

STANDARD OPERATING PROCEDURE

Abrasive Blasting

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ABRASIVE BLASTING

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| | | | | | | <i>SR</i> |
| | | | | | | <i>Des 20/20</i> |
| 1 | APP | Oct 16, 2020 | Approved | Andre Brule | Tammy Siver | Stan Miller |
| Rev | Status | Rev. Date | Status Description | Prepared by | Reviewed by | Approved by |

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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 abrasive blasting.

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

- Personnel not trained, qualified or competent to operate the blasting equipment.
 - Supervisors must ensure that workers involved in blasting activities are trained, competent and understand the task prior to using the blasting equipment.
 - The operator is responsible to complete the Blast Booth Daily Checklist prior to commencing work (see Appendix D) and report any conditions affecting the safe operation of the blasting equipment to the supervisor.
 - The operator must be familiar with the operating functions of blasting equipment before operation. This includes emergency shut off, Deadman switches, first aid kit, eye wash station.
 - The operator is responsible to ensure all non-blasting personnel are out of the blasting booth before starting.
- Equipment contact, property damage and/or personnel injury while moving skid, parts and components into the blasting booth.
 - The equipment operator will complete a visual inspection of the equipment used to transport parts and components into the blasting booth (e.g. forklift, loader, skid steer, ext.). The equipment operator must also ensure the equipment is rated for the load.
 - Spotters will be used when moving parts and components in/out of the blasting booth. Spotters will maintain eye contact or use two way radios to communicate.
 - Travel at slow and controlled speeds.
 - Before moving parts or components ensure there are no obstructions and/or obstacles in the way.
 - Stay clear of crushing and line of fire hazards and use good communication. Equipment operator must ensure ground personal are clear of the load prior to setting in position.
 - Ensure the skid is set in the tracks prior to moving. Parts and components must be secured to the frame/skid. Use slow speeds and spotters when moving the skid into the blast booth.
 - Clean all parts, components and skids prior to entering the blast booth (this will help to prevent media contamination).

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- Improper isolation during bi-monthly inspection and maintenance resulting in personal injury.
 - Supervisors will ensure workers are trained, competent and understand how to perform the bi monthly inspection and/or maintenance on abrasive blasting equipment.
 - Follow isolation process and ensure the unit is locked out and deenergized prior to performing inspection and/or maintenance (see Appendix A for locking out equipment).
 - Read and understand the manufacturer's procedures when conducting inspections and maintenance on the blasting equipment.
- Abrasive blasting equipment failing during use, resulting in personal injury and/or property damage.
 - Use the correct equipment, hoses, fittings, couplers and accessories that are designed or intended for abrasive blasting. Nozzle must be properly sized and rated for blasting.
 - Ensure all abrasive blasting equipment is inspected prior to use. Look for any breaks in the hoses, lose fittings, lose whip checks and wear in the nozzle. If any defects are found work will not proceed until repairs are made.
 - Inspect and test the Deadman system, ensure everything is functioning prior to starting work. This includes the doors entering the blast booth and dead man switch located on the blast hose.
 - Inspect the lighting inside the booth, ensure lights are on and have protective coverings installed, prior to starting work. Ensure exit lights are illuminated.
 - Ensure whip checks are used on hoses to prevent the end of the hoses from whipping around if a coupling connecting two hoses breaks.
- Poor air quality, visibility, and noise conditions during blasting activities.
 - Use and wear all required personal protective equipment (PPE) when abrasive blasting this includes; NIOSH approved air-fed respiratory hoods (Nova 3 abrasive blasting helmet), blast suit, hearing protection, long leather gloves and approved safety boots.
 - Workers must ensure air supply and filters for the helmet are in proper working condition and inspected prior to each use.
 - Workers must ensure protective blasting helmet peel away protective face shield covers are in place prior to use.
 - Review and understand the safety data sheet (SDS) on the material used for blasting.
- High Pressure system, heavy lifting, slips, trips and falls resulting in musculoskeletal injuries (sprains/strains) and personal injury.
 - Stretch before and during the task. Take micro breaks as needed and always use both hands when controlling the blasting nozzle/airlines.
 - Maintain control of the nozzle/airlines and never point nozzle at yourself or other personnel.
 - Use good ergonomics and proper lifting techniques when handling heavy awkward objects. Anything over 50lbs requires assistance.
 - Operator is responsible to maintain a clean working environment. Eliminate hazardous surface obstacles that may cause slipping/tripping hazards or interfere with worker's mobility.
 - Operator is responsible to position hoses out of the line of fire. Inspect the walking path prior to blasting.
 - Keep all floor grating and screens in position/ closed during operation.
- Personnel unaware of emergencies or unable to report if they are injured or fallen during blasting activities.

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- Supervisor or designate must physically check on worker during blasting activities. Check-in intervals will not exceed two (2) hours (follow 962C-SOP-006 - Working Alone).
- In the event of a building evacuation supervisor and or lead hand must notify the abrasive blaster.
- Uncontrolled movement of equipment, parts and components being blasted.
 - Ensure equipment has been isolated from movement. All parts and components being blasted must be secured to prevent unintentional movement.
- Falling from elevations resulting in personal injury.
 - Work from approved platforms or equipment landings, wear fall protection equipment when working over 6 feet (follow 950C-C-016 Fall Protection Code).
 - Only trained personnel shall operate elevated work platforms. Ensure hoses and supplied air lines are not fastened to the handrail while it is being raised. Use rope to pull hoses and supplied air lines up to elevation.
- Abrasive blasting on fuel tanks resulting in ignition and/or explosion.
 - Steam or hot water flush; inert with CO₂, or Argon; use a gas monitor to determine the level of flammable/combustible gases within the tank (follow 960C-SOP-306 Fuel Tank Repairs by Welding).

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.**

5.0 DEFINITIONS

5.1 Company

North American Construction Group (NACG) divisions, departments, or subsidiaries.

5.2 Company Personnel

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

5.3 Deterioration

Excessive wear, damage, fractures, fatigue or distortion.

5.4 HSE

Refers to the Health, Safety & Environment department.

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6.0 PROCEDURE

6.1 Before Operating Abrasive Blasting Equipment. (ABS – Below Floor Sweep in Recovery Blast Room 6.1 – 6.6)

- 1) Supervisor and workers will discuss the task and plan the safest way to approach the work. During that time workers will complete an FLRA card to identify the hazards in the area.
- 2) Complete a visual inspection of the equipment used to transport parts and components into the blasting booth.
- 3) Complete inspections on equipment, parts and components to be blasted, ensure parts and components have been cleaned prior to entering the blast booth. All parts and components being blasted must be secured to prevent unintentional movement.
- 4) Ensure hoses do not create tripping hazards, plan your path of travel before blasting.
- 5) Operator needs to ensure all doors are fully closed for the blast booth to fully function. The blast booth ventilation system needs to be running during blasting activities.

NOTE: Follow the isolation process and ensure the unit is locked out with a personal lock/tag and deenergized prior to performing inspection and/or maintenance.

6.2 System Start-up

- 1) Shut air supply off at blast manifold and bleed down manifold.
- 2) Perform blast booth daily inspection at the beginning of each day or shift - **Ensure system is shut down.**
- 3) Complete the daily checklist and record all information. Any deficiencies must be reported and repaired.
- 4) Clean and inspect rotary classifier. Remove pieces of wire, steel, wood, paper and other large trash picked up by the system. Do not depend on the reclaim to remove all items from the system.
- 5) Make sure discharge pipes and hoses are clean and not clogged.
- 6) Empty trash receptacles for undersize and other trash, do not let them over fill.
- 7) Make sure dust collector hopper is empty.
- 8) Empty barrels if necessary.
- 9) Examine Magnahelic gauge – If the reading exceeds “5.5”, contact your supervisor and/or maintenance. System must be running for this check.
- 10) Check abrasive dust for the carryover of good abrasive. Good abrasive should not be present. If it is present contact supervisor or maintenance.

6.3 Starting and Running Blast Booth Operation

Turn all these systems on (they must be on at all time during blasting and / or blow off):

- Dust Collector
- Longitudal Screws
- Bucket Elevator
- Cross Screw

6.4 General Cleanup After Blasting or at the End of Each Shift or Day

- 1) Keep all floor grating and screens in proper position during operation.
- 2) Clean room as normal, sweeping (or vacuuming) all grit from floor.
- 3) Look and listen for any abnormal sounds from the elevator, augers, motor and dust collector. Contact your supervisor and/or maintenance if any deficiencies are found.

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- 4) Run the system for 10 minutes before shutting down at the end of the day.

NOTE: Make sure entire reclaim system is running.

6.5 Handling and Storing Abrasive Blasting Material

- 1) Store material away from incompatible materials and keep dust away from sources of ignition. Keep dry to reduce rusting.
- 2) Ensure to read and understand the safety data sheet (SDS) on blasting material before handling.

6.6 Adding Abrasive material

- 1) Make additions sparingly as to not overload the system.
- 2) Keep abrasive 12" below separator lip.

6.7 Mod-U-Blast Cabinet Operation

- 1) Complete an inspection of equipment, parts and components to be blasted. Ensure gloves and hoses are in good condition free from any damage, replace if needed.
- 2) Check moisture trap regularly and drain when needed.
- 3) Check media hose for soft spots. Especially at the hose ends at the gun metering valve.
- 4) Do not overfill sump. Periodically drain completely and replace media if needed.
- 5) After loading Mod-U-blast with parts and components. make sure the lid is closed and locked.
- 6) Clean up after.

Note: If the Media does not flow from the gun, check for clogged valves and/or media hose. Blow back through gun and media hose. If media starts to flow then stops again drain media and replace it. Disassemble gun, media hose and metering valve; clean all internal parts and reassemble. If air does not flow, drain and clean the moisture trap.

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

- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 18, section 255 - Abrasive blasting operations}
- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 15, Section 212 – 214 – Isolation}
- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 29 – WHMIS}
- The National Institute for Occupational Safety and Health (**NIOSH**)
- 950C-C-016 Fall Protection Code
- 950C-C-022 General Housekeeping Code
- 950C-C-028 Hazardous Energy Isolation Code
- 950C-C-036 Manual Materials Handling Code
- 950C-C-047 PPE - Eye and Face Protection Code
- 950C-C-050 PPE - Respiratory Protection Code
- 950C-C-061 WHMIS & Hazard Communication Code

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- 950C-C-063 Working Alone Code
- 960C-SOP-001 Elevated Work Platform
- 960C-SOP-019 Slip Trip and Fall Hazard Prevention
- 960C-SOP-020 Selection and Use of Mechanical Manual Lifting Aids
- 960C-SOP-112 Air Line Control and Dangers
- 960C-SOP-306 Fuel Tank Repairs by Welding
- 962C-SOP-006 Working Alone
- 962C-SOP-009 Manual Lifting and Carrying Heavy Objects
- 962C-SOP-008 Signaling Equipment

9.0 APPENDICES

- Appendix A - Locking Out the Abrasive Blasting Equipment During Bi-monthly Inspection
- Appendix B - Main Control Panel, Warning and Safety Decals
- Appendix C - Types of Abrasive Blasters
- Appendix D - Blast Booth Operator Daily Checklist
- Appendix E - Blast Booth Operator Bi-Monthly Checklist

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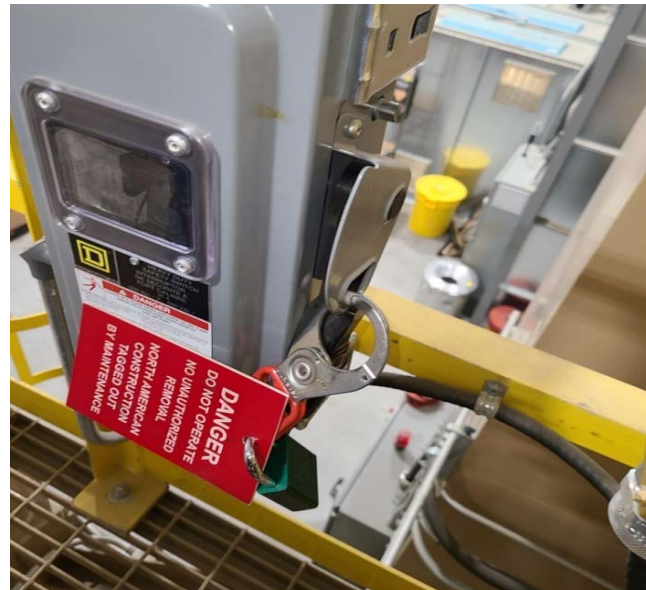
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Appendix A Locking Out ABS - Abrasive Blasting Equipment During Bi-Monthly Inspection

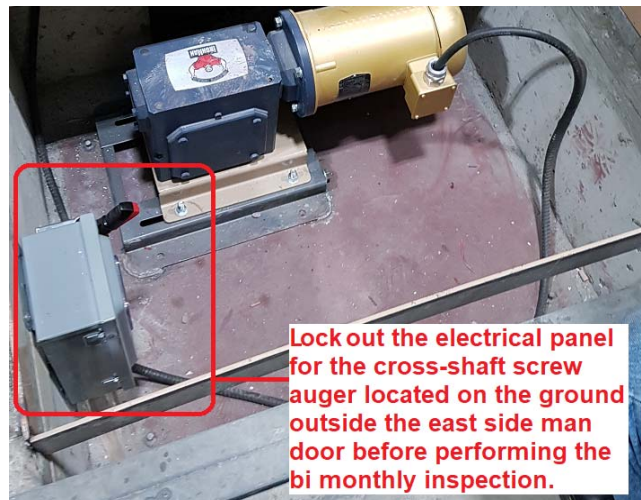


Lock out the electrical panel located on the second elevation before performing the bi-monthly inspection.

ABS – Below Floor Sweep in Recovery Blast Room



ABS – Electrical Panel



Lock out the electrical panel for the cross-shaft screw auger located on the ground outside the east side man door before performing the bi monthly inspection.

ABS – Cross Shaft Auger Electrical Panel

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Appendix B Main Control Panel, Warning and Safety Decals



ABS – Below Floor Sweep in Recovery Blast Room control panel and warning decals

WARNING

1. Operating blasting equipment without following written instructions and recommended safe procedures could result in serious injury or death. Before using the equipment read all instructions, literature, owner's manuals, labels, specifications and warnings sent with and affixed to the unit. If operation of the unit is unclear after reading the instruction manual, contact your supervisor for instructions.
It is the responsibility of the employer to read all labels, warnings and instructions to users of this equipment who are unable to read. Periodic inspections and instructions in the use of this equipment should be made by supervisory personnel to assure the equipment is being properly used and maintained.
2. To prevent delayed lung injury do not use abrasives containing free silica. Personal protective equipment is required for all abrasive blasting operations. Observe all applicable local, state and federal safety regulations in conjunction with air line filters and respiratory protection (Reference OSHA 29CFR1910.134, 1910.1000 and all subsequent additions or modifications).
OSHA regulations require the use of an approved breathing air compressor when using NIOSH approved respirators. Before attaching breathing air lines to the compressor and air filter, determine that the compressor is rated suitable as a supply for breathing air entering the respirator(s).
If an oil lubricated compressor is used, it shall have a high temperature or carbon monoxide monitor alarm (or both). Gross contamination of the inlet air to the air compressor or serious compressor malfunction will adversely affect the quality of the breathing air entering the respirator(s).
All personnel in the vicinity of abrasive blasting operations should wear NIOSH approved air fed respirators, hoods or helmets.
3. Always depressurize any vessel before loading media or any maintenance is performed.
4. Never operate blasters without remote controls. OSHA regulations require remote controls on all blast machines. Failure to use remote controls can cause serious injury or death to the operator(s) or other personnel in the blasting area. (Reference O.S.H.A. Specifications 29CFR1910.244(b) and all subsequent additions or modifications).
5. Do not modify or alter any equipment or controls without written consent from Abrasive Blast Systems, LLC.
6. The use of modified remote controls or door limit switches can cause unintentional start-up without warning, which can result in serious personal injury.
7. Periodically check all hoses and deadman controls to see that they are in good condition. Repair or replace any valves, hoses or controls that show any sign of wear or leakage.

ABS – Below Floor Sweep in Recovery Blast Room

WARNING

HEARING AND EYE PROTECTION MUST BE WORN BY ALL BLAST OPERATORS & PERSONNEL PRIOR TO ENTERING THE BLASTING AREA

ALL PERSONNEL IN THE BLAST AREA MUST WEAR NIOSH APPROVED AIR-FED RESPIRATORY HOODS OR HELMETS AT ALL TIMES

ABS – Below Floor Sweep in Recovery Blast Room

WARNING

- 1 TO PREVENT INJURY OR DEATH, READ WARNINGS AND SAFE PROCEDURE IN OWNER'S MANUAL.
- 2 DE-PRESSURIZE UNIT BEFORE ANY MAINTENANCE OR LOADING.
- 3 TO PREVENT DELAYED LUNG INJURY, DO NOT USE ABRASIVES CONTAINING FREE SILICATE.
- 4 FURNISH ALL PERSONNEL IN THE AREA WITH N.I.O.S.H. APPROVED RESPIRATORY EQUIPMENT AND EAR PLUGS.
- 5 FAILURE TO PROPERLY USE BLASTING EQUIPMENT COULD RESULT IN SILICOSIS AND DEATH.

Mod-U-Blast Abrasive blaster

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Appendix C Types of Abrasive Blasting Equipment



ABS – Below Floor Sweep in Recovery Blast Room



Mod-U-Blast Cabinet Abrasive blaster – Used for small parts and components

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Appendix D Blast Booth Operator Daily Checklist

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Appendix E Blast Booth Operator Bi-Monthly Checklist



Blast Booth Operator Bi-Monthly Checklist

Inspector: _____
First Name Last Name

Signature: _____ **Date:** _____

Hour Meter Reading: _____
Start of Shift End of Shift

| Key | Inspection Description | Needs Repair | OK |
|---------------------------|--|--------------|----|
| Bi-Monthly Checks | Power OFF, LOTO, Turn Air Off & Bleed Air Lines | | |
| 1 | Perform all items on the Daily Operator Check List. | | |
| 2 | Follow LOTO Procedures, Inspect All Bearings - Remove inspection plates and check bearings for damage. | | |
| 3 | Follow LOTO Procedures, Inspect All Auger Drives and Chains. | | |
| 4 | Inspect all Felt Seals to ensure grit is not leaking. | | |
| 5 | Follow LOTO Procedures, Remove Plates on Bottom of Elevator and inspect bottom pulley and bearings. | | |
| 6 | Follow LOTO Procedures, Check Top Elevator Pulley. | | |
| 7 | Make sure none of the ducting has collected abrasive in it. | | |
| 8 | Follow LOTO Procedures, Check Blower for any signs of wear or wobble (Power Off) | | |
| 9 | Follow LOTO Procedures, Inspect All Augers for foreign objects, Additionally check them to make sure they are running true. | | |
| | | | |
| Operational Checks | Power ON, Live Testing Procedures, Turn Air ON Requires 2 Technicians to Complete | | |
| 1 | Follow Live Testing Procedures, Inspect Bearings - System Running- Look for Damage or Bearing Wobble | | |
| 2 | Follow Live Testing Procedures, Inspect Auger Drives and Chains - Look for Binding, Alignment, Noise, Loose Chain | | |
| 3 | Follow Live Testing Procedures, Inspect Bottom Elevator Pulley and Bearings - Look for Damage, Bearing Wobble, Loose Belt | | |
| 4 | Follow Live Testing Procedures, Inspect Top Elevator Pulley and Bearings - Look for Damage or Bearing Wobble | | |
| 5 | Follow Live Testing Procedures, Inspect all Augers to check they are running true. | | |
| 6 | Close both Blast Media Gates above Blast Pots - Run the System in Blast Mode, you will have to blast for a while to lower the Blast Media Levels in the Blast Pots - Turn Off the System - Check everything on the Blast Pots to make sure it is operating correctly - Remove the screens from the top of the Blast Pots - Inspect the Pop Up seal and ensure it is sealing the dish correctly. Clean & Replace the screens, reopen the Media Gates. | | |
| 7 | On all New model Systems - DO NOT Grease or Oil anything. All components are life time lubricated and sealed. If a Bearing or Gearbox Fails it must be replaced. | | |