

MANITOBA HEAVY CONSTRUCTION ASSOCIATION

Best Environmental and Safety Management Practice

Redi-Mix
Concrete Facilities

Manitoba Heavy Construction Association

Best Management Practice

REDI-MIX CONCRETE PLANTS

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ACKNOWLEDGEMENTS

This document has been a joint effort between members of the Manitoba Heavy Construction Association (MHCA) and the Manitoba Redi-Mix Association. Having all stakeholders involved in its development has been beneficial. The MHCA would like to acknowledge all who were involved in the development of the document. The document will be distributed to and used for training of, the redi-mix industry throughout Manitoba.

1. INTRODUCTION

1.1. Purpose

The Best Management Practices (BMP) was developed to assist owner(s) and operators of Redi-Mix Concrete Facilities to adopt best practices in order to improve the environment, protect human health and safety, and reduce potential risks and economic liabilities at their work site.

This document outlines recommended operational practices that will minimize the impact of Redi-Mix concrete plants on the environment and promote safety at the workplace. The document can be used for new facilities or for upgrading existing facilities.

BMP is intended to identify best management practices as a supplement to the requirements of existing legislation. BMP is NOT intended to create or replace any legislation, industry standards, code or guidelines. BMP does not guarantee a successful “due diligence” defense in the event of legal action. Although reference is made in BMP to provincial statutes and regulations, where federal legislation is applicable (such as on First Nation Lands, or National Park Lands) such legislation shall also be complied with. As well, municipal by-laws and other industry standards and codes should be observed.

This document was developed in April 2000. The document will be reviewed every three (3) years to ensure the information is up to date, relevant to the industry, and reflects changes in industry practices and legislation.

1.2. Background

In the overall context of industrial facilities, Redi-Mix concrete plants do not generally pose a significant problem in terms of environmental impact. The usual ingredients that are combined to produce concrete as outlined by the Canadian Portland Cement Association in 1990, as follows:

| | | |
|---|---------------|------------------|
| ➤ Course aggregate | 48% by weight | 31-51% by volume |
| ➤ Fine aggregate | 31% | 24-48% |
| ➤ Portland cement | 13% | 7-15% |
| ➤ Water | 8% | 14-18% |
| ➤ Admixture chemicals (control Characteristics such as air Entrainment, water/cement Ration, initial set, and Compressive strength) | <0.01% | N/A |
| ➤ Air | N/A | 4-8% |

These ingredients are mixed, with no heat involved (except steam for aggregate heating in late season), in an overhead silo and drum. The mix is then deposited into a mixer truck for

transport to a job site. Alternatively, concrete production can be mixed directly in the mixer truck and transported to a job site.

Emissions, as a result of this mixing operation are limited, but may include dust particles from aggregate piles or in the mixing process become airborne in the drum or silo, and noise. Surface drainage, and wastewater and solid waste management can pose site management issues at Redi-Mix concrete facilities.

2. GENERAL – Compliance with the Law

- Take all reasonable steps to identify all applicable laws, including legislation, regulations, municipal by-laws and codes. Comply with all aspects of applicable laws.
- Obtain all proper and applicable licenses, permits and Certificate of Approvals for site operations.

3. PERMANENT PLANTS (see Appendix A for Definition)

- The owner/operator shall make efforts to minimize noise nuisance created as a result of the operation.
- Spent bag house filters should be disposed of in an environmentally friendly manner.
- To every extent possible, the owner/operator should practice the best environmental practices listed under Sections 5.1, 6.0, and 7.0 at the permanent plant.
- All environmentally related activities should be recorded.

4. PORTABLE PLANTS (see Appendix A for Definition)

- Siting of portable plants should be, to every extent possible, reviewed and sited at an early stage in connection with the local Municipal Authority and Manitoba Conservation Environment Officer.
 - The owner/operator should consult with adjacent landowners.
 - All environmentally related incidents should be recorded.
 - To every extent possible, the owner/operator should practice the best environmental practices listed under Sections 5.1, 6.0, and 7.0 at the portable plant.
 - After removal of the portable plant from a property, leave the site in a neat and clean condition; sites should be left in an aesthetically acceptable condition.
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5. SITE MANAGEMENT

5.1. General Site Management

- Plastic concrete is toxic to fish (e.g. reducing the BOD) and therefore must not enter watercourses. Efforts to ensure catchment of wet concrete must be implemented on-site (e.g. a drop sheet).
- Where practical and appropriate, mitigation measures should be implemented to protect fine aggregate stockpiles from wind erosion.
- In an urban or highly populated setting, dust suppressants should be used on internal plant roads to minimize dust carrying off the site. Water is an example of an environmentally friendly dust suppressant.
- Runoff from the concrete plant site should be minimized to prevent contamination.
- Use good housekeeping practices to clean up spills of cement and concrete as soon as possible.
- It is recommended that incidents occurring at the concrete plant be recorded.
- Staff involved in concrete production should be made aware of this BEMP.

5.2. Site Water Management

A reduction in water usage could be achieved by the following options:

- Monitoring/auditing of water usage;
 - Use water reducing admixtures which reduce the amount of given water in the batch concrete;
 - Capture and reuse wash water;
 - Restrict freshwater uses to truck exterior wash off, hot water production and batch water for high quality concrete;
 - Install flow controls on freshwater sources, where practical;
 - Recycle water, where practical; and
 - Train employees to minimize water use and on water conservation practices.
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- Conduct chemical washing of trucks in a safe manner (appropriate PPE).
- The resultant wash, which is generally neutralized, should be disposed of using a safe and environmental practice.
- Use a sloped settling pond for washout, where practical.
- Where necessary and practical, containment of wastewater and surface runoff is recommended.

5.3. Site Air Management

To improve air quality at Redi-Mix facilities, one can follow such examples:

- Install effective dust removal devices such as bag houses on vents from pneumatic or mechanical transfer systems;
- Use curtains or socks for truck loading operations;
- Minimize surface areas of aggregate storage piles;
- Locate aggregate storage piles in area sheltered from wind, where practical;
- Pave high vehicle traffic areas and use dust control, where practical;
- Reduce speed limits;
- Routine sweeping of paved portions of yard to remove accumulated dust; and
- For aesthetic and environmental purposes, one should consider planting vegetation (i.e. trees) around the site.

6. MATERIALS MANAGEMENT

6.1. Pollution Prevention: General

- The owner/operator should implement a high standard of equipment and maintenance, and good housekeeping and operational practices, at all times.

6.2. Chemical and Fuel Management

- Proper storage of lead batteries, solvents and waste oil for recycling.
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- Ensure containment at fuel and chemical handling areas is sufficient.
- Install proper WHMIS signage to identify contents of bulk tanks.
- Facility operators should be familiar with appropriate sections of the Manitoba Environment Act and any other applicable guidelines, codes and local land use permits with regards to handling and storage of fuels.
- The Owner/Operator shall obtain all necessary permits from Manitoba Conservation for the handling and storage of fuel products and shall keep copies available for reference.
- Take adequate precautions to ensure that diesel fuel, oil, grease and other transportable material do not enter surface and groundwater courses. For example:
 - Fuels, lubricants and other potentially hazardous materials as defined in the Manitoba Dangerous Goods Handling and Transportation Act shall be stored and handled within the designated storage area(s).
 - The Owner/Operator should ensure that all equipment is maintained such that it poses a minimum risk to the environment.
 - The Owner/Operator should ensure that all fuel storage containers are inspected, for leaks and spillage of hazardous fluids, (such as oil) on a regular basis, and repairs carried out immediately.
 - When servicing requires the drainage or pumping of fuels, lubricating oils or other fluids from equipment, suitable spill response equipment (such as spill trays and spill kits) should be available to catch the fluid, contain, and collect small spills.

7. WASTE MANAGEMENT

7.1. Non-Hazardous Waste

- The Owner/Operator when necessary should undertake site clean-ups, with all resulting debris deposited at a Waste Disposal Ground operating under the authority of Manitoba Regulation 150/91. Exceptions are liquid industrial and hazardous wastes, which require special disposal methods.
 - Indiscriminate dumping or littering shall not take place.
 - No burning or burying of wastes at the concrete plant sites (both permanent and portable) shall be allowed unless approved by appropriate authorities.
 - Reuse returned concrete for other purposes, where practical.
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- Incorporate returned concrete in succeeding batches where operational and quality constraints allow.
- Wherever possible sludge should be recycled for other purposes, where practical.
- When disposing of all other solid waste, i.e. paper, wood, metals refuse. etc. that it may be carried out with consideration for reuse & recycle.

7.2. Hazardous Waste

- Dangerous goods/hazardous waste is identified by, and shall be handled according to the Manitoba Dangerous Goods Handling and Transportation Act and associated Regulations.
- The Owner/Operator shall have on site staff that is trained and/or knowledgeable in the handling and transportation of dangerous/hazardous goods, when said dangerous goods/hazardous wastes are being utilized.
- Used oils shall not be used for dust suppression unless approved by appropriate authorities
- Used oils shall be stored in appropriate drums, or tanks with signage until shipped to used oil recycling centres, incinerators, or disposal facilities approved for such wastes.
- Used oil filters shall be drained, placed in suitable storage containers, and disposed of in an appropriate manner.

8. EMERGENCY RESPONSE

- The Owner/Operator should ensure that there is an Emergency Management Plan in place, and that it has been communicated to all employees.
 - The Owner/Operator should designate an on-site Emergency Response Coordinator (ERC) for the project. The ERC shall have the necessary training, authority, and responsibility to redirect manpower in order to respond to an emergency. The Emergency Response Coordinator (ERC) shall be familiar with the Emergency Management Plan, and have on site a list of telephone numbers to call in the event of an emergency, and a map to the closest hospital including at least Manitoba Conservation, Environment Canada, emergency company contacts, and the local fire and police departments.
 - The Owner/Operator shall report and document all environmental accidents involving contaminants (as defined in Appendix B) to Manitoba Conservation, immediately after occurrence of the environmental incident, by calling the 24-hour emergency phone number, in accordance with Manitoba Regulation 439/87.
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- In general, the following actions shall be taken by the first person(s) arriving at the scene (first responder) of a spilled dangerous good/hazardous waste:
 1. Secure area and ensure safety;
 2. Assess the situation/risks and identify spilled material;
 3. Respond (e.g. get help, eliminate source of ignition, contain, block sewers etc.), if it is safe to do so.
 4. Notify, verbally, the appropriate government agency immediately. Follow up with a written document (fax).
 5. Manage spilled material, if it is safe to do so.
- When dangerous goods are used on site, materials for containment and cleanup of spill material (e.g. spill kit) should be available on site.
- Minor spills of such substances, less than reportable quantities shown in Appendix B, which may be contained on land with no significant impact on human health or the environment, may be responded to with in-house resources without formal notification of Manitoba Conservation.

9. **Safety**

- Each new worker should be given a plant orientation before they start work, which should include a tour of the plant and how it operates, where to find a telephone, emergency first aid kit, fire extinguisher who to report to and where to evacuate to, where the MSDS's are kept and the hazards at the plant.
 - Always communicate with the plant operator, especially when you are doing any maintenance at the plant.
 - Good housekeeping in the yard and plant will go a long way to preventing trips and falls.
 - Each worker should know about the chemicals on site and the proper PPE to wear and where the PPE is kept.
 - At a concrete plant, dust masks need to be with you at all times.
 - Falling objects are a hazard at concrete plants therefore; Hardhats and steel-toed boots are required.
 - Watch for traffic in a concrete yard and give right of way to all vehicles and be sure to make eye contact with the drivers before crossing their path.
 - Wear the right PPE and read the MSDS when acid washing a truck and always work with your back to the wind.
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- Never pour water into acid dispense the acid into the water.
 - Always use proper lifting procedure; Bend your knees, get under the load and lift with your legs.
 - When cleaning a mixer drum in a redi-mix truck, use full confined space entry procedures and plan your work. And wear all necessary PPE at a minimum; this is eye protection, steel toed boots, gloves and hearing protection.
 - Always have an entry watch person when cleaning the in side of a mixer drum. Both persons need to have confined space entry training.
 - All pinch points within reach should be guarded and wear all PPE and clothing nice and snug
 - Always use the 3-point contact method to mount and dismount a truck cab.
 - Concrete is caustic avoid direct contact by using the appropriate PPE.
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APPENDIX A: GLOSSARY OF TERMS

The following Glossary of Terms apply to the Redi-Mix Concrete Facilities BEMP:

Aggregate: granular materials, such as sand, gravel, crushed stone, crushed hydraulic-cement concrete, or iron-blast finance slag, used with a hydraulic cementing medium to produce concrete or mortar.

Batch: quantity of either concrete or mortar mixed at one time.

Biological Oxygen Demand: the amount of oxygen required by bacteria while stabilizing decomposable organic matter under aerobic conditions.

Calcium Chloride: a crystalline solid, CaCl_2 : in various technical grades, used as a drying agent, as an accelerator of concrete, a de-icing chemical, and for other purposes.

Cement, Bulk: cement that is transported and delivered in bulk (usually in specially constructed vehicles) instead of in bags.

Concrete: a composite material that consists essentially of a binding medium within which are embedded particles or fragments of aggregate, usually a combination of fine aggregate or coarse aggregate; in Portland cement concrete, the binder is a mixture of Portland cement and water.

Decibel: a comparative unit that measures the intensity of sound. It is the term to identify 10 times the common logarithm or the ration of two like quantities proportional to power or energy.

De-Scaling Agent: chemicals used in water to prevent scale from forming on pipes and tanks/vessels. Bromine is a common de-scaling agent.

De-Watering: refers to a process used in detention/retention facilities, whereby water is completely discharged or drawn down to a pre-established pool elevation by way of a perforated pipe. De-watering allows the facility to recover its design storage capacity in a relatively short time after a storm event.

Dust Suppressant: an example is water. Other materials can be applied without prior approval from a given jurisdiction.

Effluent: flowing forth or out.

Emission Source: from concrete plants includes: 1) diluted sources which are ducted to the atmosphere through a stack. 2) Fugitive emission emitted directly to the atmosphere from open sources i.e. from yard dust, loader and mixer travel, handling aggregate, wind erosion, etc.

Mechanical Reclaimer: any equipment that mechanically separate components of plastic concrete allowing the reuse of the individual components where operational and quality constraints allow.

Mixing, Water: the water is freshly mixed sand-cement grout, mortar, or concrete, exclusive of any previously absorbed by the aggregate.

Noise: unwanted or undesirable sound; sounds which create detrimental effects.

Opacity: means the degree to which an emission reduces the passage of light (obscures the view of an object in the background) expressed numerically from 0% (transparent) to 100% (opaque).

Permanent Plant: a permanent batch plant is one that remains in one location for more than 1 year.

Portable Plant: capable of being moved from one job site to another and sited for less than 365 days in a single location. A portable plant is where the aggregate batching and weighing system is contained on a unitized chassis wholly capable of being towed down a road to a remote job site. This chassis may or may not include the cement-weighing portion of the process. Sometimes, depending on the silo size, the cement silo is a separate entity. Portable plant can also include a mobile mixer.

Sludge: any thick, semi-fluid mass, usually a sediment or filtered waste product, muddy or slushy sediment.

Slurry: thin mixture of water and any several fine, insoluble materials.

Stormwater Treatment: detention, retention, filtering or infiltration of a given volume of stormwater to remove urban pollutants and reduce frequent flooding.

Truck Mixer: a concrete mixer suitable for mounting on a truck chassis and capable of mixing concrete in transit.

APPENDIX B: REPORTABLE QUANTITIES

| CLASSIFICATION | HAZARD | REPORTABLE QUANTITY OR LEVEL |
|---------------------------|-------------------------------------|--|
| 1 | Explosives | All |
| 2.1 | Compressed Gas (Flammable) | 100 L* |
| 2.2 | Compressed Gas | 100 L* |
| 2.3 | Compressed Gas (Toxic) | All |
| 2.4 | Compressed Gas (Corrosive) | All |
| 3 | Flammable Liquids | 100 L |
| 4 | Flammable Solids | 1 Kg |
| 5.1 Packing Groups I & II | Oxidizer | 1 Kg or 1 L |
| Packing Group III | Oxidizer | 50 Kg or 50 L |
| 5.2 | Organic Peroxide | 1 Kg or 1 L |
| 6.1 Packing Group I | Acute Toxic | 1 Kg or 1 L |
| Packing Groups II & III | Acute Toxic | 5 Kg or 5 L |
| 6.2 | Infectious | All |
| 7 | Radioactive | Any discharge or radiation level exceeding 10 mSv/h at the package surface and 200 uSv/h at 1 m from the package surface |
| 8 | Corrosive | 5 Kg or 5 L |
| 9.1 | Miscellaneous (except PCB mixtures) | 50 Kg |
| 9.1 | PCB Mixtures | 500 grams |
| 9.2 | Aquatic Toxic | 1 Kg or 1 L |
| 9.3 | Wastes (Chronic Toxic) | 5 Kg or 5 L |

* Note: To be amended to other materials in the near future.

Source: *Manitoba Dangerous Goods Handling and Transportation Act, Regulation 439/87: Environmental Accident Reporting Regulation.*