

Technology Safety Data Sheet

Jet Edge® GyraJet LP Hand Lance

Section 1: Technology Identity

Technology Name(s):		Emergency Contact:	
Jet Edge® GyraJet LP Hand Lance		Carl Franson (800) 356-0349	
Manufacturer's Name and Address:		Information Contact:	
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Section 2: Technology Pictures



Figure 1: Operation of GyraJet LP Hand Lance.



Figure 2: Jet Edge® GyraJet LP Hand Lance.



Figure 3: GyraJet Rotating Manifold.



Figure 4: Jet Edge® Ultra-High-Pressure Water Pump Mounted on a Trailer.

Section 3: Technology Description

The Jet Edge® GyraJet LP hand lance is an ultra-high-pressure water-jetting gun used for surface cleaning, coating removal, and hydro demolition. The design is similar to a spray wand used at self-service car washes. The GyraJet uses a pneumatic drill motor to turn a manifold at the lance tip. The rotating manifold creates an unconventional spray pattern and increases water jet effectiveness. Two separate pneumatic triggers activate manifold rotation and water jetting, neither of which operate independently. Both triggers, one on the pistol grip the other midway on the lance, must be depressed to activate both manifold rotation and water jetting. The dual trigger configuration helps assure proper operator hand placement and serves as a two-hand positive-pressure switch.

Section 4: Safety Hazards

Hazard Category:

(Adapted from Appendix A to MIL-STD-882D, February 10, 2000, Department of Defense Standard Practice for System Safety.)

- 4 - Could result in death or permanent total disability
- 3 - Could result in permanent partial disability or injuries or occupational illness that may result in hospitalization of at least three persons
- 2 - Could result in injury or occupational illness resulting in one or more lost work days
- 1 - Could result in injury or illness not resulting in a lost work day
- N/A - Is not applicable to this technology and poses no appreciable risk

A. Buried Utilities, Drums, and Tanks

Hazard Rating: N/A

This hazard is not applicable to this technology.

B. Chemical (Reactive, Corrosive, Pyrophoric, etc)	Hazard Rating: N/A
This hazard is not applicable to this technology.	
C. Confined Space	Hazard Rating: N/A
This hazard is not applicable to this technology.	
D. Electrical	Hazard Rating: N/A
This hazard is not applicable to this technology.	
E. Explosives	Hazard Rating: N/A
This hazard is not applicable to this technology.	
F. Fire Protection	Hazard Rating: N/A
This hazard is not applicable to this technology.	
G. Gas Cylinders	Hazard Rating: N/A
This hazard is not applicable to this technology.	
H. Ladders/Platforms	Hazard Rating: 2
Use three points of contact when descending and ascending ladders. Use a haul rope when moving the water jetting apparatus. When platforms are used, assure sufficient footing area free of tripping hazards. Assure proper tie-off points when working on an elevated working surface. The reaction force of the GyraJet will alter the operator's balance. Operators need training to anticipate this force. Operators need to prevent any water accumulation on walking or working surfaces to prevent slip hazards.	
I. Lockout/Tagout	Hazard Rating: 2
Use lockout/tagout procedures when servicing any of the system components. A keyed switch should control the Ultra-high pressure water pump. All sources of potential energy must be controlled by a lock or keyed switch. Water and air pressure are sources of potential energy with the GyraJet technology.	
J. Mechanical Hazards	Hazard Rating: 3
The rotating manifold at the tip of the GyraJet lance has the potential to cause serious harm due to the high-speed mechanical rotation. In addition, loose materials in the water jetting area could wind up onto the rotating manifold. A shroud should be attached to the end of the non-rotating lance barrel to protect the operator from the rotating manifold and reduce the likelihood of material entanglement.	
K. Moving Vehicles	Hazard Rating: 1
The ultra-high-pressure water pump is trailer mounted. Vehicle movement is possible on a large job site. Use proper mirrors and backup alarm on vehicle.	

L. Overhead Hazards	Hazard Rating 1
Hydro demolition removes concrete for repair or replacement. When hydro demolition occurs on an overhead surface loose sections of concrete will fall. Assure overhead sections of concrete will not fall on operator or support personnel.	
M. Pressure Hazards	Hazard Rating: 3
<ul style="list-style-type: none"> Ultra-high-pressure water jetting, 36,000 to 55,000 psi, requires extreme caution. Water pressures at the manifold are highly hazardous. Body contact with the water stream will result in instantaneous cutting; however, more damage to the human body will result from water traveling through veins and arteries. If water does travel through veins and arteries, the area may become infected and require amputation. Air and water hoses present a potential struck-by hazard upon rupture or disconnection. Air and high-pressure water hoses need safety lines at all connection fittings to prevent whipping in the event of a hose disconnection. Proper hose selection, assembly, and inspection are required. Lockout/tagout procedures are necessary before any intended contact with or proximity to the manifold. 	
N. Slips/Trips/Falls	Hazard Rating: 1
The GyrJet requires water and air hoses that can create tripping hazards. These hoses must be managed to keep the work area free from tripping hazards. Group hoses together and place to the side of high-traffic areas. Operators need to prevent any water accumulation on walking or working surfaces to prevent slip hazards.	
O. Suspended Loads	Hazard Rating: N/A
This hazard is not applicable to this technology.	
P. Trenching/Excavation	Hazard Rating: N/A
This hazard is not applicable to this technology.	
Section 5: Health Hazards	
A. Inhalation	Hazard Rating: 2
Exhaust fumes from the diesel engine will be present. If the diesel engine is used inside, air monitoring for diesel exhaust should be performed. A fine dry spray mist may occur when water jetting. This mist has the potential to contain any contaminants found on or within the surface undergoing water jetting. Air sampling is recommended.	
B. Skin Absorption	Hazard Rating: 1
Contaminants in the surface coating or the surface material such as lead or radionuclides will be forced away by the water jet. Personnel should wash exposed body parts before eating or drinking. Specific PPE may be required to protect against radionuclides.	

C. Noise	Hazard Rating: 2
Noise monitoring of the water pump in an outdoor location has shown values may exceed the OSHA Permissible Exposure Limit for an 8-hour work shift if work is performed within 15 feet of the ultra-high-pressure water pump or air compressor. Operation of the water pump or GyraJet in a confined location where noise is reflected will cause an increase in noise exposure. Personnel in the areas of the air compressor and the high-pressure water pump should wear hearing protection. GyraJet operators must wear hearing protection and possibly dual hearing protection depending upon site conditions.	
D. Heat Stress/Cold Stress	Hazard Rating: 1
Technology does not produce a hazard but ambient conditions need to be considered and monitored. Personal Protective Equipment (PPE) requirements for entering work zone will increase the risk of heat stress.	
E. Ergonomics	Hazard Rating: 2
The operator must hold the GyraJet in a static position when water jetting. The GyraJet weighs 15.5 pounds. Reaction forces in the opposite direction of the water jet can exceed 60 pounds. The reaction force combined with GyraJet weight and static positioning fatigue the operator quickly. Mounting the GyraJet on a tripod would eliminate the static positioning operators encounter. Anchoring the tripod would eliminate the operator's need to counteract the reaction force generated by the water jet. Pulling on hoses will stress the lower back, making proper lifting techniques important.	
F. Ionizing Radiation	Hazard Rating: N/A
This hazard is not applicable to this technology.	
G. Non-ionizing Radiation	Hazard Rating: N/A
This hazard is not applicable to this technology.	
H. Biological Hazards	Hazard Rating: N/A
This hazard is not applicable to this technology.	
I. Other	Hazard Rating: 2
Pieces of the substrate, concrete chunks, become projectiles when hydro blasting. Concrete pieces rapidly eject and become a potential struck-by hazard. The area around the water jetting operation needs barricading and labeling to prevent personal injury.	
Section 6: Phase Analysis	
A. Construction/Start-up	
A vehicle is required to position the water pump trailer. Muscular/back injury is possible while moving water and air hoses. Water and air hoses can cause slips/trips/falls. The ultra-high-pressure water system presents pressure hazards. Hoses and the corresponding fitting need labels to assure proper connection.	

B. Operation

The area of GyraJet operation needs barricades and labels. Assure operator training on the GyraJet, PPE, and water jetting. Assure adequate workspace is free of tripping hazards. Operators need to prevent any water accumulation on walking or working surfaces to prevent slip hazards.

C. Maintenance (Emergency and Routine)

Use lockout/tagout procedures when maintenance is performed on any system component.

D. Shutdown (Emergency and Routine)

The GyraJet does not create any additional need for shutdown procedures.

E. Decontamination/Decommissioning

Decontamination of the GyraJet would not require any more than washing off the surface of the lance.

Section 7: Worker Protection Measures

A. Exposure Monitoring

Personnel need periodic monitoring for noise exposure. Assure proper hearing protection is in use, as needed. Air sampling is advised when water jetting a coating or subsurface that contains or has the potential to contain a contaminant. The spray mist near the area of GyraJet operation is dry rather than wet. The intense pressure of the water jet combined with warm ambient conditions, dry the spray mist. It appears the mist is wet at times but at higher pressures, the mist dries rapidly. This mist has the potential to carry contaminants; therefore, personal and area air sampling is advised to assure operator protection.

B. Worker Training

Personnel require training on ultra-high-pressure water operation techniques. Operators require specific training on the GyraJet operation and the reaction forces generated by the water jet. Additionally, training on proper PPE usage, hearing conservation, and lockout/tagout is recommended.

C. Medical Surveillance

A general health screening with emphasis on the back and cardiovascular/respiratory system is warranted. Depending on the contaminant present in the surface or substrate, airborne levels, and the need for respiratory protection/PPE, medical surveillance may be required by OSHA standards. A hearing conservation program needs to be in place. In addition, annual audiograms may be warranted depending upon typical daily working conditions.

D. Engineering Controls

The operator must hold the GyraJet in a static position when water jetting. The GyraJet weighs 15.5 pounds. Reaction forces in the opposite direction of the water jet can exceed 60 pounds. The reaction force combined with GyraJet weight and static positioning fatigue the operator quickly. Mounting the GyraJet on a tripod would eliminate the static positioning operators encounter. Anchoring the tripod would eliminate the operator's need to counteract the reaction force generated by the water jet. A shroud should be attached to the end of the non-rotating lance barrel to protect the operator from the rotating manifold and reduce the likelihood of material entanglement.

E. Administrative Controls

The design of the GyraJet requires extensive effort on the part of the operator. Rotating operating personnel of the GyraJet will lessen fatigue and improve productivity. Observed operation of the GyraJet was no longer than five-minute intervals due to operator fatigue.

F. Personal Protective Equipment

PPE required for GyraJet operation consists of earplugs and earmuffs depending upon noise levels, face shield, steel-toed boots, hardhat, leather gloves, rain suit, water jetting protective shields, and respirator depending upon presence of airborne contaminants.

Section 8: Emergency Preparedness

The GyraJet does not create any additional need for emergency preparedness.

Section 9: Comments, Lessons Learned, & Special Considerations

None

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Copies of this Technology Safety Data Sheet and others developed by the Operating Engineers National Hazmat Program can be found on the internet at: www.iuoeiettc.org.