VALE WASTE MANAGEMENT FACILITY

OPERATIONS MANUAL

VALE MANITOBA OPERATIONS
THOMPSON, MANITOBA

Prepared by

AMEC Earth & Environmental
Tervita Corporation
Vale Manitoba Operations

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Form 1: Record of Issues and Revisions

Version No.		Issue Date	Summary of amendments	Approved by
Issue	Revision			
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1. BACKGROUND AND PURPOSE OF MANUAL

1.1 OBJECTIVE OF THIS OPERATIONS MANUAL

The Vale Waste Management Facility (WMF) has been developed to manage waste generated at or during work performed for Vale Manitoba Operations in Thompson, Manitoba as outlined below:

- storage of recyclables prior to disposal;
- storage of contaminated material prior to disposal;
- storage of hazardous waste prior to disposal;
- storage of clean wood prior to disposal/incineration; and
- disposal of wastes which cannot be readily recycled or re-used.

This Operations Manual (Manual) is intended to outline the methods by which the WMF is to be managed and includes descriptions of the following:

- WMF description;
- regulatory approvals;
- levels of responsibility and position descriptions;
- waste acceptance;
- descriptions of the design of the components;
- future development;
- landfill optimization;
- operations of the WMF components;
- inspection and reporting;
- health and safety requirements;
- routine monitoring;
- closure requirements;
- post-closure care; and
- training and contingency plan

The Manual should be considered a live document that is updated on a regular basis in response to improving operational practices and/or regulatory requirements. All changes made to the Manual will be submitted and approved by Manitoba Conservation.

The Manual is intended to provide an overview of the design concepts behind the WMF and operating techniques to provide compliance with all regulatory requirements. The Manual is based on industry standards of practice, and provides a practical and common sense approach to waste management. In the event that there is a discrepancy between this Manual and the applicable regulations, the regulations shall prevail.

Any changes to the design or operation of the WMF not in accordance to applicable regulations may result in suspension or withdrawal of site regulatory approval.

1.2 WASTE MANAGEMENT FACILITY SETTING AND DESCRIPTION

1.2.1 LOCATION

The location of the WMF is northeast of the main plant site. The location is bounded by N27674/E11960; N27981/E11915; N27976/E11881; N29188,E11703; N29316/E12589; and N27799/E12813 of the Vale Grid System and is located in NE ¼-T77-R3W in PIPs' 581, 582, 579 and 580.

The WMF is located on a parcel of land, approximately 895 by 1,535 feet in size that is owned by Vale. Within this area, the landfill cell #1 footprint covers an area of 265 by 630 feet at the south end of the WMF. The main building and storage shed are located on the southwest side of the WMF. The burn area and leachate holding pond are located on the north end of the site.

The nearest residence is roughly 1.5 miles away; thus the site is sufficiently separated so that no objectionable odours or noise are apparent to the neighbours.

The annual precipitation is 20 inches with the annual rainfall being 13 inches. It is expected that there will not be excess surface water as the total annual evaporation rate is 22 inches.

1.2.2 ACCESS

The WMF is located within the Vale Manitoba Operations main plant site where limited access is monitored by security. Public access to the WMF is not allowed. Access to the WMF is restricted to authorized personnel only.

Access to the WMF is from the internal access road located at the southwest portion of the WMF. The regular hours of operation for the WMF will be from 8:00 AM to 4:30 PM. Regular hours of operation are subject to change to meet the needs of the operations and will be posted at the entrance of the WMF.

1.3 COMPONENTS OF THE WMF

The general layout of the WMF is shown on Figure 1 and 2. The primary components of the WMF include:

- gated access road to provide controlled access into the WMF;
- waste disposal areas in defined landfill cells;
- main waste handling building;
- cold storage shed;
- outdoor storage pad;
- storage area for clean wood (burn area);
- leachate holding pond;
- expansion areas set up for future cell construction; and
- storage areas for cover soil;
- groundwater table monitor wells for monitoring of the elevation and quality of groundwater within the WMF boundary.

2. REGULATORY APPROVALS

2.1 PERMITTED USE OF THE WMF AND PERMIT HOLDER

The development and operation of the WMF is authorized through Permit Number 35818 (Permit) issued by Manitoba Conservation under the Waste Disposal Grounds Regulation. As noted in the Permit, the WMF has been classified as a Class 2 Waste Disposal Ground Facility and identified as the Vale Waste Management Facility. The Permit has been issued to Vale, who is referred to as “the Operator” in the Permit.

A copy of the Permit is included in Appendix A of this Manual. The Permit contains specific conditions relating to the development, operation and monitoring of the WMF which are addressed within this Manual. Amendments to the permit will be incorporated into revisions to this Manual as required. The Permit also makes reference to the Waste Disposal Grounds Regulation 150/91. A copy of this regulation is also included in Appendix A.

3. CHAIN OF RESPONSIBILITY / MANAGEMENT TEAM

3.1 ADMINISTRATION

Vale (Administration) is the owner of the WMF and as such is responsible for the following duties:

- liaison with Manitoba Conservation regarding standards for operation of the WMF;
- reporting of site performance data, reportable incidents, and other information in accordance with the Manual, the Permit and the requirements of Manitoba Conservation;
- maintenance of appropriate insurance coverage;
- maintenance of Vale owned infrastructure; and
- maintenance of environmental monitoring systems, including routine sampling and testing, interpretation, and reporting of results and follow-up actions where required.

3.2 OPERATOR

Administration has retained Tervita Corporation (Operator) to handle the materials brought into the WMF and to report any occurrences or observations which may be relevant to the operation of the WMF. Responsibilities of Operator will include:

- operation of the WMF according to the regulatory requirements and approval conditions;
- management of health and safety issues at the WMF with respect to applicable industry standards, Vale policies and WMF procedures;
- maintenance of WMF Emergency Response procedures, and management of Emergency Response activities (including training);
- maintenance of records based on the requirements documented in the Manual;
- supervision of employees;
- tracking of equipment repair and replacement schedules;
- planning of site development;
- day-to-day compliance with this Manual;
- inspection of WMF structures, plus documenting and reporting of any deficient areas requiring remedial action;
- safe operation of equipment to place, spread, compact and cover waste in the cell;
- placement of materials in appropriate areas and maintenance of the recycle compounds;
- routine maintenance of drainage, litter and roads;
- maintenance of Operator owned equipment;
- maintenance of the WMF loader;
- litter control including waste pick-up from the gate and disposal within the WMF; and
- closing and locking the site access gate upon leaving the WMF.

3.3 COMMUNICATION

The Vale Senior Supervisor of Environment or designate shall be the main contact between Vale and Manitoba Conservation.

The Vale SLAM Dunk Supervisor shall be the main administrative contact between the Administration and the Operator.

4. WASTE ACCEPTANCE

4.1 ACCEPTED WASTE

Only waste generated at or during work performed for Vale Manitoba Operations shall be accepted at the WMF.

Only industrial waste and solid waste as defined in Section 1 of the Waste Disposal Grounds Regulation 150/91, excluding any waste included in section 4.2 Prohibited Waste, shall be disposed at the landfill tipping face.

4.2 PROHIBITED WASTE

The following wastes are prohibited from final disposal in the landfill cell at the WMF:

- hazardous wastes;
- radioactive materials;
- burning wastes (materials that are still at elevated temperatures);
- contaminated soil;
- liquids (as defined in Section 1 of the Waste Disposal Grounds Regulation 150/91);
- dead animals; and
- explosives or ammunition.

4.3 TEMPORARY STORAGE OF WASTE

The WMF will also be used to temporarily store waste generated from Vale Manitoba Operations, including the following:

- non-industrial recyclables (non-industrial plastics, recyclables, cardboard and office paper) – baled and, stored in the storage shed, and transported off site for recycling;
- industrial plastics – stored in the storage shed, and transported off site for disposal;
- wood – stored within the WMF and burned for disposal with a portion of the wood recovered for re-use;
- contaminated – the waste oil will be pumped into the AST adjacent to the main building. Other contaminated material will be stored within the WMF. The contaminated waste will be transported off site for disposal; and
- hazardous - stored within the WMF, and transported off site for disposal

5. DESIGN OF WMF COMPONENTS

5.1 GENERAL

The WMF is designed to provide waste management services that meet or exceed applicable Provincial regulations and current industry standards. An understanding of the design concepts of the WMF will aid in proper operation of the WMF and avoid damage to important components of the WMF.

The sections that follow provide brief descriptions of the design intent of the principal components of the WMF, the locations of which are shown in Figure 1 and 2. Operation procedures for these components are included in subsequent sections of the Manual.

5.2 SITE ACCESS ROAD AND CONTROL SYSTEMS

The access road provides access from the mine to all points of the WMF. Fencing and a lockable gate at the entrance restrict unauthorized entry into the WMF. A sign posted at the entrance will provide visitors and users of the WMF the following information:

- contact phone number and address for appropriate Administration staff representative and Operator representative;
- phone number in case of emergencies; and

hours of operation.Perimeter fencing exists around the entire WMF. Access to the area will be controlled by the gate across the access road and will be closed and locked when unmanned.

5.3 CELL PERIMETER ROAD

The road around the perimeter of the cells is an extension of the berms of the cells and serves many purposes including:

- providing access to the main building, storage shed and outdoor laydown areas;
- providing access to the perimeter of the cells;
- providing access to the leachate holding pond;
- providing access to the groundwater monitoring wells;
- providing access to leachate collection and removal system riser and LCC;
- preventing surface water from entering the cell (and potentially becoming leachate); and,
- being the location where the geosynthetics used in the waste disposal cells are anchored.

The perimeter road was constructed of local native clayey material with 2 feet of compacted gravel as the final wearing surface. The top of the road slopes away from the cell to promote surface water run off to the perimeter ditches.

5.4 PERIMETER DITCHES

A series of ditches have been constructed around the perimeter of the waste disposal cells. The ditches are intended to direct surface water upstream, at a higher elevation, around the waste disposal. The ditches, in conjunction with the perimeter berms, are intended to prevent surface water from getting into the cells, contacting waste and becoming leachate.

5.5 SURFACE WATER MANAGEMENT/STORM WATER DRAINAGE

The ground surface in the area of the WMF is relatively uniform with no major depressions and slopes from a high of 704 feet in the northwest corner to 684 feet in the southeast corner. In general, the surface water will follow these grades and flow to the southeast.

Perimeter berms and access road around the cells of the WMF and ditches constructed around the perimeter of the WMF will prevent surface run off water from entering the cells and direct it back to natural drainage courses beyond the limits of the WMF.

5.6 WASTE DISPOSAL CELLS

The WMF has been permitted for the construction of five cells. Cell 1, the southernmost cell, is constructed while cells 2 through 5 will be constructed as needed in the future. The cells will be constructed by excavating into the native soils to depths that range from 10 feet below ground surface in the southern part of the WMF to 20 feet below ground in the north. The base of the cells slope at 2% from the southern and northern edges towards the centre of the cells. The centre line of each cell will be sloped at 1% from the west to the east.

A perimeter berm that is a minimum of three feet above the existing grade all around the cell was constructed to mark the edges of the cell and to prevent surface water from entering the cells.

Each cell will be complete with a barrier layer that consists of the following:

- one foot thick re-compacted native clay soil; and
- 60 mil thick High Density Polyethylene (HDPE) geomembrane.

The geomembrane extends up the side slopes and is anchored in the tops of all berms all around each cell. HDPE geomembranes are an industry standard material used in many containment applications because of the superior resistance characteristics to a large number of chemicals. The specifications for the manufacture of HDPE geomembranes have become industry regulated standards.

5.7 MAIN WASTE HANDLING BUILDING

A 40 by 100 feet structure was constructed to receive the waste entering the WMF. There are three components to the main waste handling building; a garage, waste handling area and office space complete with a washroom. Two ASTs for used oil are located outside of the main building. A series of jersey barriers will protect the ASTs from the potential of vehicle collisions. The main building will be used to receive waste, handle the waste, and process specific waste streams.

5.8 COLD STORAGE SHED

A 130 by 100 feet storage shed was constructed to temporary store waste generated at Vale Manitoba Operations. The building will be used for the storage of specified waste streams prior to them being disposed of off-site.

5.9 BURN AREA

The clean wood burn area is contained within the secured WMF. The clean wood burn area was originally constructed as one 65 by 130 feet compacted clay base enclosed by a clay perimeter berm. The north most berm is 60 feet away from the WMF fence. The native soil within the footprint of the pit was excavated to grade, and the excavation fill was used to construct the berms. The clay beneath the pit bottom was reworked to create a 3 feet thick compact clay base. The height of the berm is roughly 3 feet. Water drainage within the clean wood burn pit will be contained by the perimeter berms. The topography of the pit base will allow water to collect in the centre of the pit.

Revisions to the burn area will transform the single burn pit to two burn pits approximately 65 by 65 feet with berm height of 5 feet on the north, east and west sides of both individual pits. The south side of the burn area will be ramped down from the main access road to provide containment and allow vehicle access via the entire length.

5.10 LEACHATE MANAGEMENT SYSTEM

Leachate is generated from liquids contacting waste and potentially absorbing chemicals from the waste material. Leachate can be generated from rain and snow falling on the waste or from liquids that escaped from the waste directly. These liquids cannot be released to the environment and must be collected.

Snow removal will be managed as surface water.

Each cell will be constructed with a leachate collection and removal system as described in the sections that follow.

5.10.1 BASE LEACHATE MANAGEMENT SYSTEM

On the base of the cell, the collection system will consist of:

- minimum 6 inch thick sand layer placed immediately above the geomembrane;
- 12 inch thick layer of washed drainage rock above the sand cushion; and
- a network of 6 inch diameter perforated HDPE pipes consisting of several laterals and one header pipe.

5.10.2 SIDE SLOPE LEACHATE MANAGEMENT SYSTEM

On the side slopes, the leachate collection system will consist of a geocomposite drainage layer consisting of a geonet drainage layer with a non-woven geotextile on the top. The geocomposite will direct leachate to the base collection system.

The geocomposite extends up the side slopes and is anchored in the tops of all berms all around each cell.

5.10.3 LEACHATE REMOVAL SYSTEM

The combination of the grading of the cells and the leachate collection system will direct leachate to the low point of each cell on the east side. Leachate will be moved, by gravity, to a collection chamber located outside the east side of each cell. The collection pipe will penetrate the liner at the low point to convey the leachate to the chamber. The leachate chambers have been constructed of HDPE similar to the geomembrane to provide the same resistance to leachate.

A special penetration structure consisting of HDPE plates welded to HDPE pipes and the geomembrane has been designed to allow the construction of the penetration while still being leak proof.

Leachate collection chamber (LCC) No. 1 has been installed downstream of Cell no. 1. LCC No. 2 has been installed downstream of Cell no. 2 and so on. LCC No. 3 at Cell no. 3 is designed to be the main collection and pumping location as it is located in the centre of all five cells.

Leachate flows by gravity into LCC No. 1, then into LCC No. 2 and then into LCC No. 3. Leachate will be pumped from the collection chamber by a permanent pump through the forcemain to a leachate holding pond.

A small sump exists in LCC No. 1 and No. 2 to allow for settlement of solids prior to flowing into LCC No. 3 and subsequent pumping.

LCC No. 1 and No. 2 are constructed. LCC No. 2 is acting as the main collection and pumping location until future expansion is required.

5.10.4 LEACHATE HOLDING POND

The leachate holding pond was constructed in the same fashion as each cell with a base containment system consisting of re-compacted native soil and with a 60 mil HDPE geomembrane installed over it. Leachate will be allowed to stay in the pond and will evaporate over time, and possibly by the use of evaporation sprinklers and by recirculating the leachate back on the cell. Excess leachate may be disposed of at a Manitoba Conservation approved location.

The quantity of leachate produced will be minimized by the site operations and surface water drainage design.

The pond was designed with a suitable freeboard of two (2) feet above the maximum level of the pond to prevent overtopping of the perimeter berms.

5.11 OUTDOOR STORAGE PADS

Outdoor storage pads were constructed north of the storage shed. Geotextile was placed atop clay with 1 ½ feet of 5 inch rock and finally 6 inches of ¾ inch A Base.

6. FUTURE DEVELOPMENT AND CONSTRUCTION

It is intended to continue the development of the WMF with the construction of additional cells. The additional cells will be constructed to the same design standards as the existing cells.

6.1 FUTURE DEVELOPMENT OF THE WMF

Future construction of any areas of the WMF that are controlled by permits shall be completed in accordance with the requirements of the respective permits and applicable legislation. Design drawings, prepared by appropriately qualified professionals shall be submitted to the Provincial regulators prior to commencing work on the site.

Construction reports that include items such as Drawings of Record and field test reports shall be submitted prior to permission for use of those areas to be granted.

It is required that all future expansions be done under supervision of appropriately qualified staff to ensure compliance with the permits and design intent for the WMF.

Only those materials proven to meet the intent of the design are to be employed. This will require laboratory and field testing of native soils as well as preparing specifications for materials imported from off the site. The condition of the placed materials (e.g. moisture content, plasticity index, density and permeability) shall be measured by a qualified professional during construction to ensure that the WMF specification is achieved.

Reports that summarize the construction activities for each area of expansion shall be submitted to the Provincial regulators in accordance with the respective permits.

7. LANDFILL LIFE OPTIMIZATON

A new waste management program has been implemented. The goals of the program are to Reduce, Reuse and Recycle through an intensive segregation program referred to as SLAM Dunk. Numerous waste streams have been identified with waste generators performing the bulk of segregation at the point of generation. Of the numerous waste streams only two are intended for final disposal in the landfill cells, General Waste and Wood. The SLAM Dunk Program will constantly evolve to continue to improve its goals.

8. OPERATIONS OF WMF COMPONENTS

8.1 GENERAL

Proper operation of all components of the WMF is required to ensure compliance with applicable legislation and permits, and with industry practice. The general concepts for all aspects of the operation are discussed within this section.

An understanding of the operational concepts of the components of the WMF will avoid damage to and extend the life of important components of the WMF.

Technical Procedures have been prepared for activities with particular environmental and/or health and safety sensitivity, and are included in the sections that follow. These procedures may require updating from time to time to incorporate improvements or modifications to the WMF or the operations.

The following principals will be maintained during operations of the WMF:

- access to the WMF is controlled;
- operating personnel are on site at all times the site is open;
- operating equipment is maintained for continuous operation;
- roads are maintained for all weather access as required;
- only approved wastes are accepted for storage or disposal;
- the landfill is operated according to the current design and acceptable industry standards;
- wastes are compacted to the greatest practical density;
- MSW wastes are covered regularly to control litter and nuisances;
- surface water is managed to prevent infiltration into the landfill and prevent pollution to adjacent property;
- leachate is managed and treated as required;
- ground water is monitored annually;
- emergencies are responded to quickly and responsibly;
- site personnel practice safe operating practices;
- all operating personnel are provided with training suited to their specific roles;

- portable and stationary fencing may be used to control windblown litter; and
- litter escaping from the working area is collected in a timely manner.

8.2 SITE ACCESS ROAD AND CONTROL SYSTEMS

The WMF is to be operated with appropriate access and security restrictions to prohibit entry into the site by unauthorized persons. Access restrictions include:

- a fenced entrance with locked gate;
- posted hours and emergency contact numbers; and
- full time supervision during waste acceptance.

The access road must be graded and ploughed to provide all-weather access into the appropriate areas of the WMF. The gate must be closed and locked at all times when there is no one at the WMF. Keys to the gate will only be provided to Vale SLAM Dunk Supervisor (x1), Vale Senior Supervisor of Environment (x1), Vale Security (x1), and the Operator (x3).

8.3 CELL PERIMETER ROAD

The cell perimeter road must be maintained so that it remains useable. The maintenance will include:

- regular inspections;
- regular grading of the road surface;
- repair of damaged areas by replacing fill and compacting into place.

If dust becomes a concern, a request for dust control will be made through Administration.

8.4 PERIMETER DITCHES

The maintenance of the perimeter ditches will include:

- regular inspections;
- regular grading of the ditch inverts to remove collected soil that may impede flow; and
- regular removal of litter that may impede flow.

8.5 SURFACE WATER MANAGEMENT

Ditches carry the surface water from the WMF and must be kept clear and free of debris and litter. Once every two (2) years or as required, the ditches are to be re-graded to ensure they flow properly. This is accomplished by excavating collected silt and dirt. The excavated silt and dirt is to be delivered to the cover stockpile area.

The Vale Environment department will be notified of any significant ponded surface water located in the WMF area.

8.6 WASTE DISPOSAL CELLS

The waste will be deposited at the toe of the working face, spread in layers approximately 2 feet thick on the slope, and compacted. Non-compactable or hard to compact bulky wastes will be buried deep in the cell of the active working face. Special care will be taken to ensure the non-compactable or hard to compact bulky wastes is not placed within three feet of the bottom of the cell.

The goal of the compaction efforts at the landfill cell is to achieve the following conditions:

- conserve cell airspace;
- provide a solid base for reclamation of the cell;
- increase overall life of cell by maximizing the capacity;
- reduce soil cover requirements; and

- minimize settlement of the cell upon completion.

Each waste lift will be compacted using the loader with three to five passes or until the equipment is able to 'walk out' of the waste (the loader can travel on the waste without sinking). The surface of the cell will be smoothly graded to fill in low areas and/or trim high spots prior to the placement of cover material. A minimum of 6 inches of cover will be placed monthly or as required to control odour. An intermediate cover of 1.5 feet will be placed in the event that the landfill cell has not been used for 30 days.

Every effort is to be made to have a minimum of 3 feet of waste between the loader and the cell bottom. The loader is to stay a minimum of 1.5 feet away from the berms of the cell. No equipment is to run directly over leachate collection and lining systems.

8.6.1 WORKING FACE OF THE CELLS

After placing 3 feet of solid waste on the bottom of the cell to protect the liner, the cell will be filled from the southeast corner working back to the west. There will be one active working face in the cell at any given time to minimize leachate generation and cover material required, and to control litter. The width and height of the working face will remain relatively constant whereas the length will vary as waste is placed in the cell. The following working face dimensions will be achieved during operations of the cell.

- width - 25 to 30 feet;
- height – 10 feet;
- length - varies with daily waste volume rates; and
- face slope - 4H:1V (4 horizontal: 1 vertical).

The waste is to be placed to maintain a 3 feet deep ditch around the perimeter of the cell to collect surface water run off with the cell and direct it to the leachate collection system.

8.6.2 ALTERNATIVE DAILY COVER MATERIAL

Alternative daily cover material will be utilized in conjunction with the placement of cover soil. The following alternative daily cover materials may be used at the WMF:

- wood chips;
- construction and demolition waste;
- compost material; and
- shredded rubber.

8.6.3 ANNUAL TOPOGRAPHIC SURVEY

An annual topographic survey will be conducted on the active landfill cell. A RTK GPS survey unit will be utilized to perform a topographic survey. The survey will be done in world coordinate system, tying into established benchmarks at the Site.

8.6.4 CELL CAPACITY QUANTIFICATION

The results of annual topographic survey will be used to quantify the remaining capacity of the cells. The Operator will continue to monitor the air space available in the cells to ensure adequate capacity is maintained. The correlation between the density of the waste and associated storage volume will continue to be improved.

8.6.5 WASTE ACCEPTANCE

Proper handling requirements for waste will be provided for waste generators. A correction notice procedure that will identify errors in the handling and provide the correct handling procedure, shall be developed and used to ensure only accepted waste is disposed in the waste disposal cells.

Information on the type, location and quantity of generated waste will be obtained by the Operator and provided to Administration. This data will be used to assist in manners in which overall waste generation may be reduced.

8.7 MAIN WASTE HANDLING BUILDING

Safety stations will be maintained within the main building.

Operator administrative functions and waste oil pumping will be performed in the main building. Other operations requiring heated or sheltered conditions will be performed in the main building as required. Examples include:

- equipment maintenance
- bin labeling
- recyclables sorting

8.8 COLD STORAGE SHED

The cold storage shed will be used for handling and storage of recyclable and hazardous wastes. This will include baling of recyclable wastes.

Recyclable and general waste will be received at the WMF on a daily basis. All waste will be received, weighed and recorded into the waste database. The general waste will be placed in the active waste disposal cell. The recyclable material will be handled and stored in the storage shed.

The Operator will collect contaminated and hazardous materials generated at Vale Manitoba Operations from designated Waste Laydown Areas. Hazardous materials will be segregated and packaged according to TDG requirements at the designated collection locations and transported to the WMF.

Hazardous and contaminated materials intended for disposal will be received, weighed and recorded into the waste database. The waste will be placed on the hazardous waste pad in the storage shed and kept separate from all other waste streams and stored in a secure manner.

A designated area within the storage shed will be set up for reception, consolidation, and temporary storage of contaminated and hazardous materials. The designated hazardous materials area will be divided into sections, one for each class of hazardous material. The sections would be demarcated by hazard class signage and by physical barriers between each. If required, partially full containers of hazardous materials will then be consolidated, based on compatibility, to make full containers. Hazardous waste decals will be placed on each container.

8.9 BURN AREA

The clean wood burn pits will be maintained by the Operator. The Operator will be responsible to ensure only clean combustible wood is placed within the footprint of the burn pits. The wood will be free of light wood products such as sawdust that may migrate with the wind outside of the footprint of the burn pits. Only larger pieces of processed wood such as non-salvageable untreated wood will be stored within the pits. The two burn pits will be filled alternately to provide a safe workspace during a burn.

Only combustible materials such as leaves, loose straw, paper products, cardboard, and packing material derived from wood may be burned. Wood being placed within the burn pits will be limited to a footprint of 6 feet from the perimeter berm, and a height not exceeding 4.5 feet above the base of the pit.

Controlled burning of the clean wood will take place under the direction of the Vale Fire Hall. The burn will take place during daylight hours with favourable weather conditions – steady light eastern winds, temperature not greater than 25^{o}C. The Manitoba Conversation Fire Hazard Maps will be reviewed prior to the initiation of a burn. A representative from Vale Fire Hall with supporting firefighting equipment will be onsite at all times to supervise the burn.

At the completion of a controlled burn, the extinguished ashes will be collected and transported to the active cell for final disposal. The Operator will maintain detailed records of the controlled burns which will include the date of the burn, weather conditions during the burn, start and end of the burn, volume of wood burned, personnel overseeing the burn, and general details of the burn.

Ashes from a burn must be disposed prior to starting a second burn in the alternate pit.

In the event of any non-planned burns, the fire will be extinguished immediately and Manitoba Conservation's regional office will be notified.

A detailed Clean Wood Burn Procedure is included in Appendix B.

8.10 LEACHATE MANAGEMENT SYSTEM

Leachate generated within the cells will flow, by gravity, to the low point in the cell and through the penetration to the LCC located outside each cell. Leachate is to flow from LCC No. 1 to LCC No. 2.

At LCC No. 2, the leachate will be pumped for storage at the Leachate Holding Pond or removed for treatment.

Regular inspections will be completed at each of the LCCs to complete the following:

- ensure that no debris is trapped inside the LCC;
- that leachate is flowing to the next LCC; and
- that the level of leachate in LCC No. 2 is not rising to unacceptable levels prior to being pumped or removed.

Flushing of the main riser pipe will be completed every five (5) years to ensure that sediment that may build up in the line is being removed. Flushing is to be completed at the east side of the cell through the riser pipe.

8.10.1 LEACHATE QUANTITY AND QUALITY

The Operator will routinely monitor the leachate levels in the cell to maintain safe leachate level. Excess leachate will be treated as described in section 8.10.3 below.

8.10.2 LEACHATE SEEPAGE INSPECTION

The Operator will conduct visual inspections of cell side slopes for evidence of leachate seepage. Seeping leachate can be identified by rusty brown or black liquids with a strong putrescent odour.

In the event that leachate seepage is identified, necessary steps to contain the seepage will be conducted. Corrective action for surface seeps will initially include the construction of containment berms or ditching to collect and recover the leachate to prevent off-site migration. Minor seeps may be remediated by excavating the seep area and filling the area with compacted clay soils. Surface seeps may be a result of a depression or erosion on the surface of the landfill and therefore corrective actions will include recapping areas of the landfill to reduce infiltration.

8.10.3 LEACHATE TREATMENT

Leachate treatment involved at the WMF will include the following three treatment techniques:

- recirculation of the leachate into the cells;
- evaporation of the leachate using evaporation pond and/or sprinklers; and
- disposal of the leachate at Manitoba Conservation approved location.

Recirculation will be considered the preferred method of leachate treatment and disposal for the landfill cell. Leachate recycling is accomplished by pumping the leachate from the collection riser and redistributing it over the top of the waste. The recirculation of the leachate will significantly reduce leachate chemical concentrations, and enhance the stabilization of the landfill.

Evaporation will be used as a treatment technique for the leachate generated. The leachate in the evaporation pond will be evaporated over time, and possibly using sprinklers or misters to aid leachate evaporation if required.

Leachate may be disposed of at an approved location in the event that the recirculation and evaporation treatment techniques prove to be inadequate. The leachate will be sampled and the disposal location will be approved by Manitoba Conservation prior to disposal.

8.10.4 LEACHATE HOLDING POND

Regular weekly visual inspections of the Leachate Holding Pond will be completed to ensure that the level of leachate does not extend beyond the 2 foot free board. Should the levels exceed this level, alternate methods of leachate handling must be investigated, noted in section 8.10.3.

Prior to disposal of excess leachate, pumping from the waste disposal cells into the pond will be halted causing accumulation with the cells to provide leachate within the pond an opportunity to evaporate.

Accumulated sludge shall be collected and transported to the active cell for final disposal.

8.11 GENERAL WMF OPERATION AND MAINTENANCE

The WMF will be subjected to regular checks to infrastructure and environmental monitoring systems. These checks will include:

- monthly inspections of signs, fences, drainage works, berms and retention pond(s); and
- a complete written record of each inspection, complete with recommendations for corrective action if required.

Regular inspections will be completed on the following items (with follow-up maintenance as required):

- fencing and security;
- signs;
- ditches, culverts, flow structures and retention ponds;
- containment berms;
- leachate holding pond;
- pumping systems;
- vegetation and weed controls;
- buildings and utilities; and
- litter and general tidiness.

8.12 LITTER CONTROL

Litter at the WMF will be maintained on a weekly basis. Preventative measures to reduce the amount of windblown litter shall include:

- compacting and covering waste regularly;
- keeping the working face of waste small (i.e. not too wide);
- installing portable fencing and/or windbreaks to reduce the wind velocity, if required; and
- maintaining cell perimeter fence by keeping it clean and free of debris.

Waste that blows from the working face or that is left unattended at the site gate or along the access road shall be collected, at a minimum, weekly.

8.13 EQUIPMENT ASSIGNED FOR USE DURING OPERATION

The equipment assigned for use during the waste handling operation includes the following:

- waste collection truck;
- telehandler;
- forklift; and
- track loader with bucket.

8.14 PCB STORAGE

PCB handling and disposal will be done in accordance with PCB Regulations SOR 2008-273. A PCB storage inventory will be maintained. Storage will be provided by an intermodal container complete with smoke detection and remote annunciation at the main plant Substation for continuous monitoring. Adequate signage will be put into place. PCB fluid will be packaged in 16 gauge steel 45-gallon drum, and a standard 18 gauge steel drum will be used for solid PCBs.

8.15 OFF-SITE DISPOSAL OF WASTE

The off-site disposal of all waste will be conducted in accordance to the safe vehicle operation as well as the TDG and Provincial regulations. The Operator will coordinate the off-site disposal of waste with assistance and approval from the Administration.

The following procedures will be followed for the off-site disposal of contaminated and hazardous waste:

- a Waste Manifest or Recycling Docket is prepared for the waste;
- every container is labeled properly;
- ensure that the License number and the unit intended to transport the waste is identified on the manifest of docket. The waste requires a Carrier License in the province, territory or state the waste is generated in and will be transported through.
- ensure TDG regulations are being followed regardless of the pick-up vehicle; proper labeling, placarding and documentation requirements must be met; and
- ensure the vehicle being used to pick-up the waste meets provincial requirement weight restrictions. Every province, territory or state as well as vehicle operating specifications have different weight restrictions depending on the type of pick-up vehicle. These restrictions may include the pay load in the box or the length, weight or type of trailer being utilized.

8.16 EROSION CONTROL

The berms and ditches around the WMF will erode naturally by rain, snowmelt and wind. Once per year or following a major storm, the following procedure shall be followed:

- inspect the ditches along their full length;
- identify areas of concern where visible erosion has occurred;
- work with Administration to repair damage with new fill compacted into place; and
- place erosion protection materials in areas of continual concern.

9. INSPECTIONS AND REPORTING

9.1 MONTHLY INSPECTION

The WMF will be subjected to weekly inspections of the infrastructure and environmental monitoring systems, including:

- fencing and gates;
- signs;
- ditches, culverts, flow structures;
- perimeter berms;
- waste disposal cells;
- leachate collection systems;
- leachate holding pond;
- monitoring wells;
- fuel tank;

- waste oil ASTs;
- fire extinguishers;
- eye wash station and first aid kits;
- vegetation and weed controls;
- burn area;
- main building;
- storage shed; and
- utilities.

A written record of each inspection, complete with recommendations for corrective action, if required, will be submitted to the Administration within five (5) days of any malfunction and corrective action.

9.2 ANNUAL LANDFILL REPORT

The Administrator is responsible for submitting the annual report to Manitoba Conservation as described in the Permit. The annual report will include the results of the groundwater sampling analyses, complete with previous results and trends.

10. SAFETY AND EMERGENCY RESPONSE

10.1 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Persons at the WMF shall wear appropriate approved PPE at all times except when in the office or cab of equipment, including:

- coveralls with reflective strips;
- CSA approved boots with steel toe, metatarsal guard and shank;
- shatter proof safety glasses with side shields;
- tear resistant gloves;
- hearing protection, while operating equipment; and
- hard hat.

10.2 FIRE EXTINGUISHERS

Fire Extinguishers will be kept in the following locations:

- site trucks;
- waste collection truck;
- telehandler;
- forklift;
- track loader;
- main building; and
- storage shed.

10.3 FIRST AID KITS

First aid kits shall be kept in the site trucks, waste collection truck and main building.

10.4 INCIDENTS AND REPORTING

An incident is any accident that causes harm to a person or to equipment. This may include any or all of the following:

- fire;
- equipment, office, and site break-in;
- gate and fence damage or other property damage;
- accidents on the site; and
- injuries resulting from accidents or waste handling (such as cuts or abrasions).

All incidents shall be immediately reported to the Administration and Tervita Supervisor.

All injury incidents shall be immediately reported to a Vale First Aid. Telephone numbers can be located in the Emergency Contact Numbers Section of this manual.

It is important that appropriate treatment is sought.

All injury incidents shall have an SAF 079 immediately generated.

The Workplace Safety and Health Act W210, Operation of Mines Regulation 212 section 2.11 Notice in cases of serious injury or incidents shall be referenced to identify the required Mines Branch reporting.

10.5 EMERGENCY CONTACT NUMBERS

The following emergency contacts have been identified for the WMF at this time. This table should be visibly posted in the site office and the muster points on the WMF.

VALE FIRST AID	**24 hour Emergency Line**	**204-778-2276**
VALE AMBULANCE	**24 hour Emergency Line**	**204-778-2276**
VALE FIRE DEPARTMENT	**24 hour Emergency Line**	**204-778-2250**
VALE SECURITY	**24 hour Emergency Line**	**204-778-2365**
HOSPITAL	**Thompson General Hospital - 871 Thompson Drive South**	**1-204-677-2381**
AMBULANCE	**24 hour Emergency Line**	**1-204-677-7911**
POLICE (PROVINCIAL/RCMP)	**24 hour Emergency Line**	**1-204-677-6911**
WCB	**WCB – Manitoba (24 Hour)**	**1-800-362-3340**
FIRE DEPARTMENT	**24 hour Emergency Line**	**1-204-677-7911**
VALE REPRESENTATIVE	**Toni Paulic**	**1-204-679-8361** (Cell)
TERVITA PROJECT MANAGER	**John McCusker**	**1-204-451-2869** (Cell)
TERVITA SITE SUPERVISOR	**Tanya Hodgins**	**1-204-918-1703** (Cell)
TERVITA REGIONAL SAFETY	**Ella Clark**	**1-204-894-5563** (Cell)
TERVITA's 24 hour Emergency Response Coordinator		**1-800-667-0444**
Mines Inspector	**Joe Dobbin**	**204-677-6533** **204-679-2944 (Cell)**

10.6 WORKING ALONE POLICY

To ensure the safety of employees, the Vale SPI Manitoba Divisional Policy on Working Alone is to be followed when working alone.

Employees should have a cellular phone with them at all times. In case of an emergency, call the following numbers for assistance:

Tervita Site Supervisor - 1-204-918-1703

Vale First Aid - 204-778-2276

11. GROUNDWATER MONITORING PLAN

The Administration will coordinate regular groundwater monitoring events in conjunction with the WMF operations to detect any potential impacts before they become problematic. In this manner, groundwater concerns could be identified and managed before ecosystem harm takes place. In the event that management of the groundwater is required, management will be performed to the full satisfaction of the appropriate regulatory community.

As required by the Permit, groundwater monitoring is to be completed once per year in later summer. Four groundwater monitoring wells have been installed around Cell No. 1 with two upgradient and two downgradient of the cell. The number of wells will be increased as additional cells are constructed. The frequency of monitoring is subject to review and discussion with Manitoba Conservation.

The analysis for groundwater will be analyzed for the parameters listed in Appendix C of the Permit. These parameters are divided between activities to be completed on the site and in a laboratory. These are summarized below.

List of Parameters to be Collected on the Site

Conductivity
Groundwater elevation
pH

List of Groundwater Analysis Parameters

Category	Parameters	
Inorganic parameters		
	Alkilinity-Total	Iron – Dissolved
	Ammonia	Lead - Dissolved
	Arsenic - Total	Magnesium
	Barium	Manganese
	Boron	Mercury
	Cadmium - Dissolved	Nitrate – Reported as N
	Calcium	Nitrite – Reported as N
	Chloride	Total Kjeldahl Nitrogen – Reported as N
	Copper - Dissolved	pH
	Chromium – Dissolved	Total Dissolved Solids
	Conductivity	Sulphate
	Total Phosphorus	Zinc - Dissolved
	Potassium	
Volatile Organic Compounds		
	Benzene	(BTEX)
	Toluene	
	Ethylbenzene	
	Xylene	
Other Compounds	Chemical Oxygen Demand	Dissolved Oxygen Demand

The groundwater monitoring program involves monitoring groundwater table monitoring wells MW1, MW2, MW3, and MW4 until the future landfill Cells are developed. As the future cells become active, the groundwater monitoring program will be expanded as required.

11.1 SURVEY OF INTEGRITY

All wells will be inspected on an annual basis to confirm their integrity. This will include inspections to:

- confirm that protective well casings are in place and locked;
- confirm no damage has occurred to the monitoring well pipe;
- ensure that soil has not built up within the monitoring well;
- confirm that elevations of the top of the pipe are checked and recorded annually; and
- make recommendations for repairs to any damage.

12. CLOSURE OF THE WMF

12.1 GENERAL

Landfill closure requirements consistent with a site such as this would generally include:

- placement of waste to final design elevations;
- construction of a final cap structure;
- groundwater monitoring; and
- limitation on future development on and adjacent to the landfill site.

The landfill will be operated so as to achieve final elevations progressively during the lifetime of the facility. Final grades will be approximately 10%, and will be in accordance with the most recent facility closure drawings filed with Manitoba Conservation.

The final capping layer will be constructed to direct drainage into the run-off control system, to provide control on sediment loads and other contamination (if any).

Completed cells must be reclaimed in accordance with the Permit and this Manual. All cell closure work must be documented and the following information recorded:

- certified as-built plans and construction Quality Assurance/Quality Control documentation;
- survey reports indicating the final cover depths and slopes;
- the contents and history of use for the cell;
- the groundwater monitoring wells that will be used during the post-closure period; and
- the seed mix used to support the vegetated layer of the final cover.

12.2 SITE GRADING

Site grading is required to remove local surface depressions to reduce the potential for surface water ponding and infiltration to the waste zones. Site grading (after burial of all waste) is to be as close as possible to the following:

- surface grades across the site are to be a minimum of two percent and local surface depressions are to be filled;
- areas with a soil cover over buried waste are to be monitored regularly until the settlement of the waste areas has stabilized. Any depressions or holes that develop in the cover soils are to be re-graded; and
- all areas of disturbed surface soils on the site are to be re-vegetated with grass species that are native to the region to help stabilize surficial soils and provide erosion protection.

12.3 FINAL CAP CONSTRUCTION

The cap shall be composed of a layer of cover material to a thickness of approximately 2 feet and mounded with a minimum slope of two percent to reduce surface water ponding and infiltration.

Once complete, the capped area is to be seeded with a native seed mix to promote re-vegetation to control erosion and decrease infiltration into the landfill cells.

13. POST-CLOSURE CARE

After landfill closure, the WMF will enter the post-closure period which will extend for 25 years or as otherwise directed by Manitoba Conservation. Reclaimed areas are to be inspected on an annual basis during the snow free period. The inspection is to include information on the following conditions (if identified):

- substantial erosion;
- slope movement or failure;
- vegetation hardiness (e.g. bare patches, dead or dying plants);
- venting gases; and
- plugged or eroded runoff ditches or culverts.

Any problem areas observed must be recorded on a site drawing. A work program must be developed and implemented to deal with any deficiencies within four weeks of each inspection. The successful completion of the work must be recorded on an appropriate inspection form, a copy of which will be entered into the main WMF operating record.

13.1 POST-CLOSURE REPORTING

A complete record set must be maintained for the landfill through the operating phase and the post-closure period. Hard copy or electronic copies of records and reports shall be retained. Documents and records to be maintained include:

- all as-constructed reports and drawings;
- annual monitoring reports;
- annual summaries of waste disposal; and
- regulatory approvals specific to the landfill.

13.1.1 GROUNDWATER MONITORING

Groundwater monitoring will be required in accordance with the Permit in the post-closure period. The post-closure groundwater monitoring approach may be summarized as follows:

- annual groundwater monitoring for the complete list of permit parameters or as otherwise authorized by Manitoba Conservation.

14. TRAINING AND CONTINGENCY PLANS

14.1 TRAINING OF SITE PERSONNEL

Operator employees receive safety and operations training as part of a regular schedule of employee training as a requirement of the requirements of the Operator's safety plan available at the site office or upon request. Emphasis is on health and safety, first aid, emergency response and recognition of dangerous waste materials. Contingency plans exist for events such as fire, contaminant release, severe storms, personnel injury and discovery of non-conforming wastes.

The training program includes instruction to prevent injury, illness and damage to equipment or the environment. New employees are required to demonstrate their ability to safely perform their jobs. Routine training is conducted for employees in the following areas:

- Vale site orientation;
- first aid;
- WHMIS and TDG;
- health and safety, personal protective equipment;
- safe equipment operating procedures;
- recognition of potentially unacceptable wastes;
- emergency notification procedures; and
- emergency response.

All employees are also trained on the operations plan.

14.2 WMF SAFETY

14.2.1 GENERAL SAFETY PROGRAM

The safety of site operating personnel and the others is of prime importance at all times. Site employees shall not endanger themselves or others on the site. Employees are obligated to report unsafe practices and are empowered to notify other employees or site users acting in an unsafe manner.

All accidents, injuries, or near misses are reported to the Site Supervisor and the following steps are taken:

- investigate the accident immediately;
- find out the cause;
- make a complete accident report;
- take immediate measures to correct the cause and prevent it reoccurring; and
- have a safety meeting with the employees as soon as possible to review the incident.

14.2.2 SAFE EQUIPMENT OPERATION

The following operating procedures will take place at the WMF during equipment operation activities:

- check equipment for safe operating conditions and defects such as exhaust fumes or fuel leaks, before operating;
- use stepping points and handholds when mounting and dismounting equipment;
- keep the operator's compartment clean and free of loose objects;
- look to front, back and both sides before moving equipment;
- ensure back-up warning devices are operating;
- wear seatbelts when operating equipment;
- always check waste piles to make sure there is no person, vehicle, or other equipment in blind areas ahead of piles;
- maintain adequate clearance to the sides when pushing waste piles to avoid falling objects or bursting containers from striking vehicles or persons;
- do not crush sealed containers with unknown contents;
- move cautiously over bulky items to avoid tipping or sudden lurches;
- always use caution around site users who may not be aware of dangers with heavy equipment;
- when stopped, park equipment on level ground and rest blades or buckets firmly on the ground;
- check the ground for glass, pipe, wood or other debris prior to dismounting; and
- provide adequate lighting if operating equipment in non-daylight hours

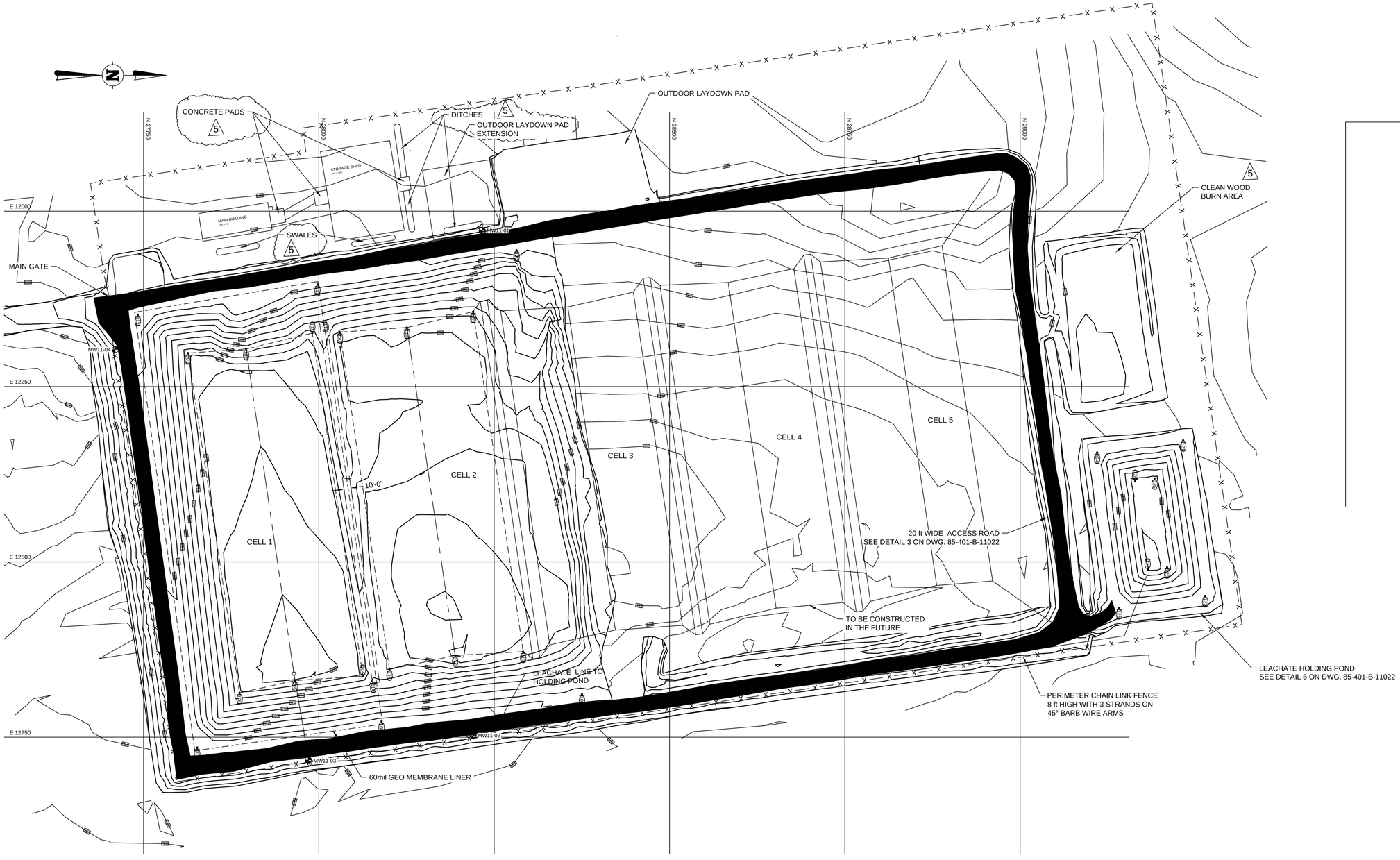
14.2.3 PERSONNEL DECONTAMINATION PROCEDURES

Personal hygiene practices will ensure that workers are not impacted from chemical and biological contaminants found in WMF. Standard hygiene practices include washing hands before eating or smoking. Outer clothing used during work activities (coveralls, gloves, etc) should be removed before food handling.

In situations where contact has been made with chemicals/wastes, proper decontamination procedures based on the appropriate MSDS are to be used.

Figure 1

WMF Landfill Cell Layout



CELL 1 AND 2 GRADING PLAN
SCALE: 1" = 75'

LEGEND:

- GROUNDWATER MONITOR WELL
- (101) DESIGN CONTROL POINT

NUMBER	REFERENCE DRAWINGS
85-401-B-11321	WASTE MANAGEMENT FACILITY BUILDINGS SITE PLAN
85-401-B-11021	CELL 1 LEACHATE COLLECTION SYSTEM LAYOUT AND DETAILS
85-401-B-11022	TYPICAL DETAILS
85-401-B-11023	LEACHATE RETURN LINE, HDPE PIPE AND LINER DETALS
85-401-B-11024	LEACHATE HOLDING POND - GAS MANAGEMENT SYSTEM

NO.	REVISION	DATE	BY	CH'D	CORD	PROJ.
5	REFERENCES AND LAYOUT ADDED	04/06/2014	RM	HM		
4	RECORD DRAWING	16/01/2012	SPI	IBM		
3	ISSUED FOR CONSTRUCTION	08/09/2010	RDJ	IBM		
2	ISSUED FOR TENDER	23/07/2010	MK	CP		
1	ISSUED FOR CLIENT REVIEW	30/06/2010	IBM	IBM		

NO.	REVISION	DATE	BY	CH'D	CORD	PROJ.

	NAME	DATE
DRAWN	M. KHALIL	23 JUL 10
CHECKED	C. PRISCU	23 JUL 10
DESIGNED	I.B. MACLEOD	23 JUL 10
REVIEWED	D.WALL	23 JUL 10

CONSULTANT
AMEC E&E
WINNIPEG, MB

PROJECT No. WX16258-1000
DIVISION No. 4190
DRAWING No. 85-401-B-11020

PROFESSIONAL STAMP
STAMPED BY : C. PRISCU
DATE : SEPTEMBER 07 2010
REVISION No. : 3
LICENSE No. : 22789

PERMIT STAMP
A.P.E.G.M. CERTIFICATE OF AUTHORIZATION AMEC EARTH & ENVIRONMENTAL (MB) No. 555

PLANT NAME: THOMPSON PLANT T-1
PLANT AREA: NEW LANDFILL SITE
KEY WORD: NEW LANDFILL
DESCRIPTION: SITE GRADING PLAN FOR CELL 1, CELL 2 AND ACCESS ROAD
SCALE: AS SHOWN
85-401-B-11020
PROJ. REF.
REVISION 05

CADD DRAWING

N:\Mech\3D Drawings Archive\05 - Division\Landfill\WX16258-ASB-001.dwg - 85-401-B-11020 - 7/25/2014 2:19 PM - rtimyrha

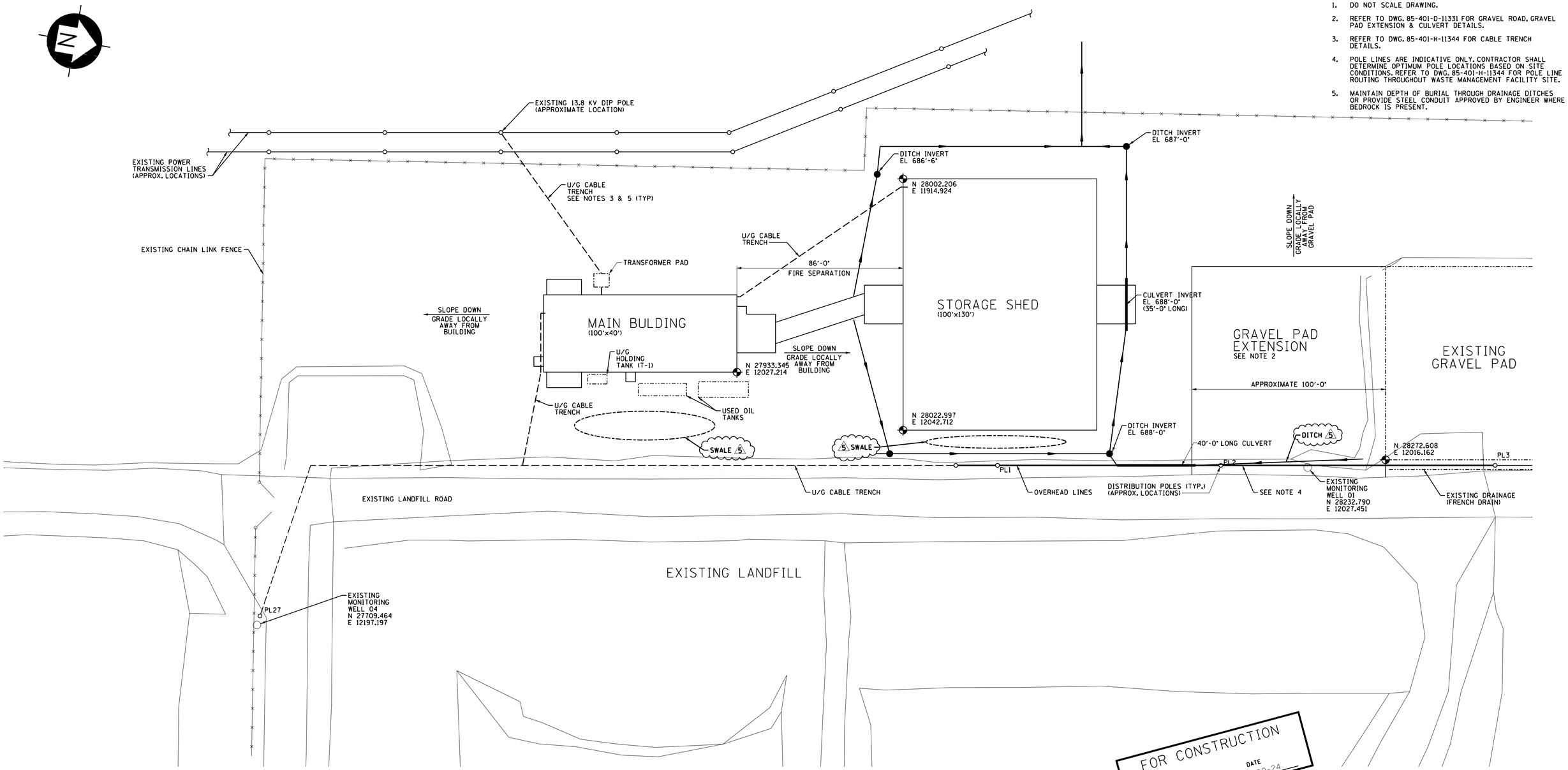
Figure 2

WMF Main Building and Storage Shed Layout

DWG. NO. 85-401-B-11321

NOTES:

1. DO NOT SCALE DRAWING.
2. REFER TO DWG. 85-401-D-11331 FOR GRAVEL ROAD, GRAVEL PAD EXTENSION & CULVERT DETAILS.
3. REFER TO DWG. 85-401-H-11344 FOR CABLE TRENCH DETAILS.
4. POLE LINES ARE INDICATIVE ONLY. CONTRACTOR SHALL DETERMINE OPTIMUM POLE LOCATIONS BASED ON SITE CONDITIONS. REFER TO DWG. 85-401-H-11344 FOR POLE LINE ROUTING THROUGHOUT WASTE MANAGEMENT FACILITY SITE.
5. MAINTAIN DEPTH OF BURIAL THROUGH DRAINAGE DITCHES OR PROVIDE STEEL CONDUIT APPROVED BY ENGINEER WHERE BEDROCK IS PRESENT.



FOR CONSTRUCTION
HATCH™ DATE 2012-09-24

SITE PLAN

APEGM Certificate of Authorization
HATCH Ltd.
No. 4400 Date: 2012-09-24

ORIGINAL STAMPED BY J.S. WALKER 2012-09-24 # 25431

REV.	ISSUE FOR	AUTH. BY	DATE
3	CONSTRUCTION	JSW	JDK 12-09-24
2	CONSTRUCTION	JW	JK 12-06-28
1	TENDER	JW	JK 12-06-01

HATCH™
DESIGNED BY J WALKER DATE 2012-06-01
DRAWN BY S. POLINCHUK DATE 2011-11-25
DWG CHECKED BY SM GOMEZ DATE 2012-06-01
DISCIP. ENGR. JD KILGOUR DATE 2012-06-01
ENGR. MGR. DATE
AREA. MGR. DATE
ISSUE AUTHORIZATION
HATCH DWG. NO. H337596-N005-00-014-0001

$$DATAENTRY$$

DWG NO.	REFERENCE DRAWINGS	REV	JOB NO.	DESCRIPTION	DATE	DRAWN BY	CHECKED DRAWING	APPROVED DESIGN	REVIEWED DESIGN
85-401-B-11314	MAIN BUILDING LAYOUT	1	ER9271	ISSUED FOR TENDER	2012-06-01	S. POLINCHUK	S.M. GOMEZ	J.D. KILGOUR	J.S.WALKER
85-401-B-11317	STORAGE SHED LAYOUT	5	TA	REFERENCE DRAWING ADDED. AND LAYOUT MODIFIED TO ACTUAL	2014JUNIO	RENE MAYNARD	JALPESH PATEL		HUGH MCMILLAN
85-401-H-11344	WASTE MANAGEMENT FACILITY & DISTRIBUTION-SITE PLAN	4	ER9578	AS BUILT	2013-12-19	E. DAWSON			
85-401-B-11020	SITE GRADING PLAN FOR CELL#1, CELL#2 & ACCESS ROAD	3	ER9271	ISSUED FOR CONSTRUCTION - STORAGE SHED RELOCATED & DRAINAGE MODIFIED	2012-09-24	S. POLINCHUK	J.S. WALKER	J.D. KILGOUR	J.S. WALKER
		2	ER9271	ISSUED FOR CONSTRUCTION	2012-06-28	S. POLINCHUK	D.S. BODNARUK	J.S.WALKER	S.M. GOMEZ

VALE MANITOBA OPERATIONS

PLANT: THOMPSON PLANT
SUB PLANT: T1 MINE
AREA: WASTE MANAGEMENT FACILITY
CLASSIFICATION: LAYOUT
TITLE: WASTE MANAGEMENT FACILITY BUILDINGS SITE PLAN
SCALE: NTS
REV.1 PROJECT NO.: ER9271
DRAWING NO.: 85-401-B-11321
REV.: 05
REV.0 START DATE: 2013-12-16
OLD DRAWING NO.

APPENDIX A

Permit

Waste Disposal Ground Regulation

Waste Disposal Ground Operating Permit

Manitoba
Conservation and Water Stewardship

Permit No: 35818 **Client File: 50212**

In accordance with the *Waste Disposal Grounds Regulation*, made under *The Environment Act*, **Vale Inco Ltd.** is hereby permitted to operate a **Class 2 Waste Disposal Facility**, to be known as the **VALE Manitoba Operations Waste Disposal Facility** situated at **Pt NE T77-R3 WPM** in **PIPs' 581, 582, 579 and 580** in the Province of Manitoba.

THIS OPERATING PERMIT is subject to being AMENDED, SUSPENDED or REVOKED under section 6 of the *Waste Disposal Grounds Regulation.*

THIS OPERATING PERMIT is issued subject to the following TERMS AND CONDITIONS:

General Terms and Operating Conditions

1. The Operator shall construct and operate the Vale Manitoba Operations Waste Disposal Facility (the Facility) in accordance with the most current version of the *Waste Disposal Grounds Regulation*, (M.R. 150/91), the Vale Manitoba Proposal Submission submitted by AMEC Earth and Environmental and dated August 2010 (hereafter referred to as The Plan) and this Operating Permit.

2. The Operator shall ensure that the Facility is not accessible to the public.

3. The Operator shall obtain approval in writing from the Director for any proposed alteration to the facility before proceeding with the alteration.

4. The Operator shall, not later than 90 days following commissioning of the Facility, forward an operation and maintenance manual for the Facility to the Director for written approval.

5. Cover of waste shall occur in accordance with M.R. 150/91 or as required by an Environment Officer. The use of cover materials other than those specified in M.R. 150/91 may be permitted with written approval of the Director.

6. The Operator shall remove any litter accumulated along the access road and around the perimeter of the site on a regular basis, at minimum twice annually or as required by an Environment Officer.

7. Unless otherwise approved in writing by the Director, the Operator shall allow solid waste only from Vale Manitoba Operations Development, to be deposited or disposed of at the facility.

8. The disposal of liquid wastes or liquid industrial wastes shall not be allowed at the facility.

9. The Operator shall ensure that the collection and disposal of Hazardous Waste shall be in accordance with the *Dangerous Goods Transportation and Handling Act* and other Provincial and Federal Regulations.

10. No animal mortalities may be disposed of at the facility.

11. The Operator shall implement control measures to prevent attraction and sustenance of rodents and scavenging vectors.

12. The Operator shall ensure that all asbestos is handled and disposed of in accordance with the most current version of the *Guideline for Working with Asbestos*. The Operator shall document and maintain records of the volume disposed and the disposal locations. These records must be made available for review upon request of an Environment Officer.

Site Construction and Upgrading

13. Individual cell construction shall occur as described in The Plan. The construction is subject to the following conditions:
    a) Notify the assigned Environment Officer within five (5) days commencement of construction and within five (5) days of commencement of installing the groundwater monitoring wells,
    b) Notify the assigned Environment Officer five (5) days prior to installing the proposed 60 mil HDPE geo-membrane liner,
    c) Testing of all berms and cell bases shall be conducted by a professional engineer to ensure that the compaction is done to 95% Standard Proctor Density on a maximum lift of 150 mm,
    d) Monitoring wells shall be installed in the presence of an Environment Officer and under the supervision of a qualified hydro geologist or professional engineer,
    e) Installation of the HDPE liner shall be carried out in accordance with the specifications from the liner manufacturer and under continuous and direct supervision o f the engineer or a qualified installation supervisor designated by the manufacturer.

14. The Operator shall ensure the Facility is constructed and maintained so that all uncontaminated surface water flows to the perimeter ditch and impacted water from the active area is directed to the leachate evaporation pond.

15. The Operator shall have four (4) monitoring wells installed as indicated in The Plan not later than 90 days following completion of the construction of the first cell to be developed.

16. The Operator shall, upon completion of construction of each cell of the Facility submit "record drawings" along with a construction report to the Director. The construction report shall be compromised of, without being limited to the following: the engineer's inspection dates and notes, density measurements, geo-membrane liner installation QC data, monitoring well installation logs, and locations. The plans and reports are to be submitted within 90 days of construction completion.

Closure

17. The final cover of waste when closing waste disposal cells (active areas) shall be undertaken under the supervision of a professional engineer within 12 months of the termination of use of the cell. A final cover of suitable low permeability material must be applied to the surface of the active area, and the area graded to minimize ponding of water on the surface and graded to create stable slopes. Suitable material must be placed on top of the cap to facilitate revegetation.

18. The Operator shall submit a Closure Plan prepared by a Professional Engineer acceptable to the Director for final closure of the former landfill cell within six (6) months of the commissioning of the new landfill active area.

Burning of Combustible Waste

19. All burning shall be carried out in accordance with the attached Appendix A:.Terms and Conditions for Burning at Waste Disposal Grounds.

20. The Operator shall obtain a Permit to Burn as required under *The Wildfires Act* (W128) prior to igniting any fire at this facility.

21. The Operator shall submit to the Director for written approval, by Jan 15, 2015 a plan to ensure no contaminants (soluble or insoluble) are released to the environment from the ignition or incineration of refinery burnables.

Monitoring and Reporting Requirements

22. The Operator shall notify the Environment Officer, in writing, of the date of commissioning of new waste disposal cells.

23. Prior to commissioning the Facility, the Operator shall ensure that the groundwater monitoring wells are sampled for the baseline parameters stipulated in Appendix B.

24. All groundwater monitoring well samples shall be collected; stored and analyzed using approved field and laboratory methods.

25. The Operator shall sample the groundwater monitoring wells once per year in later summer for those parameters identified in Appendix B or selected parameters as approved by the Director.

26. The Operator shall submit an Annual Report, in a form acceptable to the Director, detailing the results of groundwater sampling analyses, complete with previous results and trends. The Report shall be submitted no later than December 31 annually.

Revocation

27. This permit replaces Permit No. RRR-121 which is hereby rescinded.

Date: August 24, 2012

for Tracey Braun, M.Sc.
Director, Environmental Approvals

APPENDIX A
TERMS and CONDITIONS for BURNING at WASTE DISPOSAL GROUNDS

Burning of certain waste materials is allowed at waste disposal grounds **only** after a variance to the operating permit for that waste disposal has been issued. Burning is conducted at the **operator's** discretion and subject to authorization under the *Wildfires Act* and this Permit.

Siting Criteria

1. A burn area is allowed only at a waste disposal ground which can meet the siting and design requirements.
2. There shall be no dwellings or commercial establishments within **400** metres of the burn area.
3. The burn area shall be located a minimum of **50** metres from the active waste disposal areas or an area for the collection of flammable materials.

Design Criteria

1. The burning area shall be constructed of 2 or more separate cells. These cells shall have containment on 3 sides and each side shall be not less than 1.8 metres in height.
2. A chain link fence, not less than 1.5 metres in height and with mesh size no greater than 5.5 cm, shall be constructed on top of the berms to contain windblown scatter.
3. The base of the burn area shall be graded to prevent the collection of water inside the burn area. In areas where groundwater contamination is a concern the base of the burn area shall be constructed of 1 meter of compacted clay with a hydraulic conductivity of 10^{-7} cm/s or less.

Operating Criteria

1. Burning shall take place within the confines of a trench or in a berm-confined area and not on or above the prevailing grade.
2. Only separated and readily combustible materials such as boughs, leaves, loose straw, paper products, cardboard, non-salvageable untreated wood, and packing materials derived from wood may be burned, and only when there is an appropriate volume of this material to burn.
3. Burning of any other product or material is prohibited.
4. Burning is to occur only when weather conditions are favourable, taking into consideration wind direction and velocity, so that nuisance to any neighbouring resident and / or highway does not occur.
5. Burning shall be under constant supervision.
6. Burning is restricted to daylight hours only.
7. If burning is started as a result of vandalism or act of god, the fire is to be extinguished as quickly as possible by the most appropriate means; and the regional Manitoba Conservation office must be notified of the occurrence and actions taken.
8. Ashes, when completely extinguished, shall be removed from the burn area regularly and deposited at the active cell.
9. The site supervisor shall keep a record of all controlled burns indicating the date of each burn; volume of waste burned and types of wastes burned on each occasion. Upon request by the Director or an Environment Officer, the records must be provided.

Appendix B
Ground Water Chemistry Parameters

Chemical Parameters		
INORGANICS		
Alkalinity - Total		Magnesium
Ammonia		Manganese
Arsenic - Total		Mercury
Barium		Nitrate - Reported as N
Boron		Nitrite - Reported as N
Cadmium - Dissolved		Total Kjeldahl Nitrogen - Reported as N
Calcium		pH
Chloride		Total Phosphorus
Chromium - Dissolved		Potassium
Conductivity		Sodium
Copper - Dissolved		Total Dissolved Solids
Iron - Dissolved		Sulphate
Lead - Dissolved		Zinc – Dissolved
Volatile Organic Compounds (VOC's)		
BTEX		
Other Organics		
Chemical Oxygen Demand		Dissolved Oxygen Demand
Field Parameters		
pH		Groundwater Elevation
Conductivity		

Note: Dissolved samples should be filtered in the field and preserved in the field at time of sampling.
If dissolved samples are not to be filtered and preserved in the field then Manitoba Conservation must be notified prior to sampling.

APPENDIX B

Vale Clean Wood Burn Procedure

CLEAN WOOD BURN		Page: 1/ 3
	Classification: Internal Use	Rev.: 1 - 7/30/2013

Technician in Charge:	Training Code: n/a
Target Audience: Fire Hall; SLAM Dunk administration;	Keywords: burn; clean wood; Waste Management Facility

1. PURPOSE

To provide a safe process to perform a clean wood burn in the WMF burn pit.

2. APPLICATION

This procedure is applied to the burning of clean wood at the burn pit of the WMF.

Most waste wood collected throughout the Manitoba Operations will be reused or recycled. Wood that cannot be reused or recycled may be burned at the WMF burn pit.

This procedure may not be revised without approval of the Fire Chief, Superintendent of Emergency Services & Plant Protection and Environmental Senior Supervisor.

3. REFERENCES

- Permit No.: 35818 Waste Disposal Ground Operating Permit issued by Manitoba Conservation and Water Stewardship

4. DEFINITIONS

- SLAM Dunk: the waste management program of the Vale Manitoba Operations that promotes the 3Rs, Reduce, Reuse, Recycle
- WMF: Waste Management Facility
- WMFO: Waste Management Facility Operator; the operator assigned to manage the WMF

5. SAFETY GENERAL RULES

- Report all incidents, accidents and unsafe conditions;
- Always use PPE approved by Vale and in a perfect state of conservation recommended for the activity;
- Follow all equipment rules and regulations;
- Be familiar with written procedures, JSA's and SPI's for the work included in this procedure;
- In case of contact with a dangerous product, follow the manufacturer's recommendations on the MSDS sheets or WHMIS label;
- Check the inherent risks in your working areas to avoid an accident;
- Practice good housekeeping;
- Place your hands and body in an ergonomic way, at a comfortable distance when handling material to avoid injury when handling parts;

6. MANDATORY PPES

- Eye Protection
- Protective Footwear
- Protective Headwear
- Full firefighting PPE excluding SCBA

7. DEFINITION OF RESPONSIBILITIES

7.1. FIRE CHIEF

- oversees the entire wood burn process;

7.2. FIRE HALL PERSONNEL

- complete a clean wood burn as per this procedure ;

7.3. SENIOR SUPERVISOR OF EMERGENCY SERVICES

- provide approval for the burn based on the conditions and recommendation of the Fire Chief;

7.4. SENIOR SUPERVISOR OF ENVIRONMENTAL

- provide approval for the burn based on the conditions and recommendation of the Fire Chief;

7.5. CORPORATE AFFAIRS

- issue Divisional communications prior to burns;

7.6. WASTE MANAGEMENT FACILITY OPERATOR

- manage wood burn pit as per permit;

7.7. VALE SECURITY

- provide monitoring of the fire once free burning is complete.

7.8. NATURAL RESOURCES

- provide burn permit for burns occurring between April 1st and November 15th;

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8. PROCEDURE

8.1. PRIOR TO BURN DATE

- Fire poses a threat to trees surrounding the WMF as well as the Facility buildings and landfill. Extreme caution is to be taken throughout this procedure.
- If the burn date is between April 1st and November 15th, obtain a permit to burn from Natural Resources.
- Inspect the wood pile to be burned prior to expected burn date, to ensure there are no light weight combustibles, cylinders or other waste that may pose a hazard when exposed to heat or flame.
- Ensure the wind direction will be blowing out of the north or northwest 360° to 240° on the VERP wind chart for 72 hours after the planned ignition date.
- Obtain approval for the burn from:
  - Senior Supervisor of Emergency Services
  - Supervisor of Environmental
- Request the distribution of a Bulletin indicating the burn activity. Include in the request the following:
  - specify a clean wood burn;
  - burn start date;
  - burn start time;
  - expected burn duration;

8.2. ON BURN DATE

- Ensure a trained fire fighter is available to attend the burn until free burning is complete.
- Contact the following to indicate the burn will take place on the specified date.
  - Vale Substation ph. **2395**
  - Vale Security ph. **2365**
  - Vale T3 Mine Safety Facilitator ph. **2163**
  - Vale T1 Mine Safety Facilitator ph. **2818**
  - Vale Mill Safety Facilitator ph. **2471**
  - Vale Manager SHE ph. **2729**
  - Vale Senior Supervisor of Emergency Services ph. **2582**
  - Vale Senior Supervisor of Environmental ph. **2724**
  - Vale Corporate Affairs ph. **2676**
  - Vale Safety On Call
  - Vale Management On Call
  - City Fire Department ph. **204-677-7916**
  - WMFO Supervisor ph. **2003**
  - Smook ph. **204-677-1560**
- Gather the following equipment:
  - burn pots;
  - tiger torch;
  - mixture of gasoline and diesel fuel;
- Contact the WMFO Supervisor in person to restrict access to the north end of the WMF.
- Ignite wood pile using two Fire Hall Personnel including at least one trained fire fighter.
- One Fire Hall Personnel will remain at the burn pit until free burning of the fire is complete.
- Upon completion of free burning, Vale Security is to be instructed to provide two hour fire watch.
- The Fire Chief will inspect the fire at the start of every shift to determine when the fire is extinguished.
- When the Fire Chief determines the fire is extinguished, Vale Security is to be informed that fire watch is no longer required.
- Contact the WMFO Supervisor to release the burn pit and the north end of the WMF.

8.3. BURN DATE DATA

- This page is to be printed and used as a check sheet in preparation and during a clean wood burn.

- Date of Burn: _____

- Fire Chief: _____