

STANDARD OPERATING PROCEDURE

Recovery of Stuck or Immobile Equipment

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RECOVERY OF STUCK OR IMMOBILE EQUIPMENT



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The following is a step by step procedure on how to complete a specific task or meet a facility specific requirement. Standard Operating Procedures (SOPs) are written for all identified critical tasks. By virtue of the hazard or complexity associated with critical tasks it is paramount that the SOP be followed as written. SOPs contain a listing of high-level hazards associated with the task, for detailed hazard analysis reference the applicable Task Hazard Assessments. SOPs do not replace the requirements contained in the company Standards, Codes, and Processes nor does it replace the need to comply with required legislation. Section 8.0 references documentation that the worker shall understand before work commences.

1.0 PURPOSE

- To establish a Company standard to safely and effectively carry out work as it applies to recovery of stuck or immobile equipment.

2.0 SCOPE AND APPLICATION

- This document applies to all Company Heavy Construction Mining operations. Ensure all site specific requirements are being met or exceeded before performing the task.

3.0 HAZARDS AND CONTROLS

3.1 General

- Inadequate notification and communication; unnecessary personnel in area.
 - **Supervision must be notified prior to recovery of any and all stuck equipment.**
 - Communicate the task of recovering stuck equipment to any personnel in the area that may be affected.
 - All personnel not associated or required for the task must be relocated or removed to a safe location for the duration of the task.
 - When working in congested areas, the use of barricades or cones may be required for additional access controls.
 - Establish adequate communication methods for the task; radio communication in addition to verbal communication is recommended.
- Unstable or compromised equipment.
 - In situations where equipment has become compromised or unstable due to situations such as, but not limited to, sinking in the ground, sloughed dump edges or travelling over an edge, a supervisor must be notified immediately and be present for the recovery.
 - Ensure the equipment has been stabilized prior to any recovery attempt.
 - Ensure the safety of the equipment operator. If it becomes unsafe for the operator to be in the equipment during recovery, follow site specific emergency procedures and extract the operator.
 - A JSA must be completed prior to the recovery of any and all compromised or unstable equipment. The JSA will address the specific hazards associated with the compromised equipment and ground conditions as well as the required steps to safely extract the equipment.

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- Untrained personnel involved in task.
 - All personnel involved with task must have received the necessary equipment training to complete the task safely.
 - Ensure the workers are familiar with rigging practices and have reviewed the applicable hazard assessments as well as the Company codes and SOPs related to equipment operation, rigging and towing.

3.2 Recovery via Tow Cable

- Limited visibility due to positioning of equipment and environmental conditions.
 - If vision is impaired between the disabled equipment and the recovery equipment, a spotter must be used. Follow 962C-SOP-008 Signaling Equipment and ensure signal person is never in the line of fire. Do not position the signal person or any other personnel between equipment or within 1.5 times the tow cable's length.
 - If required to perform task during night or in poor lighting conditions, a light plant may be used to provide adequate lighting. The light plant must be positioned in such a manner that it will not impair the workers' vision. The light plant must also be set up in an area where it will not restrict access to the task nor create a congested work area. Follow 962C-SOP-004 Transport, Set up and Operation of Portable Light Plants.
 - Ensure primary spotter/signal person is identified with reflective arm gauntlets.
- Poor ground conditions (i.e. soft, slippery, uneven, etc.).
 - Inspect ground conditions prior to task and ensure adequate footwear is worn. Wear traction aids in winter conditions.
 - Where possible ensure area has been levelled and sanded adequately.
- Inadequate or defective tow rigging
 - Once rigging is used for towing it shall be clearly labelled as "Towing Only" and will not be stored with lifting rigging or used for lifting purposes. Ensure manufacturer's tag has been removed from sling.
 - Only use wire rope slings of sufficient length and approved load rating for the towing task. Minimum recommended cable tow sling size is 1.5 inches x 20 feet for a 100 ton (777) haul truck. Tow sling size will increase depending on size of equipment being recovered.
 - Inspect all tow slings for any broken wires, strands, corrosion wear or kinks. If the sling does not meet the requirements for the safety standard applying to its particular use, the sling must be replaced by a sling that meets the requirements. At a minimum, remove sling from service if there are *excessive* broken wires or strands, evidence of bird caging, kinking, crushing, or displacement of the main strand.
 - Only use shackles approved for the load rating appropriate for the towing task. If any abnormal conditions such as stretching, cracks, deformities are noted during the inspection they are to be taken out of service and tagged out or destroyed.
 - Ensure hooks are inspected prior to use and removed from service if the throat opening is stretched more than 15% from normal or twisted more than 10 degrees from plane of the unbent hook.

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- Personal injury from handling tow cables.
 - Wear site approved gloves prior to handling tow cables. **At a minimum double palmed leather or Kevlar gloves must be worn.**
 - Use proper lifting techniques when lifting tow cables; use more than one person if required.
 - When using multiple personnel to handle the tow cable ensure an adequate FLRA and communication plan has been reviewed and agreed upon prior to the task. This should address items such as path of travel, physical or body position limitations, and unexpected movement of cable (i.e. dropped to ground while being carried).
 - Do not let the cable slide through your hands due to the possibility of broken strands or burrs.
 - Do not place hands in the line of fire or in pinch point areas when attaching tow slings to anchor points and shackles.
 - Never straddle or try to jump over tow cables that have been attached to equipment and are under tension.
 - In the event the tow cable breaks or releases suddenly all ground personnel required for the task (i.e. spotter) must be a minimum of 1.5 times the length of the tow sling away from it while the stuck unit is being recovered. Do not stand in the line of fire. All non-essential ground personnel must be cleared from the area prior to the task commencing.
- Personal injury from material falling off equipment.
 - Inspect the equipment for overhanging lumps of material. Do not walk under lumps of material.
- Inappropriate anchor / attachment points.
 - Only use manufacturer approved tow attachment points.
 - All workers involved to be instructed on proper attachment points.
 - Inspect all tow attachment points prior to use. If any damage or abnormal conditions such as cracks, bends, excessive wear, corrosion, deformity or other visible damage is noted it must be reported to the supervisor prior to continuing task. If the supervisor determines the tow attachment point is not safe to use, a JSA must be completed outlining an alternative method to recover the equipment.
 - If hooks/eyes are unavailable, attach to frame locations rated as tow attachment points.
- Uncontrolled movement of equipment while attaching tow cables.
 - Ensure all implements are lowered and grounded, hydraulic lock applied, and park brakes applied prior to positioning tow cables.
 - Equipment operators must be out of the cab of the equipment when ground personnel are positioning/attaching tow cables. NOTE: haul truck operators may stay in the cab of the equipment if it is not safe to exit due to the position of the haul truck (i.e. tires raised off the ground). If the haul truck operator remains in the cab, ensure an adequate communication plan has been established between the ground personnel and haul truck operator to ensure there is no unplanned movement of equipment.
- Uncontrolled movement of equipment post recovery.

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- Once the recovery task has been completed the equipment must be properly parked (park brake applied, all implements lowered, grounded and hydraulic lock applied).
- Apply wheel chocks to rubber tired equipment.
- All operators are to be out of the cabs while ground personnel detach tow cables.
- Pulling/towing improperly causing damage to equipment and/or cable breakage.
 - Pull in a straight line whenever possible.
 - Clear the area of unnecessary personnel.
 - Pull slowly with even force (do not jerk or put undesired stress on tow rigging).
 - Use equipment of adequate size for the towing tasks, i.e. a 793 Cat Truck to pull a 793 Cat Truck; D8 or larger dozers can be used to pull haul trucks or equipment.
 - If required to pull / tow down a grade; use a piece of equipment of adequate size as an anchor point to prevent uncontrolled movement. It must be attached using rigging of adequate size to an approved attachment point.
 - Before towing a piece of equipment that is in danger of tipping over or runaway, safety lines must be attached to the piece of equipment and to another anchor of equal or greater weight.
 - If the equipment being recovered is loaded ensure the load is dumped or removed by an excavator so as to minimize the total amount of weight being pulled.
- Personal injury from stored energy after cable breakage to ground workers and equipment operators involved in the recovery.
 - All ground personnel required for the task (i.e. spotter) must be a minimum of 1.5 times the length of the tow sling away from it while the stuck unit is being recovered to prevent potential line of fire injuries from cables releasing stored energy if breakage occurs.
 - All recovery attempts will be communicated using the pre-determined communication method. Positive communication from all parties involved in the recovery is necessary before proceeding with the attempt.
 - All equipment operators involved in the recovery will ensure they are seated comfortably in their seat, with their seatbelts fastened as they face the action and follow all instruction provided over the pre-established communication method.
 - In the event of cable breakage during a recovery, the person leading the recovery will stop all activities until they can confirm that all personnel involved in the task remain uninjured and are fit to continue in the recovery attempt.

3.3 Recovery via Pushing on Equipment

The preferred method of recovering stuck or immobile equipment is by using a tow cable; however, in the event that field conditions create additional hazards, such as increasing the frequency of tow cable use due to equipment being stuck repeatedly in soft dump conditions, the supervisor may authorize the alternative method of pushing on stuck equipment.

- **Pushing on stuck equipment is only permitted under the following conditions:**
 - Last resort where the use of tow cable presents an increased risk of injury for ground personnel.

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- **Supervisor MUST be present for all pushing tasks and is responsible for any and all damages resulting from pushing on equipment.**
- Haul trucks MUST be empty and the box in the raised position.
- Pushing on haul trucks is permitted for equipment sizes up to and including Caterpillar 785 haul trucks.

- Metal to metal contact between stuck equipment and recovery equipment resulting in damage.
 - Metal to metal contact is not permitted.
 - A cushion of material must be used between the dozer blade and truck box.
 - Loading units may assist loaded haul trucks from becoming stuck by pushing on the material centred in the rear portion of the truck box.

- Equipment damage due to improper placement of dozer blade or loading unit.
 - Haul truck dump body must be empty and in the raised position.
 - Haul trucks will be pushed in a straight line and not at an angle.
 - Dozer will not push on the side or the front of the haul truck.
 - Dozer will be positioned parallel to the dump body and ensure the blade does not come into contact with the truck's tires.
 - Dozer will not use side of blade to pull backwards on haul truck box.
 - Dozer will not use spill guard on blade to push with.
 - Loading unit must not swing to push the truck or fully extend the boom and stick as this may upset the loading unit.
 - Loading unit pushing must only be under hydraulic power and not with the final drives.

- Operator injury due to unplanned equipment movement.
 - Haul truck operator will be notified via radio of dozer commencing push; haul truck operator will be alert and prepared for equipment movement.

- Equipment damage as a result of pushing.
 - Once the stuck equipment has been recovered it should be inspected prior to returning to production; any damages must be reported immediately for assessment and approval to return to work.

4.0 CHECKLIST

- Attend all preparatory meetings (IE: daily PSI; job scope; review of JSA's and SOP's for the job).
- Complete FLRA cards before starting the work.
- Ensure all personnel involved in the task are aware of the hazards and the controls to be used, as identified in the SOP's; JSA's; and FLRA's
- Conduct a pre-job inspection of all equipment to be worked on and tools to be used.
- Standard of Training required for working on this job: On-the job training.**

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5.0 DEFINITIONS

5.1 Company

Means North American Construction Group Ltd. (NACG) and all directly or indirectly owned subsidiary companies, including joint ventures.

5.2 Company Personnel

Includes the Company's employees, officers, directors, agents, associates, consultants/contractors, temporary employees and third-party processors.

5.3 HSE

Refers to the Health, Safety & Environment department.

5.4 Stuck or Immobile Equipment

Stuck or immobile equipment includes any equipment that cannot move from a location under its own power and as a result, requires recovery assistance. Recovery can include the use of a tow cable; digging, pushing or the removal of material around the machine; as well as using equipment to push on the machine. Supervision must be notified prior to the recovery of any and all stuck or immobile equipment.

6.0 PROCEDURE

6.1 Recovery via Tow Cable

- 1) In all situations the supervisor or designate must be notified prior to commencing task. **Supervisor or designate must be present for any and all recovery tasks involving a tow cable.**
- 2) Complete a hazard assessment for the task and review it with all personnel involved. Designate primary spotter/signal person.
- 3) Inspect area where equipment is being recovered as well as route of travel.
- 4) Inspect equipment, tools and rigging prior to attaching to equipment. Ensure tow cables and shackles are adequate size and sufficient load rating for the task.
- 5) Ensure equipment to be recovered is adequately secured against movement prior to attempting to hook-up / connect tow cable / sling(s). If there is a hazard of the equipment tipping over, safety lines attached to a piece of equipment of equal or greater size must be used.
- 6) Review communication plan with all equipment operators and ground personnel. Ensure plan is documented on hazard assessment.
- 7) Ground personnel will attach tow cable and shackle to stuck equipment.
- 8) Primary spotter will guide recovery equipment (i.e. dozer) to tow cable.
- 9) Dozer operator will drop ripper in eye of tow cable or ground personnel will attach tow cable to approved anchor points (note: equipment must be stopped with implements lowered, hydraulic lock applied and

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operator out of cab prior to ground personnel approaching). **If visual contact between spotter and equipment operator is lost the operation must STOP until visual contact is reinstated between the operator and spotter.**

- 10) Clear area of unnecessary personnel; ensure spotter is not in the line of fire (i.e. between equipment, path of travel) and is a minimum of 1.5 times the length of the cable away from it.
- 11) Upon signal of spotter, recovery equipment will slowly remove slack in the tow cable prior to exerting force to pull the stuck equipment. **Recovery equipment will not jerk the tow cable.** Operator of stuck equipment will work in tandem with recovery equipment to ensure an adequate amount of throttle is applied to equipment to propel it out of the area.
- 12) Once the recovery task has been completed the equipment must be properly parked (park brake applied, all implements lowered and hydraulic lock applied – if applicable) to prevent any undesired movement when releasing tension from tow cables. If required wheel chocks of adequate size should be used to assist with the prevention of undesired movement.

6.2 Recovery via Pushing on Equipment – Crawler Tractors

- 1) In all situations the supervisor must be notified prior to commencing task. **Supervisor must be present for all recovery tasks and is responsible for any and all damages resulting from pushing on equipment.**
- 2) Complete a hazard assessment for the task and review it with all personnel involved.
- 3) Inspect area where equipment is being recovered as well as route of travel.
- 4) Ensure haul truck box is empty and in the raised position.
- 5) Position dozer behind truck, parallel to dump body and ensure corner bits of dozer blade do not come in contact with haul truck tires.
- 6) Create cushion of material between dozer blade and haul truck box.
- 7) Dozer operator will notify haul truck operator of contact. Using first gear, dozer will begin to push.
- 8) Upon signal from spotter, haul truck operator will apply throttle as dozer pushes.
- 9) Haul truck will not lower dump body until dozer has cleared the area and truck operator has received signal from spotter that it is safe to do so.
- 10) Supervisor will inspect equipment for damages prior to returning haul truck to work.

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6.3 Recovery via Pushing on Equipment – Loading Units

- 1) In all situations the supervisor must be notified prior to commencing task. **Supervisor must be present for all recovery tasks and is responsible for any and all damages resulting from pushing on equipment.**
- 2) Complete a hazard assessment for the task and review it with all personnel involved.
- 3) Inspect area where equipment is being recovered as well as route of travel.
- 4) If working from windrow or pile of material, loading unit must be a minimum of (1) one metre from edge.
- 5) Loading unit will place bucket on material in centred in the rear portion of the truck box.
- 6) Loading unit will push stuck truck using hydraulic power only and will not push with the final drives. No metal on metal contact is permitted.

6.4 Employee Management During Prolonged Recoveries

- 1) When equipment recoveries are prolonged and operators are captive to the cab of their equipment, establish regular check in intervals with the worker, based on the hazards associated with the recovery. These check in intervals must not exceed two (2) hours.
- 2) Recovery leader will make every effort to physically check on the worker in the event the check-in interval is missed and visual contact with the worker cannot be established.
- 3) If a health event or injury has occurred, or physical / visual contact hasn't been established, initiate an emergency response as per site requirements to rescue the employee.

7.0 NOTES

If this task is to be done by a method different than described in this SOP, the work must **STOP** and the alternate method must be **DOCUMENTED** with an adequate hazard assessment tool such as a JSA. The document must be **APPROVED** by a supervisor before such procedures are implemented.

8.0 REFERENCES

- 950C-C-008 Cranes, Hoists and Rigging Code
- 950C-C-056 Towing Code
- 950C-C-049 PPE General Code
- 962C-SOP-004 Transport, Set up and Operation of Light Plants
- 962C-SOP-006 Working Alone
- 962C-SOP-008 Signaling Equipment

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- 962C-SOP-009 Manually Lifting and Carrying Heavy Objects
- 962C-SOP-016 Driving Haul Trucks General
- 962C-SOP-037 Securing Disabled or Parked Equipment in an Operating Environment
- 962C-SOP-042 Approaching Equipment

9.0 APPENDICES

No appendices.