16.4.1 **INTRODUCTION**

16.4.1.1 The purpose of this standard is to provide requirements for the operation, inspection, and maintenance of cranes and hoists. This standard applies to all cranes including vehicle-mounted cranes, equipment used as cranes, hoists, lifting and rigging equipment.

16.4.2 **REQUIREMENTS**

16.4.2.1 A register of cranes, hoists, rigging attachments and lifting slings must be established.

16.4.2.2 There must be documented procedures that require:

- All rigging connections to be checked and correct prior to commencing a lift.
- Checks that the load being lifted is within the rated capacity of the crane and lifting attachments and is also within the limits set out in the lift plan.
- Checks of all safety devices or overload limiters to ensure they are not overridden or disabled.

16.4.2.3 Each facility must develop a register of critical lifts and a documented plan for each critical lift to address the associated hazards. Critical lifts include all multiple crane lifts; lifts over operating facilities where this may endanger personnel; lifts over power lines; lifts involving personnel cages; a non-routine lift of 20 tons or more, and a lift of more than 85% of the crane's total load capacity. Crane operators and rigging crews involved in critical lifts must have input into the lifting plan and be consulted prior to finalization of the plan. A "Planned Critical Lift Permit" (Exhibit 16.4.1) must be completed and approved by the facility Maintenance Superintendent. The lift plan must include:

- **Lift data**: equipment weight, rigging weight, total weight, height of lift, radius of lift and equipment surface area, center of gravity.
- **Equipment data**: manufacturer, model, size, boom length, jib length, load block, material size.
- **Rigging data:** sling diameter, length, sling configuration, capacity, hook type, shackle size and capacity.
- **Lift computation:** boom length, radius of lift, equipment capacity, size of outrigger footplates, and wind speed.
- **Proximity to power lines and process areas**: mobile cranes working in proximity to energized power lines must operate under a proximity permit (Exhibit 16.4.2), which must define exclusion zones and spotter duties.
- **Local hazards and their controls**: including the route for the crane, ground stability, proximity of people or equipment and agreed communication method.

References:
OSHA CFR 29 Part 1910.179-181.
MSHA CFR 30 Subpart M, O, and R.
ANSI/ASME B30.
Equipment Manufacturers' Specifications.
Rio Tinto Standard C6. Cranes and Lifting Equipment

Signatures

| | | | | | |
|---|---|---|---|---|---|
| Standards Committee Chairman | Date | Vice President Human Resources | Date | President, KUCC | Date |

16.4.2.4 Lifts not subject to a critical lift plan must be subject to a risk assessment.

16.4.2.5 There must be a documented and approved method for communication between the crane operator and those assisting with the lift.

- Hand signals shall be those prescribed by the applicable ANSI standard for the type of crane in use. An illustration of the hand signals shall be posted at the jobsite/work area.
- When hand signals are used in directing the crane operator only one employee will be designated to give the signals. Any signal not understood by the operator will be taken to mean STOP. A STOP signal shall be obeyed no matter who gives the signal.

16.4.2.6 Load ratings must be clearly marked on each crane or hoist.

- Labeling for capacities, safe lifting area, and other pertinent data shall be kept clearly legible.
- Any crane or hoist suspected of having been overloaded shall be removed from service and locked and tagged out until either repaired or re-certified by qualified personnel.
- A procedure must be in place to prevent the use of lifting or rigging equipment in lifting operations if such equipment has been used for towing.

16.4.2.7 Where practicable or where the weight of a lift is uncertain, cranes should be fitted with a load cell (LMI - load moment indicator) with the weight of the load displayed in the visual range of the operator. Load-limiting devices shall be kept in good working order.

16.4.2.8 Cranes should be equipped with an anti two-block device or limit switch that includes audible and visual alarms.

16.4.2.9 All lifting hooks (except for grab and chain shortening hooks) will be fitted with the correct manufacturer safety latch to prevent the load from accidentally detaching, unless otherwise specified in a risk assessment. Blocks, hooks, balls, or crane loads shall not be used for lifting or transporting personnel.

16.4.2.10 Loads must not swing over people or occupied buildings and no person shall be under a suspended load or in a position where they could be struck by a falling load. Where there is a risk of a load falling and striking a person, barricading or similar controls to prevent access must be in place. The operator shall not leave the crane controls while a load is suspended.

16.4.2.11 Overhead travelling cranes must be fitted with effective audible warning signals.

16.4.2.12 Tag lines must be attached to loads that require steadying or guidance while suspended. The load must be well secured and properly balanced in the sling or lifting device. Tag lines must be used when the possibility exists for the load being lifted to shift or swing into adjacent structures or when a swinging load may endanger people or property.

16.4.2.13 Mobile cranes must have a rating capacity chart fixed in a position visible to the crane operator or available in the crane cabin. Mobile cranes must meet mobile-equipment safety standards including horns, back-up alarms, seat belts, etc.

- Operator control stations for vehicle-mounted cranes must be located in an area protected from swinging loads and from the crane jib.
- Slew pins must be secured in place in mobile cranes while travelling.
- Slewing to test the integrity of outriggers on mobile cranes must be conducted prior to commencing lifts.

16.4.2.14 Mobile cranes are prohibited from operating within 10 feet of energized power lines (greater distances are required for voltages above 50kV). Signs must be installed in all mobile cranes to inform the operator of this requirement.

- A "Close Proximity Permit" (Exhibit 16.4.2) shall be completed before conducting work that places a mobile crane within 15 feet of a powerline; within any fenced substation; within any work area where exposed buses are present; or when moving loads over powerlines or substations;.

16.4.3 **MAINTENANCE and INSPECTION**

16.4.3.1 There must be a documented process that ensures all critical components are inspected and in place prior to a crane being commissioned and put into service.

16.4.3.2 Crane operators must undertake a pre-operational safety check for each shift the crane is used and this should be kept with the crane. The detail required in the pre-operational safety check must be based on a risk assessment for the crane. The operator shall report any malfunction to the supervisor immediately. A crane must not be operated with an inoperable or defective safety device.

16.4.3.3 Any crane brought to site must have a current test certificate and a pre-use safety inspection to ensure the crane is fit for purpose. As a minimum, this inspection must satisfy regulatory and manufacturer requirements for frequency of inspection and physical condition of the machine.

16.4.3.4 There must be a system for the inspection, maintenance and approval of lifting equipment, including a process that verifies the equipment is able to function to its design specifications and the integrity of:

- Mechanical and electrical components.
- Controls for each piece of lifting or rigging equipment.
- Crane cables and all lifting attachments.
- Structural components of the hoist, brakes, wheels, hooks, hook-blocks and rails.
- Integrity of load limiting devices, safety devices, limit switches and control systems required for individual equipment e.g. independent fail-safe braking systems, a device to stop the crane such as a “dead-man” switch, and emergency shut-off switch.

16.4.3.5 All welding procedures and welder qualifications used on load-sustaining members shall be in accordance with AWS D14.3. Modifications or additions are prohibited without written approval from the manufacturer.

16.4.3.6 All cranes shall be formally inspected on a monthly and annual basis. The inspections must be documented, and performed in accordance with manufacturer's recommendations and regulatory requirements. Inspections and repairs to cranes, cables and lifting equipment must comply with the manufacturers specifications and regulatory requirements as a minimum. All operations and maintenance inspection records, and cable tests records must be sent to the facility recordkeeping center and retained for one calendar year.

16.4.4 **Training**

16.4.4.1 Personnel must be trained, competent and authorized if they operate cranes; set-up or rig loads; provide signals for controlling lifts; or inspect, maintain or test cranes, hoists, personnel cages, lifting or rigging equipment.

- Operators of cranes and hoists shall be trained and capable of safely operating the hoisting equipment. There must be a system for establishing minimum operating time, frequency of operation and testing to ensure competency for each class of crane. Task training documentation for crane operation must be filled out as each employee is trained. Training documentation is to be sent to the facility recordkeeping center for recording and filing.

Exhibit 16.4.1

# ***KENNECOTT UTAH COPPER CORPORATION***

## PLANNED CRITICAL LIFT PERMIT

**REV 3 – 5/04**

Permit will be posted at work site until work is complete or a new permit is issued. This permit must be reviewed every shift and reissued if a change in conditions or work scope has occurred. This permit and supporting data must be submitted before any of the following lifts are made (check all that apply):

- ☐ A non-routine lift of 20 tons or more
- ☐ An expected load lift is 85% or more of the crane's rated load capacity
- ☐ A tandem lift

| | | | | | |
|---|---|---|---|---|---|
| **Originated By:** | | **Date and Time Issued:** | | | AM / PM |
| **Crane Operator:** | | **Work Area / Location:** | | | |
| **Work Description:** | | | | | |
| **Contractor Name:** | | **Contractor Supervisor:** | | | |

| | | |
|---|---|---|
| TRACK completed for this task *(Initials)*: | | |

## LIFT DATA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Equipment Weight | 1. | | | | | | |
| 2. Weight of Rigging | 2A. | Main Hoist Block | | Secondary Block or Ball | | | |
| | 2B. | Slings | | Shackles | | | |
| | Total Rigging Weight: | 2A. | | 2B. | | | |
| 3. Total Lift Weight | 3A. | On Sling (1 + 2B) = | | | | | |
| | 3B. | On Crane (1 + 2A + 2B) = | | | | | |
| 4. Height of Lift | Not greater than | | Feet | | | | |
| | Elevation sketch showing height relation to crane attached? | | | ☐ | Yes | ☐ | No |
| 5. Radius of Lift | Not greater than | | Feet | | | | |
| | Plot plan showing location and orientation of crane attached? | | | ☐ | Yes | ☐ | No |
| 6. Equipment Surface Area | Maximum subject to crosswind | | Sq. Ft. | | | | |

## CRANE DATA

| | | | | | |
|---|---|---|---|---|---|
| 1. Crane Manufacturer | | | | | |
| | Manufacture's load chart showing capacity at varying radiuses and boom lengths attached? | ☐ | Yes | ☐ | No |
| 2. Model and Size | | | | | |
| 3. Attachments | | | | | |
| 4. Bumper or Auxiliary Counterweight | | Lbs. | | | |
| 5. Boom Length | Not greater than | | Feet | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6. Jib Length | Not greater than | | Feet | | | | | |
| 7. Load Block | Size | | Weight | | # Sheaves | | | |
| 8. Secondary Block or Ball | Size | | Weight | | # Sheaves | | | |
| 9. Main Block | Parts of Line | | Capacity | | | | | |
| 10. Secondary Block | Parts of Line | | Capacity | | | | | |
| 11. Mat Size | Beneath each track or fully extended outrigger? | ☐ | Yes | ☐ | No | | | |
| | Soil bearing pressure (PSF) calculated | | Allowable | | | | | |
| 12. Notes | | | | | | | | |

## RIGGING DATA

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Sling(s) | Diameter | | Length | | Capacity | | | |
| | Vendor's chart showing capacity for different angles and sling configurations, type of wire rope and loop splice attached? | ☐ | Yes | ☐ | No | | | |
| 2. Briefly describe and sketch sling connection at hook and equipment. Show dimensions and sling angles. | | | | | | | | |
| 3. Shackle(s) | Size | | Capacity per shackle | | | | | |
| | Vendor's chart showing capacity attached? | ☐ | Yes | ☐ | No | | | |
| 4. Briefly describe and sketch shackle connections. | | | | | | | | |
| 5. Notes | | | | | | | | |

## LIFT COMPUTATION

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Boom Length | | | | | | | | | | |
| 2. Radius of Lift | | | | | | | | | | |
| 3. Crane Capacity | | | | | | | | | | |
| | From manufacturer's chart using conditions in #1 and #2 of CRANE DATA? | | | | | | ☐ | Yes | ☐ | No |
| 4. Initial orientation of lift relative to crane | ☐ | Front | ☐ | Side | ☐ | Rear | | | | |
| 5. Swing orientation of lift relative to crane | ☐ | Front | ☐ | Side | ☐ | Rear | | | | |
| 6. Total Lift Weight | Item 3B of LIFT DATA | | | | Lbs. | | | | | |
| 7. Sling Capacity Required | Safe working load with hitch configuration based on two legs maximum | | | | | | | | | |
| 8. Shackle Capacity Required | Based on two legs maximum | | | | | | | | | |
| 9. Total Weight on Slings and Shackles | Item 3A of LIFT DATA | | | | | | | | | |
| 10. Mat Size | Beneath each track or fully extended outrigger | | | | | | | | | |
| | Soil bearing pressure (PSF) calculated | | | Allowable | | | | | | |
| 11. Wind Speed | No lifts to be made with wind speeds in excess of | | | | MPH | | | | | |
| 12. Notes | | | | | | | | | | |

## APPROVALS

| | |
|---|---|
| *Contractor Supervisor Acceptance Signature:* | |
| *KUCC Supervisor Acceptance Signature:* | |
| *KUCC Superintendent Acceptance Signature:* | |

## WORK COMPLETION or CANCELLATION

| | | | | | | |
|---|---|---|---|---|---|---|
| Completed or Cancelled By: | | Date: | | Time: | | AM / PM |
| If cancelled, provide reason: | | | | | | |

Exhibit 16.4.2

# KENNECOTT UTAH COPPER CORPORATION
## *CLOSE PROXIMITY PERMIT (Standard 16.4)*

RRev. 4 – 9/04

A "Close Proximity Permit" shall be completed and approved before conducting work that places equipment that is capable of coming into contact within:

- ❑ 15 feet of power lines;
- ❑ Any fenced substation;
- ❑ Any work area where exposed busses are present.

| | | | | | |
|---|---|---|---|---|---|
| Requested By | | | | | |
| | Print Name | | *Signature* | | Date |
| Plant | | | Work Location | | |
| Department | | | Contractor (If Applicable) | | |
| **Description of Work:** | | | | | |

TRACK completed for this task *(Initials)*:

Reference Drawing No.:

Location:

Work to be Performed:

Brief Description of Interference and Safety Measures to be Taken:

Area barricaded ☐

Proposed Work Date and Time:

Approved By:

| | | | |
|---|---|---|---|
| Superintendent | Print Name | *Signature* | Date |
| Electrical Engineering/ Supervisor | Print Name | *Signature* | Date |
| Safety | Print Name | *Signature* | Date |
| Equipment Operator | Print Name | *Signature* | Date |