

Smoke Exposure from Wildland Fires



Interim Guidelines for Protecting Community Health and Wellbeing

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Manitoba Health

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1 INTRODUCTION

Smoke from wildland fires can pose a health risk. Being prepared can help prevent harm. Spring is a good time to review preparations for the wildland fire season.

Manitoba Health supports the health care sector and communities during wildland fires. The decision to evacuate because of smoke is complex. Before evacuating, it is important to assess health risks. Evacuations can be risky, disruptive and costly. They should happen only when health benefits outweigh all risks. Scientific evidence about the effects of wildland fire smoke on human health is limited. Various sources were used to prepare these guidelines.

The responsibility and final authority in a community for the declaration of an emergency lies with the local mayor, chief or designate. Sometimes an evacuation decision must be made quickly because of an immediate fire threat. When smoke threatens a community, there may be time to consult and discuss action plans. Consultations may include:

- Manitoba Conservation
- Office of the Fire Commissioner (OFC)
- Emergency Measures Organization (EMO)
- Manitoba Health: Office of Disaster Management (ODM)
- Regional Medical Officer of Health
- Regional Health Authorities
- Manitoba Health: Public Health and Primary Health Care Division
- Manitoba Infrastructure and Transportation
- the mayor and council of a municipality
- First Nations band councils, Aboriginal and Northern Affairs, Manitoba Association of Native Fire Fighters (MANFF), Indian and Northern Affairs Canada (INAC), First Nation and Inuit Health (FNIH), RCMP where onsite.

EMO coordinates all of these organizations during a wildland fire. Each spring, EMO begins preparing for evacuations that might occur throughout the year.

1-1 Objectives

These guidelines are intended to assist the health sector, communities and other stakeholders in communicating health risks and recommending actions or precautions to protect people from wildland fire smoke exposure.

1.2.1 Wildland Fires

Wildland fires are an annual occurrence throughout Manitoba. They are caused by accidental or intentional human activity and lightning strikes. Though they often involve remote forested areas, wildland fires can affect communities. Large fires may disperse smoke over great distances. Occasionally, larger centers are affected.

1.2.2 Smoke Composition

Wildland fire smoke composition depends on many factors, including the types of vegetation burned. Pollutants in smoke can include deadly gases like carbon monoxide and many solid and liquid elements often known as particulates or particles. Many, like acrolein, formaldehyde and benzene, are toxic or carcinogenic for humans. We measure particle levels to tell us when we need to reduce health

risks by evacuating people. When substances other than wild vegetation are burning, we may need additional precautions.

1.2.3 Air Quality

Air quality refers to the state of the air around us. Poor air quality occurs when pollutants, such as those in smoke, reach high enough concentrations to endanger human health (and/or the environment).

Individuals react differently to air pollutants. Air quality health effects are determined by the length of time exposed, how much air is breathed, personal health and the concentration of pollutants in the air.

The Air Quality Health Index (AQHI) is used in Winnipeg and Brandon to provide information about pollution levels, risk levels and recommended actions. Information on the AQHI and how it is applied is available at: <http://www.manitoba.ca/conservation/pollutionprevention/airquality/aq-health/index.html>

For communities without AQHI monitoring, visibility can be used as an indicator of risk from smoke (See Section 3).

1.2.4 Particulates

Sources of airborne particles in both urban and rural settings can include:

- motor vehicles
- wood burning stoves and fireplaces
- dust from construction, landfills and agriculture
- wildland fires and brush or waste burning
- industrial sources
- wind-blown dust

Particle levels are a principal concern in wildland fire smoke. The size of particles in the air we breathe affects their potential to cause health problems. Particle pollution may contain substances like carbon, sulphur and nitrogen compounds, metals and organic chemicals. Particle size is usually measured in microns, which are units of one millionth of a metre. Coarse particles range from 2.5-10 microns in diameter.

Fine particles, with diameters less than 2.5 microns are often linked to health effects. Particles in this size range are slow to clear from the lungs when they are inhaled.

Particles from smoke tend to be extremely small, with a size range near the wavelength of visible light (0.4 to 0.7 microns). At this size range, smoke particles efficiently scatter light and make it difficult to see, explaining why people often become disoriented in smoke. It also explains why some smoke particles can be inhaled deeply into the lungs and why these are a greater health concern than larger particles.

1.2.5 Health Effects of Wildland Fire Smoke

Particulate matter exposure is the principle public health threat from short-term smoke exposure. The health effects of smoke from wildland fires range from eye, nose or throat irritation to serious problems such as reduced lung function, bronchitis, exacerbation of asthma and even a risk of death. People who are otherwise healthy may have irritated eyes, increased mucus production in the nose or throat, and/or coughing or difficulty breathing, especially during exercise. People with existing respiratory or cardiovascular conditions may experience aggravation of existing conditions.

People at increased risk for adverse health effects include:

- **people with existing respiratory conditions** such as lung cancer, asthma or chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema
- **people with existing cardiovascular conditions** including angina, previous heart attack, congestive heart failure or irregular heartbeat
- **infants and young children** may be more at risk because they have elevated metabolic rates and immature immune systems that make them more at risk
- the **elderly** tend to be more at risk because respiratory, cardiovascular and immune systems are not as strong as they may have been
- during **pregnancy**, both mother and fetus may be harmed by wildland fire smoke because it contains many of the same compounds as cigarette smoke
- **diabetics** are at risk because they may have underlying conditions such as cardiovascular disease
- **smokers** may have compromised lung function
- **outdoor athletes and workers** are at risk when they are breathing deeply and rapidly

Carbon monoxide exposure may happen to anyone close to a fire, especially if it is smouldering. Fire fighters and people with cardiovascular disease are at increased risk. Symptoms of carbon monoxide exposure may include headache, weakness, dizziness, confusion and visual impairment. Prolonged or heavy exposure may result in a coma and death.

Chemicals like **formaldehyde** and **acrolein** can irritate eyes and the respiratory system. They may also trigger asthma.

Short term exposures to smoke containing agents that can cause cancer, such polycyclic aromatic hydrocarbons or benzene, may increase cancer risk over a lifetime.

1.2.6 Populations At Risk

Populations at risk for smoke exposure include people considered sensitive, vulnerable or both.

Sensitive people may experience abnormally severe or prolonged symptoms when exposed to smoke. They may include:

- people with existing respiratory and cardiovascular conditions
- infants and young children
- elderly people
- pregnant women
- other groups (diabetics, smokers and people participating in sports or strenuous work outdoors) (Lipsett et al. 2008) (Environment Canada modified 2009) (Health Canada modified 2006).

Vulnerable people are those who cannot comfortably or safely use standard emergency resources. Evacuating vulnerable people may require extra planning. They may include people who are:

- critically ill
- elderly
- physically or mentally disabled
- unable to advocate or speak for themselves
- geographically, culturally or socially isolated
- medically or chemically dependent
- homeless or street-involved
- recent immigrants
- refugees

1.2.7 Health Authority

In this guideline, health authority means an organization or agency responsible for health facilities and medical services in a particular area.

1.2.8 Local Authority

In this guideline, local authority refers to governments such as villages, towns, municipalities, regional districts, regions, counties or First Nations in charge of emergency management for their residents.

2 ROLES AND RESPONSIBILITIES

2-1 Local Authorities

When wildland fire smoke threatens Manitobans, municipal governments and First Nations are involved in decisions about evacuating people in their communities.

2.1.1 First Nation Communities

Manitoba Health is part of a larger federal/provincial group concerned with evacuations because of wildland fire smoke in Manitoba First Nations communities. The group provides First Nations with a process to use in an evacuation. The group includes:

- Indian and Northern Affairs Canada (INAC)
- First Nations Inuit Health (FNIH)
- Public Safety Canada (PSC)
- Public Health Agency of Canada (PHAC)
- Emergency Measures Organization (EMO)
- Emergency Social Services (ESS)
- Manitoba Conservation
- Manitoba Aboriginal and Northern Affairs
- Manitoba Association of Native Fire Fighters (MANFF)

If a First Nations community is affected by smoke, the Chief and Council are notified by Manitoba Conservation, the local nursing station or residents. INAC is notified and a meeting is called with INAC, the local police authority, Manitoba Conservation, MANFF and the Chief and Council. The FNIH nurse manager or director of nursing provides information for the meeting and a decision is made about whether general evacuation is required or whether there is a need to evacuate those at highest risk from smoke exposure in the community.

If evacuation is not called for, group members will monitor the situation and reconvene if conditions change.

If the decision is to evacuate, INAC will notify group members to begin the evacuation by priority (Manitoba Association of Native Fire Fighters, 2006).

2.1.2 First Nations Inuit Health (FNIH)

Health Canada works with First Nations and Inuit communities to help people stay healthy and prevent chronic or contagious diseases:

- **Community programs** aim at improving health and reducing health risks in areas of children and youth; chronic disease and injury prevention; mental health and addictions.
- Health Canada works with the provinces and First Nations to support basic **public health protection** on reserves. Because Health Canada does not have public health legislation that applies to reserves, it works with provincial governments and First Nations to address regulatory issues.
- FNIH funds and provides **primary health care** services in 76 nursing stations located in remote and isolated reserves where there are no provincial services readily available. It provides home and community care on all reserves and provides limited primary care services to small isolated reserve communities.

- The **Non-Insured Health Benefits** program provides approximately 780,000 eligible First Nations and Inuit people with a limited range of medically necessary health-related goods and services not provided through private insurance plans, provincial/territorial programs or other publicly-funded programs.
- **Health governance and infrastructure support** helps eligible First Nations, Inuit, provincial, territorial and non-governmental organizations support health programs and services. Health governance and infrastructure support is delivered at national, regional and community levels.
- **FNIH staff work as community team members** to address health risks from smoke and forest fires. This includes identifying people most at risk because of pre-existing health issues and ensuring that appropriate medications are available should these people need to be evacuated. While nurses do not decide when evacuation should occur, they help the decision making process by identifying increases in demand for health services caused by smoke exposure.

2.1.3 Local Municipal Government

During wildland fire season the local authority can require mandatory evacuation of the community. The local authority will work with EMO and other organizations that can help monitor the situation and conduct a voluntary or mandatory evacuation. Decisions to evacuate include many factors such as transportation options or community resources such as availability of a cleaner air shelter.

If a municipality is affected by smoke it is the responsibility of the mayor or reeve and council to determine the best course of action for that community. In Manitoba, if the decision is made to evacuate, Section 12 of *The Emergency Measures Act* provides authority for municipal officials working under a local state of emergency “to issue an order to any party to do everything necessary to prevent or limit loss of life and damage to property or the environment.” This includes evacuating people, removing livestock, removing personal property and arranging for care and protection of people and their possessions.

2-2 The Province of Manitoba

2.2.1 Manitoba Conservation

Manitoba Conservation Fire Program is responsible for the detection and suppression of wildland fires. The program manages all human and equipment resources needed for fighting wildland fires in the province. Staff monitor weather patterns, lightning strikes, soil moisture and forest conditions to determine the probability and location of wildland fires. Manitoba's Fire Program works in close co-operation with other forest firefighting agencies and jurisdictions.

During forest fire season in Manitoba (April to October) , the Manitoba Conservation website offers timely information, including the *Fire Update* (outlining the general fire status in the province), the *Fire Situation Report* (a numerical table outlining the number of fires, their status and the personnel and equipment being used to battle the fires), a weather forecast, a fire hazard map and more. Each of these reports is updated daily or as required.

2.2.2 Manitoba Public Health and Primary Health Care Division

The core functions of Manitoba Public Health are:

- population health assessment
- health surveillance
- health protection

- disease and injury prevention
- health promotion

Manitoba Health, Public Health and Primary Health Care Division, provides leadership and coordination for an integrated approach to public health programs and services. Prior to a disaster, Manitoba Public Health collaborates with other government departments to provide guidelines and information about the five core functions of public health during a disaster. During a disaster, Public Health program staff will coordinate the provincial public health response, provide appropriate communications to the public and health care providers and provide support to the regions for their public health response. Manitoba Public Health is organized into the functional branches of Communicable Disease Control, Environmental Health, Emergency Preparedness and Epidemiology and Surveillance. Public health programs and services are provided by provincial program staff, public health inspectors, and provincial and regional medical officers of health.

A medical officer of health (MOH) is a physician trained in community medicine, including epidemiology and statistics. With a background of medical training, knowledge of health determinants, human physiology and disease, MOHs provide a valuable and objective resource. They work as part of the provincial and regional public health team to promote consistent and efficient public health practice and response to public health issues. They provide 24-hour public health coverage in Manitoba and are responsible for ensuring that requirements of *The Public Health Act* are met.

MOHs provide medical guidance, expertise and leadership under *The Public Health Act*. They protect people from the effects of wildland fires and smoke by contributing science based risk assessment and helping to make the public aware of the risks. Manitoba's Public Health and Primary Health Care Division provides provincial policy direction and guidelines for responding to wildland fire smoke at a local and regional level.

2.2.3 Office of Disaster Management

Manitoba Health's Office of Disaster Management (ODM) makes sure the health sector can respond effectively to health needs in Manitoba during a disaster. During a disaster, ODM helps coordinate health sector activities with other agencies and organizations involved in the response.

ODM and regional health authorities work with local and provincial agencies to increase preparedness programs. Hazard and risk reduction helps communities prepare to respond better and recover faster when disasters occur.

2.2.4 Emergency Measures Organization (EMO)

In Manitoba *The Emergency Measures Act* gives EMO responsibility for managing the provincial response to a major emergency or disaster. This includes:

- oversight and coordination of all aspects of emergency preparedness in the province
- managing, directing and coordinating emergency responses from all provincial departments, other than initial response and incident management at the site of the disaster or emergency
- coordination between departments, other levels of government, non-governmental organizations, and the private sector
- operation of the Manitoba Emergency Coordination Centre and the Emergency Mobile Coordination Centre

Under the *Act* the EMO also:

- prepares and maintains the all-hazards *Manitoba Emergency Plan* (MEP), including its schedules and hazard-specific annexes. This coordination plan is prepared in consultation with other

provincial departments and certain federal departments, and sets out the provincial emergency management concept and structure

- helps municipalities with their emergency management programs, which include training, exercises, preparedness, response and recovery, business continuity planning and critical infrastructure assurance
- approves each compliant municipal emergency plan
- advises local authorities and coordinates provincial, federal and non-government organization (NGO) assistance during an emergency or disaster
- advises the minister and local authorities on provincial and local states of emergency and emergency prevention orders
- informs public on emergency preparedness, response and recovery
- administers the provincial Disaster Financial Assistance (DFA) program, and the federal/provincial Disaster Financial Assistance Arrangement (DFAA)
- coordinates Manitoba's Business Continuity Program (BCP)
- acts as a secretariat to various government organizations concerned with public safety
- participates in national emergency management policy and strategy development

2.2.5 Emergency Social Services (ESS)

Manitoba Family Services and Labour has a distinct emergency program called Emergency Social Services (ESS), to meet the essential survival needs of people following an emergency or disaster. The Manitoba Emergency Measures Organization requests ESS when required.

ESS provides extra help when normal community social service resources are unable to cope with a disaster situation. ESS continues until regular social services resume operations or until other plans or programs come into operation. The object is to minimize social and economic disruptions that affect the well-being of individuals, families and the community as a whole.

If requested, Family Services and Labour staff will be assigned to help a local authority in an emergency. Staff may include social workers, employment and income assistance counsellors, child care coordinators, behaviour specialists, finance officers and administrative support teams. Staff are located in Winnipeg, Central, Eastman, Westman, Interlake, Parkland and Northern regions.

ESS works with and supports municipal emergency response teams. Local authorities are responsible for managing emergency responses. When the local authority's capacity to respond is exceeded, it should request help from neighbouring municipalities and, as required, help from the province. In some circumstances, such as when there is no local government, the province may assume primary responsibility for managing an emergency operation.

The deputy minister and assistant deputy minister for the Community Service Delivery Division, and the executive directors of Rural-Northern Services, Winnipeg Services, and Service Delivery Support advise the ESS director/program specialist who coordinates the department's response.

Manitoba Family Services and Labour works collaboratively with Partners in Disaster, an NGO coalition. Services and supplies can include:

- registration of evacuees
- help to reunite families
- response to inquiries
- food or meals for displaced people
- culturally appropriate and sensitive foods for evacuees
- clothing or emergency covering to help preserve health and dignity
- diapers

- safe, immediate, temporary accommodations for evacuees using congregate facilities, private arrangements or hotels, as required.
- information on immediate emergency help available
- temporary care of unattended children and dependent adults
- counselling for people with problems and needs created or aggravated by the emergency
- staff support to one-stop facilities that provide: registration and inquiry, food services, accommodation, and personal services
- coordination of emergency social services in reception centres such as liaison officers and on-site response personnel to help and advise local authorities

2-3 Health Authorities

2.3.1 Health Care Staff

Local health facility staff are responsible for local community health services. Health staff can help community members with information on how to reduce smoke exposure and negative health effects. Health staff can also teach communities how to prepare people in case of evacuation. In an evacuation, health care staff must ensure that people with chronic medical conditions have appropriate medication and documentation with them.

If smoke threatens a community, but there is no imminent fire risk, health facility staff may be asked for an opinion about the health threat and possible evacuation need. This may include consideration of:

- smoke assessment by the municipality or designate to give some idea of air quality concerns and what actions should be considered
- a recommendation to the community to reduce their exposure to smoke and to individuals to make preparations in case evacuation is required (ex: packing bags, ensuring adequate amounts of regular medications, etc.)
- preparation for possible evacuation of priority groups (See Section 3.2.2)
- medical assessments of individuals experiencing health problems aggravated by smoke

3 RECOMMENDATIONS

3-1 Prevention and Mitigation

3.1.1 Local Authority: Preparation and Planning

1) Activities for the local Emergency Coordinator:

- develop a method to identify smoke conditions and changes in visibility – before the wildland fire season; designates in each community can identify specific landmarks at various distances that can then be used to estimate smoke concentrations and risks
- identify sites within the community that can be used as cleaner air shelters in the event of short-term smoke conditions within the community
- develop a list of key contacts and decide who takes charge during an incident
- teach citizens about hazards and provide a plan to follow in case of a wildland fire

3.1.2 Health Authority: Preparation and Planning

1) Activities for the Health Authority:

- ensure a plan is developed to monitor health effects
- support health facilities

2) Activities for the Regional Health Authority (RHA) Disaster Management Officer (DMO)/ Emergency Preparedness Officer (EPO) OR First Nation community Emergency Management Officer:

- review emergency preparedness plans for each health facility and review roles and responsibilities of health staff
- arrange a planning review with the local authority or community's emergency coordinator or contact person
- develop a telephone list of trained nurses and other health care staff
- ensure the community has a plan to inform its citizens of hazards and procedures to follow in the event of a wildland fire
- if a health facility is located in a community, meet with the local authority's emergency coordinator and identify someone to assess smoke conditions and changes in visibility
- ask local authorities to identify sites within the community to use as cleaner air shelters when the community experiences short-term smoke conditions and make sure they are available for emergency use (criteria for identifying and preparing cleaner air shelters is provided in Appendix B)

3.1.3 Health Facility: Preparation and Planning

1) Activities for Health Facilities:

- review the stock of emergency supplies (first aid, oxygen and oxygen delivery systems, emergency kits, etc).
- teach facility staff about the wildland fire response plan
- conduct wildland fire exercises for all who will help in emergencies
- update the list of sensitive and vulnerable patients (as outlined in Section 1.2.6), including the patient's health information and specific care needs; during smoke threats, a list of priority risk people will be required and this will help-- in larger communities, several care providers may be involved in preparing these lists *Note: Individual health information records partially filled out in advance can help during a selective priority or full evacuation; a copy should be given to the evacuee and a copy kept at the facility*

- evaluating a facility's ability to shelter people from smoke requires: knowledge of preparation of cleaner air shelters (Appendix B), identification of experts in heating, ventilation and air conditioning systems in hospitals or health care facilities, methods and supplies for monitoring air quality in the facility, available supplies such as filters for improving air quality

3-2 Response

3.2.1 Risk Assessment of Smoke Conditions

It is important for each community to designate someone to assess health risks from wildland fire smoke before calling for an evacuation. Evacuation can be risky and cause considerable community disruption. The risks must be balanced.

Assessment should include the following criteria:

1) Air quality

It is important that health professionals get immediate information about air quality so that they can help make timely decisions that protect public health. Communities without continuous particulate monitoring (ex. Air Quality Health Index) need other ways to estimate particle levels.

This is true even in areas that do have continuous monitors, because smoke concentrations can vary widely within short distances and can change rapidly. A visibility index gives a quick, alternative way to estimate smoke levels. Using landmarks at known distances, an experienced observer can provide a reasonable estimate of particle concentration. It is wise to identify visibility landmarks before they are needed.

The following is a guide for estimating particulate levels by using landmark visibility:

Table 1 Estimating Particulate Matter Concentrations from Visibility Assessment

Air Quality Category	Equivalent approx. PM2.5 1- 3-hour average in µg/m3	Visibility in Km
Good	0-40	15 kms and up
Moderate/Unhealthy for Sensitive Groups	41-175	5-14 kms
Unhealthy	176-300	2.5-4 kms
Very Unhealthy	301-500	1.5-2 kms
Hazardous	over 500	Less than 1 km

Adapted from *Wildfire Smoke: a guide for public health officials*: <http://www.arb.ca.gov/smp/progdev/pubeduc/wfgv8.pdf>

When estimating particulate matter concentrations visually, it is important to face away from the sun. Determine the limit of your visibility range by looking for landmarks at known distances. The visibility range is the point at which even high-contrast objects totally disappear (ex: a dark building viewed against the sky at noon). Once visibility has been determined in kilometres, use Table 2 (below) to identify suggested health messaging and potential actions based on the air quality category. The visibility index is not effective at night or when humidity is high.

2) Health effects of smoke

Health authorities are responsible for monitoring the effects of smoke on local residents. This could be assessed through health centre or emergency room monitoring of increased reports of smoke-related health effects. Other means of monitoring health effects within a population could include monitoring calls to Emergency Medical Services (EMS), local health facilities or Health Links.

3) Duration of smoke/ weather forecast

Determine how long the smoke has been affecting the community, and use weather forecasts to estimate how long it is expected to remain in the area. Consider whether smoke exposure is continuous or intermittent.

From April to September, the *Western Canada BlueSky Smoke Forecasting System* provides an hour-by-hour forecast of smoke from wildfires in Western Canada. However, the output is still considered experimental as the forecast is produced by a system that is an ongoing research project. For more information on BlueSky or to review the current forecast, visit: www.bcairquality.ca/bluesky/

Heat is also a concern in managing smoke exposure. Since wildland fires are likely to occur in summer and precautions may involve staying indoors with windows and doors sealed, managing heat may also be required. Exposure to heat can lead to dehydration, exhaustion, heat stroke or other serious illnesses and even death. Fortunately, most heat related illnesses can be prevented if people understand the causes. For more information about heat related illness, visit: www.manitoba.ca/health/publichealth/environmentalhealth/heat

A combined approach, assessing air quality, health effects and estimated duration of smoke, will help in making decisions. It is also important to take into account availability of local services such as access to health care and cleaner air shelters.

3.2.2 Prioritization of Evacuees

Smoke evacuations are risky, so a decision needs to include information from officials about smoke distribution, weather, road visibility, road accessibility and numerous other factors.

When a community is experiencing heavy smoke and it is expected to remain heavy for some time, evacuating people at risk should be considered. Efforts to keep family units, caregivers and support people together must also be acknowledged, particularly for priority #1 and #2 people.

Priority #1 – highest risk:

- people experiencing symptoms such as: worsening cough, shortness of breath beyond what is usually experienced, difficulty breathing without exertion, chest pain or tightness, fluttering in the chest or feeling lightheaded, significant weakness or fatigue
- people with respiratory and/or cardiac conditions (with or without symptoms listed above)

Priority #2 – high risk (in no ranked order):

- elderly, frail or infirm
- people who have difficulty walking
- newborns, infants and children
- pregnant women (any trimester)
- people requiring special care and supportive care (ex: wheelchair, stretcher, institutionalized residents, on dialysis, home care)

Priority #3 – increased risk individuals (in no ranked order):

- people without symptoms who have chronic illnesses that are not cardiac or respiratory
- others case-by-case

3.2.3 Recommendations for Heavy Smoke

The following table categorizes air quality based on the level of particulate matter and makes recommendations on potential health messages and health team actions for each category.

Table 2 Recommended Messages and Actions by Air Quality Category during Wildland Fires

Air Quality Category	Health Messages At-Risk (Sensitive*) Populations**	Health Messages General Population**	Actions for Health Team**
Good <i>Visibility: 15 kms and up</i> 1-3 hour average PM2.5 0-40 µg/m3	Enjoy your usual outdoor activities.	Ideal air quality for outdoor activities.	Be aware of forecast (current, daily, tomorrow).
Moderate/ Unhealthy for Sensitive* Groups <i>Visibility: 5-14 kms</i> 1-3 hour average PM2.5 41-175 µg/m3	Reduce or reschedule prolonged strenuous activities and limit time spent outdoors.	Be aware of health effects of smoke and related symptoms.	Advise public about: health effects of smoke, related symptoms, and ways to reduce exposure. If the smoke event is projected to be prolonged, evaluate and notify possible cleaner air shelter sites and prepare evacuation plans for At-Risk Populations.
Unhealthy <i>Visibility: 2.5-4 kms</i> 1-3 hour average PM2.5 176-300 µg/m3	Avoid prolonged strenuous activities and stay indoors if possible.	Reduce or reschedule prolonged strenuous activities outdoors, especially if you experience symptoms.	Consider cancelling public events, based on public health and travel considerations (ex. number of people, level of physical exertion, etc.)
Very Unhealthy <i>Visibility: 1.5 -2 kms</i> 1-3 hour average PM2.5 301-500 µg/m3	Avoid all strenuous activities and stay indoors if possible.	Avoid prolonged strenuous activities and stay indoors if possible.	Consider having At-Risk populations go to cleaner air shelters in the community.
Hazardous <i>Visibility: < 1 km</i> 1-3 hour average PM2.5 >500 µg/m3	Avoid all strenuous activities and stay indoors.	Avoid all strenuous activities and stay indoors.	Cancel public and outdoor events (ex. competitive sports). If smoke event is projected to be prolonged, consider evacuation of At-Risk populations.

Adapted from *Wildfire Smoke: a guide for public health official*: <http://www.arb.ca.gov/smp/progdev/pubeduc/wfqv8.pdf>

***Sensitive:** People with existing respiratory and cardiovascular conditions, infants and young children, the elderly, pregnant women and possibly other groups (diabetics, smokers and people participating in sports or strenuous work outdoors).

** Higher advisory levels automatically incorporate all of the guidance/ recommended actions offered at lower levels of concern

*****GENERAL MESSAGE ON WHEN TO SEEK CARE:** *Seek medical care if experiencing symptoms of heart or lung disease. Symptoms of heart or lung disease may include: repeated coughing, shortness of breath or difficulty breathing, wheezing, chest tightness or pain, heart palpitations, unusual fatigue or light-headedness.* ***

3-3 Recovery

3.3.1 Return of Evacuees

Return of evacuated people can be considered when the following criteria have been met:

- the smoke or fire emergency that caused the evacuation is over – refer to risk assessment of smoke conditions (3.2.1)
- people with health risks and care needs can be managed locally with existing resources
- family units, caregivers and support people can be kept together
- local officials have agreed it is safe to re-enter the community, clean water is available and utilities are working properly

Re-entry of evacuees may be considered in reverse priority order. This ensures that higher priority evacuees stay away until air quality has improved to a level where no harmful effects are anticipated. Local officials should also consider providing information about food safety if a power outage affected refrigeration (See Appendix E).

3.3.2 Assessment/Evaluation

When the smoke emergency is over the whole experience should be assessed by the local committee, and the health authority's disaster management officer should conduct a review and use it to update emergency plans, if needed.

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APPENDICES

- **Appendix A:** *Contingency Evacuation Plan for Health Facilities and Home Care Clients: SAMPLE*
- **Appendix B:** *Identification and Preparation of Cleaner Air Shelters*
- **Appendix C:** *Create a Cleaner Air Shelter at Home: Checklist*
- **Appendix D:** *Suggested Preparations for Evacuation*
- **Appendix E:** *FACT SHEET- Food-borne Illness: Returning Home Following an Evacuation*

Appendix A Contingency Evacuation Plan for Health Facilities and Home Care Clients: SAMPLE

Adapted, with permission, from the NOR-MAN RHA

It is the responsibility of the regional health authority (RHA) to ensure appropriate planning for the possibility of evacuating the health care facilities it administers. The section below provides an example of initial planning for movement of patients from the three areas of responsibility: home care, long-term care and acute care. For more detail, refer to the specific RHA evacuation policy.

PERSONAL CARE HOME RESIDENTS

Clients of personal care homes A and B should be categorized according to their medical needs and care they require. Care needs will help determine what mode of transportation will be required to evacuate care home residents from the community.

Evacuation Priority:

1. requires oxygen or diagnosis exacerbated by smoke
2. patient may be grouped with others, has active behavioural challenges
3. patient may be discharged to family (if available), has no diagnosis exacerbated by smoke and no active behavioural challenges

* Care categorized according to help required with activities of daily living (ADLs).

- a. requires maximum assistance with all ADLs
- b. requires minimal assistance with ADLs, can transfer with minimal staff intervention
- c. requires supervision or direction with ADLs or independent

Clients	Levels of Care			Evacuation Priority			Mode of Transportation			
	High	Med	Low	High	Med	Low	CAR/ VAN	AMBULANCE	AIR	INDV.
PCH A (59)	20	22	16	11	13	33	21	19	19	15
58 Residents										
Residents on Oxygen								3	3	
Total	20	22	16	11	13	33	21	22	22	15

COMMUNITY – HOME CARE CLIENTS

Clients currently on home care services are categorized monthly based on their care needs and the level of services provided. This helps determine requirements for essential services.

High Risk – clients who will require home care services if support systems are unavailable and clients who are at risk if no services are provided, ex: clients requiring extensive support and supervision

Medium Risk – clients that may receive care although it may, for example, be modified in frequency and duration where support services are unavailable to meet all needs

Low Risk – clients not considered for care because adequate support is available to sustain the individual whether living alone or with others

Clients	HIGH RISK	MED RISK	LOW RISK	CAR/VAN	AMBULANCE	BUS	AIR
Includes any town and area	24	30	65		7		7
Village of Happy Rock							
Clients on Oxygen							
Village of Happyville					8		8
Village of Smallville					1		1
TOTAL	24	30	65		16		16
Note: clients have no family supports and will require additional assistance							
Majority of clients have family supports to help with evacuation. All clients can be transported by car/van or bus if needed with minimal support. High risk clients will require additional supports once relocated to another area.							

Appendix B Identification and Preparation of Cleaner Air Shelters

Before the wildland fire season, local authorities should identify cleaner air shelters. Cleaner air shelters can provide residents, especially sensitive or vulnerable individuals, with a safe place to get away from smoke. A cleaner air shelter is essentially an airtight location that holds clean air in and prevents polluted air from entering. In some cases, older homes may be poorly sealed and may not adequately protect people when outdoor air leaks inside. Some homes do not have air conditioning and homeowners rely on open windows and doors for cooling. During spring and summer, when outdoor temperatures are high, people who do not have proper ventilation or cooling may be at risk for heat-related illness such as heat stroke or heat exhaustion.

All of the information provided below was extracted and adapted from the Federal Emergency Management Agency (FEMA 453) document, Chapter 3; *Design Guidance for Shelters and Safe Rooms*. The FEMA document provides information about the design and construction of shelters for the protection of people against a variety of hazards (explosives, release of toxic substances and natural disasters). Some of the information is highly technical and consultation with a heating, ventilation and air conditioning (HVAC) expert may be needed. The FEMA document does not deal with wildland fire smoke, but some information about handling smoke may be adapted from it.

SELECTION CRITERIA

Table 1 presents criteria for selecting a cleaner air shelter for protection against airborne smoke. Although the protective envelope can be defined as the whole building, a room within the building (safe room) can provide a higher level of protection if it is tighter than the building as a whole or the location of the room is less subject to wind or buoyancy forces that induce infiltration.

Table 1 Criteria for Selecting a Cleaner Air Shelter

Criteria	Description
Accessibility	The shelter should be located so it can be reached quickly and must be accessible to persons with mobility, cognitive or other disabilities.
Size	Identify facilities that can comfortably occupy large groups (could include educational facilities, large commercial buildings, halls or anyplace), preferably facilities with central air conditioning and filtration.
Tightness	Newer buildings may be more desirable than older ones. They should have a low rate of air exchange between outdoors and indoors, a minimum number of doors and windows and ceilings should be of solid construction.
Heating, Ventilating and Air Conditioning system (HVAC)	The shelter should be capable of being isolated quickly from the HVAC system so that smoke or fumes do not enter the shelter. Assure that the facility can handle the increased cooling load due to high occupancy. Ductless mini split-type air-conditioner, fully enclosed air-handling unit (only if the unit and its ducts are fully within the cleaner air shelter) can be used. Conventional air conditioning systems must not be operated in the protective mode because the fans introduce outside air
Ventilation	Class 1 shelters (see Table 3): 15 cubic feet per metre (cfm) per person is the desired ventilation rate; however, the minimum ventilation rate is 5 cfm per

	person if that rate is adequate for pressurization. Class 3 and unventilated Class 2 (see Table 3) shelters are suitable only for short-duration use, not only because the low ventilation rate when occupied can cause carbon dioxide levels to rise, but also because protection diminishes as the time of exposure to the hazard increases.
Water and Toilets	Drinking water and a toilet should be available to occupants of a clean air shelter. This may involve the use of canned/bottled water and a portable toilet.
Communications	Cleaner air shelters should contain a radio to receive emergency instructions for terminating sheltering. A telephone or cell phone can be used to receive emergency instructions and to communicate with emergency management agencies.
Power	Electrical power and lighting are required. Class 1 and Class 2 (see Table 3) Cleaner air shelters require power for the air-filtration units. If power is lost in a Class 1 or Class 2 shelter, it will continue to protect at the level of a Class 3 shelter as long as the room remains sealed. Also consider a building with a backup generator.

IDENTIFICATION

Table 2 and Table 3 describe ventilated and unventilated shelters and further categorize them into three classes of shelters.

Table 2 Ventilated and Unventilated Shelters

SHELTER TYPE	DESCRIPTION	ADVANTAGE	DISADVANTAGE
Ventilated Shelter	Can be designed to provide filtered and conditioned fresh air.	May provide filtered and conditioned fresh air. Can be used for a longer period of time.	May be more difficult to find a building with this capability.
Unventilated Shelter	Tightly sealed room or building.	Any room or building can be turned into an unventilated shelter.	Cannot be occupied for long periods of time. Shelter is never perfectly tight and may have leakage paths.

Table 3 Categories of Shelters: Class 1, 2, 3

SHELTER CLASS	DESCRIPTION	PROTECTION	COST	ADVANTAGE	LIMITATIONS
<u>CLASS 1</u> Ventilated and pressurized with filtered air	Air is drawn from outside the room, filtered and discharged inside the room at a rate sufficient to produce an internal pressure. The clean air shelter is ventilated with filtered air and the internal pressure produced with filtered air prevents infiltration of outside air	HIGH	HIGH	Protection has no time limits Eliminates accumulation of Carbon dioxide (CO ₂)	It provides no protection against some toxic chemicals of high vapour pressure

<p><u>CLASS 2</u></p> <p>Filtration with little or no pressurization</p>	<p>Includes air filtration, but with little or no internal pressure. Without positive pressure, the cleaner air shelter does not prevent the infiltration of contaminated air.</p> <p><i><u>Class 2 unventilated:</u></i> air is drawn from inside the cleaner air shelter, filtered, and discharged inside it.</p> <p><i><u>Class 2 ventilated:</u></i> air is drawn from outside but at a flow rate too small to create a measurable differential pressure.</p>	<p>MED</p>	<p>MED</p>	<p>Protective against all gases</p>	<p>Protection diminishes with duration of exposure (and against non-filterable gases)</p>
<p><u>CLASS 3</u></p> <p>Unventilated, no filtration</p>	<p>Derives protection only by retained clean air within its tight enclosure.</p>	<p>LOW</p>	<p>LOW</p>	<p>Protective against all agents. No air-filtering capability and is unventilated.</p>	<p>Protection diminishes with time of exposure. CO2 build-up may limit time in the shelter</p>

High-efficiency air filtration

The protection a cleaner air shelter provides can be increased substantially by adding high-efficiency air filtration. Filtration may remove contaminants from the shelter as it enters the cleaner air shelter or remove contaminants as air is circulated within the room. With a filtration system drawing outside air, the level of protection the shelter provides is a function of the filter efficiency. It is important to recognize that increasing the efficiency of the filter will add stress to the system overall because of the added pressure needed to force the air through the new filter. All filters have limited service life. In operation, a HEPA filter loads with dust and other particles to increase the resistance to flow.

Commercial filter units that are designed for indoor air quality can be used in an unventilated Class 2 Cleaner air shelter. There are many different models available from several manufacturers; however, the filtering performance varies over a wide range. The HEPA filter element provides protection against liquid and solid aerosols such as those found in smoke, while the adsorber element protects against gases and vapours.

PREPARATION

After the room or location for the cleaner air shelter has been decided based on the criteria listed in Tables 1-3 above, the first decision is to determine the class of cleaner air shelter. Details for preparation and maintenance for the three classes of cleaner air shelters are presented below.

CLASS 3 Cleaner air shelter

Features of the Class 3 cleaner air shelter can be either permanent or expedient. Guidance for **preparing the cleaner air shelter** is presented below.

Checklist for preparing both Class 2 and 3 Cleaner air shelters

- Ceiling/Floor:** Temporarily seal baseboards by removing them and applying foam sealant in the gap at the floor-to-wall juncture or use caulk to seal the top and bottom of baseboards and quarter rounds. Electric baseboard heaters could be temporarily removed to seal the wiring penetrations and the gap at the floor-to-wall juncture.
- Pipes/Conduits/ Cables:** Seal penetrations using caulk, foam sealants, or duct seal by placing weather-stripping.
- Doors:** During the event, door sweeps or duct tape can be used to seal the gap beneath the door temporarily.
- Windows:** If older windows, reduce leakage by measures such as taping plastic sheeting over them.
- Electrical outlets and switches:** Expanding foam can be used or ready-made outlet sealers can be used to seal gaps behind switches and outlets.
- Ducts for supply, return, and exhaust:** Temporarily closing the ducts to the clean air by placing duct tape or contact paper over the supply, return, and exhaust grilles. Automatic dampers or hinged covers can be custom-made of sheet metal or wood, to be attached above or beside the opening for all applications except the door periphery.
- Fans:** Some shelter systems have been designed with the capability of automatically deactivating all fans in the building with a single switch. The low-cost alternative to automatic fan shutoff is to record on a checklist the location of switches for all fans in the building.
- Air conditioning:** Cover window-type or through-the-wall air conditioner with plastic sheeting and tape over the inside of the window and/or air conditioner.

Maintenance for a Class 3 Cleaner air shelter

The Class 3 cleaner air shelter has no air filtration equipment and, therefore, requires little or no routine maintenance. It has no mechanical equipment unless there are dampers for isolating the air conditioner. Maintenance requirements are limited to periodically checking supplies for deterioration or loss.

CLASS 2 Cleaner air shelter

The design details of the enclosure presented above also apply to the Class 2 cleaner air shelters (ventilated and unventilated).

Unventilated Class 2 Cleaner air shelter

For the unventilated Class 2 cleaner air shelter, the improvement in protection over the Class 3 cleaner air shelter is determined by the flow rate and the efficiency of the particulate filter (also known as air purifiers, indoor air cleaners, or indoor air quality units) for aerosols and the efficiency of the adsorber for gases and vapours. These filter units re-circulate air within the cleaner air shelter. There are four configurations: free-standing table top unit, free-standing floor unit, ceiling-mounted unit, and duct-mounted unit.

The protection provided by an unventilated Class 2 cleaner air shelter is determined by the clean-air delivery rate of the filter unit and the tightness of the enclosure. The clean-air delivery rate is a product of the filter removal efficiency (expressed as a decimal fraction) and the actual flow rate of the filter unit. If a high-efficiency filter unit is used, the clean-air delivery rate approaches the actual flow rate of the unit.

For the unventilated cleaner air shelter, floor/table model filter units and ceiling-mounted models should be placed in the center of the room to maximize air mixing. There should be no obstruction to the airflow into and out of the filter units. Duct-mounted models must conform to the requirements stated below. Ducts cannot be outside the envelope formed by the walls, ceiling, and floor.

1. The filter unit must have both an adsorber containing activated carbon and a particulate filter. The adsorber must have at least one pound of activated carbon for each 20 cfm of flow rate. For example, a 200-cfm unit requires at least 10 pounds of carbon adsorbent.
2. The particulate filter must have an efficiency of at least 99 per cent against one-micron particles.
3. The unit(s) must provide a total clean-air delivery rate of at least one cfm per square foot of floor area.
4. The adsorber must have the capability for chemisorption (removal of gases that are not removed by physical adsorption).

Ventilated Class 2 Cleaner air shelter

These are shelters for which the filter unit has inadequate capacity to produce a measurable overpressure with the size of the selected cleaner air shelter. In essence, the filter units are overrated by the filter unit manufacturer. Generally, if a filter unit capacity in cfm is less than one-fourth the area of the selected cleaner air shelter, depending on the type of construction, it will not produce a measurable overpressure. Matching the filter unit capacity to cleaner air shelter size for Class 1 (pressurized) cleaner air shelters is addressed later in this document.

Maintenance for a Class 2 Cleaner air shelter

The filter unit used in a Class 2 cleaner air shelter is an indoor air quality filter unit and, as such, it can be used routinely to improve the air quality in the spaces in or around the designated cleaner air shelter. A spare filter set, both adsorber and HEPA filter, should be stored in a sealed bag in the clean air shelter along with instructions and any tools needed for changing the filter quickly in an emergency.

CLASS 1 Cleaner air shelter

Designing and installing a ventilated cleaner air shelter is much more complex than an unventilated cleaner air shelter, particularly with regard to the filter unit. Pressurization requires introducing air from outside the protective enclosure; therefore, the removal efficiency of the filters is more critical in determining the protection provided. The system must employ ultra-high efficiency filters, and it must allow no air to bypass the filter as it is forced into the safe room.

Operating procedures for Class 1 cleaner air shelters are similar to those of Classes 2 and 3. The system is turned on immediately upon receipt of a warning. Tape, plastic, and carbon dioxide detectors are not necessary in the Class 1 cleaner air shelter.

Selecting a Filter Unit for a Class 1 Cleaner air shelter

Generally, filter units available commercially are not designed to standards that ensure protection against highly toxic chemical, biological, and radiological materials. The ideal requirement is a certified filter unit that has both a HEPA filter and an ultra-high-efficiency gas adsorber in series. To protect against very fine particles, a Class 1 system requires ultra high-efficiency filtration, at least 99.999 percent removal in a single pass. HEPA filters, which are defined as having at least 99.97 percent efficiency against the most penetrating particle size (about 0.3 micron), have efficiencies greater than 99.999 percent against aerosols of 1 to 10 micron size.

Sizing the Filter Unit for Pressurization

If a filter unit is undersized (provides inadequate flow for pressurization), the result is substantially lower protection factors and the system becomes a ventilated Class 2 cleaner air shelter. Filter unit(s) must be sized to provide makeup air at a flow rate sufficient to produce a pressure of at least 0.1 inch water gauge (iwg) in the shelter. The airflow rate needed to achieve this pressure in a cleaner air shelter varies with the size and construction of the cleaner air shelter. For cleaner air shelters of frame construction and standard ceiling height, most can be pressurized to 0.1 iwg with airflow in the range of 0.5 to 1 cfm per square foot.

Maintenance for a Class 1 Cleaner air shelter

Maintenance of the Class 1 cleaner air shelter consists primarily of serviceability checks and replacing filters. Serviceability checks should be performed about every two months by turning the system on and checking for the following while it is operating:

Checklist for maintenance of a Class 1 Cleaner air shelter

- System pressure**: The system pressure is indicated by a gauge typically mounted on the control panel, with the correct operating range marked on the gauge.
- Isolation dampers**: Correct damper positioning is indicated by damper status lights on the control panel.
- Relief damper**: It should be visually inspected while the system is operating. A properly functioning relief damper should be open when the cleaner air shelter is pressurized, and it should close immediately when a door is opened into the cleaner air shelter, releasing pressure.
- Cooling system**: If the cleaner air shelter supply air is cooled and heated, the temperature of the air flowing from the supply register should be checked with a thermometer during serviceability checks.
- Door latches**: All doors into the cleaner air shelter should be adjusted to latch automatically with the force of the door closer. For cleaner air shelters with multiple doors, leakage past unlatched doors can cause internal pressure to fall below the specified operating range.
- Weather stripping**: The weather stripping on each door on the boundary of the cleaner air shelter should be visually inspected to ensure it has not been removed or damaged through wear and tear. For wipe seals at the bottom of the door, the alignment and height of the seal above the floor should be inspected and adjusted as necessary.
- Filters**: Routine maintenance includes replacing filters. If a canister-type filter is used, it is replaced as a unit at its expiration date. For other types of filter units, three types of filters are replaced: the pre-filter, HEPA filter, and carbon adsorber. Ideally, with only intermittent operation, all three types of filters should be replaced at the same time, **every three to four years**. This period is defined mainly by the service life of the adsorber. A spare filter set should be stored in a sealed bag in the clean air shelter along with instructions and any tools needed for changing the filter quickly in an emergency.

Appendix C
Create a Cleaner Air Shelter at Home: Checklist

Sheltering in place, at home, is basically the same as the Class 3 clean air shelter. Air will tend to move from areas of high pressure to areas of low pressure through any opening. The goal is to seal in the good air by closing the gaps and avoiding bringing in the bad air. The pressure differences that come from wind and temperature are hard to control, but any appliance that actively removes air from the home will create a negative pressure that will pull in outside air and should therefore not be used.

- Close all windows and doors: The effectiveness of the seals can be checked by determining whether air moves through at the edges. This movement of air may be seen by observing the path of a small puff of smoke such as from a match or by observing the movement of a small strip of paper or plastic.
- For extra protection, apply tape to the periphery of the door, unless there are good weather seals on the door.
- Do not operate exhaust fans, window air conditioners, clothes dryer vented outside or combustion heaters in the home. The air conditioner or central air conditioning system, if you have one, may be considered when necessary. If the air conditioner provides a fresh air option, keep the fresh-air intake closed to prevent smoke from getting inside. Make sure the filter is clean enough to allow good air flow indoors.
- If there is no telephone in the cleaner air shelter, take a cell phone or portable phone into the cleaner air shelter for emergency communications.
- Turn on a radio or TV in the cleaner air shelter and listen for emergency information.
- If your home has a carbon monoxide detector, monitor it, particularly if the time in the sealed cleaner air shelter exceeds one hour.
- Consider the size of the home, the number of occupants and the time spent in the shelter. The shelter may feel stuffy as the carbon dioxide exhaled by the shelter occupants may build up over time and cause discomfort.
- If it is too warm to stay inside with the windows closed, or if you are very sensitive to smoke, seek shelter elsewhere.
- Do not smoke in the house.
- Do not burn anything such as wood stoves, gas stoves or candles anywhere in the house.
- If you have room air cleaners with HEPA filters, turn them on.
- Keep in mind that many particles and other pollutants may enter your home even if you take all these steps.
- When air quality improves, even temporarily, residents should air out their homes. Clean by using a damp cloth or mop to pick up settled particles and vacuum preferably with a HEPA filter-equipped vacuum.

Supplies for the cleaner air shelter:

- rolls of duct tape for sealing doors and securing plastic over vents and windows
- pre-cut plastic sheeting to fit over supply and return vents (also for windows if they are judged to be less than airtight)
- battery operated radio with spare batteries
- flashlight with spare batteries
- drinking water
- first aid kit
- telephone (cell phone) for emergency instructions

Appendix D Suggested Preparations for Evacuation

Manitoba Health suggests that every individual or family should be prepared to manage an unexpected event such as an emergency. This preparedness will greatly reduce anxiety and provide assurance in handling the situation as it develops. It is also recommended that if you live in an area that is prone to disaster that you review your plan and kit with your family before each hazard season. To be best prepared for any disaster there is a three step process you can follow:

- 1- know the risks
- 2- create a plan
- 3- create a kit

A list of items is provided below to help you be ready. Evacuation may last a long time. Plan to bring enough items to keep your family comfortable for a few days. These items should be easily accessible at all times:

- easy to carry shoulder bag
- photocopy of important documents(photo identification, Manitoba Health card, list of medications, insurance documents, financial documents, contact information for family and friends)
- prescriptions for at least 72 hours
- small flashlight with extra batteries, or a chargeable flashlight
- small radio
- warm set of clothing (sweater, jacket for each person)
- basic first aid items (various bandages, antiseptic, tweezers, scissors)
- basic toiletry items (toothbrush, paste, hand wipes, soap)
- comfort items (toys, cards, book)
- small amount of water per person
- healthy food snack per person
- items for infants (formula, baby food, diapers)
- spare prescription eyewear
- small amount of cash, debit and credit card

Additional items that may be considered are a pocket knife, can opener, extra clothing and supplies for any pet(s) that may need to be relocated.

When an evacuation order is given, you must leave your dwelling.

- Don't panic. Use your pre-planned route or follow directions from authorities.
- Move away from the hazard, never toward it. Use the recommended evacuation route.
- Drive carefully with headlights on. Watch for pedestrians and emergency vehicles.
- Report to authorities and wait for further instructions. Don't leave without informing officials.
- Don't return to your property until permitted to do so by authorities.

The following websites provide helpful tools and information to help you and your family prepare for emergencies:

Manitoba Emergency Measures Organization: www.manitoba.ca/emo

Public Safety Canada: www.getprepared.gc.ca

Appendix E
FACTSHEET: Food-borne Illness: Returning Home Following an Evacuation

One of the critical factors in the prevention of food-borne illness is controlling the temperature. Disease-causing microorganisms multiply rapidly in foods when the temperature is in the danger zone between 4°C and 60°C. Homeowners should take the following precautions to protect themselves from food-borne illnesses when returning home after an evacuation, especially when a power failure has occurred:

- For food safety, refrigerator temperatures should remain at 4°C or below and the food in a freezer should remain frozen solid.
- A refrigerator may be able to keep food cool for up to 12 hours without power. A half full freezer may hold food safely for up to 24 hours, while a full freezer may hold food safely for 48 hours.
- If you are unaware if the power was out, check freezer products like ice cream to see if they have the appearance of being thawed and refrozen. Fish products that are malodorous (smell off) on thawing is also a good indicator.
- Use a metal stem probe thermometer to take the temperature of perishable food in your refrigerator and freezer. If the food exceeds 4°C, it must be discarded. This includes, raw or cooked meat, dairy products (milk, cream, soft cheeses), cooked food products. Meats that were previously frozen, but not thawed and do not exceed 4°C can be safely cooked, but should not be refrozen. Ice cream, frozen dinners, vegetables, fish and shellfish that have thawed should be thrown out.
- If you don't have a thermometer to check food temperatures, check food items in the fridge for spoilage or souring. Milk and other dairy products that have soured are good indicators that the refrigerator has been off and all the food should be discarded.
- All foods that still contain ice crystals can be refrozen, but partial thawing and refreezing may reduce quality.
- Refrigerator and freezer units should be cleaned and sanitized before restocking with food.
- Extra precautions should apply to ready to eat foods.
- If in doubt, throw it out.

For more information on food-borne illnesses and safe food handling:

Manitoba Health: *Enteric Illnesses A-Z index*

<http://www.manitoba.ca/health/publichealth/environmentalhealth/enteric.html>

Manitoba Health: *Food Safety*

<http://www.manitoba.ca/health/publichealth/environmentalhealth/protection/food.html>

Manitoba Agriculture Food and Rural Initiatives: *Consumer Food Safety:*

<http://www.manitoba.ca/agriculture/foodsafety/consumer/cfs01s00.html>

Canadian Restaurant and Foodservices Association: *Food safety during a power outage*

www.restaurantcentral.ca/Foodsafetyduringapoweroutage.aspx

Interior Health. *Forest Fire Health Information:*

www.interiorhealth.ca/health-and-safety.aspx?id=464#food