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FINAL REPORT

Storage Plan

Smelter and Refinery
Decommissioning/Demolition
Thompson, Manitoba

Prepared for: Vale Canada Ltd.

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

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TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

1.0 INTRODUCTION

This Storage Plan identifies locations for temporary and short-term storage of contaminated waste, equipment, and materials generated as a result of the decommissioning and demolition of the Smelter and Refinery at the Vale Mine Site (Site) in Thompson, Manitoba.

CRA has selected storage locations that will cause minimal disruption to other activities occurring at the Site but are accessible by transport vehicles and other required equipment. The Contractor shall develop a final Storage Plan that will provide the final layout of the material storage areas to allow efficient movement and segregation of material during the facility decommissioning and demolition. The Contractor may select other storage locations; however, these locations will need to be reviewed and approved by Vale. Additional procedures and protocols for waste and material storage are provided in the Environmental Protection Plan.

2.0 STORAGE LOCATIONS

The types of waste and materials that will be generated during decommissioning and demolition include hazardous and regulated wastes, general demolition debris, recyclable materials, equipment, and unused product.

Designated areas within the Smelter and Refinery will be used to store hazardous and regulated wastes that are generated during the decommissioning of each building, as well as unused raw materials until the waste and materials are ready to be shipped off-Site or to other locations on Site. Polychlorinated biphenyl (PCB) waste must be stored in the on-Site licensed PCB storage facility until the waste is ready to be shipped off Site. All waste and materials must be clearly labeled in accordance with the Waste Management Plan. Recyclable materials such as concrete, bricks, steel, and other metals will be stored in the South Yard until it is processed and ready for off-Site shipment or on-Site placement.

CRA has developed this Storage Plan assuming that all waste and materials stored within the Smelter and Refinery buildings after shut-down will be removed prior to demolishing the buildings. The specific sequencing of the demolition of the Smelter and Refinery will be developed by the Contractor. CRA has developed this Storage Plan to accommodate a scenario where both buildings are demolished at the same time. This Storage Plan would also accommodate either the Smelter or Refinery building being demolished first. Once the Contractor develops their sequencing plan, the available sorting and storage areas for materials may change based on available space.

2.1 HAZARDOUS AND REGULATED WASTE

Hazardous and regulated wastes will be stored in accordance with applicable federal and provincial regulations, and the Environmental Protection Plan. The majority of hazardous and regulated wastes, asbestos waste, and some recyclable materials will be stored inside the Smelter or Refinery buildings at designated locations or in associated structures outside of these buildings until they can be removed for off-Site disposal.

2.1.1 RADIONUCLIDES

Licensed technicians will dismount/dismantle the nuclear gauges within the Smelter and Refinery in accordance with approved Canadian Nuclear Safety Commission (CNSC) procedures. Nuclear gauges that will be transported for off-Site disposal or for

use at another Vale facility will be packaged and transported based on the nature, form, and quantity or activity of the substance in accordance to the Transportation of Dangerous Goods (TDG) Act and as stipulated in the Packaging and Transport of Nuclear Substances Regulations (PTNS) Regulations.

If necessary, nuclear gauges may be temporarily stored in Vale's on-Site nuclear storage vault; however, the expectations are that the gauges will be transported to their final destination within a short period of time.

2.1.2 LIGHTING BALLASTS (PCB)

The Contractor must verify whether lighting ballasts contain PCBs based on the codes on the ballast. The Contractor will place PCB lighting ballasts in drums that are labeled as containing PCBs in accordance with the PCB Regulation SOR 2008/273 as amended and Vale's Standard Procedure Instruction for Management of PCBs (SPI #34-4). Full drums (approximately 50 ballasts) will be sealed, labeled appropriately, and transported to the on-Site licensed PCB storage facility for storage prior to off-Site disposal at a licensed facility. If the identification number on the ballast is illegible, the Contractor will handle the ballast as if it contains PCBs.

The Contractor will store non-PCB lighting ballasts in accordance with Section 2.4.3.

2.1.3 LABORATORY PACKS

The Contractor will place small quantities of unused chemicals and materials into laboratory packs for disposal in accordance with the TDG Act. The laboratory packs will be stored in the designated hazardous waste storage area within each building.

2.1.4 TRANSFORMER OIL

Prior to shutdown, Vale will collect oil samples from each of the transformers that previously contained PCBs. Transformer oil and capacitors that contains PCB concentrations greater than 50 parts per million (ppm) will be classified as PCB waste and placed in drums or containers. The oil-filled drums or containers must be stored at the on-Site licensed PCB storage facility until the waste is ready to be shipped off Site for disposal.

Transformer oil containing PCB concentrations less than 50 ppm will be placed in drums or containers and stored in the designated hazardous waste areas within the Smelter and Refinery until the waste is ready to be transported to an off-Site facility for disposal or recycling. The Contractor must label each drum/container as it relates to its contents.

2.1.5 OTHER OILS

Hydraulic oil drained from equipment that has been classified as hazardous waste will be placed in drums or containers and will be stored in the designated hazardous waste areas within the Smelter and Refinery prior to being transported to an off-Site facility for disposal or recycling. The Contractor must label each drum/container as it relates to its contents.

Drums containing drained hydraulic oil with PCB concentrations greater than 50 ppm, will be sealed, labeled, and transported to the on-Site licensed PCB storage facility until the waste is ready to be shipped off Site.

2.1.6 LIGHTING

Lighting removed is typically segregated by type (e.g. mercury or sodium) and by size (e.g. 4 feet or 8 feet). The Contractor will package lighting not designated for reuse in accordance with the TDG Act. The lighting will be stored in a designated storage area inside the Smelter and Refinery (see Figure 2.1) prior to transportation to an off-Site facility for recycling or disposal.

2.1.7 OZONE DEPLETING SUBSTANCE (ODS), GLYCOL, MERCURY-CONTAINING DEVICES, LIQUID MERCURY, AND BATTERIES

The Contractor will package ODS, glycol, mercury devices, liquid mercury from the rectifiers, and batteries in accordance with the TDG Act. These wastes will be stored in designated storage areas within the Smelter and Refinery prior to off-Site shipment to a facility for recycling or disposal.

2.2 ASBESTOS WASTE

Asbestos waste from within the Smelter and Refinery that is packaged according to the Waste Management Plan will be stored in designated areas inside each building (see Figure 2.1) prior to being transported to the on-Site asbestos landfill.

The Contractor must document and maintain records of the volume of asbestos waste disposed.

2.3 POTENTIAL HAZARDOUS BULK SOLID/LIQUID WASTES

Potential bulk solid wastes include the fines from final equipment, process lines, and tank cleaning in the Refinery, bricks from inside the thickeners and tanks in the Cobalt Purification Area, refractory brick from the furnaces, converters, and stack, and dust from within the Smelter. See Section 2.8 for storage details.

Potential liquid wastes include petroleum products, transformer and hydraulic oils, and product within process pipes. Liquid wastes may be stored in drums, tanks, or tanker trucks. Bulk liquids must be stored within secondary containment.

2.4 DEMOLITION DEBRIS/NON-HAZARDOUS MATERIALS

2.4.1 WOOD (UNTREATED)

Wood debris generated during the Refinery demolition will be sorted by the Contractor and if needed, resized for packaging. Untreated wood will be stored in the South Yard (see Figure 2.1) prior to being transported to a Vale-approved location for processing or disposal.

Any untreated wood generated from the Smelter demolition will also be stored in the South Yard prior to being transported to the on-Site waste facility for burning.

2.4.2 NON-ASBESTOS CONTAINING MATERIAL (ACM) INSULATION

Non-ACM insulation will be disposed off-Site at a non-hazardous waste disposal facility.

2.4.3 ROOFING MATERIALS

Prior to demolition of the Smelter and Refinery, the Contractor will determine whether the Smelter and Refinery roof or parts of each contain asbestos (e.g., tar and felt layers of built-up membrane, fibreboard, vapour barrier, flashing, and caulking).

Roofing materials that contain asbestos will be placed in covered bins, lined with 2 layers of 6-mil plastic and transported to the on-Site asbestos waste landfill for disposal. The Contractor will designate a staging area for full bins that cannot be transported to the asbestos waste landfill in a timely manner.

Roofing materials that do not contain asbestos will be stored in the South Yard prior to off-Site disposal at a non-hazardous waste disposal facility.

2.4.4 FIBRE-REINFORCED PLASTIC

Fibre-reinforced plastic includes piping, hoppers, tank liners, and tanks from the Refinery. The plastic will be stored in a designated area south of the Refinery prior to off-Site disposal at a non-hazardous waste disposal facility.

2.4.5 CREOSOTE WOOD (RAIL TIES AND CRIBBING)

The rail ties and cribbing around the Copper Ponds not designated for reuse will be stored in the South Yard prior to off-Site shipment to a licensed non-hazardous waste disposal facility.

2.4.6 USED FILTER CLOTH (WASHED)

Used filter cloth that has been washed will be stored in the Shear Shed prior to off-Site shipment to a licensed non-hazardous waste disposal facility.

2.4.7 LIGHTING BALLASTS (NON-PCB)

The Contractor will handle PCB lighting ballasts as detailed in Section 2.1.2. The Contractor will store non-PCB lighting ballasts not designated for reuse in the cold

storage building located west of the Refinery until the waste is ready to be shipped to an off-Site facility for recycling or disposal.

2.5 RECYCLABLE MATERIAL

2.5.1 FERROUS AND NON-FERROUS METALS

Scrap steel, copper, and other metals will be collected, segregated, and shipped off Site to be recycled. The scrap metal will be stored and processed at a location within the South Yard (see Figure 2.1) prior to shipment by rail to a recycling facility.

2.5.2 CINDER BLOCKS/CONCRETE

Clean brick and concrete/cinderblock will be pulverized on Site with heavy equipment to an aggregate size that allows the material to be used as machine-compacted backfill in basements, pits, and other excavations or low areas. Clean brick and concrete/cinder block material will be stored in the South Yard at the location shown on Figure 2.1.

Concrete/cinder block that is identified as potentially hazardous will be stored in a designated area within the South Yard (see Figure 2.1) for characterization in accordance with the Waste Management Plan. If the concrete/cinder block is deemed non-hazardous, the Contractor will move it to the main concrete storage area for crushing. If the concrete/cinder block is deemed hazardous, the concrete/cinder block will remain at the hazardous concrete storage area until it is transported off Site to a waste disposal facility.

Refractory brick that is identified as potentially NORM and/or hazardous will be stored in a designated area within the South Yard (see Figure 2.1) for characterization in accordance with the Waste Management Plan. If the brick is deemed unrestricted NORM and non-hazardous, the Contractor will move it to the main concrete storage area for crushing. If the brick is deemed NORM and/or hazardous, a qualified Contractor will evaluate the exposure risk associated with the brick and an appropriate storage/disposal plan will be developed.

2.6 RINSE WATER

Rinse water generated from cleaning activities will be stored in frac tanks. The frac tanks will be stored in a central area between the Smelter and Refinery for accessibility.

Rinse water generated from cleaning areas impacted with PCBs must be segregated and stored separately. Each frac tank must be clearly marked indicating the source of the rinse water (PCB areas versus non-PCB areas). Final disposition of the rinse water will be determined in accordance with the Waste Management Plan.

2.7 PETROLEUM AND POLYCYCLIC AROMATIC HYDROCARBON- (PAH-) IMPACTED SOIL

Vale will determine the final disposition for petroleum-impacted soil, which may include on-Site treatment in accordance with the Treatment of Petroleum Contaminated Soil, Manitoba Conservation Authority, June 1996 or off-Site disposal at an approved facility. The Contractor will excavate and directly load petroleum-impacted soil into trucks for transportation to an on-Site treatment area or the Contractor may stockpile the soil prior to off-Site disposal at an approved facility.

PAH-impacted soil will be stockpiled at the location shown on Figure 2.1 until soil remediation is completed. PAH-impacted soil will be disposed off-Site at a Class 1 licensed facility or another approved facility.

2.8 RESIDUAL RAW MATERIALS

CRA expects that there will be residual raw materials and waste materials (dust, solids in process lines, sumps, etc.) that will require storage prior to off-Site shipment or transfer to other locations within the Site (i.e. mill). The following is a list of potential materials from the Smelter and Refinery that may require storage and suggested storage locations:

- Materials that can be slurried will be stored in the thickener area in the Smelter and fed back through the Mill
- Dust from cleaning activities and residual raw materials (quartz and silica) will be stored in the Voisey's Bay Nickel (VBN) building located at the south east corner of the Smelter

- Residual scrap will be removed from the converter bins in the Smelter and staged in the VBN Building prior to shipment to Vale - Ontario for processing
- The hearths and refractory (that is below the bath level) that are removed from each furnace in the Smelter will be staged in the VBN Building prior to shipping to Vale - Ontario for processing
- Composite solids from the sumps, tank bottoms and piping in the Refinery will be dewatered through the appropriate filter presses and stockpiled in the Shear Shed for assay testing as this material may be shipped to other Vale facilities for processing or sold under contract

2.9 SMALL EQUIPMENT

Small equipment, such as small transformers, that are removed from the Smelter may be stored in the Warehouse 1-A and the Refractory Storage structures until removed from the Site.

3.0 MATERIAL HANDLING AND STORAGE

Material handling and storage practices to be conducted at the project Site include manual lifting of materials, the use of hoisting and rigging equipment and stockpiling and staging of demolition debris. As a rule, mechanical means should be used for lifting heavy loads whenever possible.

General Storage Practices

The basic safety requirement for storage areas is that the storage of materials and supplies shall not create a hazard. Additional general storage area practices include the following:

- Bags, containers, bundles, etc. stored in tiers shall be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.
- All stacked materials, cargo, etc. shall be examined for sharp edges, protrusions, signs of damage, or other factors likely to cause injury to persons handling these objects. Defects should be corrected as they are detected.
- Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.
- Storage areas shall have provisions to minimize manual lifting and carrying. Aisles and passageways shall provide for the movement of mechanical lifting and conveyance devices.
- Stored materials shall not block or obstruct access to emergency exits, fire extinguishers, alarm boxes, first aid equipment, lights, electrical control panels, or other control boxes.
- "NO SMOKING" signs shall be conspicuously posted, as needed, in areas where combustible or flammable materials are stored and handled.
- Stockpiles of material that are subject to dust generation must be covered or arranged to allow for the application of water and/or dust suppressants.
- Stockpiles of irregularly shaped material like scrap metal should be arranged such that protrusions of metal are limited to the extent practical.
- The maximum size, height and slopes of stockpiles of material should be identified in the Contractor's storage plan to ensure the stockpiles are stable.
- Any stockpiled wood should be located in an area that is accessible to emergency response personnel in case of fire.

Cylindrical materials such as pipes and poles shall be stored in racks or stacked on the ground and blocked.

All hazardous and regulated waste must be stored in accordance with federal and provincial regulations. The storage requirements for these types of waste, including a spill contingency plan are presented in the Environmental Protection Plan and the Waste Management Plan.

Special Precautions for Hazardous or Incompatible Materials Storage

Generally, materials are considered hazardous if they are ignitable, corrosive, reactive, or toxic. Manufacturers and suppliers of these materials must provide the recipient with Material Safety Data Sheets (MSDSs), which describe their hazardous characteristics and give instructions for their safe handling and storage.

Many hazardous materials are incompatible, which means they form mixtures that may have hazardous characteristics not described on the individual MSDSs. The following special precautions shall be followed regarding the storage of hazardous materials:

- Label and store all hazardous materials in accordance with the Manitoba Act and TDG Act and MSDS. The Contractor shall keep an inventory of hazardous materials stored on Site.
- All employees involved in the handling and storage hazardous materials will have completed Workplace Hazardous Materials Information System (WHMIS) training.
- Based on the information available on the MSDSs, incompatible materials shall be kept in separate storage areas
- Storage sites for hazardous materials will be secured. Signs indicating hazard warnings, emergency contacts, access restrictions, and under whose authority the access is restricted will be posted.
- Hazardous materials will be stored at least 100 m from any surface water.
- The Contractor will designate on-Site Emergency Spill Response Coordinators.
- Bulk storage of hazardous materials will be within dyked containment areas.
- In the event of a spill, the Contractor will contact Vale's designated contact and the Manitoba Conservation 24-hour spill reporting line at (204) 945-4888.
- Spill containment and clean up materials must be available at all storage sites.
- All necessary precautions will be taken to prevent and minimize the spillage, misplacement, or loss of hazardous materials.

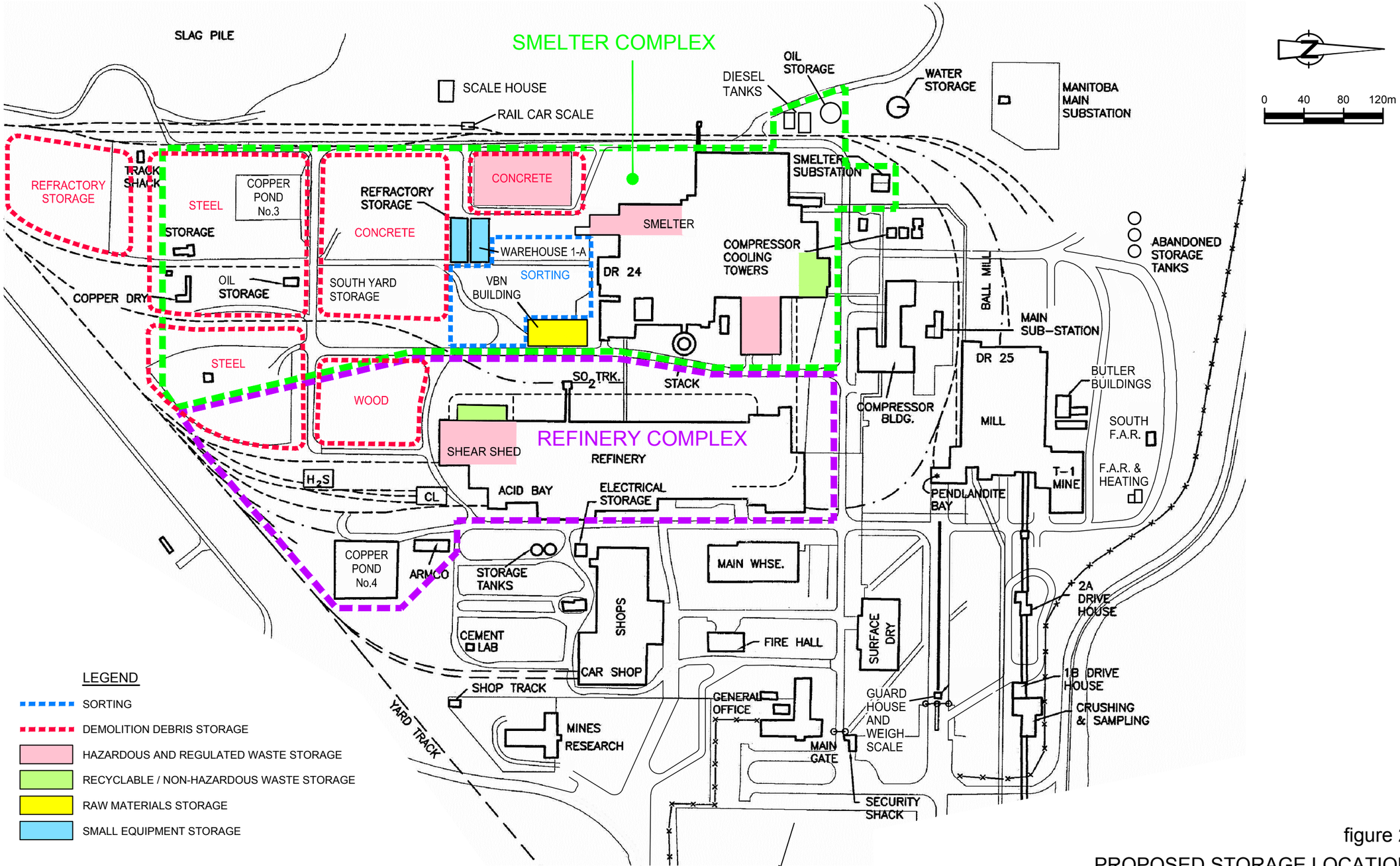

figure 2.1

PROPOSED STORAGE LOCATIONS
VALE - MANITOBA OPERATIONS
Thompson, Manitoba

SOURCE: AMEC EARTH & ENVIRONMENTAL LIMITED, 2003 MINE CLOSURE PLAN, THOMPSON PLANT, SITE PLAN.

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