

FLOOD RESPONSE INFORMATION

Flood Response Information

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SAFETY RELATED INFORMATION

Safety Considerations

Safety requirements for flood response personnel must be carefully considered since the work involves exposure to hazardous conditions.

Great care should be taken if water is flowing over the ground surface. A minimum depth of flowing water can produce a large force on a human being.

Personnel Safety planning is required and includes:

- Personal Protective Equipment
- Safety Working Procedures:
 - Check in time
 - Communication equipment
 - Less experienced personnel should be accompanied by experienced person
 - Volunteer safety requirements must be met

The Workers' Compensation Board Regulations must be followed.

Safety Checklists (Example)

Safety and General Functions - for all Personnel

It is the responsibility of supervisors to ensure that safety of response personnel is of the highest priority. All new response personnel arriving on the scene must be briefed on safety matters and informed of unsafe situations. Hazard response work has an Hazard Classification under the *Workers' Compensation Act (WCA)*. Safety requirements must be organized according to the requirements of the *Occupational Health and Safety Regulations*, and are dependent on the number of workers per shift and the travel time to the nearest hospital.

Ideally, response personnel should work in teams of two in the field, and must have ready access to communications (phone, receivers). Operations under night, or very severe weather, conditions should be carefully considered. The well-being of personnel working alone must be checked in accordance with WCA requirements. Checks should be made at such intervals and by such means as are appropriate to the nature, hazard and circumstances of the employment.

Personnel Requirements

In a small emergency, a single person might handle all of the functions for a limited period of time. The same is true even of a larger emergency at the initial stage of activation and mobilization. As the response expands to meet the requirements of a larger emergency, a person is assigned to each component branch, and then that person gains additional personnel who are assigned individual functional responsibilities as their cells become more active.

The response must function on a continuous, 24/7 basis from activation until de-activation. The manner in which this is done is at the discretion of the Chief of Planning (Flood Assessment and Planning Chief). While the immediate solution may be to establish several complete shifts for the duration of operations, there are seldom resources or facilities to sustain this approach. Plans should call up two complete shifts for an initial period of time, after which reduced-strength options can be considered for implementation on a branch by branch basis, such as:

Duty Officer(s) - a reduced staff of one or two persons handles all incidents affecting the branch. This system might require several days experience or some preliminary training, but it is particularly useful during periods of reduced activity.

Reduced Staffing - the branch staff work longer shifts or with fewer people than would be attempted in order to provide relief to some others. This is appropriate to allow short breaks for meals, etc. Reduced staffing can also be used to permit other staff activities to occur, such as VIP briefing or a field visit.

Partial Stand-down - a branch or section within a branch may be left unmanned temporarily to suit reduced activity levels. This approach may be possible during night hours when supported (or supporting) functional organizations cannot operate, and as response operations come to an imminent end.

Other Considerations

- a. Staff Rest:** Time must be allowed for rest, meals, ablutions, etc. The matter cannot be "left to sort itself out". Schedules must follow the Hours of Work Provisions in the *Employment Standards Act*, especially section 39, **No excessive hours**.
- b. Labour Relations:** Rules and regulations regarding safety and over-time, etc. are not suspended on account of the emergency.
- c. Briefings, Conferences:** Activities at the PFRC which require all staff to attend should be infrequent. They interrupt necessary rest time and can preclude such necessary events as field visits.

Safety and General Functions Checklist

- for all Personnel

The following are general instructions applicable to all MELP Hazard Response Personnel.

- Determine re-assignment of priority office work and arrange personal/home matters.
- Acquire work material and safety gear required for field work.
- Determine initial location and staging areas and means of transportation.
- Report to assigned location (Provincial Field Response Centre, Command Post, Staging Area) and obtain situation briefing and assignments.
- Identify supervisor and obtain all necessary safety/survival equipment and procedures.
- Ensure arrival and location recorded by supervisor.
- Obtain checklists of respective functions.
- Obtain appropriate forms for field operations.
- Identify and brief subordinates on situation, safety, reporting relationship and functions.
- Maintain personal log of activities and hours worked.
- Check out with supervisor on completion of functions and/or end of shift.

**Reference: MELP
Water Related Hazards
Emergency Response
Plan and Procedures,
1998**

Vehicle Safety Equipment Checklist

LIST OF VEHICLE SAFETY EQUIPMENT (EXAMPLE)

1	FIRST AID KIT	1	JACKALL JACK
2	TRAFFIC CONES	1	SPARE TIRE
3	FLARES	1	WHEEL WRENCH
1	FIRE EXTINGUISHER	1	SET WINTER TIRE CHAINS
1	REFLECTIVE VEST PER PERSON	1	SET JUMPER CABLES
1	FLOATING LIFELINE ROPE	1	AX OR SANDVICK
2	BLANKETS	1	PACKAGE OF WATER-PROOF MATCHES
1	REFLECTIVE WARNING KIT	1	CANDLE (EMERGENCY HEAT SOURCE)
1	AUTOTEL RADIO OR EQUIVALENT	1	SEARCH LIGHT (Plugs into cigarette lighter)
1	SHOVEL	1	SET OF PERSONAL SAFETY EQUIPMENT FOR EACH PERSON IN ACCORDANCE WITH WCB REGULATIONS
1	FLASHLIGHT		
1	TOOL BAG C/W TOOLS		
1	STANDARD VEHICLE JACK		

Great care should be taken if water is flowing over the roadway. A minimum depth of flowing water can produce a large force on a vehicle.

Flooding: How Can 0.3 to 0.6 metres of Water Cost You Your Life?

- **Nearly HALF of all flash flood fatalities are auto related!**
- **0.6 metres of water will carry away most automobiles!**

Notice to Residents (Example)

NOTICE TO RESIDENTS ON POTENTIALLY HIGH RIVER LEVELS

(Date)

Dear Resident:

The Province of British Columbia, Ministry of Environment, Lands and Parks, has recently advised that normal snow melt in the mountain areas has been delayed due to cool temperatures and the runoff is three to four weeks late. A sudden prolonged warm spell will increase the risk of above average river levels and the potential risk of flooding. The Local Authority is monitoring the situation and will issue further notices as necessary.

Property Owners with river frontage and in low lying areas are responsible for taking the necessary precautions against the risk of flooding. Stockpiles of sand and sandbags are available at all fire halls. Delivery of sand and bags will be arranged by the Local Authority on a priority basis. Pamphlets on flood preparedness including a recommended method for sandbag diking are available from the Local Authority, B.C. Environment and the Provincial Emergency Program.

If further information is required please contact the Local Authority.

(Closing)

INSPECTIONS AND PATROLS

EXAMPLE

High Water Patrol Inspections

Patrol inspections should be carried out during high water events to monitor the performance of the flood control works and identify needed corrective actions.

During high water events, local water level gauges should be monitored regularly and the readings recorded for future reference. Dike patrol frequency should increase as flow and/or water levels approach critical conditions, and should be continuous while the level is within about 1.0 m of the dike crest. The patrol crews are to observe and report to the diking authority any conditions or occurrences that could signal a weakening of the works such as:

- Seepage through the dike and at the landside toe of the dike. Close attention should be paid to seepage, as the safety of the dike can be threatened by an increase or concentration of seepage flows.
- Boiling. these are small up-wellings of clear running water caused by excessive seepage pressure and can appear at considerable distances inland from the dike.
- Piping. Seepage is generally considered to be normal provided flows are not excessive nor concentrated in the form of piping or boils. Piping is the physical transport of fill or foundation material by concentrated seepage flows; this can be identified either as suspended silts (murky water) or visible sand particles. The process results in progressive removal of material with an enlarging hole extending toward the river at an increasing rate. Eventually an open path is created and the dike may collapse and breach in an "explosive" manner. Piping is sometimes preceded by boils.
- Cables, utilities, pipes, floodboxes, etc. Structures that transverse the dike fill should be monitored for seepage and settlement.

- Relief wells. The rate, colour of flows and transport of particles from relief wells and internal drains should be monitored.
- Gulying. Observations should be made for sloughing and / or erosion of the dike slopes by gulying.
- Settlement of the dike crest and slopes causing ground depressions or sinkholes. Observations should particularly be made for possible differential settlement over floodboxes and structures in or through the dike.
- Areas of low freeboard due to variable river profile or loss of dike fill.
- Cracking of the dike crest or slopes.
- Erosion of the riverbank adjacent to the dike.
- Sloughing, erosion and/ or loss of rock from bank protection works. Critical areas should be closely inspected during and after high water events.
- Debris accumulation at floodboxes, flap gates and trash racks.
- Stream blockages or redirection of flows due to logs, debris, gravel and sediment, and/ or ice jams, especially near bridges or other constrictions.
- Pumps not operating properly.
- Dike patrol/inspection logs should be retained by the Diking Authority to record all inspections and actions taken, and also to serve as part of the performance record. Sample logs are provided.

**Reference: MELP
Guidelines for
Management of Flood
Protection Works in BC,
1999**

Flood Protection Works Management Checklist

Diking Authority: _____

O&M Supervisor: _____ Tel: _____ Fax: _____

DIOD _____ Tel: _____ Fax: _____

Dike Name: _____

O&M Manual: Yes No

Floodplain Management Bylaw: Yes No

1. **Records:** Design Reports _____ Plans _____
 Files Nos. _____ Floodplain Maps _____

2. **Rights-of-way:** Yes No

3. **Annual Budget/Taxes:** Yes No

4. **Follow-up Last Inspection:** By: _____

Annual Inspection (submit report to DIOD): Yes No

5. **Approvals/Changes:** Yes No

6. **Maintenance:** Required Okay

Access:

gates

dike crest

Damages/Repairs:

dike

bank protection

floodboxes

pumps

drainage

Vegetation Control:

animal activity

debris

	Required	Okay
7. Flood Response Plan:		
Flow Forecasting	<input type="checkbox"/>	<input type="checkbox"/>
Contact list	<input type="checkbox"/>	<input type="checkbox"/>
Materials	<input type="checkbox"/>	<input type="checkbox"/>
Equipment	<input type="checkbox"/>	<input type="checkbox"/>
Communications	<input type="checkbox"/>	<input type="checkbox"/>
Flood Patrol	<input type="checkbox"/>	<input type="checkbox"/>
Warning/Evacuation Plan	<input type="checkbox"/>	<input type="checkbox"/>

8. Follow-up Action Complete: Yes No
 (submit report to DIOD)

Date: _____ Signed _____

10/07/98

Sheet No. _____

File No. _____

Flood Protection Inspection Report

Dike Length: _____

DIKE: _____

REACH: _____

DATE INSPECTED: _____ **Signed** _____

The condition of the flood protection works is as reported below:

1. **DIKES:** (access, gates, locks, vegetation growth, gravel surface, height, slopes, erosion, animal burrows, seepage, trash, berms, relief wells)

2. **BANK PROTECTION:** (loss of rock, settlement, slumping)

- 3. **FLOODBOXES/PUMP STATIONS:** (inlet and outlet channels, gate operation, trash racks, debris, erosion, corrosion, structure, discharge structure, electrical and mechanical components)

- 4. **WORK REQUIRED:**

- 5. **ADDITIONAL INFORMATION** (see over) (sketch, photos, etc.)

6. **WORK COMPLETED:** Date: _____ Signed _____

Dike Patrol Log

Date: _____ Inspector: _____

Time Commenced: _____ Time Completed: _____

1. Gauge Height	Design WL	Time	Water Level
Gauge _____	_____	_____	_____
Gauge _____	_____	_____	_____

2. Landside Seepage	Comments/Location
Boils Yes <input type="checkbox"/> No <input type="checkbox"/>	Clear: _____ Dirty: _____ Piping: _____
Ponding Yes <input type="checkbox"/> No <input type="checkbox"/>	_____

3. Landside Slope	Comments/Location
Cracking Yes <input type="checkbox"/> No <input type="checkbox"/>	_____
Sloughing Yes <input type="checkbox"/> No <input type="checkbox"/>	_____
Seepage Yes <input type="checkbox"/> No <input type="checkbox"/>	_____

4. Dike Crest	Comments/Location
Accessible Yes <input type="checkbox"/> No <input type="checkbox"/>	_____
Cracking Yes <input type="checkbox"/> No <input type="checkbox"/>	_____
Settlement Yes <input type="checkbox"/> No <input type="checkbox"/>	Sinkholes: _____
Freeboard	_____

5. Riverside Slope	Comments/Location
Erosion Yes <input type="checkbox"/> No <input type="checkbox"/>	Dike Fill: _____ Riprap: _____
Instability Yes <input type="checkbox"/> No <input type="checkbox"/>	_____

6. Floodboxes	Comments/Location
Gates Open <input type="checkbox"/> Closed <input type="checkbox"/>	Leakage: _____ Flow Estimate: _____

7. Pumps	Comments/Location
Inlet/Outlet	Open: _____ Obstructed: _____
Operating Yes <input type="checkbox"/> No <input type="checkbox"/>	Flow Estimate: _____

8. Required Action _____

Notification: _____ To Whom: _____ Time: _____

Refer to System Operation & Maintenance Manual

Dike & River Assessment - Information Log

SITE NUMBER: _____

A Dike & River Assessment Form should be completed for each site showing a potential or actual dike failure or river problem. The Team Leader should complete the form and submit it to the Chief of Planning. Each form should be provided with a unique site number that corresponds with each problem area. The site should, in turn, be staked and flagged with this number to facilitate locating by field operations.

Dike Assessment or River Assessment

Part I - Location and Access
 Diking or River System: _____
 Description of dike section or river reach inspected (provide nearest landmark(s) and access information).
 Use Site Location Map to facilitate locating section or reach.

**Site Location Map &/or
Situation Sketch**

N
↑

Part II - Supervisor / Inspector
 Supervisor / Inspector _____
 Date: _____ Time(24 hr.) Started: _____ First _____ Last _____
 Finished: _____
 d / m / y

Part III - Water Levels (Gauges)

River reach or Gauge:	Design Water Level or Flood Level (m)	Time (24 hr.)	High Watermark (m)
Name _____	_____	_____	_____

Water Level Change: Rising Falling Unknown
 _____ mm rise/fall over last one hour, _____ mm rise/fall over last 24 hours,
 _____ mm rise/fall since last inspection; date/time of last inspection

Comments: _____

Comments: _____

Part IV - Assessment Check situation and circle problem. If more than one situation, number according to severity. Use Situation Sketch to assist in describing situation.

<p style="text-align: center;">DIKE</p> <p><input type="checkbox"/> Riverside (Erosion/Instability)</p> <p><input type="checkbox"/> Dike Crest (Settlement/Cracking/Access/Freeboard)</p> <p><input type="checkbox"/> Landside Slope (Seepage/Instability/Cracking)</p> <p><input type="checkbox"/> Flood Box (Gate Leaking)</p> <p><input type="checkbox"/> Flood Box (Seepage)</p> <p><input type="checkbox"/> Seepage (Boil, Ponding)</p> <p><input type="checkbox"/> Internal Drainage</p> <p><input type="checkbox"/> Other: _____ Specify _____</p>	<p style="text-align: center;">RIVER</p> <p><input type="checkbox"/> Flooding</p> <p><input type="checkbox"/> Bank (Erosion, Overflow)</p> <p><input type="checkbox"/> Debris Jam</p> <p><input type="checkbox"/> Public (Risk/Harm)</p> <p><input type="checkbox"/> Property (Threat/Damage)</p> <p><input type="checkbox"/> Bridge & Abutment (Erosion/DebrisJam/Highwater)</p> <p><input type="checkbox"/> Road or Causeway (Erosion/Highwater)</p> <p><input type="checkbox"/> Other: _____ Specify _____</p>
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Part V - Risk Evaluation Severity: High _____ Medium _____ Low _____
 Risk to: people infrastructure property environment:

Part VI - Operation Requirements & Constraints
 Operation requirements (sand bagging, rip-rapping, etc.) & operation constraints (access difficulty, heavy equipment limitations, etc.).

Chief of Planning

Operation Priority:
 High: _____ Med.: _____ Low: _____
 Authority: _____
 Time: _____ Date: _____