HYDRO-BLASTING PROGRAM

SUBPART A - PURPOSE

To ensure the safety and health of our employees and those working in and around the hydro-blasting operations of Berry Bros. General Contractors, Inc. this program is being developed.

SUBPART B- POLICY

The efficiency of any operation can be measured directly by its ability to control loss. Accidents resulting in personal injury, damage to property and equipment, represent needless suffering and waste. The safety of our employees, your employees and the public, will be the first consideration in the operation of our business.

Berry Bros. General Contractors, Inc. (BBGCI) has every desire to provide, for its employees a safe working environment. To accomplish this, we will provide all reasonable safeguards to ensure safe working conditions.

BBGCI will provide and require the use of all needed safety equipment and PPE and will also provide all needed training in areas including but not limited to:

- Hydro-blasting
- Confined Space
- Fall Protection
- Bloodborne Pathogens
- Lockout Tagout
- Respirator Protection
- Hazard Communication

The joint cooperation of employees and management, in the observance of this policy, will provide safe working conditions and accident free performance.

SUBPART C - PERSONNEL RESPONSIBILITY

Supervisors

- Must be aware of potentially hazardous conditions that may arise during the blasting process, such as lead and other heavy metals, asbestos, and flammable atmospheres, prior to starting any blasting job, and must, take measures to protect employees.
- Must instruct all blast operators, prior to the start of a job, on the form, fit and functions of the machines to be used.
- Supervisors must ensure that BBGCI operators are trained in the safe operation, installation and maintenance of the equipment.
- Supervisors must ensure the proper PPE is provided on the jobsite and that all affected employees have the appropriate medical evaluations and training prior to donning the equipment.
- Must understand the importance of regularly scheduled maintenance for continued safe operation of blast equipment.
- Must ensure that all employees comply with this policy and all other related policies.

Employees

1. Operators, primary, (Nozzle) and secondary, (Pump) must be trained in the safe operation, installation and maintenance of the equipment to be used on a job. This will be the minimum employees on this process.
2. Operators must inspect and ensure safety devices are in place, prior to use.
3. Operators will inspect equipment installation, the high pressure unit and hoses for defects, proper fluid levels and filters, and properly sized/rated end fittings before use.
4. Operators must be familiar with and utilize proper PPE during hydro-blasting operations.
5. Operators will never hold objects manually to be cleaned.
6. Operators must comply with all company procedures.

SUBPART D - EQUIPMENT SAFETY

Pump Safety

1. Operators should be made aware that the cleaning nozzle's discharge jet(s) can inflict serious bodily injury.
2. The system is not to be operated above the lowest working pressure (40% of the burst pressure) of any of its components.
3. Use only clean water in any high pressure system.
4. Place barricades with warning signs or barricade tape with tags around the work area.
5. Minimum PPE is Hard Hat with a face shield, rain suit, non-skid knee boots with metatarsal protection, gloves and hearing protection.
6. Always use two (2) operators in hydro-blasting operations if possible and/or when necessary.
   a. The primary operator handling the cleaning device must have control of the water pressure.
   b. The secondary operator should observe the operation from as safe a distance as possible (at least 12 feet).
   c. The secondary operator should have use of a foot control connected in series with the primary operator's gun so the system pressure can be instantly relieved in case of an emergency.
7. Inspect the condition of all components prior to use.
   a. Do not use any item that is in suspect condition.

b. Use only components which are marked with the recommended operating pressure.
c. Never exceed the operating pressure of the weakest component in the system.

8. Check the condition of the connection threads prior to making up any high pressure connection.
   a. Use Teflon tape on the male (NPT) threads for sealing purposes.
   b. Do not let tape overlap male pipe thread end as tape fragments may enter the system's water stream and clog the nozzle's orifices.
9. Properly tighten all high pressure connections.
   a. Pipe connections should be made up hand tight plus 1 ½ - 2 full wrenched turns.
   b. All NPT connections must have a minimum engagement of four (4) threads.
10. Before attaching a nozzle to the control gun or tube cleaning lance, operate the pump at low speed to purge dirt and debris from the system.
11. Test system before operating at high pressure.
    a. With nozzle installed, operate pump at low pressure for test.
       i. Should system repairs or adjustments be necessary, stop the pump and relieve all pressure and lockout/tagout before making any required repairs or adjustments.
12. If system is operating properly, slowly increase pump speed until operating pressure is reached and adjusted.
    a. Pressure adjustments should always be made slowly.

Control Gun Safety

1. Always use a safety shroud and a safety whip with hand-held control guns for operator protection against a burst occurring in the high pressure hose connection to the gun.
2. Use of a Hand Grip and a Shoulder Stock on hand-held control guns will provide greater operator comfort, control and improved cleaning productivity.
3. Operators shall employ a 30-minute rotating shift when possible or necessary.
4. Hand-held control gun's discharge barrel should be at least 66" long to keep nozzle discharge from operators feet and legs.
5. Properly sized anti-reversal devices will be used throughout the task. The combined length of the hose connection, stinger, and nozzle shall be a minimum of 1.5 times the diameter of the pipe being cleaned unless the pipe being

cleaned has a "T" then the combined length shall be 3 times the diameter of the largest pipe.

6. Always check the control gun or control device for smooth operation before each use.
    a. Do not use any control gun or control device that has not been checked.
7. The recoil from the hand held control gun can be upwards of 50 lbs.
    a. The operator must be in a braced position and prepared for this rearward reaction force before depressing the gun trigger.
    b. The operator must have a firm solid footing at all times to counter this force.
8. Always start blasting with the system at low pressure then slowly increase to operating pressure.
    a. Depress and release the control gun trigger/pedal several times at operating pressure to check operation of gun control before commencing cleaning operations.
9. When using dump style control guns always insure that the system pressure drops to near zero immediately when its trigger/pedal is released.
    a. If the control gun does not relieve system pressure immediately, do not use the control gun.
10. Never pass the control gun off to another operator without first stopping the pump and water flow to the control gun.
11. Never use a control gun that doesn't have a trigger/peddle guard.
12. Never tie or wedge the control gun trigger in the blasting position.
13. Any hose used for transporting dump water back to the pump must have a large enough diameter and short enough length so potentially dangerous back pressure is kept low.

Nozzle Safety

1. Make sure the flow rating of the nozzle is compatible with the pump discharge and pump pressure rating. The flow rating is generally stamped on the nozzle.
2. The blast cleaning nozzle must be equipped with an operating valve (on the gun or foot pedal) which must be held open manually and always under the control of the operator.
3. Inspect nozzle to make sure the orifices are not clogged prior to use.
4. Moleing devices or lances must have minimum 2 feet end identification when a pipe flange is available. If no flange or other means to secure anti-reversal

device is used, the hose/lance shall require a 2 feet end identification marking and a 4 feet end identification marking of a different color or different pattern.

5. Special nozzles that require a thread locking pin must have the pin installed prior to use.
   a. Without pin nozzle may unscrew from lance while in service and cause lance to blow back toward operator.
6. If nozzle appears to be clogged or partially blocked with debris stop use, depressurize, lockout/tagout and clean nozzle.
   a. Blocked orifice (s) can cause excessive system pressure.
7. Remove nozzle from service if :
   a. The nozzle is split or damaged
   b. The nozzle sidewall is worn by more than 25% at any point
   c. The nozzle's ability to hold pressure is suspect.

Air Compressors

- Air compressors must be located in a well-ventilated area. It must be able to obtain large volumes of clean, toxicant-free air. This means the compressor must be placed "upwind from the blasting" operation and out of the range of dust and flying debris.
- Due to the high pressure that air compressors create, precautions must be taken to prevent unleashing of strong forces that can cause serious bodily injury.
- Air compressors must be inspected daily, prior to use, by a competent person. Inspection must include, but are not limited to the following:
  1. Look for broken airlines.
  2. Look for damaged air fittings.
  3. Ensure the filters are clean.
  4. Ensure all fluids are at the appropriate level.
- The maximum working pressure rating is indicated on the manufacturer's metal identification plate.
- Air compressors being utilized for offshore work shall have the following safety features:
  1. Spark arrestor on the exhaust system.
  2. ESD shut down on the air intake, with the appropriate signage.
  3. Secondary containment under unit for fuel/oil containment.

4. Exposed exhausts surfaces operating at or above 160º F will be either insulated or have appropriate signage.
5. Proper grounding will be employed while in operation.

Hoses and Connectors

1. Protect hose from sharp objects, abrasive surfaces, foot and wheel traffic.
2. Couplings must have safety wires/pin/whips in place and be secure as required by federal safety regulations. The operator shall be responsible to ensure that each coupling has these safety devices in place.
3. Whip checks must be installed at high pressure hose connections.
4. Hoses should never be dropped or thrown down because such actions may damage nozzles and the remote control handle assemblies.
5. Do not use high pressure hoses with a burst rating less than 2.5 times the pressure at which it will operate.
6. Retire hose from service if:
   - The cover is damaged and reinforcing wires are exposed to rust and corrosion.
   - The cover is loose, has blisters or bulges,
   - The hose has been crushed or kinked,
   - The end fitting shows evidence of damage, slippage, or leakage,
   - The hose has been exposed to pressures greater than 50% of burst rating; the hose is three or more years old, regardless of condition.
7. Disconnect, drain, coil, and store hose properly after each use.

Operator Signals

- On the job site, voice communication is often impossible. Even shouts cannot be heard over the noise of compressors and blasting operations. For these reasons, an industry wide standard set of hand and sound signals has been developed.
- Signals may be visual hand movements, flashing light, pulls on a rope or sounds made by banging a hammer or using a horn or electric buzzer.
- Every primary and secondary operator should become familiar with the signals to be used on the jobsite prior to the start of any work.

SUBPART E - ENVIRONMENTAL CONTROLS

Electrical Safety

1. The work area must be inspected for exterior electrical power lines or cords that may endanger operators prior to the start of work.
2. Operators should use care to avoid directly blasting power lines and insulators.
3. Efforts should be taken to eliminate these hazards through engineering controls.
4. Indoor or confined space work areas should be inspected for electrical wiring, which should be protected from blasting.
5. Electrical power should be shut off and not restored until the wiring is inspected for damage and determined to be safe.
6. Electrical wiring used for equipment on the job site should be constructed of heavy-duty casings and equipped with moisture resistant connectors.
7. Inspect wiring to ensure that it is in good condition and properly grounded prior to the start of work.
8. Electrical control panels and terminal boxes should be UL-approved, dust tight and moisture-free enclosures.
9. Use moisture-free connectors on all electrical fittings.
10. Keep electrical cords and fittings away from water and other liquids.

Fire Protection

- Always consult with client safety representative for specific instructions when the work environment may be flammable.
- If possible do not blast in atmospheres that contain flammable fumes.
- On applications where flammable gas is present and cannot be avoided, install additional grounding wires on blast machines and nozzles, and use ventilation systems to reduce the fume concentrations to an acceptable level.
- On applications where flammable gas is present and cannot be avoided, a properly trained attendant equipped with air monitoring equipment capable of determining LEL and Oxygen levels is required.

Walking and Working Surfaces

1. Take precautions at the work site to eliminate hazardous surface obstacles that may interfere with worker mobility. Operators will ensure hydro-blasting be completed from a stable work surface.
2. No ladders, step stools, benches, etc. are to be used. Use only approved scaffolding or platforms that are job specific.
3. Prior to working from scaffolds ensure that a competent person has inspected the scaffold.
   - Scaffold tags shall be attached at the access point of the scaffold and shall have the competent person's name and date of the inspection on it.
   - If the scaffold has not been inspected prior to the work shift, ask your supervisor to call for an inspection.
4. Check means of access to areas where blasting will occur.
   - Portal must be large enough for workers and hoses to pass so not to cause hazards.
5. Surfaces where platforms, scaffolding, scissor lifts or personnel lifts are used must be level, dry, and free of obstructions and holes and in compliance with other conditions recommended by manufacturers and safety specialists.
6. Debris must be removed from walking and working surfaces as soon as possible and not allowed accumulate.
7. Water used and debris removed from surfaces must be disposed of in accordance with the Federal and State regulation covering liquid, solid and hazardous waste.

Enclosures and Containment

- Adequate ventilation must be provided for employees working within enclosures.
- Consultation with a client representative, project management and safety personnel is required prior to job start-up to plan for containments

Temperature Extremes

1. Never operate compressor if hoses are frozen.
2. When winter temperatures drop below freezing, check them for ice prior to pressurizing hoses.
3. Provide adequate drinking water, especially during summer.

4. When working in an enclosure or confined space, the supervisor shall request the safety department to assess the work environment utilizing a Wet Bulb Globe Thermometer.
   - If it is determined that the working environment is too extreme to work in, appropriate engineering controls shall be installed prior to the continuation of work.

SUBPART F - PERSONAL PROTECTION EQUIPMENT

Body Protection

- Minimum PPE is Hard Hat with a face shield, waterproof body protection, non-skid waterproof boots, boots with metatarsal protection, waterproof gloves and hearing protection as required.
- Based on the operating pressure, JSA and the safety departments recommendations, Kevlar lined body armor may be required and provided at no cost to the employee, for the primary operator.

Fall Protection

- Secure hoses by tying them to scaffolding or personnel platforms, when working from elevations, to prevent injury from hoses falling on other personnel working below or near blasting area.
- Workers must be certified to operate lift equipment, if blasting is to be performed from aerial work platforms.
- Harnesses and lanyards must be worn when required.

Respiratory Protection

- Investigate the chemical and physical composition of the materials that are to be removed from the surface. Some protective coatings consist of lead, cadmium, chromium, titanium or other metals which when pulverized to respirable dust particles can cause harm to respiratory system.
- All personnel within a blasting zone must wear the minimum PPE listed (VI) (a) (A) above.

Hearing Protection

1. Noise from hydro-blasting nozzles can be loud enough to damage the hearing of blasters and others on the work site. The noise level depends on nozzle size and pressure and noise generated in the surrounding area.
2. In accordance with OSHA regulations, workers must not be exposed to noise levels exceeding 80 decibels as an eight-hour time-weighted average (80 dBA TWA); therefore all blasters shall wear appropriate hearing protection.
   - Lengths of exposure to noise, noise level readings, and distance from the noise source are factors used in determining level of hearing protection required.
3. Other workers are required to wear earplugs as required.

SUBPART G - TRAINING

BBGCI's superintendents and/or foremen are responsible for ensuring all personnel assigned to hydro-blasting operations are satisfactorily trained in the safe operation of equipment required to perform the task at hand. Training shall be provided and documented prior to the start of operations.

At a minimum training should encompass industry best practices such as:

1. System Operation
2. Personal Protective Equipment
3. Cutting Action
   - Must address the potential hazard to the human body by a practical example of cutting through a piece of lumber, concrete block or rubber boot.
   - Should an accident occur during this training, and high pressure water penetrates skin, medical attention must be given immediately.
4. Control Devices
5. Equipment maintenance
6. Compatibility
7. Hoses
8. Stance

It is the responsibility of the Supervisor of the job to verify proof of training.

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SUBPART H - PERMITS and JSEA

Prior to the start of work, a work permit along with a JSEA discussing the pre-operational, operational, and post-operational hydro-blasting will be developed by the Superintendent/Foreman and reviewed by each employee involved with the cleaning process or working in an adjacent area that may be affected. At minimum the JSEA will include the job description and equipment being cleaned, precautions taken to protect electrical equipment, maximum operating pressure, and list of qualified personnel.

The system shall be shut down, depressurized and permit suspended any time: the barricade is violated, the equipment malfunctions (special attention should be given to the dump control valve), repairs need to be made or the system is left unattended. Once the issue is resolved and new permit will be issued.

SUBPART I

HYDROBLASTING PRE-START & OPERATIONAL CHECKLIST

DATE:	**LOCATION:**
JOB DESCRIPTION:	**EQUIPMENT BEING CLEANED:**
SUPERINTENDENT:	**EMPLOYEE(S) INVOLVED:**
MAX OPERATING PRESSURE: PSI	**TIME IN:**

	ITEM	Y/N	IF NO, CORRECTIVE ACTION
1	Is the work area, including other end of unit being cleaned, clearly defined, and proper warning signs posted?		
2	Have precautions been taken to protect all electrical equipment?		
3	Is there any hazard to personnel or possible equipment damage such as release of corrosive chemicals, hot or flammable liquids, gases, drifting mists or other materials?		

4	Has everyone working in the vicinity been advised about hydro-blasting operations in the work area?		
5	Are the fittings of the correct pressure rating?		
6	Are all hoses of the correct pressure rating?		
7	Are all fittings in good operating condition?		
8	Are all hoses in good operating condition?		
9	Have suitable means been taken to protect hoses and lines from accidental damage?		
10	Are all nozzles free from plugging, and in good operating condition?		
11	Have precautions been taken to prevent inadvertent nozzle reversal?		
12	Is the filter on the pump water supply suction clean & in good operating condition?		
13	Is there an adequate water supply?		
14	Have all personnel been provided with the appropriate PPE for this job?		
15	Have all personnel received proper training for this job?		
16	Are all personnel involved in this job competent to perform this work?		
17	Has the complete hook-up been flushed and air removed from the system?		
18	Has hook-up, including pipes, hoses and water been checked at the maximum operating pressure?		
19	Are all controls operating correctly?		
20	Is the location 0f emergency medical services known?		
21	Have effective means of communication been established for the job?		

SUBART J

HYDROBLASTING POST OPERATIONAL CHECKLIST

DATE:	**LOCATION:**
JOB DESCRIPTION:	**EQUIPMENT BEING CLEANED:**
SUPERINTENDENT:	**EMPLOYEE(S) INVOLVED:**
TIME OUT:	

	ITEM	Y/N	IF NO, CORRECTIVE ACTION
1	Was the work completed satisfactorily, and approved by the supervisor or owner/client representative?		
2	Was there any damage to electrical equipment?		
3	Were there any injuries to personnel or damage to equipment?		
4	Has everyone working in the vicinity been advised that hydro-blasting operations in the work area have ceased?		
5	Was there any damage to nozzles, fittings or hoses?		
6	If so, has the equipment involved been tagged, taken out of service and reported to the appropriate parties?		
7	Is the filter on the pump water supply suction clean & in good operating condition for the next use?		
8	Has water supply been turned off?		
9	Has hook-up, including pipes & hoses been flushed, cleaned & stored properly?		
10	Did personnel clean and turn in any required PPE?		
11	Additional comments if any		

SUBPART K - SIGNS & BARRICADES

1. Prior to commencing any water blasting operations, the work area limits applicable to the particular operation will be defined and suitably barricaded to restrict unauthorized access. The perimeter of this area will be outside the effective range of the water blasting equipment.
2. Entry into the cordoned or barricaded area by unauthorized persons will be prevented whenever blasting operations are in progress. As a part of their duties The Safety Observer (Pump Operator) will watch for intrusions into the cordoned or barricaded area.
3. The barriers used will be highly visible and appropriate to the level of risk. Warning notices will be displayed so as to be clearly visible and legible to all persons who are in or near the restricted area where the equipment is being used (refer to Figure 1).

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HYDRO-BLASTING PROGRAM

Approved By: _Safety Committee_____