

## SECTION 6 - TECHNOLOGY SAFETY DATA SHEET

### TECHNOLOGY SAFETY DATA SHEET Rubble Makers Brokk 250

SECTION 1: TECHNOLOGY IDENTITY	
Manufacturer's Name and Address:  Rubble Makers A Duane Company 51 Park Street PO Box 130 Dorchester, MA 02122  <a href="http://www.rubblemakers.com">www.rubblemakers.com</a>	Emergency Contact: Joe Magerowski 617-282-4885
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	Date Prepared:  February 2001
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## **SECTION 2: PROCESS DESCRIPTION**

The Brokk 250 is a rubber wheeled, robotic machine, capable of being outfitted with specially designed end effectors for decontamination and dismantlement. The end effectors are mounted on a remote operated articulating boom. Workers up to 400 feet away can operate the Brokk 250.

Technical specifications for the Brokk 250:

- Weight 3,060 kg
- Transport Length 3,600 mm
- Transport Height 1,760 mm
- Operating Width 2,450 mm

Two end effectors were used for this assessment, the La Bounty Shear and the Model SH-U11 scabblers. The La Bounty Shear is capable of cutting rebar, pipe and angle iron.

Technical Specifications for the La Bounty Shear:

- Capable of cutting structural members up to 3/8 of an inch thick.
- Capable of handling pipe up to 6 inches in diameter with 1/4 of an inch thick walls.

The SH-U11 scabblers houses eleven cylindrical bits that are 2- 1/4 inches in diameter. The bits are designed for fast and deep reduction of concrete surfaces. There are two types of bits available:

- Nine point bit for general scabbling and keying.
- For this assessment, the five point “digger” bit for faster and deeper reduction of ordinary concrete surfaces was used.

Technical specification for the SH-U11 scabblers:

- Length 24 inches
- Width 17 inches
- Height 18 inches
- Working Length 19 inches
- Air Consumption 290 CFM
- Air Pressure 90 psi
- Weight 410 lbs
- Blow Rate 1,200 blows per minute
- Average Bit Life 80 hours

The SH-U11 scabblers uses a shrouded vacuum work head to capture dust and particles. A vacuum system collects the dust and particles created during scabbling.

## SECTION 3: TECHNOLOGY PHOTOS



The La Bounty Shear is used to dismantle pipes.



The articulating boom with SH-U11 scabbler attached.



The vacuum extraction system used to capture and collect dust and debris during scabbling.

**SECTION 4: CONTAMINANTS AND MEDIA**

Specific contaminants need to be evaluated on a site-by-site, job-by-job basis to determine the potential for exposure. This technology has the potential to increase the risk of exposure by sending resting contaminants airborne during demolition.

**SECTION 5: ASSOCIATED SAFETY HAZARDS**

Probability of Occurrence of Hazard:

1. Hazard may be present but not expected over background level
2. Some level of hazard above background level known to be present
3. High hazard potential
4. Potential for imminent danger to life and health

**A. ELECTRICAL (LOCKOUT/TAGOUT)****RISK RATING: 3**

The Brokk 250 uses electrical energy as well as hydraulic and mechanical energy. Lockout/tagout of the machine and the remote control is a necessity during maintenance.

**B. FIRE AND EXPLOSION****RISK RATING: 2**

The Brokk 250 has the potential for fire and explosion if fuel, oil, or hydraulic fluid is ignited.

**C. CONFINED SPACE ENTRY****RISK RATING: N/A**

Not part of this technology.

**D. MECHANICAL HAZARDS****RISK RATING: 2**

Lockout/tagout procedures should be followed during maintenance and repair. Operators should be conscious of the machine and any workers in the area.

**E. PRESSURE HAZARDS****RISK RATING: 2**

The Brokk 250 uses hydraulic energy to power its boom and some end effectors such as the La Bounty cutting shear. Hydraulic fluid is under pressure flowing through hoses, which may be punctured during operation. Lockout/tagout procedures should be followed during maintenance and repair.

**F. TRIPPING AND FALLING****RISK RATING: 3**

The remote control is on a tether to the machine. Power cords run from the power source to the vacuum system. Hoses run from the vacuum system to the Brokk 250. Operators should be conscious of this hazard at all times.

**G. LADDERS AND PLATFORMS****RISK RATING: 3**

The vacuum system is approximately 16 feet high when erected. A secured ladder or anchor point is necessary to work at elevated heights on the vacuum system.

**H. MOVING VEHICLE****RISK RATING: 3**

The ability of the operator to move does offer some advantages but because they are on the ground there is a blind spot on the other side of the machine. Operators should be conscious of all workers and equipment in the area.

<b>SECTION 5: ASSOCIATED SAFETY HAZARDS (CONTINUED)</b>	
<b>I. BURIED UTILITIES, DRUMS, AND TANKS</b>	<b>RISK RATING: N/A</b>
Not part of this technology, but site-specific considerations need to be taken.	
<b>J. PROTRUDING OBJECTS</b>	<b>RISK RATING: 1</b>
The Brokk 250 is designed for demolition work so most objects are housed within. The articulating boom with end effectors must be avoided at all times during operation.	
<b>K. GAS CYLINDERS</b>	<b>RISK RATING: N/A</b>
Not part of this technology.	
<b>L. TRENCHING AND EXCAVATIONS</b>	<b>RISK RATING: N/A</b>
Not part of this technology.	
<b>M. OVERHEAD LIFTS</b>	<b>RISK RATING: 2</b>
The end effectors are used to cut and remove overhead debris during demolition. Workers should never be under or around overhead end effectors during operation.	
<b>N. OVERHEAD HAZARDS</b>	<b>RISK RATING: 2</b>
Loose and falling debris may be present during demolition. Workers should never be under or around overhead end effectors during operation.	

<b>SECTION 6: ASSOCIATED HEALTH HAZARDS</b>	
Probability of Occurrence of Hazard: <ul style="list-style-type: none"> <li>1. Hazard may be present but not expected over background level</li> <li>2. Some level of hazard above background level known to be present</li> <li>3. High hazard potential</li> <li>4. Potential for imminent danger to life and health</li> </ul>	
<b>A. INHALATION HAZARD</b>	<b>RISK RATING: 2</b>
During demolition concrete dust may be present. Site-specific hazards must be taken into consideration and monitoring conducted accordingly. A hazard assessment of the contents of tanks, pipes, etc. will identify inhalation hazards that may be released or created during demolition.	
<b>B. SKIN ABSORPTION</b>	<b>RISK RATING: 2</b>
Traditional hazards associated with heavy equipment such as exposure to diesel fuel and hydraulic fluid do exist.	
<b>C. HEAT STRESS</b>	<b>RISK RATING: 2</b>
Operators are exposed to low workload operating handheld remote control. Ambient temperatures and the addition of PPE may increase heat stress and should be taken into consideration on a site-by-site, day-to-day basis.	

<b>SECTION 6: ASSOCIATED HEALTH HAZARDS (CONTINUED)</b>	
<b>D. NOISE</b>	<b>RISK RATING: 3</b>
The Brokk 250, with end effectors, creates a high level of noise. The level of noise depends on the surface and type of work as well as the machine. Extremely high levels of noise were observed during scabbling due to the surface being worked on. A Hearing Conservation Program with the use of the appropriate PPE is a must.	
<b>E. NON-IONIZING RADIATION</b>	<b>RISK RATING: N/A</b>
Not part of this technology.	
<b>F. IONIZING RADIATION</b>	<b>RISK RATING: N/A</b>
Not part of this technology.	
<b>G. COLD STRESS</b>	<b>RISK RATING: 1</b>
Ambient conditions on a site-by-site, day-to-day basis should be taken into consideration.	
<b>H. ERGONOMIC HAZARDS</b>	<b>RISK RATING: 2</b>
Operators stand for long periods of time during operation, fatigue may result. Operators should also be conscious of the weight of the end effectors and practice correct lifting methods when changing the end effectors. Mechanical lifting devices such as a forklift and crane should be used for lifting.	
<b>I. OTHER</b>	<b>RISK RATING: N/A</b>
None noted.	

<b>SECTION 7: PHASE ANALYSIS</b>	
<b>A. CONSTRUCTION/START-UP</b>	
Traditional considerations are present with the Brokk 250 during start-up. Normal machine checks are required which require the operator to climb on the machine and open doors to check the machine. The various end effectors are very heavy requiring special care and correct lifting techniques during movement. Mechanical lifting devices such as a forklift or crane should be used to lift the end effectors. Exposure to hydraulic fluid and diesel fuel is possible. HAZCOM should be implemented and MSDSs provided. A Lockout/Tagout Program should be implemented when working on or around electrical, mechanical, or hydraulic systems. A Fall Protection Program must be implemented. Engineering controls will be necessary to protect users when working at an elevated height on the vacuum system.	

**SECTION 7: PHASE ANALYSIS (CONTINUED)****B. OPERATION**

During operation, hazards from hanging or falling objects are present. Operators should ensure each worker in the area is visible and not hidden on the other side of the machine. Site-specific considerations for dormant containers may need to be taken into consideration when destroying or shearing containers. Noise levels were at, or above, the OSHA PEL. A Hearing Conservation Program should be implemented. Air monitoring for total dust and individual contaminants should be conducted. Proper lifting techniques or the use of motorized lifting devices should be used when working with the end effectors. Engineering controls will be necessary to protect users when working at an elevated height on the vacuum system. Users must wear a fall protection harness when working 6 feet or higher above the ground.

**C. MAINTENANCE**

Traditional considerations are present with the Brokk 250 during maintenance. Operators will be required to climb on the machine and open doors to gain access to system components. Safety with hand tools should be practiced so as to not create any additional hazards. Lockout/tagout must be practiced during maintenance. Assuming the machine is left in the hazardous environment during maintenance, heat stress considerations should be taken into account due to the possible addition of PPE and levels of protection. Exposure to hydraulic fluid and diesel fuel is possible. HAZCOM should be implemented and MSDSs provided. Proper lifting techniques or the use of motorized lifting devices should be used when working with the heavy objects. A Fall Protection Program must be implemented. Engineering controls will be necessary to protect users when working at an elevated height, on the vacuum system.

**D. DECOMMISSIONING**

The decommissioning phase presents several hazards, including exposure to the contaminants, pinch points, slips/trips/falls and muscular/back injury.

**SECTION 8: HEALTH AND SAFETY PLAN REQUIRED ELEMENTS****A. AIR MONITORING**

During demolition and scabbling total dust monitoring should be practiced. With a hazard assessment of the site, individual contaminants may be identified that require monitoring. The hazard of being exposed to these contaminants increases during demolition and scabbling.

**SECTION 8: HEALTH AND SAFETY PLAN REQUIRED ELEMENTS (CONTINUED)**

**B. WORKER TRAINING**

Training that would apply in this case may include, but not be limited to:

- HAZWOPER.
- HAZCOM.
- Training for specific contaminants such as lead, if applicable.
- Respiratory protection.
- Personal protective equipment.
- Lockout/tagout.
- Electrical safety.
- Job specific training for equipment operation.
- Ergonomics (proper lifting, bending, stooping, kneeling, etc.).
- Hearing conservation.
- Heat stress (learning to recognize signs and symptoms).
- CPR/first aid/emergency response/bloodborne pathogens.
- Construction Industry Outreach and/or General Industry Outreach.

**C. EMERGENCY RESPONSE**

Emergency response planning for a site needs to assure adequate coverage for hazards described in the TSDS. Having at least one worker per shift trained in CPR and first aid is recommended.

**D. MEDICAL SURVEILLANCE**

Medical surveillance in accordance with the OSHA standards will need to be conducted. Medical surveillance for site-specific hazards may be required. Initial and annual audiograms may be required.

**E. INFORMATIONAL PROGRAM**

Workers must be trained in specific operation of equipment before use, with emphasis on capabilities and limitations of the technology. Hazard communication for all substances necessary for the operation of the Brokk 250, end effectors being used, and any contaminants that may be present at the work site is a necessity.

**SECTION 9: COMMENTS AND SPECIAL CONSIDERATIONS**

Only personnel who have been adequately trained in the operation of this technology should be permitted to operate and/or work on the equipment.