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Issue Codes: RC = Released for Execution, RD = Released for Design, RF = Released for Fabrication, RI = Released for Information, RP = Released for Purchase, RPA = Released for Permit Application, RQ = Released for Quotation, RR = Released for Review and Comments.

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1.0 PURPOSE

To set minimum expectations and eliminate the hazards and risks from hoisting and lifting operations. This procedure meets the intent of Global Vale RAC #5

2.0 SCOPE

This program applies during all lifting operations and **must** be utilized during all operations undertaken for NAPG projects. This includes activities involving:

a) Vale personnel;
b) Vale owned or supplied equipment;
c) Contracted or sub contracted cranes;
d) and other types of hoisting equipment such as

- Tower;
- Crawler;
- Boom trucks;
- Derrick;
- Pedestal;
- Overhead crane;
- Monorail cranes;
- Marine and port equipment; and
- Specialized lifting devices.

In addition, to the primary lifting devices this program applies to the lifting accessories and specialized manufactured and engineered equipment including rigging, attachments, containers or baskets, tuggers, winches, hoists, lifting cradles, spreaders or lifting beams, personnel cages.

1.1.1 CAR summary requirements:

5.6.1 a Visible indication of the maximum load handling capacity on lifting accessories and equipment;
5.6.2a *Tower and Mobile cranes* will have a load table fixed next to the to the control levers.
5.6.2b *Tower cranes* will have movement sound alarm.
5.6.2.h Limit stop switch (stop of equipment and alarm when the limit of course is exceeded).
5.7 Lifting loads using improvised or adapted equipment not manufactured or designed for this purpose is prohibited, except with the express permission of the manufacturer. **Example: forklift adaptation.**

5.7.l It is strictly forbidden to for people to directly stabilize (touch) a suspended load. Instead, guide cables should be used whenever stabilization is required;
5.6.2 e/f/g Mobile cranes outriggers are to be hydraulic driven and equipped with pressure sensor and leveling control systems.
5.7.2.i – tag lines are to be used.

Exceptions to the CAR requirements:
5.4.a Load lifting activities performed by hand, manual hoist;
5.4.c During the maintenance of load lifting equipment while not in use for lifting, except when, in the maintenance activity there is load lifting. The responsibility for the lifting equipment handling during the maintenance activity must be properly qualified to operate the equipment, this qualification must enable the responsible for maintenance to ensure the minimum knowledge required for handling the equipment tests.

2 DEFINITIONS

Boom Angle: The angle above or below horizontal of the longitudinal axis of the boom.

Crane: Equipment that is designed to lift loads, lower loads and move loads horizontally when they are lifted.

Competent Person:

a) is qualified because of knowledge, training and experience to ***organize*** the work and its performance;
b) is familiar with the health and safety legislation and regulations that apply to the work, and
c) has knowledge of any potential or actual danger to health or safety in the workplace.

Competent worker: in relation to specific work, means a worker who,

a) is qualified because of knowledge, training and experience to ***perform*** the work
b) is familiar with the health and safety legislation and with the provisions of the regulations that apply to the work, and
c) has knowledge of all potential or actual danger to health or safety in the work;

Crane Operator: Crane operators control cranes to lift vertically and or horizontally, move, position or place machinery, equipment and other large objects at construction or industrial sites, surface mines and other similar locations. Crane operators are to be certified by their jurisdictions and competent workers.

Cribbing: Blocking materials that are used to increase the bearing area and height

Definitions continued:

Ground Pressure: Weight of machine divided by the area of the surface directly supporting the machine

Jib: A pendant-supported extension attached to the boom or fly head to provide added boom length for handling specified loads. The jib may be in line with the boom or offset.

Lifting Capacity: The rated load for any given load radius and boom angle under specified operating conditions and machine configurations

Load radius: the horizontal distance from the centreline of rotation of the upper to the centre of gravity of the suspended load.

Mat and/or Pad: Compacted soil, concrete, wooden timbers or manufactured mats, and or steel plates assembled into a system for supporting a crane with minimal settlement. Usually supporting pontoons or tracks on soft surfaces to add stability and or distribute machine loads (reduce ground pressure).

OEM – Original Equipment Manufacture

Outrigger: An extendable supporting device used to level the crane and increase stability.

Outrigger Pad: A wood, metal, or synthetic structural element that is placed on the supporting surface and on which bears the crane's float that is used to distribute the outrigger load over a larger area

Hoist person: a person who operates vertical conveyance hoisting equipment used to raise and lower personnel, materials and equipment through various means and formats above the collar or ground to an elevated position in a construction application and beneath the surface in a mining location. They shall be a certified competent worker in the relevant jurisdiction in the operation of hoisting equipment and have demonstrated capability to operate the job specific equipment required.

Hoist: Hoist means equipment that is solely designed to lift and lower loads.

Lifting Crew: Lifting crew are persons working directly with a Crane operation.

Lifting Equipment: Lifting equipment refers to any device which is used or designed to be used directly or indirectly to connect a load to a crane and which does not form part of a load, e.g. Wire rope slings, chain slings, man made fibre slings, hooks and fittings, swivels, shackles, eye bolts, rigging screws, wedge sockets, plate clamps and lifting beams. It includes lifts involving, hired or contracted cranes such as mobile, crawler, tower, derrick, portal and pedestal-type, vehicle loading cranes, electric overhead travelling cranes, and monorail cranes.

Definitions continued:
Lifting Operations: Lifting operations means any operation using a crane and lifting equipment that involves the raising and lowering of a load, including the suspension of a load.

Anti-two block system: A system of electromechanical devices used to prevent the crane operator from two blocking the crane. Includes a warning system used to warn the crane operator of impending two block condition.

Rigger: A rigger is a skilled tradesperson who specializes in preparing loads to be lifted with rigging and in the support of other riggers and or crane operators to hoist and lift loads. They also receive loads on the completion of lifts and assist in guiding and securing them in their final positions. They must be competent workers or persons.

Rigging: For purposes of this procedure rigging includes but is not limited to; wire rope, chain, polyester, kevlar and nylon slings as well as come along, chain falls, shackles, hooks, and other load bearing hoisting attachments. Chain will only be used in specialized application and by exception.

SWL: Safe Working Load

WLL: Working Load Limit

Workbasket: Workbasket refers to personnel carrying device designed to be suspended from a Crane.

3.0 GENERAL REQUIREMENTS

3.1 Legislation

All NAPG sites and project activities must observe and comply with all manufactures standards and design criteria. Obey all relevant standards, laws and regulation for your jurisdiction. In situations where, multiple expectations apply, the most stringent standard shall always be followed.

The following codes are applicable to this procedure.

3.1.1 CSA

a) Z167-16 overhead cranes, gantry cranes, monorails, hoist and jib cranes.
b) Z150-16 safety code on mobile crane
c) Z167-16 overhead cranes, gantry cranes, monorails, hoist and jib cranes.
d) Z150-16 safety code on mobile crane

3.1.2 ASME

a) 30-5 Mobile and locomotive cranes
b) 30th 1st below the hook lifting devices, changes

3.1.3 Vale Engineering Specifications.

a) SPEC18000 civil lifting
b) SPEC 18005 cranes
c) SPEC 80005 Mine hoisting maintenance safeguard system

3.2 General – Cranes, Hoisting and Rigging

All cranes and hoists shall be erected or dismantled according to manufacturer's instructions.

All cranes and hoists shall be operated in accordance with the safe work procedures as defined in applicable Jurisdictional Occupational Health and Safety legislation.

Every crane or hoisting device must have a load rating chart in clear view of the operator. This load chart must be legible and must be clearly marked for each crane configuration and load rating.

Crane – general use continued:

Key hoisting and lifting requirements include:

a) **At all times, the operator shall not lift loads over personnel.**
b) **Personnel involved with hoisting and rigging operations shall be aware of their position relative to a lift and shall not place themselves in pinch points or directly under a load;**
c) **Do not ride a load. No person will ride the headache ball, the hook, or the load being handled by the crane.**
d) **Never leave a suspended load unattended. At no time shall an operator leave the controls of a piece of equipment with a load suspended.**
e) **Tag lines must be used for all lifts.**
f) Do not create situations of sudden acceleration or deceleration of a moving load;
g) Use trained spotters and approved communication methods during lifting operations.
h) Use a dedicated radio channel during lifting operations.
i) Cranes should not be used for side pulls;
j) The load must not be lowered below the point where less than two full wraps of rope remain on the hoisting drum;
k) Do not tip load and always eliminate any loading on hook latch;
l) Each control for a crane or hoist must have its function clearly identified and must be maintained in good condition;
m) Holding brakes on hoists shall be applied automatically when power is removed;
n) A drag brake may be applied to hold the trolley in a desired position on the bridge and to eliminate creep with the power off;
o) Replacement wire rope must be the same size, grade, and construction as the original wire rope furnished by the crane manufacturer, unless otherwise recommended by the wire rope manufacturer;
p) If a load is supported by more than one part of wire rope, the tension in the parts must be equalized;
q) Hooks must meet the manufacturer's recommendations and must not be overloaded;
r) All cranes and hoists shall have an anti-two-block device to warn the operator of two block situations;
s) The manufacture’s operating manual is to be consulted for crane operations in high wind/severe weather conditions and cold weather situations. A reduction in capability, speed, use and capacity will likely occur.

t) All cranes fitted with outriggers or any other stabilizers, shall be used in accordance with the manufacturer's instructions and set up on solid ground with outrigger pads. Any obstructions around the outriggers shall be cleared away for personnel access.

u) When a mobile crane or other hoisting device must be supported on a structure, a qualified Professional Engineer shall check and verify that the structure is structurally adequate to support the loads (Crane, Load & Rigging) and document the findings accordingly.

v) A crane is to be removed from service if it is involved in the following:

- a contact with a high voltage electrical source,
- a shock load,
- a loss of a load,
- a brake failure,
- a collision or upset, or
- any other circumstance that may impair the safe operation of the crane or hoist.

The crane is not to be returned to service until it has been inspected, repaired and recertified by a professional engineer.

The crane or hoist shall have a weatherproof plate or label permanently attached that legibly shows the manufacture's name, the model, serial number and year of the manufacture and the manufacture's rated load.

4.0 TRAINING AND COMPETENCY

Lifting equipment shall be used only by operators (hoisting engineer, riggers, etc.) deemed competent in the use of the specific equipment, including equipment specific to a Vale location (in-house crane use where approved by Operations) and only for the purposes for which it was designed.

All crane operators shall hold the relevant Certificate/License of Competency for the size and type of crane to be used. No worker shall operate a crane or similar hoisting device that can raise, lower or move material unless the worker is certified as a hoisting engineer under the Ontario College of Trades, Qualifications and Apprenticeship Act or the equivalent in other provinces or locations.

All assessments/certifications must be completed in accordance with the relevant Government Standards and documentation provided by the Contractor prior to mobilization to site. Certified mobile/hoist crane operators must pass their **annual medical**.

Contractor Supervision shall deem lifting equipment operators (riggers etc.) as competent in the use of the equipment. This competency is partly established through documentation of the training. Review of training must place emphasis on the equipment capacity, type of loads to be carried and particularly the danger of overloading and safe work practices.

All operators of cranes and hoists must receive equipment specific training and demonstrate competency to the contractor and their employer. Such personnel shall also hold the appropriate certificate of competency on their person.

Crane operators shall be classified in one **or** all of three groups

1. For a mobile crane operator, other than a boom truck operator
2. For a tower crane operator in the construction industry
3. For an operator of a boom truck with a rated capacity of more than 10 tonnes

Riggers and Personnel involved in hoisting and rigging operations must be trained and competent workers in safe rigging practices to include:

1. sling and hitch types;
2. sling capacity determination;
3. equipment inspection, care, and maintenance;
4. load weight and centre of gravity determination;
5. safe lifting techniques.

Riggers must be a competent persons or workers and hold a record of training or a valid trade certificate that includes rigging training and competency and/or documented training from an accepted rigging training provider. Employers and supervision must complete a competency check with riggers prior to preforming any task.

All personnel involved in lifting operations must undergo a specific **crane safety briefing daily** before starting work on site. This briefing must outline the task to be completed (scope), the associated risks and control mechanisms (PMRA/JHA), methodology and personnel training/certification requirements. It will include any relevant critical or on the spot lift plans as well as communication and spotter requirements. The direct supervisor and or competent person is required to complete these reviews with the crew.

5.0 SPECIFIC REQUIREMENTS

5.1.1 Rigging:

The safe working loads of rigging shall be based on **a 5 to 1** safety factor. Any rigging components used for hoisting personnel shall be based on a 10 to 1 safety factor.

Any rigging fabricated by an employer such as spreader bars, links, lifting beams must be designed and certified by a professional engineer. This equipment shall have a permanently affixed plate or painted number that corresponds to the design drawings.

All rigging, including slings and other rigging components (e.g.: turnbuckles, shackles, wire rope clips, etc.) must be marked with the components Safe Working Load.

Determine the proper size for slings and components.

Do not use manila rope for rigging.

Do not use slings, eye-bolts, shackles, or hooks that have been cut, welded or brazed.

Determine the centre of gravity and test the balance the load before hoisting it. Initially lift the load only a few centimeters to test the rigging and balance.

Loads should be well **secured**.

Inspect and remove any loose materials, no loose items are to remain on load or crane before a lift.

Hoist line **must be** vertical for lift.

Softeners shall be used around sharp edges of steel to protect both the slings from premature wear.

Slings should be double wrapped when used in choke application.

Slings shall be stored and protected from damage when not in use.

Rigging should be **inspected** by a competent individual **pre-use** as well be part of a **quarterly** color-coded inspection program.

See Personnel Requirements, (s.7.1) for additional rigging requirements

5.2 Lift Planning

Only Competent Persons shall be involved in planning, supervising and implementing of lifting operations. Ensure these roles and responsibilities are clearly defined on site.

Use the appropriate work planning and risk management tools to assess the risk associated with all lifting activities including, crane maintenance, and crane assembly / demobilization.

Each lift activity must be categorized into one of the following:

1. Critical Engineered Lifts (s 5.6);
2. Standard Engineered Lifts; or
3. Standard Lifts/Spot lift plan (Non-Engineered) - (s.5.7)

Contractor site supervision shall develop Standard Lift plans. These shall be reviewed and accepted by NAPG construction area lead. These standard lifts require an on-the-spot lift plan to be completed for the largest or heaviest piece to be lifted and for the greatest radius used. Calculations shall be shown.

5.3 Geotechnical Requirements

Where applicable and deemed necessary, Contractor Management and the NAPG Project Team (including the HSE Advisor) shall obtain geo-technical data and determine the safe bearing capacity under crane outriggers and or supports. This process is best suited during detailed engineering phase.

5.4 Lift Permits and Documentation

A Crane Lift Work Permit is required for all Critical and Standard Engineered lifts and lift studies. The Contractor Project Management, NAPG Area Lead, Senior Construction Manager and HSEC Manager shall review and approve all documentation.

All critical and standard engineered lift documentation shall have the following at minimum:

1. Scope of work
2. Work Method JHA specific to task
3. Classification of Lift
4. Drawing to include:
    a) Crane type position and configuration
    b) Lifted height
    c) Load radius
    d) Boom length, angle deflection
    e) Size and weight of load (to include how it was determined)
    f) Percent of cranes ruled capacity (include all factors)
5. Permit
6. Supporting documents to include:
    a) Personnel involved supervision, crane operator, spotters and riggers

b) Rigging plan
c) Communication/ signal method (dedicated radio channel)
d) Ground conditions/assessment
e) Relevant environmental information
f) Control zones to restrict unauthorized personnel from entering the restricted area (hard barriers, signage, flashing lights, guarding).
g) Additional procedures (i.e. to hoist personnel if required/relevant)

A Weight Control Register (s.5.9.1) of fabricated items and pre-assemblies must be provided stating lift **weight in metric tonnes.** These lift weights must be placed on the relevant drawings.

5.5 Lift study

A lift study is required for the following:

1. Critical lift (s.5.6);
2. Lifting operations when the arcs of operation (swing study) of two or more cranes may overlap;
3. Lifting where a crane is bound by structure or existing installation;
4. Lifting equipment is operating in the proximity LOA (Limit of Approach) of live electrical conductors.

Lift studies shall determine the required equipment type and capacity to ensure the following:

- The item/s to be lifted are structurally adequate.
- Adequate load capacity and reach;
- Crane tail slewing clearance;
- Jib slewing clearance;
- The load is not jib bound;
- The load clears deck/ground or at height objects/obstructions; and
- Boom deflection effect of load chart and radius.

Drawings/sketches of the plan layout and elevations shall **include**:

- deck/ground/crane/object relationships,
- load,
- crane pedestal,
- crane jib,
- minimum distance from hook to jib tip,

- rigging,
- lifted object in its relevant orientations.

A professional engineer licenced in the site's jurisdiction **must approve** the lift study.

5.6 Critical Engineered Lifts

Critical Engineered Lifts require a Lift Permit and an Engineered Lift Study to be completed according to the Permit procedures.

The Contractor, the Permit holder and crane operator, must review the production of drawings and calculations prior to submission.

A lift is critical when **any one or more** of the following criteria are met:

1. When **exceeding 75% capacity** at the operating radius. Calculations to be used to include minimum safe working margin of 5%;
2. **Tandem** or two (or more) crane lifts or picks that include turning/flipping of loads. Tandem lifts include the use of non-traditional equipment in the lifting hoisting arrangement e.g. tilt and load, forklift, loader/excavator;
3. All lifts over **operating/occupied** facilities;
4. All lifts involving/requiring **special equipment or rigging**, e.g., cradle, spreader and or lifting beams;
5. All lifts completed out of view of the Crane operator **(Blind lift);**
6. All lifts **greater than 10 tonnes**;
7. Any load lifted **over or near energized electrical equipment** (use limits of approach to determine proximity) such as power lines, transformers, and switchgear;
8. All uses of **personnel basket**.

All critical engineered lifts must include a management pre-lift meeting/review. An example Critical Lift Checklist is provided in **Appendix B**.

5.7 Standard Lifts use of the On-the-Spot Lift Plan

An "On-the-Spot Lift Plan Checklist" is required for all non-engineered crane lifts (see attached form). All other Lifting and rigging expectations and requirements apply. An example Checklist is provided in **Appendix A**

5.8 Site Lift Plan

A Site Lift Plan is to be compiled at the earliest possible time after the date of contract award.

The Project engineering and or construction representative shall review and approve the Site Lift Plan submitted by the contractor prior to execution of the plan.

The crane contractor shall complete the Lift Plan **for each** specific activity/ contract.

The Lift Plan **shall address the following** as a minimum:

a) **Identify** the object(s) to be lifted;

b) **Identify** the lift location(s)

c) **Describe** the lift:

- lifting in the laydown fabrication area and or yard
- lifting onto or from the transportation vehicle at the project site,
- lifts for storage or retrieval at the site;

d) **Identify the parties** responsible for the lift, including the organizational structure of the parties involved and their various responsibilities;

e) **Identify the Lift Weight** and manner it was determined from the Weight Control System including rigging and an appropriate contingency;

f) **Describe** the structural/geo-technical assessments undertaken, where applicable;

g) **Identify** the crane to be used, referencing crane studies and associated relevant drawings;

h) **List the activities** that are to be initiated and completed at specific periods before and on the day of the lift;

i) Describe the means of **communications** on the day of the lift (jointly agreed upon and written);

j) Follow the **risk management** tools requirements; and,

k) Indicate any limitations/restrictions on the lift due to **inclement weather**.

5.9 Supplier Shipping Requirements for Loads

Every fabricated item or pre-assembly must be clearly marked with a certified manufacture or vendor supplied identification tag. Metal tags are preferred. Shall include description of piece

number aligned with relevant lists or drawings. The type and design of the tags shall be accepted by the NAPG project team prior to materials shipment to site.

The item/s to be lifted must be designed and structurally analysed to ensure its structural adequacy, considering its torsion rigidity and dynamic load factors.

Loads must be distributed to the item considering the stiffness of the item and the rigging arrangement.

Reference shall be made to a recognized publication for testing requirements and for determination of dynamic load factors and load distribution factors. **All test certificates** shall be attached to the Lift Plan.

The uncertainty of the exact position of the centre of gravity of the lifted load shall be appropriately considered.

The rigging and any lifting aids used such as pad eyes and lifting/spreader beams shall be designed considering the location of the centre of gravity, sling angle and load distribution due to potential sling redundancy/overloading.

A maximum Sling **angle of 60 degrees** to the horizontal is to be used.

Where the analysis and/or design is undertaken by a third party, the design shall be checked by a Project Engineer.

NAPG Area Construction Lead and HSE Advisor shall approve all other arrangements.

5.9.1 Weight Control Register:

A *Weight control register* is required for each item, stating:

a) Weight (Mass **in metric tonnes** or kilograms);

b) Determination of Weight (e.g. guess, estimate, calculation, certified weight);

c) Minimum Contingencies:

   i. Estimated weight: + 25%,

   ii. Calculated weight: + 20%, or

   iii. Certified weight: + 10%;

6.0 INSPECTION AND MAINTENANCE

6.1 Inspection

All lifting equipment must be inspected **prior to use** and **at quarterly intervals** thereafter. A record of all lifting equipment must be maintained including complete inspection records. Lifting equipment must be clearly marked to confirm compliance with inspection requirements.

Monthly preventative maintenance checks will be carried out on the lifting equipment.
Crane certification must be conducted after assembly and annually thereafter. A logbook must be kept with each crane or similar hoisting devices covering the period the unit is on the project plus a minimum of 12 months. Record all inspections, tests, modifications and maintenance in the logbook.

The contractor shall maintain all records on site and a copy shall be provided to NAPG HSE Department immediately upon request.

6.1.1 Inspection standards-*Cranes and Hoists*

Documents listed below will be compiled into one package, located inside the crane cab for easy reference, and will consist of the following:

a) crane log book;
b) crane history (2-3 years);
c) maintenance records and reports;
d) inspection reports (engineered, quality assurance inspections); and
e) physical conditions inspections.
f) Operating manual
g) Load chart

Daily Inspection Guidelines, included:

a) Pre-use checklists must be filled out daily using the Crane Logbook.
b) Make sure that all functional operating mechanisms used for maladjustment are not interfering with proper operation.
c) Check for deterioration or leakage in lines, tanks, valves, drains, pumps, and other parts of air or hydraulic systems.
d) Visually inspect hooks for deformation or cracks.
e) Visually inspect hoist slings, including end connections, for excessive wear, twist, distorted links that may interfere with proper function, or stretch beyond manufacturer's recommendations.

Crane Maintenance Records and Reports will include, but not be limited to the following items:

a) checklists – what was checked;
b) frequency of preventative maintenance checks;
c) date of last preventative maintenance check;
d) any repairs made during the preventative maintenance check;
e) whether the preventative maintenance program comply with the manufacturer's specifications;
f) any incidents or shock loading events involving the crane.

6.1.2 Inspection Reports

The types of inspection reports included in this section are generally prepared by professional engineers and will require an engineer's stamp on the report. These inspections are typically performed to re-certify the crane and serve as a quality assurance function.

Inspections will be performed as follows (certification):

a. at a frequency indicated by the manufacturer's specifications; or
b. at least annually; or
c. after any incident involving the crane.
d. After repair to a load bearing component.

The Inspection report must include the specifics of what was looked at and what was found during the inspection.

6.2 Modifications and Repairs

All modifications to lifting equipment shall be designed, engineered and fabricated in accordance with applicable national/provincial standards and the modified design approved by

the responsible Professional Engineer. All repairs to lifting equipment must be carried out under the direction of an approved person.

Repairs to lifting equipment, other than the replacement of parts, shall be carried out and approved by the original manufacturer (OEM), the manufacturer's agent or a fabricator approved by the responsible mechanical engineer. Replacement parts shall be identical to the original. Appropriate certification must be obtained.

Minimum compliance requirements for modifications and repair/replacement of load bearing components:

a) After modification or repair, lifting equipment must be tested by application of a Proof Load, specified by an approved person, and then thoroughly examined.

b) A test certificate stating the Working Load Limit/Safe Working Load and the Proof Load must be obtained and provided to the NAPG project management team;

c) Design and specifications for purpose-made lifting equipment shall be approved by the 'design authority' and the responsible mechanical engineer;

d) For maintenance of lifting equipment, the design authority/Professional Engineer is required to prepare a report of the examination and any necessary repairs;

e) Modifications and repairs of lifting equipment shall be in accordance with the applicable Canadian and International standards as determined by a Professional Engineer; and

f) The test certificate and a record of the repair or modification should be placed in the registration file with a copy provided to NAPG upon request.

Lifting equipment shall be removed from service if it is worn and/or damaged. It must be repaired and recertified by an appropriate facility (off-site) or destroyed by cutting. Repairs, recertification or destruction must be recorded in the lifting equipment register.

7.0 **OPERATION**

7.1 **Personnel Requirements**

Construction Management shall ensure all *General – Cranes, Hoisting and Rigging* (s. 4.2) requirements are met

Hoisting area must be barricaded (rigid) and restricted to personnel directly involved in the hoisting activities. Contractors shall ensure access to areas where lifting operations are carried out shall be restricted, protection provided, and procedures put in place such that persons in the vicinity are not subject to danger.

Ensure all lift or hazard areas have been barricaded. The areas where cranes and other lifting equipment operate must be clearly demarcated/barricaded and sign-posted;

Accessible areas within the swing radius of the rotating superstructure counterweight of a crane will be barricaded to prevent personnel being struck or crushed by the counterweight.

In all lifting operations a single Supervisor shall have overall responsibility for the task. This person is to be indicated on the FLHA and when possible the JHA work method
Under no circumstance are cranes to be operated without qualified and competent Riggers.

Riggers shall use tag lines to control the load and maintain appropriate safe standoff distances. This is to ensure absolutely no handling of loads at heights greater than 1 ft from the final position and only absolutely when required.

Only hand signals prescribed in the relevant International Standard shall be used. Similarly, only radio signals prescribed in the relevant International Standard shall be used to communicate between a specified rigger and the crane operator and reviewed during daily line-up. The NAPG project shall designate specific rigging radio channels.

Should there be a lack of communication, confusion of signal/movement and/or request, the crane operator shall immediately cease all movements (unless stopping poses a greater risk) until communication is restored or the request/communication is clarified.

Where lifting operations are not carried out in daylight, adequate illumination shall be provided. Planning shall include hazards related to reduced field of view, shadowing, and lack of depth perception.

Where the operator of lifting equipment does not have a clear view of the load being lifted, a single specially instructed rigger shall aid. Electronic signalling and communications devices shall be protected from interference. Communication methods are to be reviewed daily as part of the pre-lift activity meeting/line up.

If malfunction of lifting equipment occurs, operators shall immediately cease hoisting and the malfunction brought to the attention of the Contractor supervisor who shall immediately report it to the NAPG Area Construction Manager and the HSER Manager.

7.2 Equipment Requirements

7.2.1 Cranes

All crane equipment shall be operated and utilized in accordance with the manufacturer's specifications and guidelines. All equipment limitations shall be observed.

All assessments/certifications must be completed in accordance with the International Standards and documentation provided by the Contractor prior to mobilization to site.

Minimum requirements for operating cranes:

1. Contractor Management and NAPG Construction Area Lead shall identify, mark and protect as required all known locations of overhead and underground utilities (locates) prior to any lift. In addition, they must communicate this information to the contractor lifting/rigging supervisor and any operators/riggers involved in the activity.

2. A positive acting device shall be used which prevents contact between the load block or overhaul ball and the boom tip (anti-two-blocking device), or a system shall be used which deactivates the hoisting action before damage occurs in the event of a two-blocking situation (two block damage prevention feature). An anti-two block limit switch is required to be in place and functional on all cranes.

3. Telescoping booms shall be marked or equipped with a device to clearly indicate to the operator, always, the boom's extended length.

4. Contractors shall have adequate means for monitoring local weather conditions, including a wind direction and speed indicating device. Cranes **must not** be operated when wind speed exceed 10 mps / 22 mph / 35 kph or maximum wind velocity recommendations of the manufacturer. If a personnel basket equipped to a crane has been approved to lift personnel, then **it shall not be used** in wind speeds greater than 16 mph /25 kph.

Crane requirements continued:

As a minimum, all cranes must have the following correct documentation stored in the crane cabin during operations:

a) Inspection and pre-start inspection check list;
b) Manufacturer's Operating Manual;
c) Log book;
d) Load chart; and
e) Load cell calibration certificate.

In the operation and use of any hydraulic crane when both the auxiliary and main hoist line are reeved, an anti-two block warning system is required on both auxiliary and main hoist lines.

Any equipment installed or fitted to a crane must be functional and operable. Attachments used with cranes shall not exceed the capacity rating or scope recommended by the crane manufacturer.

Crane fuel tanks are to be equipped with a flame arrestor.

Slings, chains, hooks and shackles must be stamped or tagged with the approved load limitation.

Lifting equipment shall not be used in circumstances where its stability is likely to be adversely affected, such as on soft or uneven ground or on slopes, unless adequate precautions are taken to ensure safe working (i.e., swamp pads **reviewed by a** Professional Engineer to determine the appropriate sizes and configurations.)

Cranes must be level within 1 percent of grade. Note**:** a three-degree tilt can reduce capacity by nearly 50%**.**

Any lifting equipment known or suspected to have been overloaded shall be tagged "Out of Service", and immediately withdrawn from service and reported to NAPG Area Construction Manager and project HSE Advisor. The equipment must be re-tested and re-certified under the supervision of an approved person and thoroughly examined by the approved person selected by the manufacturer or their approved fabricator before being returned to use. Records of the incident, testing and examination should be entered in the registration file with a copy provided to NAPG.

All cases of failure shall be fully investigated and with all results reported to the responsible mechanical engineer, so the failure can be entered into the registration file.

Crane failures may also be reportable to the relevant government authority.

Cranes must not be moved with the boom extended unless designed to be operated as such (mobile and RT cranes.) Prior to movement the boom will be fully retracted. Once the boom has been fully retracted outriggers may be lifted and withdrawn. Once this has been completed the crane is capable of being manoeuvred or moved to another position. Cranes **must not** be moved without first retracting booms and lifting all outriggers. All movements to occur on stable, level ground and performed not to exceed the manufacturers limits/specifications.

Lifting equipment operators, riggers and responsible supervisors shall be informed of all load weight, limits of approach distances, and/or that energized systems have been isolated/de-energized before any set up or lift is performed.

All work should be completed to Zero Energy State. Where work cannot be completed at Zero Energy a specific work method, risk analysis and a critical lift plan must be performed and approved by NAPG Construction Manager, the HSER Manager.

7.2.2 Excavation Equipment

Attachment points of excavation equipment used for hoisting shall be magnetic particle inspected prior to use for lifts. Lifting attachment points will be re certified if bucket or accessory was used for digging at any time.

Exceptions:

1. Workers using excavation equipment to place pipes into a trench.

7.2.3 Forklift

All reasonable effort shall be made to use manufactured for purpose hoisting equipment only. Use of forklifts to hoist lift materials shall be avoided unless all reasonable options have been exhausted.

When forklifts and forklift type devices are used for hoisting and rigging, additional requirements are necessary as they are not originally designed for this application.

Should it be determined by the NAPG project management personnel that the use of a forklift device is necessary, the use of the lifting attachments requires a task specific JHA to be

developed by the contractor and authorized by the NAPG Project management and HSER representative.

Materials and equipment shall not be lifted directly from the forks. **No slings or rigging** is to be hung for lifting a load.

The use of attachments, jibs, and hoisting equipment shall be manufactured for purpose or designed for the specific piece of forklift equipment by a Professional Engineer. All Operators' Manuals and design drawing are to accompany the accessories to be used. Equipment operators are to be familiarized to these requirements. All use of these specialized forklift attachments shall be to the manufacturers or Engineers specifications.

All such equipment shall be inspected and certified yearly as per hoisting equipment expectations.

All such equipment shall have a specific load chart included or instructions on how to lower the capacity or the equipment used. All loads are to be carried as close to the forks/ attachments as possible. Hoisted and hanging loads will change the center of gravity and the forces applied to the equipment. Improper use can lead to loss of load or equipment upset.

7.2.4 Monorails

Overhead mono rail crane and lifting devices

7.2.5 Training

All hoisting and lifting devices regardless of capacity must be operated by a competent worker. In addition to formalized knowledge and training, all operators shall receive unit specific familiarization training prior to use by a competent person.

A. Planning and Use

Overhead mono rail crane and similar lifting devices use must be part of an accepted work method and the relevant hazards and controls must be covered in the applicable risk assessment tools (PMRA and JHA).

B. Certification

Equipment must be certified prior to first use to include a load test as per the manufacturers specifications or developed by professional engineer and include a written standard and procedure.

Yearly re-certifications are necessary. Post repairs, units may require additional certification prior to returning them to service.

For Vale owned equipment, the equipment will be set up in the SAP register with annual maintenance schedules as per manufactures' recommendation. Following the Vale procedure, SPEC 180001; the unit will be given a serial number and labelled accordingly.

Overhead mono rail cranes shall have a painted or metal plate with capacity indicator and unit number permanently installed. This information will mirror the specifications of the design drawings or manufacturers specifications.

C. Inspection

Daily pre-use and operation checks are to be documented in a log book

Operator must pay close attention to hoisting, travelling and slewing chains and their condition if so equipped. These must be protected from damage and entanglement.

D. Operation

Slowly engage any lifting or drive motors while under load or not

Do not operate a monorail crane or hoist that is damaged or has any actual or suspected mechanical or electrical malfunction

Always protect equipment from splatter damage or inadvertent electrical or ground contact from welding, grinding or torching.

Have a suitable communication system established (hand signals or radio) prior to performing lift. Always use equipped warring devices signals lights and horns as required

Hoisting on monorail cranes and davit arms are intended for vertical use and path of rail travel only do not drift loads excessively.

Do not hoist loads over workers.

Establish hoisting barricades when possible. Ensure all provided guard rails and protective barriers are in use prior to performing lifting operations

Use spotters to observe loads, hoist lines and rigging to prevent entanglement and hang ups

Verify the load, crane and hoist will clear all obstacles before hoisting, traveling slewing and or rotating.

Closely manage pendant or remote if equipped to ensure no un-intended movements. Do not leave controls unsupervised especially while hoisting a load

Always use good rigging practices and relevant crane/ hoisting device requirements

7.2.6 Wire Rope

The use of wire ropes used on site must comply with the following:

- The minimum size wire rope for lifting purposes shall be 5 millimetres diameter;
- Store wire rope clear off the ground in a clean, dry place. Make sure it is not in contact with corrosive substances when it is stored;
- Wire rope with one or more of the following defects must be removed and tagged “Out of Service” and removed from service, destroyed or replaced immediately;

  a) A single broken wire below a metal socket, end fitting or machine splices;
  b) Abrasion and core collapse;
  c) Corrosion - Red oxide powder and loose and springy wires can indicate serious corrosion. Check the valleys between the wires for corrosion beneath the surface;

d) Kinks, knots, or fractures from bending or reeving;
e) Crushed, flattened or jammed strands;
f) Bird caging - Faulty whipping of bare ends allows the strands to loosen from their proper tight lay. It can be caused by rotation of the end of a rope or a sudden release from high loading;
g) High stranding - Where a strand has slipped around the lay and projects above the surface due to faulty whipping and cutting of the rope ends;
h) An excessive number of broken wires. Where broken wires are present count the number of broken wires in a length of rope eight times the rope diameter. The total number of broken wires must not exceed 10% of the total wires;
i) In standing ropes, more than two (2) broken wires in one lay in areas beyond end connections or more than one (1) broken wire at an end connection;
j) In running ropes, six (6) randomly distributed broken wires in one lay or three (3) broken wires in one strand in one lay;
k) Wear of one-third of the original diameter of the outside individual wires caused by abrasion, scrubbing, flattening, or peeling;
l) Evidence of heat damage from any cause;
m) Where the rope diameter has reduced to 85% or less of the original diameter (even though there may be no broken wires); and
n) If one wire rope of a set (pendant lines, multi-leg Slings, and so forth) requires replacement, the entire set of ropes shall be replaced.

7.2.7 Chain Slings

Chain slings are prohibited and shall not be used for rigging.

Chain slings engineered for assembly of cranes/counter weight may be used solely for this activity and must be inspected prior to use. The Contractor must notify the NAPG HSER Manager of the intention to do so prior to work commencing.

7.2.8 Round Synthetic Slings

The use of round synthetic slings must comply with the following:

a) Round synthetic slings may be made from nylon, polyester, polypropylene / aramid polyamide and / or other synthetics;
b) Each Sling must be labelled/tagged with the working load limit/safe working load;
c) Slings should be sent for a proof load test every twelve months;
d) Discard slings if;
   - It is considered that it has lost more than 10% of its original breaking strength;
   - The label/tag has been removed or destroyed;
   - There is any damage to the sleeve or protective coating;
   - A nylon sling encounters acid;

- A polyester sling encounters alkaline substances;
- A polypropylene sling encounters an organic solvent such as paint, coal tar or paint stripper; or
- There are any visible cuts on the Sling.

e) Synthetic slings must be stored:

- In a clean, dry, and well-ventilated place;
- Away from the ground or floor;
- Away from direct sunlight, ultra-violet light and fluorescent lights;
- Away from extremes of heat;

Round synthetic slings continued:

- Away from sources of ignition;
- Away from atmospheric or liquid chemicals;
- Away from the possibility of mechanical damage;
- Dried appropriately prior to re-use when wet.

Note: A nylon sling will lose more than 10% of its strength when it is wet or after 6 months exposure to sunlight.

7.2.9 Shackles

All shackles used for lifting purposes shall be forged alloy steel shackles of Grade S or better and shall be obtained from a reputable manufacturer with a quantifiable history in the industry.

The NAPG Project may ask for documentation from the contractor or the manufacturer, that would support a comprehensive manufacturing QC/QA/certification program. They shall indicate the working load limit and come with the appropriate documentation.

The use of shackles used on site must comply with the following:

a) At no time shall the shackle be subjected to a load greater than its working load limit/safe working load;
b) All shackles shall be visually inspected prior to and after each use. This inspection shall assess the condition of the shackle body and the pin, the presence of wear on either component or the compatibility of the body and the pin;
c) Shackles must not be used without the correct pin;
d) Shackles should never be installed such that bending movements are applied to the body of the shackle;
e) Nut and bolt type pins shall always be used with split pins; and
f) All shackles shall be subject to detailed and thorough inspection by a certified rigger every three months and colour coded accordingly to the NAPG Equipment Inspection Procedure.

7.2.10 Chains Blocks / Lever Hoist / Tirfor

Chain Blocks (Chain Falls), Lever Hoists (Come-alongs), or Tirfor (hand winch) operators shall comply with the following:

a) Ensure all equipment is certified;
b) Only personnel competent to complete the required function and possess assessed certificates of competency (training) shall use these items. Trade certificate and/or documented review of manufacturers operation manual are acceptable.
c) Use the items and any attachment fittings in accordance with the manufacturer specifications and in the manner intended by the manufacturer;
d) The operator must visually inspect the condition of the item prior to and after each use. If there is any doubt of the integrity of the item, then it must not be used;

Chain block/hoist level continued:

e) Each of the items noted above must be fully inspected prior to use and every 3 months by a Certified Rigger and records kept in a register; and,
f) A qualified person shall assess any attachment points for integrity as previously noted.

7.2.11 Use of Lifting Cradles

The following types of equipment **will not be lifted** under any circumstances unless designed and manufactured with lifting points or contained in an engineered and certified lifting cradle:

a) 45 Gallon drums;
b) Tool boxes or tool kits; and
c) Oxy Acetylene and other compressed gas cylinders.

7.2.12 General Operating Procedure

Use slings or dedicated lifting points to attach lifting hooks to the load to be lifted. Reeving the load chain around the load to be lifted is not acceptable.

Attach hooks to the appropriate rigging points/equipment. Do not point load eye hooks on the tip. No part of the rigging/load can extend outside of the mouse/latch.

When used to balance a load in conjunction with fixed sling lengths in a crane lift, a chain block shall be loaded manually to balance the load and to ensure that its working load limit/safe working load is not exceeded. (I.e. The load should be taken on the fixed legs first then the load taken manually on the chain block.) These will always be secured accordingly for less than 75% of the planned safe working load limit. The equipment must be certified and visually inspected prior to each use.

Lever hoists shall only be used for lifting if this practice is within the specifications and guidelines for the hoist.

Tag lines shall be used on all suspended loads. When operating, moving or crawling a mobile crane all suspended loads shall be tied off or otherwise secured to the crane.

8.0 SUSPENDED PERSONNEL BASKETS (CAGE/MAN-BASKET)

8.1 Planning

All operations involving the use of suspended personnel baskets or platforms shall comply with applicable regulatory agencies and the requirements (summarized later within the document).

All alternate methods and safety requirements shall be investigated before using the personnel-basket as a means of conducting work at height. A personnel basket shall be used only when other means of access to the work are extremely hazardous or not possible because of structural design or work site conditions. In no case is a personnel-basket to be used as an elevator and safe working load not to be exceeded.

Registration certificates must be submitted in advance for review.

Prior to work using personnel baskets/platforms commences, a PMRA, Safe Work Method Procedure JHA, and all Permits must be developed by the Contractor/Permit Holder and reviewed and approved by the Contractor Management, NAPG Area Lead, NAPG Crane Supervisor, NAPG Construction Manager and NAPG HSER Manager prior to work commencing. This responsibility may not be delegated to subordinates.

The work method procedure must not require employees to exit or enter the basket while working at height. However, if this is impractical tasks that require entering or exiting the personnel basket while at height must complete the following:

a) A task specific work procedure and method;
b) Approved JHA and Rescue Plan signed by all personnel;
c) Work and lift permits; and
d) Drawing of work environment and controls

Before beginning any hoisting operation under this section, the constructor shall notify by telephone an inspector at the nearest local Ontario Ministry of Labour. For other jurisdictions please contact and ensure all relevant notifications protocols are followed. This notification shall

be logged by NAPG HSE Advisor including the MOL authorization number given. Other regions must notify appropriate government authorities as required by their jurisdiction.

The contractor shall develop written emergency rescue procedures and communicate these in writing to all workers involved with the hoisting operation.

The Constructor/Prime Contractor shall keep all design drawings, test reports, written statements and certification documents always required under this section with the crane during the hoisting operation. Copies shall be provided to the NAPG HSER Manager.

On request, the constructor shall provide an inspector with copies of any document described in this section.

8.2 Personnel

The persons shall remain substantially within the confines of the basket while being lifted.

100% Tie Off shall always be maintained for personnel in elevated work basket/position.

Every worker on the platform shall wear a **"full"** connected independently to anchor points on the platform and used in conjunction with a lanyard fitted with a shock absorber.

The contractor shall ensure that an adequate means of communication between the worker on the platform and the crane operator is established, maintained and used. Employees being hoisted shall be in continuous sight of and in communication with the crane operator or signal person. If at any time the operator cannot see hand signals or hear radio-relayed signals, he/she shall stop all operations and dog the load until he/she can receive signals.

The contractor shall ensure that every worker involved with the hoisting operation receives adequate instructions about the requirements, restrictions and hazards associated with the hoisting operation.

Prior to use of the basket for lifting personnel, a trial trip must be made, as required in CSA Z150-11 sec 6.4.2.8.5.2.

Employees shall keep all parts of their bodies inside the personnel basket during raising, lowering and positioning.

Hoisting of employees shall be discontinued upon indication of any dangerous weather conditions, other impending/imminent danger or wind speeds exceed **16 mph /25 kph**.

A certified Rigger or Dogger shall be in the personnel basket while it is hoisted aloft.

A meeting attended by the crane operator, rigging supervisor, signal person, riggers and any person(s) to be lifted for the task to be performed shall be held to review the relevant portions of this procedure, specific work method JHA, Rescue Plan, Drawings, etc. This meeting shall be held before the beginning of hoisting operations at each new work location and thereafter for any employees newly assigned to the operation.

8.3 **Equipment**

Qualified engineers, competent in structural design shall design personnel baskets. The personnel baskets will be constructed for the specific purpose of hoisting personnel by means of a crane.

When using a man basket, all attachments and supporting shackles must be moused (wired) prior to lift commencing.

Load and boom hoist drum brakes, swing brakes and locking devices such as dogs and pawls, as equipped, shall be engaged when the occupied personnel basket is in a stationary working position.

All crane work involving personnel baskets must be positively isolated against free fall. If the personnel basket is not landed, it shall be secured to the structure before employees exit or enter the basket using the double lanyard and tie off system.
Load test must establish a safety factor of two times for the suspended personnel basket prior to use. Re-testing required after any material handling operation in which greater than 50% of the rated capacity was lifted**.**

A personnel basket may be used to raise, support or lower a worker only if:

a) The platform that the worker is on is designed by a professional engineer in accordance with good engineering practice,
b) It is constructed in accordance with the design drawings,
c) It is equipped with more than one means of suspension or support,
d) It is equipped with anchor points for the attachment of the worker's fall arrest systems,
e) It is equipped with a guardrail in accordance with Regulation requirements,
f) It is suspended from, or supported by, a direct attachment to the boom of the crane,

g) It is designed, constructed and maintained so that the failure of one means of support or suspension will not cause the collapse of all or part of the platform, and
h) Has its maximum rated load capacity legibly & permanently marked in a conspicuous place on it.

The crane used to raise, support or lower a worker must:

a) Be equipped with fail-safe mechanisms that will prevent the boom and the suspended platform from free falling in the event of a power source or system failure or the inadvertent release of any operating controls,
b) Not used to hoist material while the platform is being used to support a worker,
c) Not loaded more than 25 per cent of its maximum rated load,
d) Have a revised load rating chart prepared by a professional engineer in accordance with good engineering practice and affixed in a conspicuous place on the crane,
e) Have on its hoist line, hooks equipped with self-closing safety catches at the point where the platform is suspended, and
f) Be equipped with an automatic limit switch (anti two block) that prevents the platform and load from reaching beyond the highest permissible position specified by the crane manufacturer.

The design drawings of the platform shall:

a) Set out the size and specifications of all components of the platform, including the type and grade of materials used for it;
b) State the maximum live load of the platform;
c) Specify the model and type of crane to be used in conjunction with the platform; and
d) Include a statement that, in the opinion of the professional engineer who designed the platform, the design meets the requirements of clauses (a), (b) and (c).

Equipment continued:

Before the platform is used, a**"competent person**" assigned by the contractor shall inspect it daily and verify in writing that it has been constructed in accordance with the design drawings. No person shall use the platform until the verification required is completed. A competent person shall visually inspect the crane's structural elements and the rigging equipment for defects before each daily use of the crane and man basket.
A professional engineer or a competent person designated by the professional engineer shall inspect the crane to ensure its structural integrity using non-destructive testing methods approved by the Canadian General Standards Board before the crane is used to lift persons and then at least once every 12 months after that.

Lifting bridles on the personnel baskets shall be designed as per engineering standards, OH&S Regulations and inspected and registered by certified third party.

If a gate is fitted it shall swing inward only and be equipped with a positive latch.

The personnel baskets weight, maximum number of employees and the load capacity of the personnel baskets must be posted permanently on the man-basket.

The personnel baskets shall be easily identifiable by colour or marking. Personnel baskets are not to be used to hoist materials or tools without employees.

Overhead protection shall also be provided when employees may be exposed to falling objects.

Load block or ball hooks shall be a type that can be closed and locked, thereby eliminating the throat opening. As an alternative, an appropriately sized shackle with a screw pin, nut and retaining pin may be used.

When a wire rope lifting bridle is used to connect the personnel baskets to the load line, the bridle legs shall be connected to a single ring or shackle that is moused. Lifting bridles and associated hardware used for attaching the personnel baskets to the hoist line **shall not** be used for any other service/purpose and shall be tagged appropriately.

All eyes in wire rope fittings shall be fabricated with thimbles. Where the platform is pinned, wire rope, shackles, rings and other rigging hardware shall have a minimum safety factor of five. Where the platform is suspended, the minimum factor of safety is 10.

A secondary attachment/safety wire rope rigging shall be affixed from the uppermost part of the lifting bridle to a point above the ball or the dead-end load line of the load block or to the load block.

The personnel baskets shall be hoisted just above the ground and inspected to assure that it is secure and properly balanced before employees can occupy the basket.

9.0 REGISTRATION AND RECORDS

All lifting equipment shall be registered with a relevant lifting equipment registration body before being brought into use. Registration of lifting equipment shall include:

a) Allocation of a unique identification reference (serial number);
b) Marking of each item with an identification reference and the Working Load Limit/Safe Working Load. Additionally, for portable lifting equipment, affixing a label or coding which indicates the next due examination date;
c) Creating and maintaining a file for each lifting equipment containing documentation relating to design, manufacture, testing, examinations, repairs and modification;
d) Retaining records for each item of lifting gear relating to testing and examinations; and
e) A notification system which displays the next due examination date, and any overdue examinations.

9.1 Supporting Documents Work Instructions

Specific work instructions are required for the operation, inspection, testing, and maintenance of each crane or lifting equipment (Relevant Standards/Regulations, certification maintenance and inspection records and lift studies etc.).

9.2 Forms and Permits

The following forms and documents shall be completed and submitted (or be available for review) to the NAPG project team, and approved prior to lifts commencing:

- Documentation to use personnel baskets & conditions of use;
- Crane Lift Permits and Engineered Lift Study documentation;
- On-the-spot lift plans;
- Crane Inspection Checklist Prior to Use on Site;
- Annual Crane Inspection Checklist;
- Monthly Crane Inspection Checklist;
- Daily Visual Inspection Checklist; and
- Weight Control Register.

10.0 REFERENCE

- PTP-00813 – Critical Risk Activity RAC 5 and RAC 3
- NAPG-SAF-SPI-0021 Working in Adverse Weather Conditions
- NAPG-SAF-SPI-0022 Loading and Unloading Material
- NAPG-SAF-SPI-0009 Working at Height
- Lifting Equipment Inspection
- NAPG-SAF-FRM-0012 On the Spot Lift Plan Checklist
- NAPG-SAF-SPI-0027 Surface Barricading
- NAPG-SAF-SPI-0017 Equipment Inspections
- NFLD 5/12 Newfoundland and Labrador regulation 5/12

APPENDIX A
EXAMPLE ON-THE-SPOT LIFT PLAN CHECKLIST

NAPG-SAF-FRM-0012

NAPG On the Spot Lift Plan Checklist

Date_____/_____/_____ Shift _____ Time _____ AM/PM			
Supervisor/ Competent Person (Print & Initial)			
Crane Operator (Print & Initial)			
Lead Rigger (Print & Initial)			

Section - 1 -

1. Description of object(s) to be Lifted.			
2. How was the weight obtained/ verified?			
Estimate +25% Calculation with Documentation +15% Scale or Actual +10%			
3. Equipment Information	Make.	Model.	Equipment #.
Serial #.		Accessories.	
4. Weight of object(s) to be lifted			
5. Total deductions for Crane – (Jib, line, block, ball, …).			
6. Total weight of all rigging used – (slings, shackles, plates, bolts, beams, ...).			
7. Total weight of Load to be Lifted. Determined by adding lines 4, 5, & 6.			
8. What is the planned radius of the lift?			
9. What is the rated capacity of the crane used at the radius listed above?			
10. **Divide line 7 & line 9 for % of load chart used**			
11. Is this lift within 75% of the allowable load chart capacity of the Crane minus 5% for "working margin?	*Yes*	***No***	

If **No** do not proceed with lift. Contact supervision, critical lift plan required.

Section - 2 - Check (√) to Indicate

☐ **Verify Crane is in its proper location, orientation and on firm level ground.**

☐ **Verify Crane is level with a four-foot level or similar. Outriggers properly deployed.**

☐ **Verify Rigging and Parts of Line are of adequate strength and configuration for load.**

☐ **Will wind speed or weather be a factor for the lift? Yes or No If yes, what additional controls are necessary to safety complete the lift?**

_____

☐ **Verify Radius been confirmed by measuring tape, pacing and or electronic device.**

☐ **Verify there are adequate clearances available for the crane to operate. Barricades are complete.**

☐ **Are there any overhead/ underground utilities or obstructions that may pose a hazard to the lift?**
Yes or No If Yes are they protected and How

☐ **Verity spotters and riggers are briefed and in location.**

☐ **Verify everything required for the lift available, serviceable and ready to complete the task**

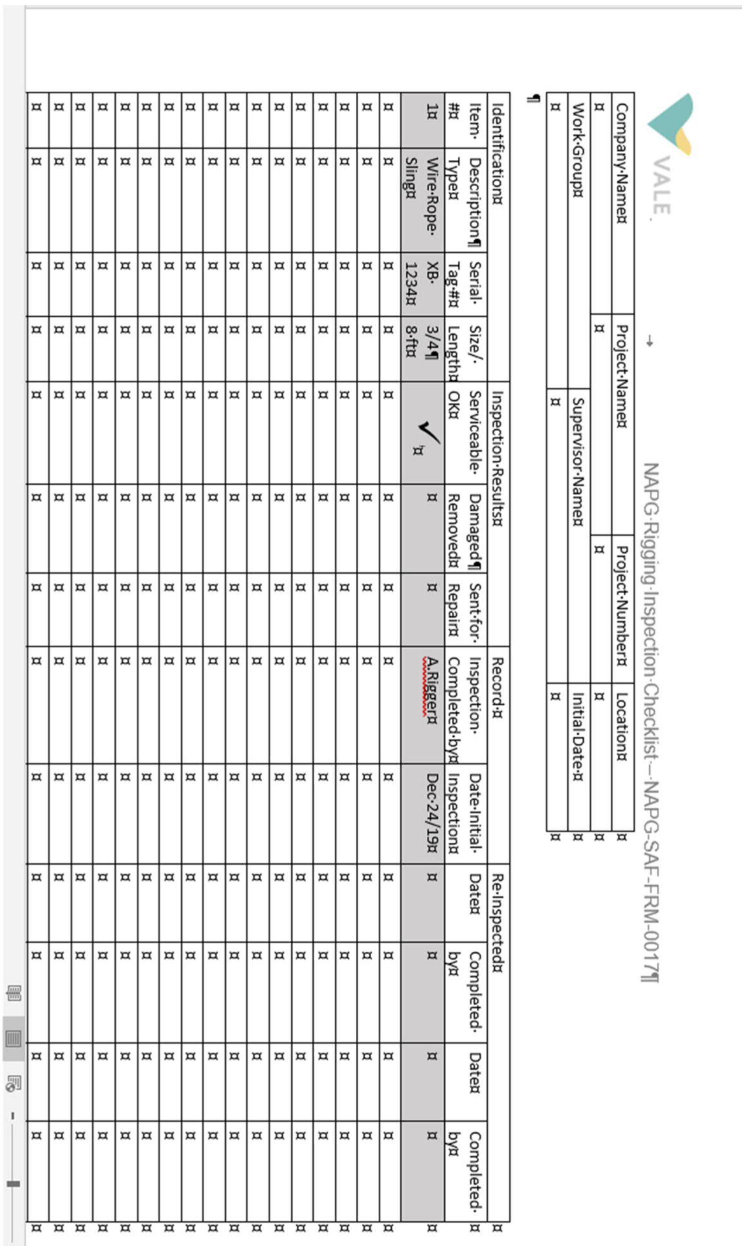
☐ **Verify it is safe to perform lifting operations. If it is not DO NOT PROCEED Contact supervision.**

Return to Contractor HSE department. Retain as part of the project record for 1 Year or End of Project

APPENDIX B
EXAMPLE CRITICAL LIFT CHECKLIST

NAPG-SAF-FRM-0008

APPENDIX C RIGGING INSPECTION CHECKLIST



VALE NAPG Rigging Inspection Checklist – NAPG-SAF-FRM-0017

Company Name	Project Name	Project Number	Location

Work Group	Supervisor Name	Initial Date

Identification				Inspection Results			Record		Re-Inspected			
Item #	Description Type	Serial Tag #	Size/ Length	Serviceable OK	Damaged Removed	Sent for Repair	Inspection Completed by	Date Initial Inspection	Date	Completed by	Date	Completed by
1	Wire Rope Sling	XB-1234	3/4 8 ft	✓			A.Rigger	Dec 24/19				

Appendix D

Tower Crane usage

1 TOWER CRANE USE

All the applicable requirements of this procedure apply to tower crane use on NAPG work sites. In addition to these requirements some specific elements for tower crane use apply

1.1 Planning

Planning for tower crane erection and operations should start as early as possible and involve consultation with everyone engaged in the work including the owner, constructor/ prime contractor, crane owner, crane supplier, crane user, crane erection supervisor, electricity utility, tower erection mobile crane provider and project supervisor(s) and others identified by the NAPG project manager.

This planning involves:

a) selecting the right crane(s)
b) locating, erecting and commissioning the crane
c) planning, scheduling and coordinating the work
d) operating, inspecting and maintaining the crane daily
e) planning for and completing crane preventive maintenance, inspection and repair.

All crane equipment is to be used in accordance with any operating manuals issued by the manufacturers. This manual is to be located with the crane at all time for operator reference.

1.2 Legislation

All manufactures design requirements as well as the relevant act and regulations for the local jurisdictional location apply. Should the local jurisdiction not have specific tower crane requirements the Ontario Construction Regulation for tower crane use shall apply.
Inspection and Certification

Certification inspection and testing of all components shall be complete where possible prior to erection and where necessary immediately after erection but prior to first use.

A professional engineer — or a competent worker designated by a professional engineer — must complete the inspection of its structural elements and components (using methods of non-destructive testing approved by the Canadian General Standards Board) to determine their structural integrity.

All Certification, engineering reports and maintenance records regarding for the tower crane are to be kept at the project

Equipment certification to include a load test as per the manufacturers specifications or developed by professional engineer and include a written standard and procedure.
In addition to documented pre-use checks a competent person appointed by the supervisor to inspect — machinery and equipment at least once a week (or more frequently as required) to ensure that the machinery and equipment does not endanger any worker.
A certified load chart shall be available in the operator cab for reference and use.

1.3 Planning

A critical requirement for site use of a tower crane is the planning phase. ensure the following expectations are met

1. Develop the planned usage foot print and site layout review (Site Plan drawing)
2. The laydown assembly and erection requirements

3. Swing and hoisting obstacles or hazardous no lift areas are Identified to include

a) Structures,
b) Critical equipment,
c) Personnel areas,
d) Use of mobile crane, concrete pumper, EWP's or other telescopic boom equipment locations and use
e) High voltage – overhead, switch room and switchyard hazards evaluated
f) Limit of Approach specified safeguards in place and safe work procedures developed
g) Crane – crane overlap, or site collision hazards evaluated

•Specified safeguards in place and safe work procedures developed. For these hazards the following additional controls are required:

a) Crane slew-limiting device and a Crane anti-collision device installed on crane

Self-extraction/ rescue, Technical High Angle Rope Rescue and Working at height plans

1.4 Mobilization and Erection

Crane installation and base drawing specific to the project and certified by a Professional Engineer
Geotechnical engineer's soils report (bearing capacity) for crane base certified by a Professional Engineer.
Pre-pour inspection of crane base imbed and reinforcing steel certified by a Professional Engineer.
Electrical grounding equipment installed in base as per crane manufacturer and or electrical code

Concrete compressive strength report required (MPA testing results as per crane installation drawing specifications)

Crane structural components, including imbeds (anchor stools) are non-destructive tested and certified by a Professional Engineer.

Specialty engineering documents readily available for crane modifications, cab location, flood lighting, signage, etc. (if required)

Noise variance permit (if required) Neighboring properties aware of crane erection, air rights, etc.
Flight path - Transport Canada Aeronautical Assessment for Obstruction Marking and Lighting (if required)

Crane power supply, hard wired or generator installed by qualified person and inspected by power authority (example ESA)
Lighting requirement and plans

1.5 Training

All tower cranes or similar devices regardless of capacity must be operated by a competent worker.
Crane operators shall hold a Hoisting Engineers tower crane certification or equivalent as per the jurisdictional requirements.
In addition to formalized knowledge certification and training, all operators shall receive unit specific familiarization training prior to use by a competent person.
All operators of tower cranes must receive relevant working at height, self-rescue/ auto descender training as well as any necessary high angle recue training as per the site plan requirements.
Use
All general and applicable requirements as per this procedure apply to the use of this equipment.

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