British Columbia Earthquake Response Plan

1999 Edition

BRITISH COLUMBIA

SHARING THE RESPONSIBILITY

Inter-Agency Emergency Preparedness Council

BRITISH COLUMBIA

BRITISH COLUMBIA EARTHQUAKE RESPONSE PLAN

This plan identifies the intended actions to be taken by the Government of British Columbia in response to a damaging earthquake.

May, 1999

Canadian Cataloguing in Publication Data:
British Columbia. Provincial Emergency Program.
British Columbia Earthquake Response Plan -- 1999 ed.

Previously published 1992.
Includes bibliographical references: p. 81
ISBN 0-7726-3924-8

1. Earthquakes - British Columbia - Safety measures.
2. Emergency management - British Columbia - Planning.
3. Disaster relief - British Columbia.
I. Title: Earthquake response plan.

HV599.B74 1999 363.34'9556'09711 C99-960210-1

FOREWORD

This plan describes the responsibilities, organization and concept of operations necessary for emergency response to a major earthquake in British Columbia. It is designed to react to the most serious subduction earthquake which has been forecast, and which would affect the southwestern region of the province where more than half of the population lives.

A smaller earthquake, whose damage could be more localized, is also the concern of this plan. This type of earthquake is not restricted to any particular region, and in fact earthquakes of potentially serious consequence have been regular occurrences in British Columbia. The 1946 magnitude 7.3 earthquake under central Vancouver Island, for example, would have had disastrous results if located closer to more heavily populated centres.

A basic premise of all emergency planning is that local governments (municipal, and regional, where applicable) remain responsible for managing and conducting their own emergency operations to the best of their ability, within their jurisdictions. Provincial government response encompasses the jurisdictions of provincial ministries and support to local government operations, including overall coordination of any provincial resources and national resources which are committed to the response effort.

This plan identifies agreed conceptual responsibilities of many agencies. Ministries of the Government of British Columbia with primary supporting responsibilities in this plan have agreed to proceed with detailed implementation plans. Local governments, crown corporations and other provincial government agencies, and the private sector are encouraged to produce their own detailed plans to support this overall plan.

Since publishing of the first (interim) version of this plan in 1992, British Columbia's *Emergency Program Act* and the regulations supporting the Act have been completely revised. Some of the assumptions and ideas found in the 1992 edition no longer need to be stated in this plan, as they are now entrenched in legislation.

Revisions to this plan take into account observations resulting from its evaluation in three major earthquake response exercises, and a changed provincial government structure. To preclude frequent amendments in the future as a result of government structural changes, responsibilities now avoid use of ministry names (ie., Ministry of .....), and instead identify "the ministry responsible for .....".

FUNDAMENTALS OF EMERGENCY MANAGEMENT: AN EARTHQUAKE PERSPECTIVE

Emergency Management is a comprehensive, four-part system set up by governments, the private sector, and individuals to address natural hazards. Some components of that system are general in nature, and not specific to earthquake planning. Narrowing the perspective of emergency management to earthquakes, the components are:

- **PREVENTION**: mitigation of earthquake effects through public education, building codes, building and land-use regulation, and tax and insurance incentives/disincentives.

- **PREPAREDNESS**: those measures undertaken in advance to ensure that individuals and agencies will be ready to react, such as emergency plans, mutual aid agreements, resource inventories, training, exercises, and emergency communications systems.

- **RESPONSE:** those measures undertaken immediately after the earthquake has occurred and for a limited period thereafter, primarily to save human life, treat the injured, and prevent further injury and other forms of loss. They include response plan activation, opening and staffing of emergency operations centres, mobilization of resources, issuance of warnings and directions, provision of aid, and may include declaration of states of emergency.

- **RECOVERY:** those measures undertaken to restore normal conditions. The time frame for recovery begins as soon as a reduction in critical response activities permits the re-allocation of resources to longer-term recovery activities. Recovery measures can extend over years, and could include physical restoration and reconstruction, financial assistance programs, counselling, temporary housing or relocation assistance, health and safety programs, and economic impact studies.

This *response plan* does not address prevention and recovery measures. However, its implementation will benefit the state of preparedness and provide the structural framework for timely initiation of recovery activities.

TABLE OF CONTENTS

Part 3 - EMERGENCY RESPONSE FUNCTIONS

Emergency Response Function Descriptions and Responsibilities

Appendix 1- AUTHORITIES AND REFERENCES, DEFINITIONS AND ABBREVIATIONS

Appendix 2- THE EARTHQUAKE THREAT

Part 1

BASIC PLAN

1.1 PURPOSE

This plan describes the provincial response system in the event of a major earthquake in British Columbia. It identifies the total response which should be provided by all levels of government, by describing expected operational activities and by assigning responsibilities to conduct additional planning, coordination, and implementation of emergency capabilities.

Part 1 is an overview which identifies basic policies, planning assumptions, and the concept for response in a variety of situations related to the earthquake hazard.

Part 2 identifies the concept for management of the provincial government response effort, including national support resources, in a major emergency or disaster situation.

Part 3 comprises operational annexes for each of the specific earthquake response functions within the jurisdiction of the provincial government. These annexes identify the tasks to be accomplished by provincial ministries and agencies, and the support agreed to be provided to them by non-government organizations (NGO) and from national sources. These concepts require the development of detailed primary supporting ministry plans by the responsible ministries, either as stand-alone earthquake plans or as a part of general ministry disaster response plans.

1.2 SCOPE

a. Provincial Response

i. Local authorities are required to plan for, and to respond to emergency situations within their jurisdictions and capabilities. Where appropriate, their capabilities may be augmented by mutual aid agreements with neighbouring local authorities.

ii. If a local authority requests assistance from the provincial government, that assistance may be provided from provincial ministries and crown corporations. Provincial assistance may also include federal government assistance or private sector and NGO support which has been arranged by the provincial government.

iii. The provincial response also includes those functional areas where the provincial government has retained jurisdiction.

b. **National/International Response**

i. If an emergency situation should prove to be beyond the capabilities of the provincial response, additional resources may be requested from the Government of Canada, from other provinces, or from international sources.

ii. Any national/international response will be in support of, and coordinated by the provincial government regardless of its origin.

1.3 AUTHORITIES AND REFERENCES

This plan is written in compliance with the *Emergency Program Act, 1996*, and regulations promulgated under the authority of the Act. These, and other pertinent references used in this plan, will be found at Appendix 1.

1.4 PLANNING ASSUMPTIONS

a. **Earthquake Scenarios**

i. See Appendix 2 for the hazard assessment related to earthquakes in British Columbia. While earthquakes can be measured in terms of their energy release, there is no universally accepted method of categorising them by their general damaging effects or the response effort required. For damaging earthquakes, the following assumptions are considered relevant:

- Earthquakes occur without warning and pre-event response activity will not be possible.
- The probability of the event occurring during non-working hours is better than 3:1.
- Damage to sensitive telecommunications systems, even if only temporary after a moderate earthquake, will interfere with response management.
- Aftershocks following a damaging earthquake will likely occur and cause additional damage, interfere with response efforts, and cause severe unease among the populace.
- Damage, even if not severe, may be widespread.

This plan, as well as the *National Earthquake Support Plan* (NESP), attempts to categorize earthquakes by the broad scope of damage (and thus the response effort expected) as follows:

(1) **"Moderate" and "Major" Earthquakes.** Clearly not all earthquakes cause severe damage or initiate a need for massive emergency response. While generally accepted that even a "moderate" Richter magnitude 6.0 earthquake is *capable* of causing damage to man-made structures (buildings, bridges, roads, etc.), the distance from the epicentre, soil conditions etc. are important considerations which cannot be accurately pre-conceived. A moderate quake can trigger other hazards, ground displacement and landslides in particular, which have a greater potential for damage than the earthquake shaking itself. The consideration of what constitutes a "major earthquake" is thus dependent upon the degree of damage which is caused, and suggests considerable response activity due to more significant damage having been caused.

(2) **"Catastrophic" Earthquake.** This term is commonly used to describe an earthquake which has or would likely cause severe damage over a large area, such as a subduction zone event near southwestern British Columbia. It is generally accepted that such an earthquake could exceed Richter magnitude 8.5, and once again the damage that would be caused is dependent upon the distance from the epicentre. Although a formal hazard assessment related to this calibre of event has not been done, sufficient scientific and technical analysis has been considered to apply some planning assumptions to British Columbia's scenario. *Additionally, because British Columbia has not experienced an earthquake of such magnitude in centuries, some of the detailed data forecast for an 8.3 Richter earthquake in southern California, near a major population centre, have been extrapolated in the assumptions below.*

- Severe damage will be widespread (possibly 100+ kilometres from the epicentre) and large numbers of casualties will occur. Moderate damage, with additional limited areas of severe damage, could occur 300+ kilometres from the epicentre. Outside the main area of severe damage close to the epicentre, the severity of damage is increased in areas of certain ground conditions, and vulnerable construction characteristics.

- Subduction earthquakes produce low-frequency seismic waves which can continue to be generated for several minutes. Liquefaction effects are particularly enhanced under these circumstances. Tall structures may "sway" if their harmonic characteristics react, causing them smash against adjacent buildings or topple over.

- Commercial electrical, telephone, and many transportation services may be inoperable for at least 24 hours.

- Landslides will be triggered in those areas with a tendency to produce slides under other circumstances.

- Seismic sea waves (tsunamis) will likely be generated. A tsunami generated by a subduction earthquake off the coast of British Columbia would provide little or no warning to the coastal areas of the province and would result in major damage to vulnerable locations.

- The principal cause of deaths and injury will be the collapse of buildings and other manmade structures, particularly older, multi-storey, and unreinforced masonry buildings. Structures in those categories include many of our schools and hospitals, which are expected to suffer at least 50% uninhabitability due to partial or complete collapse. While some modern buildings have been constructed to building codes with a degree of seismic protection incorporated, they do not meet the degree of seismic resistance for an earthquake of this magnitude (8+), and some failure is to be expected. Most residential housing is not specifically built to any seismic resistance standard at all (one and two storey houses are exempt from building code seismic provisions). However, houses will sustain damage of only a moderate nature if of fairly recent conventional (eg., wood-frame, rectangular footprint) construction.

- Fire of major proportion, as seen in some previous earthquakes such as the 1906 San Francisco and 1996 Kobe, Japan events, is not likely to materialize due to the incorporation of fire-resistant materials in modern Canadian buildings and improved fire-fighting techniques. Smaller fires may be numerous, however; and a combination of dry weather conditions, failure of water supply or pressure, and the inability of firefighters to respond due to casualties or transportation system breakdown could lead to an urban wildfire.

- Casualty estimates vary with the time of day of the event, from a low while most people are at home in bed, to about three times higher while people are at work or in school, and four times higher while people are between home and work or school where they are out in the open, unprotected, and unable to orient themselves. Injuries requiring medical treatment exceed fatalities by a ratio of at least 30:1. Injuries requiring hospitalization exceed fatalities by at least 4:1.

b. **Emergency Preparedness**

i. The preparedness of local authorities and responding agencies to deal with "routine" emergencies, and possibly disasters within their area, is the key to the evolution of an effective plan by a coordinating level of government. Based on normal conditions and current legislation and strategies, it is assumed that:

- "First Responders" will be on duty (normal shift) and will have a plan to automatically augment duty personnel in the event of an earthquake.
- Emergency Operations Centres (planned by local governments, supporting ministries, etc.) can be activated on very short notice and be effective in their response management role under the stated earthquake conditions. Response resources provided in augmentation of surviving integral capabilities will be operationally managed from these EOCs.
- The Provincial Emergency Program can activate, on short notice, one or more Provincial Field Response Centres (based initially upon the Provincial Emergency Program regional management staff), to receive requests for provincial government response assistance and to coordinate provincial response in the local area.
- The Provincial Emergency Program can activate, on short notice, a Provincial Emergency Coordination Centre with the capability to communicate with the other response management components required for effective earthquake response. That centre would be in Victoria unless the earthquake conditions required government to operate from an alternative location.
- Provincial ministries are able to implement their mandated emergency response functions and have internal plans which are in accordance with the requirements of this overall plan.

1.5 GENERAL OPERATIONAL CONCEPT

The suddenness of a major earthquake must lead to a sequence of response actions structured to overcome the difficulties of damage assessment, determination of the resource capabilities needed to respond, and the time needed to escalate the level of response management as the seriousness of the situation becomes apparent. These emergency management conditions are inherent in the *British Columbia Emergency Response Management System (BCERMS)* and the *Provincial Government Strategy for Response.*

a. **Local Response**

At the local level, initial response actions must be virtually automatic and based on existing (perhaps surviving) available capabilities to deal with emergencies. Local authorities must immediately advise persons present in their jurisdiction of the hazard threat(s) and what actions people are expected to take.

Local governments may also have pre-arranged aid from neighbouring jurisdictions, and direct assistance by locally situated provincial and federal agencies. Under these circumstances, the responsibility for the management of all response actions and resources rests with the local authority, within its jurisdiction. A local authority emergency operations centre (EOC) should be quickly established, and initial liaison from external resource agencies will be made to that EOC.

Extraordinary powers are available to a local authority through declaration of a State of Local Emergency under the *Emergency Program Act.* These powers might be needed to implement the evacuation of a threatened area, and prevent return to it by the evacuees.

Additional assistance may be requested from the province through the Provincial Field Response Centre (PFRC), if activated, or if not from PEP Headquarters, Victoria.

b. **Provincial Government Response**

Depending on the scope of response to be provided by the province, which in turn is dependent on the damage caused (or anticipated), and the local government's capabilities, a variety of approaches to response are available. Also, there are conditions which may instigate a provincial government response action for provincial jurisdictional requirements even if no local authority has requested assistance.

If required, the province will activate a Provincial Field Response Centre (PFRC) to coordinate provincial support to local government response operations and to direct operations within the province's jurisdiction. The PFRC will include the involved provincial agencies' representatives and be configured as required to suit the situation. (Part 2 explains in further detail).

A major disaster could require response actions that may only be possible under the legislated powers which accompany a State of Emergency declared by the Attorney General. Examples of special powers which could be invoked by the province include control over police and fire fighting operations.

c. **Federal Government Response**

Some federal departments and crown corporations have provisions for direct routine assistance to any level of government, without the necessity for coordination or formal passage of the request to Ottawa. While this applies primarily to matters in the federal jurisdiction (such as marine search and rescue) the Canadian Forces Commander, Land Forces Western Area may use any resources under command to provide assistance to

any civilian agency for the purpose of preventing loss of human life or suffering. It is also possible to obtain national level Canadian Forces assistance through a request to Ottawa, or on local authority if unable to communicate with Ottawa. The federal level support of this type should be incorporated in provincial ministry and local authority plans, even though it will be subject to coordination measures by the provincial government response management structure.

d. **Operational Areas**

A major disaster will probably affect an area larger than that encompassed by a single local authority's jurisdiction. The province will define an Operational Area (or Areas) which includes the region requiring a provincial response effort. An Operational Area may coincide with an existing geographical or political division, eg., a regional district, or a Provincial Emergency Program Region. The purpose of such a distinction is to delineate the boundaries within which emergency powers and other arrangements (eg., claims for disaster financial assistance) will apply.

e. **Operational Phases**

During the response operations there will tend to be two phases categorized by their urgency and, to a certain extent, the resources available. The response function tasks to be carried out may fit into the category of *Immediate Phase* or *Sustained Phase* of response as a manner of priorizing response actions.

1.6 RESPONSIBILITIES

a. **Key Ministry- (Ministry Responsible for the Provincial Emergency Program)**

The minister responsible for the Provincial Emergency Program has the responsibility for the overall effectiveness of provincial government response to an earthquake. The overall planning and response coordination required are vested in the Director, Provincial Emergency Program.

The Director of the Provincial Emergency Program is directly responsible for carrying out the provisions of the *Emergency Program Act*. That includes the responsibility for the preparation of plans on behalf of the Lieutenant Governor in Council, the coordination of the provincial response, and the integration and coordination of planning with the federal government and other provinces. Other functions in a disaster situation may be assigned on order of the Lieutenant Governor in Council, or on declaration of a State of Emergency.

The Director, Provincial Emergency Program maintains on a permanent basis sufficient staff and facilities to provide initial provincial coordination of response efforts, and maintain plans and capabilities which will permit mobilization to augment provincial operational control and coordination.

The Director, Provincial Emergency Program, shall make recommendation to the minister responsible as to the need for a state of emergency to be declared, and the need to request the Government of Canada to declare a Public Welfare Emergency.

b. Other Provincial Ministries and Crown Corporations

The responsibilities of provincial ministries and crown corporations are mandated by their own legislation, and they have been given emergency functions therein, and under the provisions of emergency management regulations. This plan identifies the total provincial response expected after an earthquake, and thus identifies likely tasks for ministries and crown corporations in the various components of the plan which may not now be specifically incorporated in their mandates. It has been necessary to assign them for an effective response.

Provincial Government agencies tasked by this plan agree to incorporate the assigned responsibilities in their own ministry or corporate emergency plan(s). Those plans should include specific procedures to accomplish the stated tasks, and note whether or not the task is dependent upon extraordinary powers attainable only on declaration of a State of Emergency.

1.7 FUNCTIONAL RESPONSE CONCEPT

a. Response Requirements

A major earthquake will generate a large number of response requirements, and there are a number of agencies which can respond at all levels of government and in the private sector. As many of the response activities to be performed require coordinated actions by multiple agencies, a functional organization for response has been used to make this feasible.

The range of tasks to be performed have been categorized into "Emergency Response Functions". The emergency response functions have been assigned to Primary Supporting Ministries for the development of subsidiary plans with the assistance of still other Secondary Supporting Agencies.

b. Primary Supporting Ministry/Secondary Supporting Agency Definitions

The Primary Supporting Ministry for an emergency response function is that organization which has the most authorities, resources, capabilities, or expertise in that area. A Primary Supporting Ministry is usually the “Key Ministry” for single-hazard response as identified in emergency management regulations, but the complexities of coordination planning require additional functions. The Primary Supporting Ministry is responsible for the detailed planning for the function, and for its management during response. Secondary Supporting Agencies are identified (in the functional annexes to this plan) to assist the Primary Supporting Ministry when requested to do so, subject to their coordination by the provincial government response management structure.

c. **Primary Supporting Ministry Assignment**

The emergency response functions have been assigned to provincial government ministries, with the exception of the Utilities function, which will be achieved by the utilities corporations themselves in cooperation with the provincial response management structure.

FUNCTION	PRIMARY SUPPORTING MINISTRY
Health Services	Ministry responsible for Health
Emergency Social Services	Ministry responsible for Social Services
Law and Order	Ministry responsible for Policing
Heavy Urban Search and Rescue	Ministry responsible for the Provincial Emergency Program, staff coordination only
Communications	Ministry responsible for the Provincial Emergency Program
Damage Assessment	Ministry responsible for the Provincial Emergency Program, staff coordination only
Firefighting/Rescue	Ministry responsible for the Office of the Fire Commissioner
Transportation	Ministry responsible for Transportation and Highways
Engineering and Construction	BC Buildings Corporation
Human Resources	Ministry responsible for the Public Service Employee Relations Commission
Resource Support	Ministry responsible for the Purchasing Commission
Coroner/Mortuary	Ministry responsible for the Office of the Coroner
Hazardous Materials	Ministry responsible for the Environment
Public Information	Ministry responsible for Government Communications
Food and Agriculture	Ministry responsible for Agriculture
Finance and Claims	Ministry responsible for Finance
Utilities	(no Primary Supporting Ministry required)

Part 2

PROVINCIAL EMERGENCY RESPONSE MANAGEMENT

2.1 GENERAL

a. Orientation

The Government of British Columbia recognizes the fundamental obligation to provide for the safety and security of all British Columbians. Accordingly, it has legislated the responsibilities of ministries and other provincial agencies, local authorities, and citizens in relation to emergency and disaster response. It clearly has the authority to plan for the *overall response* expected; and extraordinarily during response, it may direct those actions which are routinely delegated to subordinate levels of government.

b. Provincial Response Management Strategy

The Inter-Agency Emergency Preparedness Council has developed the document *Provincial Government Emergency Response Management: A Strategy for Response.* A diagram of the generic provincial emergency response management structure from that document is at Fig. 2.1.

In the interest of speed and simplicity, response management should be carried out at the lowest possible level of government organization, with a minimum of reorganization once an event has occurred. Coordination of existing, highly decentralized arrangements is preferable to the implementation of new structures and procedures. However, when resources are extremely scarce, there may be no choice but to control their employment centrally in order to use them where they are needed most. Furthermore, an influx of additional resources in support of the provincial response effort needs to be centrally managed in the disaster operational area.

All provincial government ministries and agencies have agreed to conduct operations using the *British Columbia Emergency Response Management System (BCERMS),* which exists within the Response Management Strategy. BCERMS is under development as this plan is written, and it acknowledges as a fundamental principle that there are four levels of response:

- Site (incident/multiple incidents)
- Site Support (by local authority, ministry, etc.)
- Provincial Regional Coordination
- Provincial Central Coordination

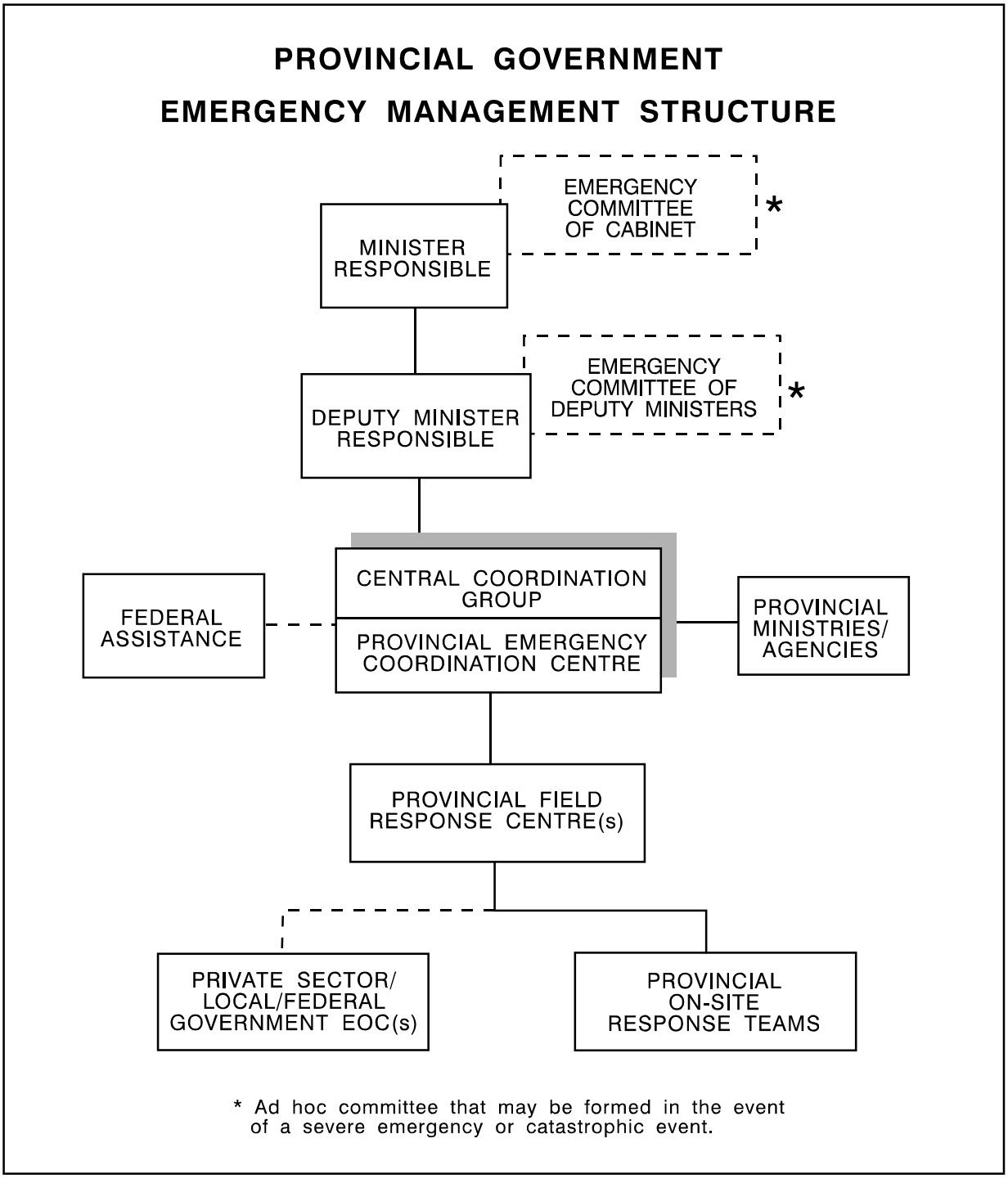
PROVINCIAL GOVERNMENT
EMERGENCY MANAGEMENT STRUCTURE
EMERGENCY COMMITTEE OF CABINET
*
MINISTER RESPONSIBLE
EMERGENCY COMMITTEE OF DEPUTY MINISTERS
*
DEPUTY MINISTER RESPONSIBLE
CENTRAL COORDINATION GROUP
FEDERAL ASSISTANCE
PROVINCIAL EMERGENCY COORDINATION CENTRE
PROVINCIAL MINISTRIES/ AGENCIES
PROVINCIAL FIELD RESPONSE CENTRE(s)
PRIVATE SECTOR/ LOCAL/FEDERAL GOVERNMENT EOC(s)
PROVINCIAL ON-SITE RESPONSE TEAMS
* Ad hoc committee that may be formed in the event of a severe emergency or catastrophic event.

Figure 2.1

c. **National Earthquake Support Plan**

In the event of a catastrophic earthquake, the Government of Canada will activate the *National Earthquake Support Plan* (NESP) to direct and coordinate the provision of support to the British Columbia response effort. The point of coordination with the federal government response will be centralized at the Provincial Emergency Coordination Centre.

2.2 PROVINCIAL MANAGEMENT REQUIREMENTS

Ministry of Attorney General will provide the personnel to fill the appointments required by the emergency management structure as follows:

- Minister Responsible- Attorney General
- Deputy Minister Responsible- Deputy Attorney General

  (The Emergency Committees of Cabinet and Deputy Ministers will likely reflect the composition of the Central Coordination Group.)
- Central Coordination Group (CCG)

  Chair- Director, Provincial Emergency Program

  (Ministry representatives should be from those ministries which [will] have an active role in response, as called by the Chair.)
- Provincial Emergency Coordination Centre (PECC)- Based on the Provincial Emergency Program Emergency Coordination Centre (PEP ECC), Victoria. The PEP ECC maintains a 24-hour operations capability, and Director PEP can activate the nucleus of a provincial coordination staff from within Provincial Emergency Program headquarters.
- Provincial Field Response Centre(s) (PFRC)- Based on the manager of each Provincial Emergency Program region, augmented by other provincial ministries' staff.

Ministries and Agencies are expected to establish their own central Emergency Operations Centre (EOC) to coordinate operations with the PECC, when the emergency response functions for which they are responsible are resulting in significant activity. They should also establish regional EOCs which coordinate with PFRCs, under similar conditions.

2.3 ESCALATION OF RESPONSE

a. Local Emergency

Should a local government be capable of response to an emergency with its own resources, augmented through direct assistance from other sources, the provincial government management requirement is one of coordination only. During a local government response, the Provincial Emergency Program *may* activate the Victoria Provincial Emergency Coordination Centre. A liaison officer may be attached to the local authority Emergency Operations Centre in order that the provincial government can be informed of the situation. A Provincial Field Response Centre (PFRC) with minimal staff and capabilities may also be activated.

b. Major Emergency/Disaster

A major emergency may overwhelm local authority response, and require an enhanced provincial response management structure because:

- resources are in demand over a wide area, and mutual aid agreements break down;
- the demands for provincial level resources exceed the existing capabilities of pre-arrangements to provide;
- the uncertainties associated with damage assessment over a wide area require provincial government action to produce an accurate total situation analysis; or
- the provincial government may choose to be represented in the disaster operational area to express its concern, to provide a wider scope to public information, and to perform provincial government functions in a manner which is clearly seen to be directed at the response effort.

Under these conditions a PFRC will almost certainly be activated in or close to the operational area, and the PECC will be in operation in Victoria. The PFRC can:

- establish communications within the operational area with all local governments likely to be affected by the disaster, and with those local governments not affected but who are able to provide assistance;
- establish and maintain communication from the operational area to the Provincial Emergency Coordination Centre in Victoria;
- gather damage assessments from local authorities in the area, define the operational area, and produce a summary report which will form the basis of future provincial government actions;

- receive, collate and forward requests for assistance from local authorities in the operational area;

- provide on-the-spot coordination on behalf of the provincial government, where possible; and

- plan for, and be the nucleus of expansion to a PFRC with greatly enhanced capabilities and responsibilities should that be directed by government.

2.4 PROVINCIAL FIELD RESPONSE CENTRE (PFRC)

To meet an unknown requirement with a structure capable of a flexible response to a possibly escalating scenario is a challenge. In the discussion of PFRC tasks below, the orientation is towards a major event. The actual configuration of a PFRC during a response operation will be the result of on-the-scene adaptation to actual conditions. The manual, *PFRC Guidance and Procedures,* includes more details.

a. Tasks - Immediate Phase

The immediate phase response is centred on operations which are the responsibility of local governments, and life-saving and life-preserving operations of the British Columbia Ambulance Service. However, during this phase significant requests for provincial assistance are possible. Inadequacies of local government response capabilities may also become evident and require provincial government action. The staff available for establishment of the PFRC must be capable of these tasks:

- communicating by telephone, radio or personal liaison with all local governments in the area to determine the extent of the damage and thus the size of the expected operational area. This will be a progressively demanding task, but the initial assessment must be rapid and accurate enough to permit selection of a site for the PFRC and to allow provincial government action to commence an expanded management role.

- communicating with the Provincial Emergency Program Headquarters/Provincial Emergency Coordination Centre in Victoria to provide the initial analysis of the situation and to recommend further provincial government action.

- functioning as a central collection point for requests for assistance from local governments, providing immediate coordination where necessary, and if authorized by the Director, Provincial Emergency Program, managing the total response in the operational area as needed.

b. **Tasks - Sustained Phase**

For sustained phase operations full coordination capabilities are needed in the PFRC to manage the overall response as resources become available and response actions in the disaster area become more methodical. The thrust of the activity swings from immediate life-saving requirements to the prevention of further loss of life and other forms of suffering, detailed damage assessment, and the prevention of further damage to property. The sustained phase tasks imply a high level of resource allocation to local governments for some functions, and a need for centralized control of resources for other functions. The PFRC tasks include:

- maintaining operational direction or coordination of the provincial response effort until responsibility is released to "normal arrangements" on a function-by-function basis.
- self-administration, and coordination of unforeseen self-administration needs of other provincial ministries involved in the response effort.
- planning for future operations, including commencement of recovery activities as these become feasible.
- financial management of the provincial government response effort, including administration of any disaster financial assistance programs that could become available.
- operating a public information centre in the operational area.
- arranging for the receipt, stockpiling, and dispatch of resources.
- coordinating disaster response communications requirements.

2.5 PROVINCIAL EMERGENCY COORDINATION CENTRE

The Provincial Emergency Coordination Centre is activated only when necessitated by the magnitude of the provincial response, as a means of coordination of more than one Provincial Field Response Centre, and to serve as a staff channel between the Central Coordination Group and the PFRC(s).

The Provincial Emergency Coordination Centre is the location designated for liaison with the Federal Coordination Officer (normally the Regional Director of Emergency Preparedness Canada).

Part 3

EMERGENCY RESPONSE FUNCTIONS

3.1 SELECTION OF EMERGENCY RESPONSE FUNCTIONS

This part of the plan identifies those specific response actions which have been considered possible in the earthquake event scenarios as they will affect British Columbia; ie., the hazard described in Appendix 2.

Emergency response functions have been selected considering:

a. Orientation towards those tasks which are within the jurisdiction of the provincial government: ministries, crown corporations, and subordinate levels of government (local authorities).

b. There is no need to elaborate on routine responsibilities of local authorities, ministries, and crown corporations even though some of their activities may become much more intense during a major emergency. For example, highway maintenance is a routine responsibility of the Ministry of Transportation and Highways which can be dealt with by that ministry without a coordinated provincial response, and without the need to identify highway maintenance as an emergency response function in this plan.

Nevertheless, it is acknowledged that situations may occur which are beyond the expectations of this plan. Also, local authorities may request assistance from the province when they are unable to cope with the magnitude of any emergency. In these instances the provincial emergency response management system will formulate an appropriate response based on the fundamental guidance contained in the *Strategy for Response*, and emergency legislation and regulations.

3.2 RELATIONSHIP TO OTHER PROVINCIAL RESPONSE PLANS

Other established plans, notably the *British Columbia Flood Plan,* may require implementation during earthquake response. As the agency tasks related to flooding are contained in that plan, they are not repeated here. Priorities and responsibilities in other plans may require adjustment by the provincial response management structure.

3.3 REQUIREMENT FOR DETAILED PLANNING

Each emergency response function identifies a Primary Supporting Ministry (often the agency identified in emergency management regulations), and (usually) one or more Secondary Supporting Agencies. The Primary Supporting Ministry is responsible for the development of plans to achieve the stated tasks in accordance with the operational concept. Some agencies may be responsible for more than one emergency response function, and they may choose to reflect their combined responsibilities in a single plan.

Below, each function is addressed with an indication of the follow-on detailed planning expected:

HEALTH SERVICES (Annex A)

The **ministry responsible for Health** will incorporate task requirements into the Ministry's emergency/disaster plans and supervise the acceptance and implementation of response requirements by the components of the health services delivery system: the BC Ambulance Service, regional health boards, and Secondary Supporting Agencies.

Regional health boards will develop plans in conjunction with the local authorities they serve, and their regional BC Ambulance Service counterpart, in accordance with guidance provided by the ministry responsible for Health.

EMERGENCY SOCIAL SERVICES (Annex B)

The **ministry responsible for Social Services** will incorporate task requirements into the Ministry's emergency/disaster plans and supervise the acceptance and implementation of response requirements by Secondary Supporting Agencies and other components of the provincial emergency social services delivery system.

Local authorities potentially affected by an earthquake scenario will adapt their emergency social services plans in accordance with the local hazard and risk, and in accordance with guidance provided by the ministry responsible for Emergency Social Services.

LAW AND ORDER (Annex C)

The **ministry responsible for Police Services** (with the Commanding Officer E Division RCMP) will incorporate task requirements into emergency/disaster plans and supervise the acceptance and implementation of response requirements by Secondary Supporting Agencies.

Local authorities potentially affected by an earthquake scenario will adapt their law and order plans in accordance with the local hazard and risk, and ensure compatibility with the RCMP Disaster Plan.

URBAN SEARCH AND RESCUE (Annex D)

Local authorities potentially affected by an earthquake scenario will adapt their plans to reflect the possible need for search and light rescue from damaged buildings, and for a heavy urban search and rescue capability.

The **ministry responsible for Mine Safety** will plan for the provision of mine rescue teams and rescue equipment.

The **Provincial Emergency Program** will continue to develop provincial plans for Heavy Urban Search and Rescue team creation and deployment, and encourage incorporation of any earthquake-specific techniques and capabilities.

COMMUNICATIONS (Annex E)

The **Provincial Emergency Program** will coordinate development of a Provincial Emergency Communications Plan, to ensure that response coordination communications are available and adequately sustained. The Communications Plan need not be earthquake-specific, but it must adequately provide for post-earthquake conditions.

Local authorities, ministries and agencies involved in earthquake response will prepare plans and acquire some initial capability to communicate in the expected absence or degradation of the telephone system.

DAMAGE ASSESSMENT (Annex F)

The **Provincial Emergency Program** will coordinate development of a Provincial Damage Assessment Plan, with a view to assessing overall damage for, and on behalf of the provincial government.

Local authorities will plan for the prompt gathering of earthquake damage information from within their jurisdictions, and communicate that information to the provincial response management system for the purpose of damage assessment.

Damage Assessment will be a PFRC and PECC (Planning/Intelligence Section) staff function.

Note that "damage assessment" in the context of this annex relates to the gathering and evaluation of damage information in order that provincial priorities can be quickly established and resources cab be applied in an appropriate manner. It does NOT relate to detailed technical assessment of damage to a particular structure or facility by professional engineers or similar specialists. (For which see Engineering and Construction, Annex I.)

FIREFIGHTING/RESCUE (Annex G)

The **ministry responsible for the Office of the Fire Commissioner** will develop plans for a fire disaster resulting from an earthquake scenario, and be prepared to provide a liaison officer to a Provincial Field Response Centre to coordinate provincial major fire response with secondary supporting agencies.

Local authorities subject to an earthquake risk will develop plans which include post-earthquake firefighting and light rescue capabilities in accordance with guidance provided by the Office of the Fire Commissioner.

TRANSPORTATION (Annex H)

The **ministry responsible for Transportation and Highways** will incorporate potential requirements of this plan in a Transportation Plan, with the assistance of Secondary Supporting Agencies.

Transportation will be a PFRC/PECC (Logistics Section) staff function.

ENGINEERING AND CONSTRUCTION (Annex I)

The **ministry responsible for Engineering and Construction** will incorporate potential requirements of this plan in an Engineering and Construction Plan, with the assistance of Secondary Supporting Agencies.

Engineering and Construction will be a PFRC/PECC (Logistics Section) staff function.

HUMAN RESOURCES (Annex J)

The **ministry responsible for Human Resources** will incorporate potential requirements of this plan in a Human Resources Plan, with the assistance of Secondary Supporting Agencies.

Human Resources will be a PFRC/PECC (Logistics Section) staff function.

RESOURCE SUPPORT (Annex K)

The **ministry responsible for the BC Purchasing Commission** will incorporate potential requirements of this plan in a Resource Support Plan, with the assistance of Secondary Supporting Agencies.

Resource Support will be a PFRC/PECC (Logistics Section) staff function.

CORONER/MORTUARY (Annex L)

The **ministry responsible for the Office of the Chief Coroner** will further develop their disaster plan to incorporate tasks required by this function, with the assistance of Secondary Supporting Agencies.

HAZARDOUS MATERIALS (Annex M)

The **ministry responsible for the Environment** will incorporate the tasks implicit in this function in ministry disaster response plans, with the assistance of Secondary Supporting Agencies.

Local Governments will acknowledge earthquake-related hazardous materials risks in their emergency response plans.

PUBLIC INFORMATION (Annex N)

The **ministry responsible for Government Communication** will incorporate the tasks required by this annex in the BC Emergency Public Information Plan.

Public Information will be a PFRC/PECC staff function.

Local authorities will plan for the delivery of public information within the context of the BC Emergency Public Information Plan.

FOOD AND AGRICULTURE (Annex O)

The **ministry responsible for Food and Agriculture** will adapt their emergency plans to incorporate earthquake hazards, and to implement tasks in this annex with the assistance of Secondary Supporting Agencies.

When warranted, Food and Agriculture will be a PFRC/PECC (Logistics Section) staff function.

FINANCE AND CLAIMS (Annex P)

The **ministry responsible for Finance and Corporate Relations** will develop plans to financially manage provincial response to an earthquake event, and to consider and process claims (with the cooperation of the Provincial Emergency Program, for Disaster Financial Assistance.) On implementation of a formal Recovery management structure, Claims activities will be transferred to it.

Finance and Claims will be a staff function of the PFRC/PECC (Finance and Administration Section).

UTILITIES (Annex Q)

Utilities companies (eg., BC Hydro, BC Gas, BC Tel) and **regional/local authority utilities providers** (water/sewage) will develop plans to deal with the effects of an earthquake.

If warranted, utilities companies/providers will plan to provide a regional utilities coordinator in liaison to the Command Staff of the Provincial Field Response Centre.

Part 3, Annex A

Emergency Response Function

HEALTH SERVICES

1. CONCEPT OF OPERATIONS

a. Introduction

A severe earthquake is characterized by its effects on the health care delivery system perhaps more than in any other way. Not only are there likely to be many injured persons, the types of injury experienced by persons rescued after being trapped under rubble require urgent hospital care. At the same time, the facilities required by the health care system are subjected to damage which can incapacitate them and require the evacuation of their existing patients. A throwback of the health care system to Spartan arrangements, such as exists when emergency medical facilities must be used, is rarely exercised. Disrupted roads interfere with ambulance movement, requiring some dependence upon on-scene paramedic treatment and first aid until removal to medical facilities is possible. The decentralized local operation of health services which is normal in British Columbia will not suffice in the event of a major disaster.

This concept must therefore establish the arrangements necessary when local capabilities are overwhelmed or incapacitated, even when only one particular health services aspect is affected (eg, ambulances) in that the health services delivery system is dependent on the efficient operation of most of its component parts.

Though outside the scope of this plan, past experience in earthquakes has emphasized that self-help and first aid have saved countless lives. In the first few hours after an earthquake, the ability of neighbourhoods and office or apartment building occupants to function collectively and independently to meet basic emergency needs is paramount. It is particularly so in regard to medical care. Local governments, the health care system, industry and community groups should accept the responsibility to facilitate such forms of self-help through simple organizational assistance, basic and advanced first aid training, and the promulgation of the location of the nearest professional medical assistance at any hour of the day.

b. Scope of Response Function

The function includes all provincial health services responsibilities which must be mobilized to provide emergency medical treatment to the injured; sustained hospital care to the seriously injured or seriously ill; continued care at an appropriate level to clients in hospital and out-patients at the time of the earthquake response; evacuation of the sick and injured to a location where care can be provided; as well as sustained

emergency care until evacuation can be carried out with medical or paramedical supervision. It also includes provincial coordination of delivery of medical supplies, blood and blood products; operation of ambulance services; prevention of epidemic through education of the general population, the carrying out of health inspections of food and water supplies, and the initiation of vaccination programs under pandemic conditions. Radiological and toxicological services could be in increased demand and require an expanded response. There will also be a need to provide initial establishing of death, and the temporary safe storage of human remains in support of coroner operations.

c. **Response Levels**

Many health services are routinely in the emergency response mode (eg., hospitals, ambulances). However, there is a threshold of response beyond which day-to-day decentralized arrangements will probably break down and health service components will seek assistance. This threshold can be quickly reached with the volume of casualties an earthquake can produce, or perhaps with the sudden loss of use of one or more hospitals.

i. In response to a moderate localized earthquake, it is expected that planned emergency measures would be able to deal with the situation without having to resort to special procedures. Any coordination of medical or non-medical support to local facilities would be under regional health board direction, and with the assistance of the Provincial Field Response Centre (PFRC)(if necessary) to provide non-medical resource support.

ii. A major earthquake would probably require a much greater degree of control of resources within the Operational Area, and would necessitate the establishment of a regional health services coordination centre. The health services team chief of that centre would also participate in PFRC decision-making affecting the Health Services function.

d. **Probable Tasks**

i. Immediate Phase. Inventory damaged health services facilities and capabilities remaining operational in the disaster area; identify emergency patient holding facilities; transfer patients which can be removed from hospitals to make room for the injured; where necessary implement a system of staging casualty collection, treatment, and evacuation to available facilities (probably outside the Operational Area); inventory and muster health services personnel to staff both permanent and temporary facilities at an appropriate level; arrange delivery of emergency medical supplies; arrange for temporary suitable storage of the dead until taken over by the coroner.

ii. Sustained Phase. Attain a stable state in which all casualties are in acceptable health care facilities or are otherwise receiving necessary out-patient services; prevent disease outbreak or spread; attend to mental health requirements; expand local public health services as necessary, particularly the supply of

essential drugs and pharmaceuticals in areas where the private sector suppliers have ceased to function; carry out sanitary inspections.

2. **PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR HEALTH**

3. **SECONDARY SUPPORTING AGENCIES**

a. **Health and Social Services ESF.** (National Earthquake Support Plan)- supplemental resources from other provinces, national services, international assistance. National survival emergency hospitals and other facilities, including manpower.

b. **Other Emergency Response Functions.** Resource support and planning assistance for major evacuations, patient relocations, delivery of supplies, erection of emergency hospitals, public information on health matters, establishment of morgue facilities, etc.

c. **Canadian Blood Transfusion Agency.** Blood supplies and transfusion services.

d. **St. John Ambulance.** Auxiliary patient care and ambulance services. Additionally, during a declared state of emergency, St. John Ambulance has agreed to operate under command of the British Columbia Ambulance Service.

Part 3, Annex B

Emergency Response Function

EMERGENCY SOCIAL SERVICES

1. CONCEPT OF OPERATIONS

a. Introduction

A severe earthquake in British Columbia will leave a large number of people in need of shelter and feeding; family members may be separated from one another and there will be an overwhelming demand for information about survivors' whereabouts and condition from both within and outside the Province. Many people will require immediate emotional support and crisis counselling. Although primary responsibility for provision of Emergency Social Services (ESS) rests with municipalities, a severe earthquake will cut across municipal boundaries and demand for ESS will exceed most municipal resources.

Damage will be unevenly spread across the affected region, with some communities experiencing a high need for services and few operational resources, and others having few evacuees and more resources than required for their residents.

b. Scope of Response Function

Emergency Social Services includes feeding, clothing, shelter, reception, registration and inquiry, and personal services provided to evacuees, victims, and response workers. The services are defined as follows:

i. Personal Services- Counselling of victims and response workers, greeting of evacuees at entrance to reception centres in order to screen for need and to give information, and supervision and support of groups of dependant individuals including children separated from their parents, frail elderly, and the handicapped.

ii. Registration and Inquiry- Registering individuals and families involved in the disaster, answering inquiries from relatives and friends concerning victims' whereabouts, reuniting separated family members, and providing information to response workers on the whereabouts and numbers of evacuees.

iii. Clothing- Emergency clothing, blankets, toiletry articles, baby supplies, and other related goods necessary to protect health and safety.

iv. Shelter- Temporary housing or sleeping space for individuals and families forced to leave their dwellings. Does not include shelter for domestic animals.

v. Feeding- Provision of meals, hot beverages and snacks to protect health, to maintain strength of response personnel, and to reassure victims.

c. **Response Levels**

A flexible and variable response is planned based initially upon the local authority's pre-arrangements for delivery of ESS. The response is demand-driven and can vary widely in the extent of each of the five ESS components. The ESS function is coordinated with other provincial government operations by the Operations Section of the PFRC.

i. Provincial government involvement in response to a moderate demand for ESS could include the augmentation of a local government's ESS response capabilities with the agencies in the ESS Team (eg, support agencies listed below), and mobilization of the capabilities of other local governments to assist. An ESS EOC may be established in the affected area.

ii. Response to a major earthquake would probably centre around the requirements of a large number of homeless families and individuals. It would include establishment of centralized control of the ESS functions within the operational area in the interest of efficiency and control. An ESS control headquarters would require considerable support from other agencies, arranged through the PFRC. It should attempt to locate near the PFRC to ease coordination and communications problems.

d. **Probable Tasks**

i. Immediate Phase- open and staff reception centres in all affected communities and alert first responders and the public to their location; mobilize feeding units to provide support to response workers on location; coordinate supporting debriefing, counselling, and related services for responders and victims; inventory the available habitable shelter supply; begin registering all persons involved in the earthquake.

ii. Sustained Phase- continue basic emergency social services to all evacuees, victims and responders; continue the registration process and respond to enquiries from around the world; initiate public information services on emotional responses to disasters; transform reception centres into multi-service centres; lay basis for outreach, self-help, and educational programs.

2. **PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR SOCIAL SERVICES**

3. **SECONDARY SUPPORTING AGENCIES**

a. **Ministry responsible for children and families' welfare**

b. **Health and Social Services ESF.** (National Earthquake Support Plan).

c. **Canadian Red Cross.** Responsible for a registration and inquiry service.

d. **Salvation Army.** Responsible for personal services (counselling and support).

e. **BC Housing Management Commission.** Responsible for emergency shelter.

f. **Restaurant and Foodservices Association of British Columbia.** Responsible for emergency feeding.

g. **Retail Merchants' Association of British Columbia.** Responsible for emergency clothing.

Part 3, Annex C

Emergency Response Function

LAW AND ORDER

1. CONCEPT OF OPERATIONS

a. General

The Law and Order function encompasses a broad range of routine policing activities. Certain of these activities are made more difficult by earthquake damage and the general disaster scenario can cause a greatly increased workload for police forces. The response function has as its primary goal the maintenance of law and order activities, and, if necessary the restoration of law and order should there be a breakdown within the normally law-abiding community. The visible presence of police forces has a calming influence for most British Columbians.

b. Scope of Response Function

The Law and Order function in an earthquake scenario is particularly concerned with the preservation of life and the protection of property, traffic control problems, the detection, investigation and prevention of criminal activity, and support to the Coroner, Light and Heavy Rescue, Communications, and Damage Assessment emergency response functions.

Larger municipal jurisdictions tend to have their own police forces, whereas the RCMP in its Contract Policing role provides the balance of local police forces. The RCMP also performs "Provincial Policing" and "Federal Policing" roles from E Division Headquarters, Vancouver.

Police forces have integral internal radio communications and can be relied upon as an immediately available backup communication system, locally within police departments/detachments, and also within RCMP districts.

Private police forces exist, with limited policing responsibilities, as well as private security agencies and the Canadian Forces Military Police. Federal legislation provides for the use of the Canadian Forces to provide armed assistance to the RCMP, and for the province to request military Aid of the Civil Power in the event of a breakdown of law and order. The latter situation is not envisaged by this plan, but it is conceivable to experience a breakdown of law and order coincident with disaster response.

The possibility exists that an earthquake may cause a breach of physical security at a penitentiary or provincial gaol and lead to the possibility of an internal riot or escape.

The disruption of transportation routes will inhibit police from performing many required tasks, and is a critical problem to be dealt with by the police forces themselves on behalf of the total response effort.

c. **Response Levels**

i. Response in a localized or moderate earthquake might include augmentation of local police forces by the RCMP with its own available personnel, or with other available forces from the secondary supporting agencies.

ii. A major law and order response may require the Commanding Officer of E Division, RCMP to control police force activity in the operational area. If required, police liaison staff to the PFRC will be provided in order to muster an effective response with the help of available secondary supporting agencies. This emergency response function is coordinated by the Operations component of the PFRC, in concert with the RCMP Division EOC.

d. **Probable Tasks**

i. Immediate Phase- carry out any necessary actions to save lives and prevent injury or damage to property; effect operational command of evacuations; carry out route damage assessment to permit identification of usable emergency routes; assess and report other damage within capabilities; maintain a control over traffic with priority to emergency services; assist with the movement of emergency traffic; assist the Coroner as requested to provide investigation of cause of deaths, security of body staging areas, protection of personal effects, and identification of bodies; assist in the dissemination of emergency notifications; assist in the manning of EOC's and the provision of immediate radio communications to them, if necessary.

ii. Sustained Phase- maintain emergency functions and restore normalcy as quickly as possible; provide personnel to protect abandoned and condemned properties and areas which may attract the curious and tempt the criminal elements; augment penitentiary and gaol facility staffs as needed to maintain a peaceful situation.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR POLICE SERVICES

In the event of a multi-jurisdictional emergency, the Commanding Officer of E Division, RCMP is the senior police authority in the province, responsible to the Attorney General. The CO of E Division may also respond in the capacity of a federal police official.

3. **SECONDARY SUPPORTING AGENCIES**

a. **Public Order ESF.** (National Earthquake Support Plan).

b. **Canadian Forces.** Assistance under Aid of the Civil Power regulations. (Other Canadian Forces assistance, armed or unarmed, is part of the Public Order ESF).

c. **Private security firms.**

d. **Auxiliaries, special constables, provincial sheriffs, conservation officers.**

e. Note that untrained volunteers should not be used to perform the duties of a peace officer, although they may assist police to alert residents of potential evacuation under direct police supervision, for example.

Part 3, Annex D

Emergency Response Function

HEAVY URBAN SEARCH AND RESCUE

Note Concerning Provincial Government Role

There is no legislated provision for the provincial government to assume any responsibility for this function, which is in the purview of those local governments which can identify that a risk exists to their jurisdictions. Nevertheless, as the field is a relatively new one, it is recognized that municipalities might utilize a provincially standardised conceptual approach as the basis for their own planning and development of Heavy Urban Search and Rescue capabilities.

This functional concept identifies such an approach, which will be used as a doctrinal model by the primary supporting ministry in the development of training programs and other support as resources allow.

During response operations, the provincial management role for this function will be essentially limited to the provision of other useful provincial government resources, generic resources (human and material), and to the arranging of assistance by rescue teams from unaffected areas and other jurisdictions.

1. CONCEPT OF OPERATIONS

a. Introduction

The Firefighting/Rescue concept (Annex G) alludes to the routine rescue capabilities of fire departments. In the urban environment, the collapse of buildings may include rescue situations well beyond the capabilities of firefighters to resolve (possibly many of them at the same time). These situations are characterized by extensive rubble, which can make it unclear if a rescue is needed. In some rescue situations heavy objects must be moved or cut to extricate trapped persons; perhaps tunnelling techniques may be needed; and in other situations further collapse could occur if an unskilled rescue attempt is made. Often there are circumstances where other specialized skills should be applied, such as on-scene medical care beyond first aid treatment.

While an *ad hoc* rescue might be put together for many such earthquake scenarios, the lack of a coordinated, specialized urban search and heavy rescue capability has been frequently cited as a contributor to the loss of life in several modern events. A level of permanent organizational integrity should exist to allow training and exercising of the techniques and skills required, and to permit the other functional responders to orient their skills in concert with those of the Urban Search and Heavy Rescue function. The

possible total preoccupation of firefighters with fire suppression at the critical time for rescue also suggests that a capability to coordinate the total organized rescue effort would be desirable, utilizing other manpower sources that possess basic rescue skills similar to those of the firefighter.

b. **Organizational Requirement**

This plan conceptualizes a Heavy Urban Search and Rescue Team which would meet the needs outlined above. The objectives of the team would be to locate and remove injured people who are trapped in the wreckage of damaged buildings and other structures; to ascertain the safety of damaged buildings and structures; to provide on-site medical treatment; and to remove the dead.

The Heavy Urban Search and Rescue Team is a local government organized structure. While a single team is described here, more than one team could be assembled (from unaffected areas and perhaps from out of province) to provide support to the affected municipalities. Formation of a team could also be on a regional basis, with shared support by municipal governments.

c. **Response Levels**

Mutual aid agreements with other local governments should be the basis for increasing response capabilities in a localized situation. In response to a major requirement, attempts to provide additional teams would be coordinated by the PFRC Operations component. Generic human resources, or related equipment and supplies, would be obtained by the PFRC Logistics Section staff.

d. **Probable Tasks**

i. Immediate Phase. Local teams respond to incidents under local government control. The PFRC, if requested, assembles team(s) and/or resources and dispatches them to the Operational Area to be under control of a local authority EOC, with priority to life-saving tasks.

ii. Sustained Phase. Assist in removal of the dead from collapsed structures.

e. **Team Organization (Conceptual)**

The Heavy Urban Search and Rescue Team should be organized as follows (see Fig. 3D.1):

i. Team Command. The command element should be closely integrated with other local government first responders. A trained Team Chief and Deputy constitute a minimum requirement, and there should be a clear chain of reporting from the Team Command through to the local authority EOC.

ii. Headquarters Group. This component includes the team management and response coordination personnel, as well as specialist expertise. Local

emergency conditions may make staffing of some of these positions impracticable, and suggest alternative arrangements. Out-of-area resources can be requested to fill vacancies, but that will impose some delays upon effective operation of this group:

- Team command personnel, including integral communications;
- Documentation and clerical personnel;
- A logistics chief;
- Search dogs and handlers;
- A structural engineer; and
- A doctor (medical chief) with trauma surgery qualifications.

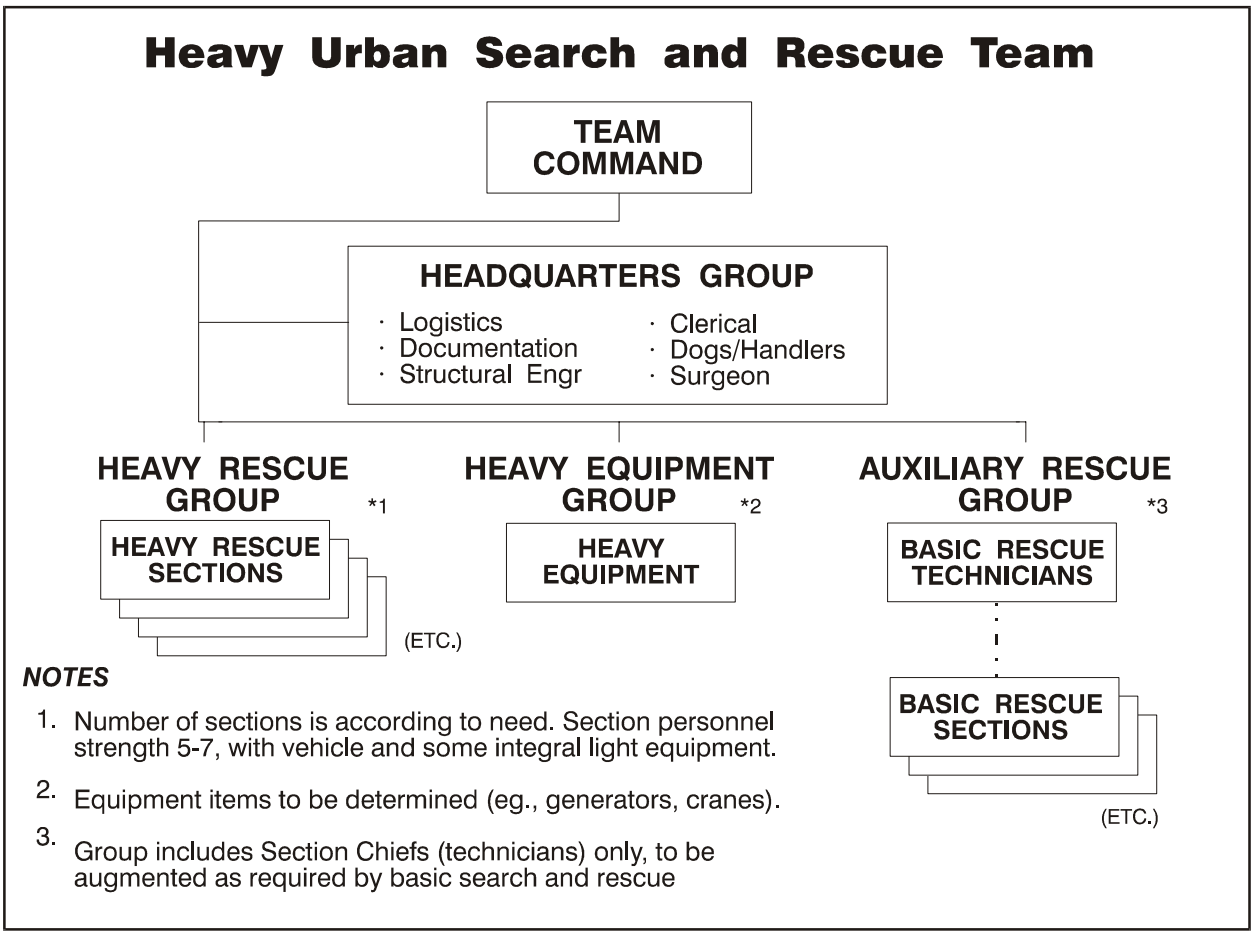

Fig. 3D.1- Heavy Urban Search and Rescue Team Organization (Conceptual)

iii. Heavy Rescue Group. This component includes one or more sections, each one of which could be assigned responsibility for search and rescue tasks for a site. Skills include basic rescue techniques including improvisation of rescue equipment; tunnelling, cutting, shoring, hoisting with mechanical equipment, searching in confined areas, operating in hazardous conditions (eg, with self-contained breathing apparatus), recognition of hazardous environments, and patient stabilization and emergency treatment to paramedic standards. Each section should comprise about five to seven persons and hold some light specialized equipment, including an integral vehicle.

iv. Heavy Equipment Group. This component holds heavy equipment and heavy equipment operators, or maintains an inventory of where they can be obtained, and trains equipment operators in the application of their skills to heavy rescue situations. Elements of this group would be assigned to a Heavy Rescue Group for the duration of a task and then re-allocated.

v. Auxiliary Rescue Group. This component includes numbers of volunteers and (ideally) Basic Rescue qualified search and rescue personnel whose skills can be used in less demanding tasks than those of the Heavy Rescue Group. If assistance is provided to the team for rescue operations by semi-skilled persons (eg., military personnel) they should be utilized in this part of the team.

The exact size, composition and duties of the team are subject to further developments as expertise is acquired and training doctrine is developed.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR THE PROVINCIAL EMERGENCY PROGRAM

The provincial government role is one of planning to assist local governments through the provision of resources and out-of-area teams; and, during response operations, to coordinate the provision of that assistance through the Provincial Field Response Centres.

3. SECONDARY SUPPORTING AGENCIES

a. **Unaffected Local Governments.** Specific resources, and complete sections or teams may be available from municipalities who do not require their use.

b. **Provincial Government Sources.** Specific rescue resources (such as mine rescue teams) may be appropriate and available. Other emergency response functions can provide non-specialised logistic support (eg., transportation and labourers). Specialised personnel (eg., medical and paramedical) may be available through the Health Services function.

c. **Federal and Out-of-Province Sources.** With support of the *National Earthquake Support Plan* agencies, provision of specialized heavy equipment and suitable personnel, air/marine transportation if needed, additional light stores, vehicles, and communications for an expanded role.

d. **Private Sector.** Heavy equipment and operators, search dogs and handlers, engineering expertise, and rescue specialists.

Part 3, Annex E

Emergency Response Function

COMMUNICATIONS

1. CONCEPT OF OPERATIONS

a. Introduction

It is accepted that telephone service will be disrupted in a major earthquake for a period of time. Not all components of the telephone system will be equally affected, but initially the failure of land-based components (which also comprise links in the radio telephone systems) will cause a general failure of the total system's reliability. As the telephone system is gradually brought back into service in accordance with the priorities given to it, it may allow limited use by the response organization within a matter of hours after the earthquake.

As this is not a dependable or even predictable situation, this plan must require the capability to carry out emergency response independent of the commercial telephone system. While the use of existing radio systems is an obvious solution, the simultaneous breakdown in delivery of electric power distribution may limit those capabilities as well. More Spartan means of communication, such as handwritten memo delivered by courier, and verbal communication through personal liaison, will also be necessary.

b. Scope of Response Function

This function is limited to the emergency communications requirements of the response structure. Public sector communications restoration is addressed in the Utilities emergency response function.

The internal emergency communications requirements of responding ministries, agencies and local governments are the responsibility of those functional organizations or local governments.

The provincial government response management communications requirements are:

- communication between the affected local government(s) and the Provincial Field Response Centre(s).
- communication between the responding ministries' EOCs in the Operational Area and the Provincial Field Response Centre(s).
- communication between the Provincial Field Response Centre(s) and the Provincial Emergency Coordination Centre.

- communication within the PFRC.

c. **Response Levels**

All communications contingencies noted above are a possibility regardless of the magnitude of the earthquake.

d. **Probable Tasks**

i. Immediate Phase. The emergency communications requirements in this concept are not *directly* connected with life-saving operations as such. If critical communications requirements are identified which are related to life-saving operation, they should be dealt with in the appropriate emergency response function organizations. The significant immediate task is the assessment of damage to the telecommunications system, the availability of radio resources and their effectiveness, and the mobilization of resources for sustained operations.

ii. Sustained Phase. Establish emergency communications in order of priority to the functions and locations most in need of them for the mitigation of life-threatening situations and the relief of human suffering. Provide a communications advisory function and internal communications organization for the PFRC. Monitor and control, where possible, the re-establishment of telephone services to give highest priority to response efforts.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR THE PROVINCIAL EMERGENCY PROGRAM

The Provincial Emergency Program (PEP) has experience in the organization of an emergency communications system utilising volunteer amateur radio operators. PEP Amateur Radio is capable of being augmented and expanded to meet many of the requirements of this emergency response function.

3. SECONDARY SUPPORTING AGENCIES

a. **Amateur Radio Clubs.** Already being used by PEP, these organizations provide radio operators with their own radio equipment, and their own vehicles kitted with appropriate radio equipment.

b. **Ministry responsible for science and technology.** Assistance in prioritized restoration of telecommunications. Activation and staffing of Internet web site requirements for emergency management and public information.

c. **Other Provincial Ministries and Agencies.** These organizations, though perhaps not otherwise directly connected with earthquake response, provide a source of

emergency communications which cover the province (eg, Ministry of Forests, E Division RCMP).

d. **Private Sector Telecommunications.** Provision of emergency equipment, and re-establishment of normal systems with priority to the response effort.

e. **Communications ESF.** (National Earthquake Support Plan). Augmentation, frequency management. Mobile self-powered field communications facilities (Canadian Forces). Federal radio nets, eg. Transport Canada Vessel Traffic Management, Air Traffic Control.

f. **Volunteers.** Operators, couriers, message recorders.

Part 3, Annex F

Emergency Response Function

DAMAGE ASSESSMENT

1. CONCEPT OF OPERATIONS

a. Introduction

The Damage Assessment function is the determining element in establishing the level of provincial response to an earthquake, and an early and accurate picture must be assembled to assist the government to be effective in its response. All emergency responders and a network of other information-gatherers must automatically pass information concerning damage encountered through a collation system which can provide an assessment appropriate for successively higher levels of government as the need arises. From the obviously damaged areas, information must be sought out at greater and greater distances until damage is known by positive information to be minimal.

b. Scope of Response Function

Damage Assessment is first conducted at the local government level, not only for local government evaluation and response, but also as the basis for a general request for provincial assistance. As local assessments become more precise, they form the basis for specific requests for provincial resources, both immediate and for the near future, and assist in provincial government mobilization of appropriate support. The assistance required by local governments may also include requests to conduct assessments in areas remote from active first responder operations.

The provincial government assessment forms the basis of the Operational Area designation, the level of provincial response, and is the basis of possible requests for federal assistance. That form of assistance may also be related to information gathering over a broader area, using air, airphoto, and satellite imagery. Damage Assessment by federal agencies will also include determination of the epicentre and magnitude of the earthquake. Damage Assessment is managed within the PFRC/PECC by the Planning/Intelligence Section.

c. Response Levels

The initial determination of damage process will be carried out irrespective of the suspected magnitude of the earthquake. On assessment that a major earthquake event has occurred, a methodological search for gross damage will be undertaken at all levels, collated and filtered at each successive level, until a clear picture of the damage has been formed at the PFRCs and the PECC. As this assessment is closely related to the

dispatching of immediate resource assistance to areas where lives are at risk, it must be accomplished promptly.

Accordingly, once a major earthquake is known to have occurred, a PFRC will have to mobilize a Damage Assessment organization and implement a regional-level plan to gather information.

d. **Probable Tasks**

i. Immediate Phase. Assess areas likely to require life-saving response action that is beyond local government capabilities to provide.

ii. Sustained Phase. Assess total damage as the basis of response efforts, future recovery activities, and claims; coordinate the gathering of information from all sources.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR THE PROVINCIAL EMERGENCY PROGRAM

The provincial government responsibility related to this function is carried out by the PFRC and PECC staffs, as planned by the Provincial Emergency Program.

3. SECONDARY SUPPORTING AGENCIES

a. **Local Governments.** Detailed assessments of damage within municipal/regional boundaries.

b. **Transportation ERF.** Aircraft and other vehicles or vessels required for information gatherers.

c. **All Provincial Government Agencies.** Detailed damage assessment of their facilities, with coordination by B.C. Buildings Corporation.

d. **Federal Government Departments**. (National Earthquake Support Plan). Provision of information and assessment related to federal facilities and areas specifically tasked in that plan, eg. seismic data from Natural Resources Canada; DND airphoto interpretation; native reservation damage assessments; national parks damage assessments).

e. **All Emergency Response Functions.** Detailed assessments related to their functions, e.g. deaths, injuries, road damage, port damage, etc.

f. **DND/RCMP.** Immediate air resources may be available under provincial regional arrangements.

g. **Private Sector.** Air reconnaissance capabilities using privately-owned light aircraft, particularly through the Civil Air Search and Rescue Association (CASARA).

h. **Public Information ERF.** Media observations of damage; video tapes/films as permanent records for later review.

Part 3, Annex G

Emergency Response Function

FIREFIGHTING/RESCUE

1. CONCEPT OF OPERATIONS

a. Introduction

Earthquakes have historically been a contributing factor to major urban fires. Improvements in utility systems, and use of fire-retardant construction materials in recent years have lessened the threat of major conflagrations; however, the potential still exists. Experience also shows that many fires occur when utilities are restored, and ignite collapsed structures.

b. Scope of Response Function

As well as fighting fires, fire departments usually contain subsidiary expertise in "light rescue" techniques necessary to extricate victims from burning buildings and other routine rescue situations (vehicle accidents, for example). These skills, and the associated equipment kept on hand by fire departments, usually prove to be of great value in rescue tasks associated with earthquakes. Firefighters are not normally trained in "heavy rescue" techniques, and the requirements associated with heavy rescue are covered in the Heavy Urban Search and Rescue emergency response function annex.

Fire departments are normally capable of providing operational radio communications within their local government area, and usually to other fire departments without prior coordination, but may not be capable of radio communication on police radio nets. (Municipalities with RCMP contract policing may not, whereas municipalities with their own police forces usually can.)

In larger municipal areas, mutual aid arrangements exist with other adjacent fire departments, and with non-municipal firefighting elements. These arrangements may be seriously affected by transportation difficulties, or inability to communicate assistance requests, or on exhaustion of resources due to a large number of fires or an inability of firefighters to report for duty.

Firefighting resources may also be hindered or even incapacitated by a breakdown of water delivery systems or collapse of fire halls, which tend to be older, heritage buildings in many areas.

c. **Response Levels**

i. Response in a moderate earthquake may involve provincial coordination by the Office of the Fire Commissioner.

ii. Response involving a major firefighting/rescue effort may require the Office of the Fire Commissioner to provide liaison to a PFRC or the PECC in order to muster an effective response with the help of all available support agency equipment and personnel. This emergency response function is coordinated by the PFRC/PECC Operations Section.

d. **Probable Tasks**

i. Immediate Phase. In order of priority: extinguish or bring under control all fires threatening human life; provide assistance to life-threatening hazardous materials incidents where no other capability exists; perform light rescue operations or supervise volunteer rescue teams; assist in damage assessment.

ii. Sustained Phase. Not in order of priority: extinguish remaining fires; assist in any remaining hazardous materials incidents; assist utilities to safely restore services where a fire hazard exists; help carry out building safety inspections for fire hazards prior to re-occupation; restore relative normalcy to firefighting services through temporary re-distribution of equipment and/or re-drawing of areas of responsibility.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR THE OFFICE OF THE FIRE COMMISSIONER

The Fire Commissioner may assume jurisdiction over firefighting when identified in a provincial State of Emergency declaration. The Fire Services Act provides legislation which interfaces with the Emergency Program Act, by providing specific responsibilities to the Fire Commissioner with respect to fire suppression.

3. SECONDARY SUPPORTING AGENCIES

a. **Ministry of Forests.** Equipment, and personnel experienced in firefighting, particularly in rural forested areas; water or retardant chemical attack aircraft; "rappattack" teams.

b. **Ministry of Attorney General (PEP).** Search and rescue teams skilled in rural operations and techniques such as vehicle extrication, light rescue techniques in urban areas, first aid, and volunteer coordination.

c. **Ministry of Health (BC Ambulance Service)**

Part 3, Annex H

Emergency Response Function

TRANSPORTATION

1. CONCEPT OF OPERATIONS

a. Introduction

A severe earthquake could severely disrupt transportation means within British Columbia from the outset. Damage to roads and bridges, airfield runways and facilities, railways, and ports can be expected. Arteries, even though essentially undamaged, may be unusable temporarily as a result of landslides or other natural secondary effects, as well as by the presence of rubble. The earthquake damage will interfere with the delivery of response personnel and supplies into the disaster area, as well as the evacuation of the injured and homeless from the area.

The carrying out of the emergency functions related to transportation is complicated in that no single government agency at any level of government has the mandate to control all types of transportation, requiring this plan to develop the concept of response by an ad hoc committee of agencies. Government roles in transportation tend to be primarily those of regulation, whereas most transportation resources are in the private sector.

On the positive side, many transportation means are equipped with independent radio communications. The establishment of additional elaborate emergency communications nets to maintain intimate control should not be necessary.

b. Scope of Response Function

The Transportation emergency response function includes the restoration and emergency maintenance of surface, air, and marine infrastructure necessary to an effective response; and coordination of the provision of transportation resources to permit the effective delivery of people, equipment, and supplies. Initially, an impromptu combination of transportation modes will probably be required to access the disaster area to compensate for disrupted routes. In some areas of British Columbia a combination of transportation modes will be necessary to travel even relatively short distances.

The disruption of transportation services is one of the major determinants in the delineation of the disaster Operational Area. This function therefore plays a major role in support of the Damage Assessment emergency response function.

c. **Response Levels**

i. A moderate earthquake would primarily involve assessment of damage to, and prompt repair of, the existing transportation systems by their usual operators. The provincial response coordination role would likely be very limited insofar as the arrangement of transportation resources is concerned.

ii. A major earthquake response could require an extensive control structure to regulate all types of transportation, where possible using normal control structures, coordinated by the PFRC Logistics Section. Transportation resources will be centrally arranged and provided to emergency response agencies, who will manage their use while under their control.

d. **Probable Tasks**

i. Immediate Phase- determine resources available and allocate to life-saving efforts; assess damage to transportation arteries and facilities, identify usable access routes to areas requiring movement of resources; in conjunction with the Law and Order emergency response function establish traffic control to permit an orderly flow of the response effort; close restricted and dangerous transportation routes and facilities to public access; and advise the public of emergency transportation measures through the Public Information emergency response function.

ii. Sustained Phase- arrange to repair damaged road arteries to provide additional access routes in the Operational Area until normal traffic patterns can be resumed; coordinate the repair of rail, marine and air facilities necessary to the response effort (with other emergency response functions and the federal Transportation and Construction/Engineering ESFs); coordinate resource delivery requirements; provide staff to the PFRCs/PECC to fulfil transportation coordination duties; and administer service contracts with private transportation companies.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR TRANSPORTATION AND HIGHWAYS

Although several government agencies are involved with transportation regulation, most are in the federal sphere. The resources required are primarily held by the private sector and crown corporations. At the provincial level, the Ministry of Transportation and Highways is the only ministry with the requisite expertise to lead, has emergency response experience (floods) and has standing contracts with highway maintenance firms which own the bulk of heavy equipment in the province capable of hasty repairs to roads, etc.

3. **SECONDARY SUPPORTING AGENCIES**

a. **Law and Order Emergency Response Team.** Traffic control.

b. **Transportation ESF.** (National Earthquake Support Plan) for air/rail/marine regulation and coordination of federally-regulated resources once the Federal Support Team is in operation at the PFRC. Prior to that time direct assistance from DND and Transport Canada is available.

c. Provincially regulated transportation agencies: BC Rail, BC Ferries, BC Transit, etc.

d. Private sector transportation companies.

Part 3, Annex I

Emergency Response Function

ENGINEERING AND CONSTRUCTION

1. CONCEPT OF OPERATIONS

a. Introduction

The damage to structures in an earthquake will require additional resources to be directed to the Operational Area. While most engineering and construction work which needs to be done will have a responsible government agency (municipal, provincial or federal) which can arrange its own requirements, the need for provincial response covered by this plan is the priorization of effort to the areas that need it most.

b. Scope of Response Function

The function comprises the gathering of requests for provincial assistance, collation and priorization, and assignment of resources to tasks. In addition to heavy equipment requirements, which may be the most obvious ones, qualified personnel to inspect damage and to supervise engineering works will also be needed. Construction and demolition materials will also be coordinated by this emergency response function. This function should not be mistakenly considered as meeting the requirements of recovery phase construction and engineering tasks.

c. Response Levels

It is anticipated that a provincial-level Construction and Engineering response will be required only in the event of a major earthquake. In that event an office will be established at the PFRC in the Logistics Section in order to coordinate with supporting emergency response functions.

The demolition of dangerous structures without an owner's permission requires the declaration of a state of emergency.

d. Probable Tasks

i. Immediate Phase. Provision of resources to meet life-saving operational requirements; technical damage assessment of potentially life-threatening situations (dams, dykes, etc.) Demolition, shoring, route clearance of debris are expected tasks.

ii. Sustained Phase. As for Immediate Phase, but continuing on to general cleanup and debris removal, emergency repairs to prevent further damage,

and assistance to other emergency response functions requiring construction and engineering support. These tasks will probably continue beyond the response stage into recovery operations.

2. PRIMARY SUPPORTING MINISTRY- BC BUILDINGS CORPORATION

The coordination of engineering and construction requirements and resources is a function of the Logistics Section in PFRCs (and the PECC if necessary to provide an interface with federal agencies).

3. SECONDARY SUPPORTING AGENCIES

a. **Provincial Ministries and Agencies.** Provision of qualified personnel and resources to the coordination structure for allocation to high priority tasks. Control of assigned resources within expertise areas. Provision of damage information to the provincial coordination structure.

b. **Engineering and Construction Resources ESF.** (National Earthquake Support Plan). Provision of resources from outside the province.

c. **Private Sector.** Equipment, supplies and specialist personnel. Professional engineering and construction associations may be able to assist in organizing efforts in the private sector.

Part 3, Annex J

Emergency Response Function

HUMAN RESOURCES

1. CONCEPT OF OPERATIONS

a. Introduction

In company with material resources, earthquake response will probably require an influx of additional human resources to augment the framework of professional responders held within the agencies which bear the organizational responsibility for their functions. These needed extra personnel will come from a variety of sources, and the desirability of each source will be dependent upon the function being performed:

- From elements of the agencies with lead or support functions, but from departments or branches with limited or no usual emergency response role;

- From auxiliary or volunteer components of the agencies, whose role is directly related to emergency response but on a part-time basis;

- From organized volunteer societies which may specialize in emergency response or disaster relief; and

- Individual impromptu volunteers, either with or without emergency response skills.

As a general rule, the preferential sequence of obtaining additional resources will be in the order listed above, in that the administrative burden on the overall response effort is minimized.

The agencies responsible for each emergency response function, in planning their response, should consider which categories are most beneficial to them and implement as capabilities allow. Thus, during response, each function can obtain its own desired additional human resources independently. Also, advance coordination should negate the likelihood of several functions expecting to employ the same group of people, or type of individual volunteer.

Additional personnel, over and above the expected augmentation, will probably still be necessary, in that casualties and personal distress may reduce personnel availability, as might transportation difficulties.

Under State of Emergency conditions, the *Emergency Program Act* allows the impressed service of citizens for emergency response work.

b. **Scope of Response Function**

This emergency response function is concerned with the coordinated and centralized methods of obtaining additional human resources for unforseen requirements, and otherwise controlling employment of those personnel in a manner that does not unduly comprise the response effort itself by requiring large numbers of staff to implement.

Human resources in this category comprise:

- volunteers which respond to a general appeal, or which simply "show up" unexpectedly, possibly from outside the province or country;

- individuals and groups with specialized skills or equipment which are expressly sought by the response structure, and which may have to be brought in from outside the operational area.

c. **Response Levels**

A provincial government general control over human resources is not envisaged unless the earthquake is a major one. Even then, response may not require a general control; however, if needed the function will be coordinated out by the Logistics Section staff of the PFRC, which will establish a human resources office and perform the tasks indicated.

d. **Probable Tasks**

i. Immediate Phase. With emphasis on life-saving operations, determine requirements of lead agencies and seek out suitably-qualified personnel. Pre-arranged public announcements for general broadcast (if possible) should be used. Establish method of reception and delivery of personnel to the requesting agency, or arrange direct reporting to collecting points or response sites, where feasible.

ii. Sustained Phase. Continue human resource support to all response functions, through direct recruiting, and federal support to obtain out-of-area skilled personnel.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR THE PUBLIC SERVICE EMPLOYEE RELATIONS COMMISSION

This function will be coordinated in the PFRC Logistics Section.

3. SECONDARY SUPPORTING AGENCIES

a. **Human Resources Support ESF.** (National Earthquake Support Plan). Employment and Immigration Canada Manpower Centres have a significant role in the local recruitment of volunteers to support local government response plans, in addition to the roles stated in the National Earthquake Support Plan.

b. **Ministry responsible for the Workers Compensation Review Board**

c. **Volunteer Agencies.** Most volunteer agencies will pre-arrange support to individual functions.

d. **Canadian Red Cross.** Capable of processing, accommodating and training out - of-area personnel at "staffing bureaus".

Part 3, Annex K

Emergency Response Function

RESOURCE SUPPORT

1. CONCEPT OF OPERATIONS

a. Introduction

The provision of materials and supplies in a coordinated way, particularly from outside the Operational Area, will contribute to a more effective response. The coordination required will be provided by the provincial emergency coordination structure as a staff function only, in that no provincial ministry is dedicated to overall supply procurement on a routine basis. Conversely, ministries and agencies routinely perform this function internally and the need for overall coordination should thus be diminished to one of priorization, and liaison with federal departments which can be of assistance.

b. Scope of Response Function

Those emergency response functions which require specialized supplies (eg, medical, construction) beyond provincial capabilities will request them directly from their counterpart ESFs or the private sector. This response function will facilitate that process where necessary, coordinate requests for like items, assure priorities are established for critical items, provide the coordination link with the delivery means required through the Transportation emergency response function, and arrange for stockpiling and holding of supplies received under provincial control.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR THE BC PURCHASING COMMISSION

This function is closely related to the normal non-emergency functioning of the BC Purchasing Commission, which is also the provincial agency most closely related to Supply and Services Canada (lead department for the supporting federal ESF).

Coordination of this function is in the Logistics Section of PFRCs and the PECC.

3. **SECONDARY SUPPORTING AGENCIES**

a. **Material Resource Support ESF.** (National Earthquake Support Plan).

b. **Ministry of Forests.** Holds considerable reserves of accommodation needs such as tentage, bedding etc. Staff are experienced in acquisition procedures in emergencies.

c. **Ministry of Agriculture and Food.** Bulk supplies of foodstuffs.

d. **Ministry of Environment, Lands and Parks.** Identification of supplies of potable water.

e. **Private Sector.**

Part 3, Annex L

Emergency Response Function

CORONER/MORTUARY

1. CONCEPT OF OPERATIONS

a. Introduction

The number of fatalities as a result of an earthquake will likely exceed the capabilities of the provincial coroner system. Response may require a centralization of control, the re-assignment of available qualified personnel from unaffected municipalities, and perhaps augmentation from external agencies. It may also demand streamlined disaster-oriented procedures to record deaths, causes of death, and to remove the dead to safe and appropriate facilities pending conventional burial or other funeral arrangements.

b. Probable Tasks

i. Immediate Phase. Removal of the dead, possibly out of the operational area to where appropriate temporary morgues can be established.

ii. Sustained Phase. Continued actions as in the Immediate Phase, plus the normal coroner functions as modified to suit the disaster situation and scale of operation.

2. PRIMARY SUPPORTING MINISTRY - MINISTRY RESPONSIBLE FOR THE OFFICE OF THE CHIEF CORONER

3. SECONDARY SUPPORTING AGENCIES

a. Law and Order Emergency Response Function

b. Health Services Emergency Response Function

c. **Municipalities and the Private Sector.** Mortuaries, funeral parlours, etc. Refrigerated storage areas for cadavers: ice arenas, refrigerated trucks.

Part 3, Annex M

Emergency Response Function

HAZARDOUS MATERIALS

1. CONCEPT OF OPERATIONS

a. Introduction

A major earthquake could cause hazardous substance releases to the environment from a number of damaged or destroyed industrial/commercial installations and transportation systems: pipelines, rail, road, marine, and inter-modal facilities. These releases could pose an immediate danger to the general public, firefighting teams, rescue teams, and the environment. Although leaking gas is probably the most dangerous factor contributing to the post-earthquake conflagration hazard of modern cities, the danger of even a small spill of highly toxic chemicals or a flammable liquid or gas cannot be underestimated.

b. Scope of Response Function

The Hazardous Materials response function in an earthquake scenario is concerned with the assessment of hazardous material spill or release incidents, the subsequent containment and abatement of major and minor discharges, and the coordination of communications and cleanup operations.

Regional environmental emergency staff are equipped with cellular and radio telephones, four-wheel drive vehicles, hazardous gas detectors, encapsulating suits and self-contained breathing apparatus (SCBA), and preliminary radiation assessment equipment. Regional office centres also have direct access to toxological information, waste and water managers and technical personnel, biologists including wildlife and fisheries specialists, and habitat/resource sensitivity and protection information. Three emergency response teams have been trained and fully equipped for deployment to support an initial 72-hour response.

Two mobile emergency command trailers are available. These are designed for self-sustained operation, and are equipped with comprehensive communications and data equipment. A number of water vessels ranging from 16-foot rigid hull inflatables to 20-foot cabin cruisers are also available on short notice.

c. Response Levels

i. Even a moderate earthquake could require mobilization of regional responders and the Environmental Emergency Services Branch (EESB), with

the likely establishment of a regional EOC in a regional office. The provincial response will be in accordance with existing plans and procedures for non-earthquake hazardous materials incidents.

ii. In a major environmental disaster as a result of an earthquake the B.C. Environment Regional Director would provide a person or persons to the PFRC (on request) to coordinate requests for assistance and response activities of ESPOs, Conservation Officers, Municipal, Industrial and other sectors as needed. This emergency response function is coordinated by the PFRC Operations Management staff. Mobilization of ESPOs from outside the Operational Area(s), including appropriate response equipment and communications systems, would be requested by the PFRC and coordinated by EESB. Additional expertise and resources would be made available through inter-jurisdictional mutual aid agreements.

d. **Probable Tasks**

i. Immediate Phase. Determine the nature and extent of hazardous materials incidents and provide a coordinated, priorized response in order to limit the extent of spills, with priority to incidents threatening human life; provide on-site identification of hazardous materials for fire and rescue response teams, test for explosive levels, and assist in rescue operations involving SCBA; monitor industrial and/or contracted containment and recovery teams, and supervise volunteer spill containment teams.

ii. Sustained Phase. Not in order of priority: supervise on-site clean-up; arrange for transportation and disposal of hazardous materials; and undertake and coordinate environmental damage monitoring and assessment activities.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR THE ENVIRONMENT

In the event of an environmental emergency which requires immediate action to prevent, limit control or mitigate any hazard that the emergency event presents, Section 5 of the Environment Management Act authorizes the Minister to declare an environmental emergency. This declaration empowers designated public officers (ESPOs, BCE Incident Commander, Regional Response Team Leaders) to order any person to provide labour, services, materials, equipment or facilities or allow the use of land for the purpose of preventing, limiting or controlling the hazard(s) presented by the emergency.

EESB will implement the *BCE Major Emergency Response Plan.*

3. SECONDARY SUPPORTING AGENCIES

a. **Municipal/Regional.** Fire Departments report possible hazardous materials incidents and respond to small spills/discharges of known chemicals, and provide compressed air for SCBAs. Ambulance and police services are provided as appropriate.

b. **Provincial Ministries.** Provide emergency response services and resources according to inter-ministry protocol agreements in force at the time. Examples of the type of assistance available include Medical Health Officers, Environmental Health Officers, the Radiation Protection Service, and the Drug and Poison Information Centre. Additional resources could be made available upon request either through PFRC coordination action or via trans-boundary and inter-jurisdictional mutual aid and memorandum of understanding agreements.

c. **Dangerous Goods ESF.** (National Earthquake Support Plan). Department of National Defence, and the Conservation and Protection Service of Environment Canada would respond to spills and emergencies on Federal Facilities; Transportation Emergency Assistance Plan (TEAP-CANUTEC); Canada Coast Guard.

d. **Industry.** While locally affected industry would not likely be able to provide additional supporting resources, industry external to the Operational Area might be able to assist. Industrial organizations and associations such as Canadian Chemical Producers Association, Canada West Petroleum Association, Propane Gas Association, Chlorine Incident Response Teams, Environmental Testing Labs can coordinate or provide resources directly.

Part 3, Annex N

Emergency Response Function

PUBLIC INFORMATION

1. CONCEPT OF OPERATIONS

a. Introduction

All levels of government and the news media have a responsibility to provide emergency information to the public that is accurate, timely and consistent. Just when public and media demands for information are at their highest following an earthquake, the probability is that most media in the area will not be operational due to power failures. Nevertheless, media will be present to gather information for later local dissemination, and for media outside the disaster area. The media represent the major resource to inform the public about the disaster situation, and some radio broadcast media have long been oriented to their role. It then follows that the utilization of the media to the benefit of a more effective response is essential, and a high level of priority should be set to restore an adequate radio broadcast capability.

b. Scope of Response Function

This Emergency Response Function is primarily concerned with creating an effective means of informing the public in the disaster operational area concerning response efforts and actions expected of them to reduce risks to life and safety. Secondarily, the presentation of a sole point of release for official provincial government information to the media in general is required to prevent confusion on the part of the public, and to make best use of public information/media affairs staff. The emergency response function may need to disseminate local government announcements on their behalf.

c. Response Levels

i. A response to a moderate event could include the determination of surviving broadcast media, and provision of assistance to local governments by delivering their emergency announcements and pre-arranged provincial government announcements. Provincial media relations activities would likely be conducted from the Provincial Emergency Co-ordination Centre. Other provincial ministries should release information through the Provincial Emergency Co-ordination Centre.

ii. In a major event response, a Public Information Centre will be established as an integral part of the PFRC and perform public information and media relations activities on behalf of the overall provincial government response

effort and assist in arrangement of official government and media tours of the Operational Area. A level of media control may be required.

d. **Probable Tasks**

i. Immediate Phase. Assist in the determination of damage to media public information capabilities; pass prepared and updated public information announcements to the operational media from the Provincial Emergency Co-ordination Centre and or the Provincial Field Response Centre.

ii. Sustained Phase. Establish the requisite level of emergency public information capabilities; establish the necessary media relations capabilities to present a single provincial government release of information to the general public through the national/international media; control media personnel access through a system of accreditation and access control, in conjunction with the Law and Order response function; as capabilities are available, assist media personnel to prepare and send their material from the Operational Area; arrange for official government and media tours of the Operational Area subject to availability of resources; assist local governments with their own requirements when requested.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR GOVERNMENT COMMUNICATIONS)

This is a Command Staff function at PFRCs and the PECC.

3. **SECONDARY SUPPORTING AGENCIES**

a. **Other Ministries.** Provide personnel to staff and equip emergency public information centres.

b. **Public Information ESF.** (National Earthquake Support Plan)- provides for qualified information centre staff augmentation, a federal spokesperson, and the establishment of a joint federal-provincial information centre. Industry Canada is co-ordinator of related emergency communications capabilities, including emergency radio broadcast.

c. **Law and Order ERF.** Assistance in establishing media access to the Operational Area.

Part 3, Annex O

Emergency Response Function

FOOD AND AGRICULTURE

1. CONCEPT OF OPERATIONS

a. Introduction

The agriculture and food system in British Columbia is diverse and complex. It includes primary agriculture and fish production and a substantial segment of the supply, service, financial, transportation, processing, marketing, inspection/food safety, research, and retail sectors.

This emergency response function recognizes that a sustained disaster situation would have an adverse effect on the broad area of food, agriculture and fisheries. Primary food production, food processing, food delivery and food marketing could be significantly impacted. Failure of transportation systems to deliver farm inputs or livestock feeds would generate immediate concern and hardship.

Crop loss due to an inability to harvest, process, store and deliver would create food supply problems. Another problem would be the need to care and dispose of dead, injured and abandoned farm animals and household pets.

This annex provides for emergency response to these situations but does not address the emergency feeding function for humans which is recognized as the responsibility of the Ministry of Human Resources and is covered under the Emergency Social Services response function.

This emergency response function is aligned wherever feasible with the Food and Agriculture Emergency Response System (FAERS) developed in co-operation with Agriculture Canada. The FAERS is an all hazards emergency management system for the Canadian Food and Agriculture Sector designed to facilitate the effective mobilization and control of resources. The FAERS builds on the current management system and existing federal, provincial, and private sector emergency plans and linkages developed to date.

b. Scope of Response Function

The scope of this function is to assist with mitigating the effects of an earthquake on the B.C. Agri-Food Sector, including food production, processing and distribution.

Specifically, the function will:

- help in providing safe, wholesome food stuffs and water (such as commercial bottled drinking water) for the people affected, by identifying, securing and arranging where necessary the delivery of food stuffs and drinking water to appropriate staging areas when it is beyond the capability of local agencies to do so;

- identify, secure and arrange delivery (where required) of feed supplies for commercial farm animals and other emergency farm input requirements;

- assist in coordinating evacuation and transfer of commercial farm animals for relocation, slaughter or disposal;

- assist in restoring the B.C. agri-food Sector affected by the earthquake and assess general damages to the agriculture and food sectors for the provincial government;

- work with appropriate ministries (eg, ministry responsible for fisheries) if necessary to help coordinate their similar responsibilities relative to the commercial aquaculture and fisheries sectors.

c. **Response Levels**

The emergency response function is applicable to a major event response only. The function will be coordinated through the Logistics Section of the PFRCs and PECC.

d. **Probable Tasks**

- establish communications with agri-food representatives and staff to monitor the situation and assess damages to the agriculture and food sectors and their requirements, including human resources;

- liaise with the central (national) component of FAERS to identify and coordinate any agri-food support required from other provinces or the federal government;

- maintain a data base of provincial food stocks and distribution systems and other vital requirements such as fertilizer, chemicals, etc.;

- establish contact with other provincial ministries and private industry, including processors, distributors and retailers, to obtain their cooperation;

- secure food/water sources and maintain food/water stockpiles, and work with Emergency Social Services to distribute food/water to relocation centres for the affected population;

- help to ensure a water supply for the agri-food production and processing sector, and commercial bottled water for the affected population (quality

assurance and inspection are the responsibility of the Ministry of Health, Environmental Health Protection Branch);

- secure and allocate feed stuffs for commercial farm animals and arrange for distribution as necessary;
- work with appropriate federal and provincial government agencies to ensure animal and plant diseases are monitored and controlled to the extent possible during and after the disaster event;
- arrange for the slaughter of injured farm animals and dispose of the carcasses (includes household pets).

1.2 PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR AGRICULTURE AND FOOD

The Ministry of Agriculture and Food mandate is to provide support and leadership to the total agri-food sector through its complement of staff and programs. The ministry must be prepared to respond to any emergency that affects the agri-food sector and to ensure the continuity and safety of the province's food stocks.

1.3 SECONDARY SUPPORTING AGENCIES

a. **Food and Agriculture ESF.** (National Earthquake Support Plan) and FAERS (central).

b. **Ministry of Environment, Lands and Parks**

i. Conservation officers for animal control operations.

ii. Water Management Branch for water supply.

c. **Ministry of Health**

i. Environmental Health Protection Branch for water quality assurance and inspection.

d. **Society for the Prevention of Cruelty to Animals**

e. **Agriculture and Food Industry.** Retailer, distributors, processors required to secure food/water supplies and animal feed.

f. **Ministry of Fisheries**

Part 3, Annex P

Emergency Response Function

FINANCE AND CLAIMS

1. CONCEPT OF OPERATIONS

a. Introduction

This concept does not cover the policy of whether or not claims are paid as a result of earthquake damage. Policies are often not decided until after the event, in consideration of the total damage suffered, the ability of insurance to cover some or all of the loss, etc. If a system of dealing with claims is required, the province will administer the necessary claims program. The process required to deal with damage claims is a part of recovery planning.

There will be a requirement to administer financial expenditures connected with the response effort.

A common disaster reaction within the private sector is the "cash only" syndrome for goods and services. This can have an effect on government response operations, but the impact is greater on individuals who are accustomed to not keeping sums of cash on hand, and who find that even the essentials cannot be obtained because bank services have been disrupted. The government has arranged to provide a means for the population to obtain emergency cash from the banking system.

b. Response Levels

The function is similar regardless of the response level, and will apply at all PFRCs and the PECC, Finance and Administration Section. However, on activation of the *National Earthquake Support Plan*, the interface with the federal agencies will require the function to be coordinated and administered from PECC.

c. Probable Tasks

i. Immediate Phase. Authorize emergency expenditures for provincial sphere response activities; prepare estimates of expenditure for government.

ii. Sustained Phase. Authorize expenditures; develop initial procedures for administration of claims; produce financial estimates of damage and response costs for government; audit.

2. PRIMARY SUPPORTING MINISTRY- MINISTRY RESPONSIBLE FOR FINANCE

The routine administration of emergency expenditures is a normal function of the Provincial Emergency Program. However, in a major disaster, the significant financial implications will require control and planning at the highest level.

3. SECONDARY SUPPORTING AGENCIES

a. **All Provincial Ministries and Agencies, Municipalities.** Administration of own expenditures.

b. **Federal Government Support.** Federal Treasury Board guidelines for emergency expenditures apply, and are incorporated in the *National Earthquake Support Plan*. A sustained federal role in a major event would probably require special emergency legislation or regulation.

Part 3, Annex Q

Emergency Response Function

UTILITIES

1. CONCEPT OF OPERATIONS

a. Introduction

Utilities *lifelines* are subject to extensive damage in an earthquake. While some expected disruptions are simply a breakdown in services which the public has come to depend upon, and are of relatively minor consequence, the potential of grave consequences cannot be discounted in such areas as the long-term provision of water and sewage disposal, and the operation of hydro and telecommunications facilities which affect the efficiency of life-saving response efforts. The risk to the public imposed by some utilities themselves in certain types of failure (dams, gas lines, etc.), must be the subject of mitigating actions in advance of disaster, and they indeed are. Other emergency response functions deal with the alternative means of response required to temporarily supplant or replace failed utilities. Nevertheless, the restoration of essential utilities must be a response function, and a degree of provincial control may be necessary to assure that the priority of restoration of service is complementary to the overall response effort.

Most utilities are not government operated, although they are government regulated and may operate under provincial government charter. Others are municipal or regional government services. Each utility has existing sole responsibility for its operations, and no change is anticipated by this plan, whether or not a state of emergency should be declared. Detailed emergency plans already exist to ensure public safety and to restore services.

b. Scope of Response Function

The actions envisaged by this plan encompass the following utilities:

i. Telecommunications.

- Telephone services, serving both public and private users (including ancillary services which interact with and serve those networks, including microwave facilities, radio and cellular telephone services, internet access, etc).

- Broadcast services, including commercial radio and television stations and their ancillary facilities (which may share with telephone services).

- Other private radio facilities, which include pagers, amateur radio, CB, and private radio nets which may use repeaters and facilities shared with other users.

- Government-operated radio networks, many of which routinely serve emergency functions, such as Marine Vessel Traffic Management and Air Traffic Control, and police, forestry, firefighting, and municipal emergency radio nets.

ii. Electrical Power. All electrical producers and distributers in the province.

iii. Gas Utilities. Companies involved in the transportation, long-distance transmission, and distribution of natural gas and LP gas.

iv. Water and Sewage. Regional Districts, Municipalities and private companies involved in the transmission and distribution of water, and the collection and treatment of sewage.

c. **Response Levels**

i. A provincial government response is not anticipated in a moderate event. Automatic reaction to utilities emergencies within the utilities companies' own resources and in accordance with their own plans is the most likely scenario. Each designated utility will provide the provincial government coordination structure with damage assessments and situation reports on request, through a pre-designated representative.

ii. In the situation where a major earthquake has caused serious damage to utilities, and should it be necessary to establish a provincial government control over one or more utilities in accordance with a declared state of emergency, the affected utilities will establish liaison to the PFRC and/or staff a Utilities office in the PFRC Operations Section. Other circumstances may require such actions for the purpose of communication with federal or provincial regulating agencies and for the arrangement of federal agency assistance.

d. **Probable Tasks**

i. Immediate Phase. Assess damage to facilities and implement activities with priority to life-saving response actions; restore facilities required for emergency response by local and provincial governments; protect facilities from further damage; prepare public announcements for dissemination by emergency operation centres, advising public actions required and restoration prognosis; assess assistance required from government.

ii. Sustained Phase. Restore normalcy in order of priority to the response structure, other essential services, and the public. Additional study is required

to provide the utilities companies with an appropriate conceptual sequence of restoration in advance of a major earthquake.

2. SUPPORTING AGENCIES

No single provincial ministry has responsibility to coordinate utilities response. Accordingly, the plan has arranged an agreement to cooperate in the absence of an encompassing ministry. The agreement provides a point of contact for the Provincial Emergency Coordination Centre or a Provincial Field Response Centre from each of the following utilities:

a. **Telecommunications.** BCT/Telus.

b. **Electrical Power.** B.C. Hydro.

c. **Gas Utilities.** B.C. Gas (most of the mainland area) and/or Centra Gas (Vancouver Island and Sunshine Coast).

B.C. Hydro has also agreed to coordinate planning amongst the above agencies and to be the first contact for representation to the management structure during response operations.

The coordination of resource assistance to local government utilities functions (water, sewage, etc), if necessary, will be done by the Operations Section of the PFRC.

3. SECONDARY SUPPORTING AGENCIES

a. **National Earthquake Support Plan.** Although a utilities emergency support function is not found in the National Earthquake Support Plan, general support is available, ie. in the Engineering and Construction, Communications ESFs. Also, support from other provinces and international assistance are possible.

b. **Private Sector.** Primary supporting agencies maintain the list of private sector firms which can provide complementary and augmentation support.

c. **Local Governments.** Those unaffected by the earthquake are capable of providing restoration resources.

Appendix 1

AUTHORITIES AND REFERENCES

1. AUTHORITIES

a. *Emergency Program Act,* 1996

b. *Emergency Program Management Regulation,* 1994

c. *Local Authority Emergency Management Regulation,* 1995

2. REFERENCES

a. *Provincial Government Emergency Management, A Strategy for Response,* 1992

b. (Canada) *Emergency Preparedness Act*, SC Chapter 11, 1988.

c. (Canada) *Emergencies Act*, SC Chapter 29, 1988

d. *Memorandum of Understanding on Emergency Preparedness between the Government of Canada and the Provincial Government of British Columbia*, April 13, 1988.

e. *National Earthquake Support Plan*, (June 1997); Emergency Preparedness Canada.

2. DEFINITIONS

These technical and scientific definitions may assist the reader who is unfamiliar with earthquake and emergency preparedness terminology:

Aftershock - Aftershocks are a part of the release of accumulated elastic strain. When a significant earthquake occurs, it not only relieves the pressure along its particular section of fault but also changes the stress patterns for miles around. These changes, in turn, create adjustments of their own.

Earthquake - A sudden shaking or trembling in the earth caused by the abrupt release of energy in the earth's crust. The motion may range from violent at some locations to imperceptible at others.

Fault - A fracture in the earth's crust accompanied by a displacement of one side of the fracture with respect to the other in a direction parallel to the fracture.

Ground Deformation - Visible manifestation of earth movement along a fault, or earth cracking. Such movement may have been vertical or horizontal, or both.

Intensity (Earthquake) - The damage caused by the earthquake as expressed by the Modified Mercalli Scale. It refers to the violence of earthquake motion in any perceptible part of an earthquake area and is based on the effects observed on people and objects.

Liquefaction (of soil) - The process of soil and sand behaving like a dense fluid rather than a wet solid mass during an earthquake.

Magnitude (Earthquake) - Is a measure of the ground motion at a fixed distance from the epicentre and is stated in terms of the Richter Scale. Magnitude is related to the energy released by the earthquakes and is determined by records received on instruments. It is a method, not an instrument. The magnitude scale is exponential (or logarithmic) in character, so that an increase of one unit in magnitude signifies a ten-fold increase in ground motion.

Microzonation - The mapping of earthquake hazards on a community-wide scale.

Mitigation - Those measures and activities aimed at reducing or eliminating hazards associated with earthquakes, or lessening the impact of the event.

Plate Tectonic Theory - A scientific theory that divides the earth's surface into six large, moving plates, bounded by actively spreading ridge crests in the oceans, major fault systems, and earthquake zones. Rates of plate motion vary from about one to ten centimetres per year. Seismic activity is typically of shallow focus near regions of upwelling and deeper where the plates dip beneath adjoining plates.

Preparedness - Those measures undertaken in advance to ensure that individuals and agencies will be ready to react, such as emergency plans, mutual aid agreements, resource inventories, training, exercises, and emergency communications systems.

Prevention - Mitigation of earthquake effects through public education, building codes, building and land-use regulation, and tax and insurance incentives/disincentives.

Recovery - Those measures undertaken to restore normal conditions. The time frame for recovery begins as soon as a reduction in critical response activities permits the re-allocation of resources to longer-term recovery activities. Recovery measures can extend over years, and could include physical restoration and reconstruction, financial assistance programs, counselling, temporary housing or relocation assistance, health and safety programs, and economic impact studies.

Response - Those measures undertaken immediately after an earthquake has occurred and for a limited period of time thereafter, primarily to save human life, treat the injured, and prevent further injury and other forms of loss. They include response plan activation, opening and

staffing of emergency operations centres, mobilization of resources, issuance of warnings and directions, provision of aid, and declaration of states of emergency.

Richter Scale - A logarithmic scale used to express the magnitude of an earthquake. The smallest earthquake that can be felt will register l.5, whereas a 4.5 quake will cause slight damage and a 8.5 quake will be devastating. The magnitude numbers are calculated from measurements of seismograph records. See Magnitude (Earthquake).

Seiche - Oscillation (standing waves) of the water in a bay/lake, or of some other fluid in a large container (i.e., gasoline).

Seismic Risk - The "expected consequences (and credible surprises) of a future seismic event." Examples of risks are the possible disruption of utilities and services (telephone, water, electricity, gas and oil lines, sewer lines), and the possible destruction of critical facilities (police and fire stations, hospitals, power plants).

Seismic Risk Zoning - A method of designating seismic risk in a geographical area.

Tectonic - Relating to the deformation of the earth's crust, the forces involved in or producing such deformation, and the resulting forms (see plate tectonic theory).

3. ABBREVIATIONS

ECC - Emergency Coordination Centre. The Provincial Emergency Program ECC operates on a daily basis to handle routine emergency calls and serves as the "mobilization base" for the provincial government response coordination structure. The Provincial Emergency Coordination Centre (PECC) is a part of that mobilized structure and must be activated in accordance with the *Provincial Government Response Management Strategy*.

EOC - Emergency Operations Centre. Although a generic term, EOC is used in this plan to describe local government and individual ministry/agency centres.

ERF - Emergency Response Function.

ESF - Emergency Support Function, as used in the National Earthquake Support Plan.

FCO - Federal Coordination Officer.

PECC - Provincial Emergency Coordination Centre (see ECC above).

PFRC - Provincial Field Response Centre, the name given to the provincial regional operations centre which coordinates emergency response. "Regional" refers to the Provincial Emergency Program Regions in this plan.

POC - Provincial Officer Coordination.

Appendix 2

THE EARTHQUAKE THREAT

1. EARTHQUAKES IN BRITISH COLUMBIA

Earthquakes are commonplace in British Columbia, in adjacent coastal territories, and in marine areas off those coasts. Fortunately, most of these earthquakes are minor in terms of energy release, or are situated so remotely that their effects on populated areas are minor, or even unnoticed.

Earthquakes with a magnitude of up to 7.3, however, have occurred in the historic past, within 150 km of the British Columbia lower mainland.

The occasional rare occurrence of earthquakes with a massive release of energy is becoming a generally accepted possibility, based on circumstantial geological evidence. These massive earthquakes appear to have recurred every 600 years, give or take a few hundred years. We cannot predict the next similar event, but probability is high that there will be a major earthquake within the next 200 years.

In our region, earthquakes are directly or indirectly caused by the movement of the earth's crustal plates. Some small platelets move in from the Pacific Ocean toward the North American continent, ultimately sliding under the continental plate (subducting) along the B.C, Washington and Oregon coasts (the *Cascadia Subduction Zone*). At about 100 km depth the plate material melts to re-form the magma which spawned the plates in the first place a few million years ago. All of these plate movements, whether gradual or in sudden "jumps", cause the uplift and subsidence of land masses, the gradual creation of mountain ranges, and the eruption of volcanoes. These processes are usually accompanied by earthquakes.

The large earthquake that this plan addresses, and that causes considerable concern because of its high damage potential, is sometimes referred to as the Cascadia subduction earthquake; it would actually rupture a fault area several hundred kilometres long, many tens of km wide, and the rocks on either side of the break would move many meters (10 to 20) relative to one another.

2. HAZARD ASSESSMENT

For planning to proceed it is necessary to define this major subduction earthquake, and to assess the damage potential. Although the resulting risk is hypothetical, it is entirely realistic. The basis of this plan is a "design event", consisting of a magnitude estimate (or equivalently energy release), and an epicentral location.

a. **Magnitude.** The earthquake would be of magnitude greater than 8, and could well be over magnitude 9. It is important to note that the latter magnitude packs many tens of times more energy than the former (perhaps 50 to 70 times more), but that the forces acting on buildings will not increase in that proportion; they will simply last correspondingly longer.

b. **Location**. A precise specification of the rupture area of the design event is not necessary; because of its large areal extent we must assume that there will be areas of total destruction and catastrophic damage in the most heavily populated regions of Greater Victoria and/or Greater Vancouver and the Lower Fraser Valley. These combined areas include about half of the population of British Columbia, the Port of Vancouver, and the major airports.

The following is a brief summation of the general types of damage that could be expected to result from the described design event; to amplify on the details would require application of the general types of damage to the specific locale being assessed (vulnerability assessment). Vulnerability assessment and risk analysis follow the provincial conceptual response plan, and ultimately will result in an detailed local determination which will lead to a defined capability to deal with the hazard.

There are two aspects of damage: the physical manifestations of the event, which are potentially hazardous to man; and the actual harmful effects on man. The physical manifestations are:

a. **Permanent Ground Displacement.** Ground may be displaced laterally, upwards (uplift), and downwards (subsidence). These are the direct effects, and may induce other effects which include landslides and the destruction of buildings due to their inertia. Subsidiary effects also may include floods if watercourses are changed by landslides or the change in land slope, and if dams and dikes are breached.

b. **Ground Motion**. Elastic waves generated by the earthquake are manifested as vibration or shaking. The intensity, duration, and frequency of the vibration will have a variable effect on the ground itself (soil failure, compaction, liquefaction), and on man's structures (collapse, lesser damage to structure and contents).

c. **Seismic Sea Waves (Tsunami)**. As a result of ground displacement at sea, tsunamis may be generated that have effects at great distances from the epicentre. The tsunami may cause sudden flooding of coastal areas and damage due to extremely violent wave action upon structures.

d. **Miscellaneous**. The direct and induced effects may cause subsidiary effects such as fires.

The impact on people of the damaging effects of earthquakes include immediate fatality, immediate physical injury, delayed fatality due to injury and subsequent possible disease, psychological trauma, and deprivation of home and organized community. Lifelines and communications may be lost temporarily, causing a subsequent breakdown in the ability of local government to provide a service to him, to maintain order, and to deal with the crisis of the moment. The cumulative effect of all of the immediate problems leads to severe economic depression and social disharmony of a nature seldom experienced outside of war.

Provincial Emergency Program
Ministry of Attorney General