed at both strategic and tactical levels of response.