HEALTH AND SAFETY PROCEDURE 333 – HYDROBLASTING

1.0 PURPOSE

1.1 The purpose of this procedure is to establish minimum requirements for the safety and health of employees and contractors who work with, near, and in connection with hydroblasting and water jet cleaning equipment at the Westlake Plaquemine facility.

2.0 SCOPE

2.1 This procedure provides minimum safety requirements to be followed when performing Hydroblasting and/or Water Jet Cleaning. All Westlake employees and contractors are required to adhere to all parts of this procedure as well as the most current local, state, and federal regulations. Contractors must follow their company's procedures, if they provide a higher level of protection to the individuals involved.

3.0 DEFINITIONS

3.1 **Affected Area** – Any area identified within the manufacturing site where specific Personal Protective Equipment shall be worn based on the site's hazard assessment.

3.2 **Anti-withdrawal Device** – a mechanical device that attaches or clamps to the equipment which prevents the lance from backing out of the equipment being cleaned.

3.3 **Anti-Reversal Device** – a rigid piece of pipe affixed to a line mole to prevent reversing of the mole inside the line, tube or pipe. Also called a "stinger".

3.4 **Competent Person** – One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

3.5 **Flex Lance** – a flexible tube that attaches to a hose on one end and to an anti-reversal and/or a nozzle on the other end.

3.6 **Hydro-blasting** – operations 3,500 psig and above.

3.7 **Water Jet Cleaning or Power Washing** – pressure greater than 1000 psig and less than 3,500.

3.8 **Single Dump** – "Shot gunning" lance with a single dump valve equipped with a safety latch trigger.

3.9 **Double Dump** - Two valves or switches, either of which when released will cause water pressure to drop.

3.10 **Lancing or rodding** - an operation where a lance and nozzle combination is inserted into and retracted from the interior of pipe or tubes. (This is often a two-person operation.)

3.11 **Moleing** - an operation where a specially designed hose and nozzle arrangement feeds itself through a pipe by means of side and rear nozzle jets.

3.12 **PSIG** – pressure on a system indicated by the gauge on the equipment showing pounds per square inch.

3.13 **Safe Work Permit (SWP)** – the Safe Work Permitting system used for issuance of work in process areas. HSP – 200 Safe Work Permitting.

3.14 **Safe work Permit Issuer** – a person deemed competent to issue Safe Work Permits. The Safe Work Permit Issuer authorizes recipients of the SWP to conduct work in an Affected Area.

3.15 **Shot-gunning** – a hands on process whereby a Hydro-blasting technician uses the lance by holding it with both hands-on dual action mechanisms to allow the flow of water and pressure to flow through the nozzle.

3.16 **Single-action switch with foot operated "dead-man"** -Safety switches that must be activated at the same time to use high pressure. Water pressure will drop if either switch is released.

3.17 **Whip Check** – a restraining device attached at any two points where hoses are joined; used to control the movement of a pressurized line in the event it becomes uncoupled.

4.0 RESPONSIBILITIES

4.1 Health & Safety

4.1.1 Ensure procedure is in compliance with latest regulatory requirements.

4.1.2 Ensure procedure is accessible to Westlake employees and contractors.

4.1.3 Periodically perform audits to assess the performance with compliance of this procedure and correct issues.

4.2 Department Managers

4.2.1 Ensure compliance to this procedure and make available adequate resources necessary for procedure implementation within responsible areas.

4.3 Supervisors or Designee

4.3.1 Ensure compliance with this procedure and correct issues as they arise.

4.3.2 Oversee aspects of HSP 200 Safe Work Permitting process and ensure **Hydro-blasting Checklist (Appendix A)** is being utilized by Safe Work Permit Issuers.

4.4 Operations

4.4.1 Understand this procedure, permit hydroblasting activities, and verify signed copy of the "**Hydro-blasting Checklist", (Appendix A)** is kept with the permit and filled out by the Safe Work Permit Recipient.

4.4.2 Provide proper location for setup of equipment. Verify hydroblasting equipment setup does not interfere with process operation.

4.4.3 Confirm barricades, signs are in place and that equipment is properly grounded.

4.5 Contract Monitor

4.5.1 Retain all documentation submitted by the contracting company including Safety Plans.

4.5.2 Maintain oversight of contractor performing work.

4.6 Hydroblasting Company Equipment Operator

4.6.1 Ensure equipment is inspected according to all regulatory requirements and manufacturers' recommendations.

4.6.2 Ensure all inspection documentation is maintained and available upon request.

4.6.3 Set up and position equipment with adequate clearances from other equipment, process lines, and powerlines after reviewing the requirements from Operations.

4.6.4 Be trained and qualified in the job tasks to be performed.

4.7 Hydroblasting Company Crew Leader

4.7.1 Retain all documentation of training, safety plans, and pre-job toolbox meetings.

4.7.2 Ensure JSA's are completed and thoroughly reviewed by the crew.

4.7.3 Ensure the crew is operating in accordance with this procedure and all other applicable procedures, standards, and regulations.

4.7.4 Thoroughly complete the "Hydro-blasting Checklist", Appendix A, of this document and present to operations during permitting.

5.0 PROCEDURE

5.1 Hydro-blasting Checklist (Appendix A)

5.1.1 Appendix A, shall be completed, in coordination with Safe Work Permit, by the Hydroblasting Company Crew Leader.

5.1.2 Appendix A shall be used prior to each Hydro-blasting, Water Jet Cleaning, or Power Washing job to help identify job hazards and ensure the safe execution of the job.

5.1.3 Appendix A shall be signed by a representative of the Hydro-blasting company and kept with the Safe Work Permit for the duration of the job until SWP is closed.

5.1.4 The pre-job checklist shall be initiated and reviewed with the crew again if there is a change in job scope, an unsafe condition or

hazard is recognized, additional personnel are added to the crew, or at each shift change.

5.2 General Considerations

5.2.1 Each hydroblasting project will evaluate use of hands-free, robotic or automated methods prior to project initiation.

5.2.2 The operating pressure shall not be allowed to exceed the rated pressure of the equipment.

5.2.3 Use of equipment with pressures above **40,000 psig** is not covered by this procedure and requires Westlake Safety Department approval and approved / qualified contractors in water cutting.

WARNING:

WHEN HYDROBLASTING WITH HAND HELD EQUIPMENT, A COMBINATION OF PRESSURE AND FLOW RATE CAN PRODUCE SIGNIFICANT TORQUE THAT MAY CREATE AN UNCONTROLLABLE SITUATION.

5.2.4 When hazardous waste is generated, proper containment and disposal must be properly determined prior to starting work and carefully maintained

5.2.5 Every effort must be made to minimize a worker's fatigue level by rotating workers into the job or by taking adequate breaks.

5.2.6 The operator or any other individual, due to the increased risk of injury, shall never manually hold material that is being cleaned. A Hydro-blasting operator shall never point a nozzle, lance or shotgun or Hydro-blast nozzle towards anyone or towards themselves.

5.2.7 Adequate means shall be in place to allow the safe cleaning and maintaining of PPE as well as tools used in the completion of this work activity.

5.2.8 All hydroblasting and water jet cleaning in confined spaces shall follow all requirements of this document as well as HSP 200, Safe Work Permitting, HSP 202 Confined Space Entry and other HSPs

as required.

5.2.9 Equipment shall only be used when conditions permit safe operation. These conditions include but are not limited to: weather, congestion of areas, and preparation time.

5.2.10 The Hydro-blasting operator shall not engage in any practice or activity that diverts the operator's attention while engaged in operating the equipment.

5.2.11 Night time operations require sufficient lighting to adequately see the surface being cleaned as well as any other surrounding hazards and/or walking surfaces.

5.2.12 HSP 319 - Fall Protection must be followed when operations are to be performed above 4 feet above grade or within 4 feet of a leading edge.

5.2.13 The working pressure of the Hydro-blasting equipment shall never exceed that of the manufacturer.

5.2.14 Pumping units must be equipped with a safety and/or rupture disc capable of rapidly relieving the full capacity of the pump.

5.2.15 All Hydro-blasting equipment shall be approved by and used under the original equipment manufacturer specifications.

5.3 General Tool Requirements

5.3.1 The pumping unit must be equipped with a safety valve and/or rupture disc capable of rapidly relieving the full capacity of the pump.

5.3.2 All fail safe valves, switches, or devices shall be operational and relieve water pressure immediately.

5.3.3 Hoses and connection shall be checked for tightness at the beginning of each shift.

5.3.4 When hose drops exceed 10ft in vertical length, the hose is to be securely fastened to a rigid support to limit stress and pull on the hose due to the weight.

5.3.5 Equipment must be grounded to protect from a buildup of static electricity.

5.3.6 Hose connections must have an "anti-whip" or Whip Check device at each hose connection to prevent whipping if the connection is broken.

5.3.7 Blast equipment must be operated from approved work surfaces.

5.3.8 Due to excessive back thrust exerted on the operator, the use of stepladders and "A-Frames" are not acceptable as work platforms and shall not be used.

5.3.9 When hydroblasting operations result in slippery work surface, actions shall be taken to ensure adequate footing is maintained (i.e. non-slip floor mats or grating).

5.3.10 When scaffolds are necessary to perform Hydro-blasting, they must be of adequate size to accommodate the equipment and the personnel and follow the site's procedure HSP – 326 Scaffolding.

5.3.11 Shotgun overall length shall be a minimum of 66 inches from the butt stock of the gun to the end of the nozzle and the attached hose shall be equipped with 6 foot of kevlar shielding.

5.3.12 All Hydro-blasting equipment shall be equipped with dual action or dual dump systems to prevent accidental discharge of water and/or pressure.

5.3.13 While Hydro-blasting inside a confined space, only 1 technician will be allowed at a time.

5.4 Personal Protective Equipment (PPE)

5.4.1 All personnel assigned to the job must wear appropriate PPE.

5.4.2 The hydroblasting technician or the qualified water jet cleaner and those within the blasting area (inside barricade or within 20 feet) are required to wear the following protective equipment when blasting is in progress:

- Hard hat
- Safety glasses with side shields or goggles

- Face shield
- Required hearing protection
- Slicker Suit or equivalent
- Rubber gloves
- Steel Toe Rubber boots with metatarsal protection for Hydro-blasting operations. **(Not required for water jet cleaning or power washing)**
- **PSIG ≥ 20,000 requires "Turtle Shell" Kevlar or similar protection.**
- Other equipment as required if a hazardous chemical is involved.
- **NOTE:** Hydro-blasting contractors must manage a way to ensure goggles, face-shields and safety glasses are maintained as not to obstruct vision of operators.

5.5 Equipment Setup & Area Preparation

5.5.1 Work authorization must be obtained prior to Hydro-blasting operation through the SWP.

5.5.2 Prior to starting Hydro-blast operations, Appendix A shall be filled out by the contractor and reviewed by the Westlake representative requesting the task.

5.5.3 A Job Safety Analysis, identifying hazards associated with the setup and operations of Hydro-blasting, shall be performed by the entire work crew before starting setup of equipment.

5.5.4 The area where Hydro-blasting equipment is to be set up shall not be congested, out of major personnel traffic routes, and a safe distance from process operating equipment (Per equipment owner).

5.5.5 The hydroblasting equipment and hydroblasting area must be barricaded using red barricade tape with appropriate tags, above, below and around the Affected Area.

5.5.6 In the event it is not possible to isolate the prescribed area, sturdy barriers/ panels must be placed/erected to shield operations. Ensure barrier shields are positioned to protect personnel in the area from the hydroblasting stream and that the barriers are not damaged by the hydroblasting operation.

5.5.7 Hoses extending from equipment to blasting area should be surrounded by barricade tape and signs.

5.5.8 If the open ends of the equipment to be blasted cannot be covered, additional barriers or panels may be required to protect personnel from the water spray.

5.5.9 The pumping unit should be located to minimize the length of hoses required. Considerations should be given to the distance from operating equipment. Hoses shall not be routed through designated travel paths. Hoses shall be protected from damage by vehicular traffic, hot lines/equipment, or external abrasion.

5.5.10 Hydroblast pumping equipment shall not be setup inside of a building or enclosed space.

5.6 Personnel Training / Certification Requirements

5.6.1 Personnel assigned to hydroblasting operations & water jet cleaning shall be trained and proven competent on the equipment they are to operate or their job task (i.e. operator, standby, and lance/gun operator).

5.6.2 Training shall be provided, specific to the task (operator, standby, lance/gun operator, etc.) and the rig qualification (10Kpsi, 20Kspi, 36Kpsi, etc.) for each individual.

5.6.3 Verification of training shall be available upon request.

5.6.4 Training shall include all the elements of this procedure.

5.6.5 The Service Providing Company shall be responsible for conducting the training for assigned personnel. The owner's manual will be the source of information for this training along with the elements of this HSP.

5.7 Hydroblasting Specific Work Activities

5.7.1 Tube Lancing

5.7.1.1 Assembly Hand guards are required in all rigid lancing operations.

5.7.1.2 A safety device (anti-withdrawal) is used to prevent the hose assembly from being pulled out of the tube or pipe while equipment is energized or pressurized.

5.7.1.3 If the end of the equipment being tube lanced is open, a cover or shield shall be placed on the open end to contain the jet spray and water.

5.7.1.4 While moving the lance from one tube to the next, the water pressure shall be bypassed.

5.7.1.5 When lancing, a foot or hand-operated fail-safe control with guard should be manipulated by the lance operator. In some operations such as lancing exchanger tubes another person must be used to assist with the lance or hose. Only the lance operator (person nearest the working end of the lance) should operate the fail-safe device.

WARNING:

AT NO TIME SHOULD THE FAIL-SAFE CONTROL BE TIED DOWN OR LOCKED INTO POSITION. INJURY COULD RESULT IF THE FAIL-SAFE IS BYPASSED OR LOCKED.

5.7.1.6 An easily visible marker shall be affixed on the hose no less than four (4) feet from the nozzle end of the lance to indicate nozzle location as the line is being inserted or withdrawn from the tube being cleaned. **Note: Mark is placed on the hose and not the rod or lance.** This will help prevent contacting the fitting with the anti-withdrawal device.

5.7.1.7 Tube lancing in a position above the operators head is not permitted.

5.7.1.8 Quick connect couplings are not allowed to be used to join the hose and lance.

5.7.2 **Line Moleing**

5.7.2.1 When Line Moleing operations are to be done, an "anti-

withdrawal" device securely fastened to the pipe flange must be installed to prevent the removal of the mole nozzle while still under pressure. Appendix B, details the design of this device. No exceptions are permitted.

5.7.2.2 An easily visible marker shall be affixed on the hose no less than four (4) feet from the nozzle end of the lance to indicate nozzle location as the line is being inserted or withdrawn from the tube being cleaned. This will help prevent contacting the fitting with the anti-withdrawal device. **Note: Mark is placed on the hose and not the rod or lance.**

5.7.2.3 Stinger rods, longer in length than the diameter of the pipe will be used when Line Moleing large bore piping 6-inches and larger. A stinger rod is a rigid piece of pipe affixed to a line mole to prevent reversing of mole in the line.

5.7.2.4 If opposite end of the equipment being Line Moled is open, a cover or shield shall be placed on the open end to contain the jet spray and water.

5.7.2.5 While moving the line mole from one tube to the next, the water pressure shall be by-passed.

5.7.2.6 When lancing, a foot or hand-operated fail-safe control with guard should be manipulated by the lance operator. In some operations such as Line Moleing another person must be used to assist with the lance or hose. Only the lance operator (person nearest the working end of the lance) should operate the fail-safe device.

5.7.2.7 Quick connect fittings shall not be used on high-pressure hose on the discharge side of the pump.

5.7.2.8 A deflector shield must be used on piping or tubes 2” or greater.

5.7.3 **Flex Lancing**

5.7.3.1 Anti-withdrawal devices must be installed and used for

flex lancing operations.

5.7.3.2 The Hydro-blasting technician shall have full control of the dump system and must be able to fully release the dump valve by removing their foot / hand from the control.

5.7.3.3 Hydro-blasting technicians shall never hold the nozzle in their hand.

5.7.3.4 If the nozzle and collar are not 1.5 times the diameter of the pipe / tube, an anti-reversal device (IE: Singer) shall be used.

5.7.4 Shotgun Jetting

5.7.4.1 Objects, PPE, or any other equipment being cleaned shall NEVER be held manually while Shot-gunning activities are being performed.

5.7.4.2 90-degree nozzles are strictly prohibited and not allowed.

5.7.4.3 Shotgun overall length shall be a minimum of 66” from the stock of the gun to the end of the nozzle and the attached hose shall be equipped with 6ft of Kevlar or approved rupture protection.

5.7.4.4 All triggers must be guarded to prevent accidental pressure / water discharge.

5.7.4.5 Shotguns shall be equipped with Double Dump system and both hands must be on the valves at all times.

5.7.4.6 For water blasting operations that require greater than 20,000 PSIG, a remote "dump valve" assembly which will immediately dump all the water pressure when the control is released is the only approved fail safe control.

5.7.4.7 The supply and return air hose to and from the "dump valve" must not exceed fifty feet in length.

5.7.4.8 Supply and return hoses must be reinforced high-

pressure hose to prevent inadvertent crimping of the hose, which may affect the operation of the fail-safe control.

5.7.4.9 Attendant shall be present to immediately shut down equipment in the event of an emergency.

WARNING:

HYDROBLAST EQUIPMENT CAN CREATE FORCES SUFFICIENT TO CAUSE PERSONNEL INJURY OR EQUIPMENT DAMAGE IF NOT PROPERLY CONTROLLED.

6.0 REFERENCES

6.1 **HSP 200 – Safe Work Permitting**
6.2 **HSP 202 – Confined Space Permitting**
6.3 **HSP 203 – Hot Work Procedure**
6.4 **HSP 300 – Personal Protective Equipment**
6.5 **HSP 302 – Signs, Signals and Barricades**
6.6 **HSP 307A – PPE Matrix**
6.7 **HSP 313 – Ladders**
6.8 **HSP 319 – Fall Protection**
6.9 **HSP 325 – Contractor Reference Guide**
6.10 **HSP 326 – Scaffolding**

7.0 APPENDICES

7.1 **Appendix A –** Hydroblasting Operation Checklist
7.2 **Appendix B –** Anti-Withdrawal Device For Line Moleing
7.3 **Appendix C –** Hydroblasting Shotgun Details

HEALTH AND SAFETY PROCEDURE 333 – HYDROBLASTING

Revision History

Rev	Changes	Approved	Date
0	Procedure was established.	H. Garner	3/13/2024

Westlake Chemical

Appendix A

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Appendix A
Hydroblasting & Water Jet Cleaning
Pre-Service & Operational Checklist

Checklist shall be completed and verified before Safe Work Permit is to be issued.

Unit or Area: _____ Date: _____ Company: _____

Equipment, structure or area being cleaned: _____

Maximum operating PSIG: _____

PERSONNEL	**Yes / No / NA**
Does the contractor have the minimum required PPE per site safety rules?	
Does the contractor have additional PPE required by the contractor's Job Safety Analysis?	
HYDROBLASTING EQUIPMENT	**Yes / No / NA**
Do the pressure relief valves installed on the hydroblasting pump display a current inspection tag?	
Has the contractor confirmed all hoses and fittings meet the correct pressure rating standards?	
Contractor has confirmed all hoses are in good operating condition free of kink, bubble or exposures?	
Contractor has confirmed all fittings are in good operating condition?	
Has the contractor confirmed all nozzles are free from plugging and in good operating condition?	
Has the contractor taken precautions to prevent line-mole reversal, if applicable?	
Has the contractor installed anti-withdrawal devices, if applicable?	
Has the contractor confirmed the dead-man valve is being used and functioning properly?	
Has the contractor confirmed the filter on the pump suction is clean and in good operating condition?	
Has the contractor confirmed the hookup, including pipes, hoses, and connections, has been pressure tested with water at the maximum operating pressure?	
If shotgunning, is there 8 feet of Kevlar shielding installed to high pressure hose? (Hydroblasting)	
If "shotgunning" operation, length of shotgun barrel complies with standard? (Hydroblasting) (overall length = 66"; nozzle length = 48" for single trigger and 36" for double trigger)	
Hydroblasting or water jet cleaning equipment does not interfere with process operations?	
Contractor confirmed anti-whip devices are installed on all hose-to-hose/hose-to-pump connections.	
Hydroblasting equipment grounded? Equipment to be hydroblasted grounded?	
LOCATION	**Yes / No / NA**
Barricades in place and warning signs posted? If minimum distance not met, additional barriers/panels installed to protect personnel and equipment?	
Waste handling considered and properly managed?	

_____ _____

Hydroblast Company Representative

(Sign & Date)

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Appendix B

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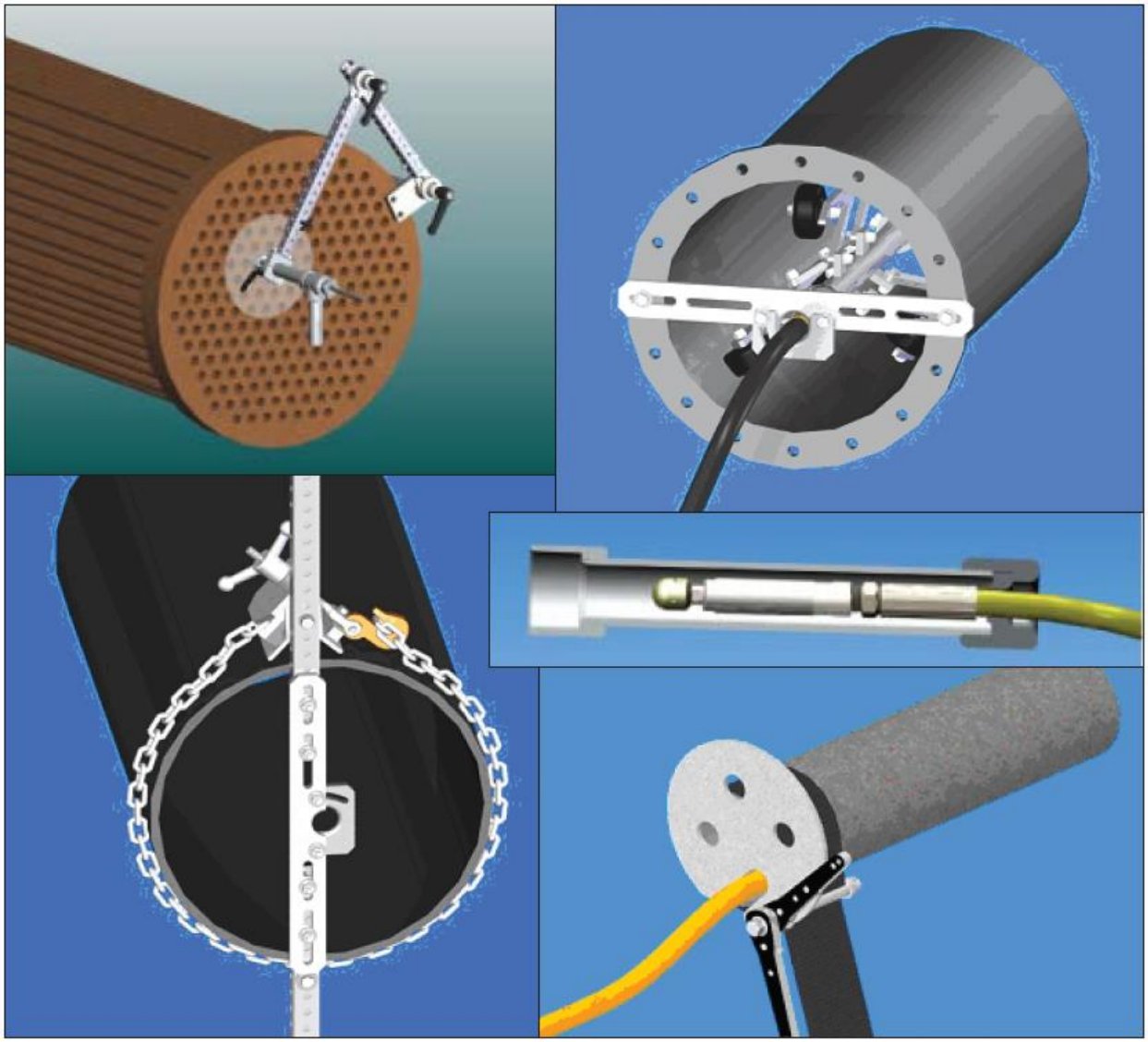
Appendix B
Anti-Withdrawal Device for Line-Moleing



Note: More than one device will be required to fit the wide range of pipe flanges.

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Appendix C

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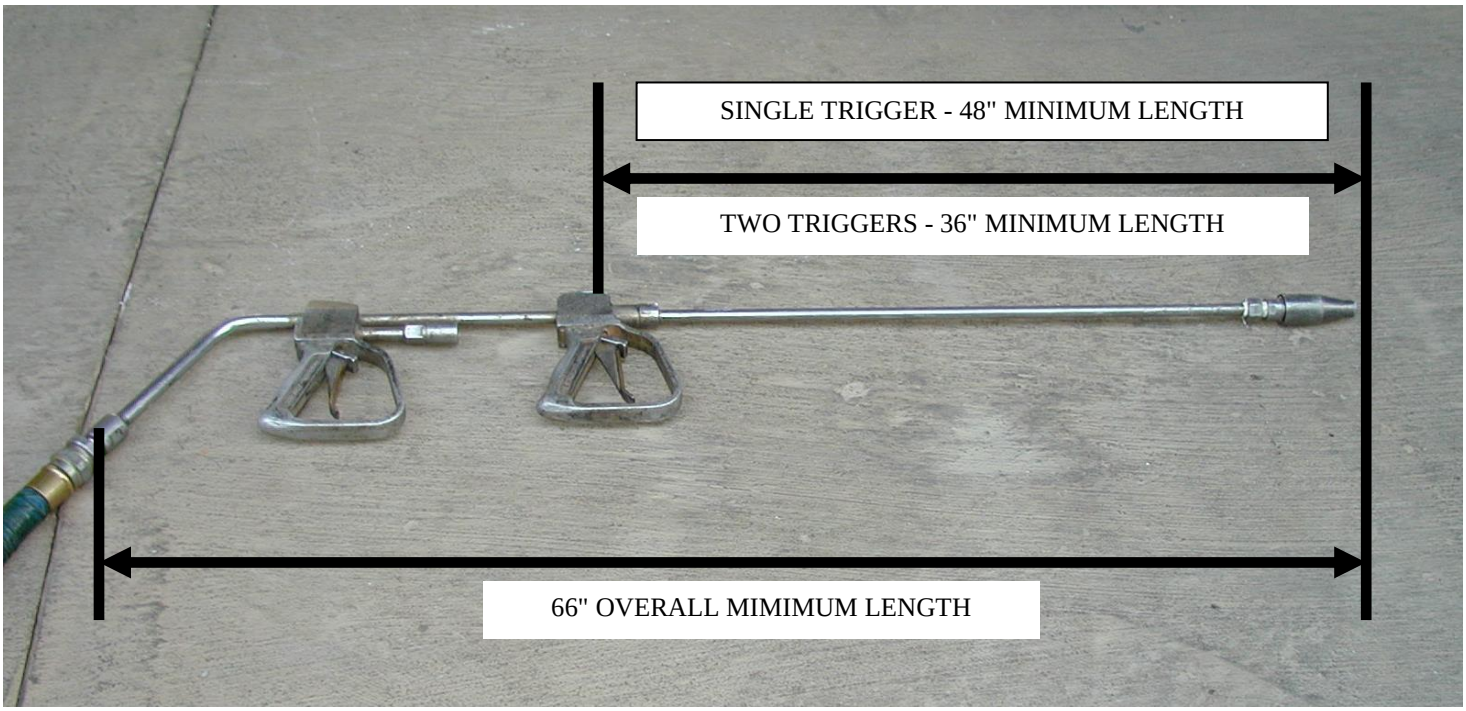
Appendix C
Hydroblasting Shotgun Details



NOTE: This picture is intended only to clarify the dimensions of the "shotgun" device. It is not intended to endorse the use of the equipment that is pictured. All equipment that is to be used in hydroblasting operations is to be properly designed, manufactured, and maintained.