Human Factors Assessment Report

Evolution 180 Circular Saw
OENHP #: 2001-03, Version A

Report Issued: January 2002
International Union of Operating Engineers National Hazmat Program
International Environmental Technology and Training Center

Human Factors Assessment Report

Frank Hanley, General President

The OENHP would like to thank the following team members for their participation in this assessment and for the professional expertise they provided:
John Kovach, MS
Jeana Harrison
Aaron Ondo, MS

Research supported by the U.S. Department of Energy’s National Energy Technology Laboratory under cooperative agreement DE-FC26-01NT41118 with the Operating Engineers National Hazmat Program, 1293 Airport Road, Beaver, WV 25813 Telephone: (304) 253-8674, FAX: (304) 253-7758 Email: hazmat@iuoeiettc.org

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1.0 EXECUTIVE SUMMARY

Florida International University’s (FIU) Hemispheric Center for Environmental Technology (HCET) evaluated five saws for their effectiveness in cutting specially prepared fiberglass-reinforced plywood crates. These crates were built as surrogates for crates that presently hold radioactively contaminated gloveboxes at the Department of Energy’s (DOE) Los Alamos facility. The Evolution 180 circular saw was assessed on August 14, 2001. During the FIU test of efficacy, a team from the Operating Engineers National Hazmat Program (OENHP) evaluated the occupational safety and health issues associated with this technology.

The Evolution 180 is a portable, metal cutting circular saw with a 7-inch diameter blade. The blade is contained within the main housing and has a retractable lower blade guard to prevent operator access to the blade during operation and shutdown. The saw is equipped with a chip collector. The maximum cutting thickness for metal is one-quarter inch and can cut steel tubing and pipe 2 inches in diameter. The unit is operated with an on/off guarded trigger switch and is supported with the hand guide mounted to the side of the saw. An adjustable lever sets the depth of the cut. The machine’s circuitry will automatically shut the saw motor off if excessive overload is detected during operation.

The one-half hour demonstration involved vertical and horizontal cuts and blade changes. During this process, operators experienced binding of the saw. This caused the blade to become hot, causing the sawdust collected in the chip collector to smoke. Care should be exercised to use the appropriate blade for the application, operator training, and personal protective equipment (PPE).

Personal noise sampling indicated that neither worker was over the Occupational Safety and Health Administration’s (OSHA) Action Level of 85 decibels (dBA) with time-weighted averages (TWA’s) of 69.1 and 68.8 dBA. The personal noise sample taken during the special demonstration with the stainless steel plate had a TWA of 69.8 dBA. These data are not entirely representative as they were gathered during a simulation and not at the actual worksite. Additional sampling should be conducted on-site, but the workers should wear hearing protection until it is determined that it is no longer necessary.

The total nuisance dust sample for the Evolution 180 circular saw was 3.5 milligrams per cubic meter (mg/m$^3$), which is lower than the OSHA Permissible Exposure Limit (PEL) of 15 mg/m$^3$ and the American Conference of Governmental Industrial Hygienists’ (ACGIH) Threshold Limit Value (TLV) of 10 mg/m$^3$. The fiber analysis yielded 1.74 fibers per cubic centimeter (f/cc), which is above the PEL of 1 f/cc. Although the nuisance dust levels were low, fiberglass dust levels were higher than the PEL. Since fiberglass dust is known to be a strong skin irritant and a possible human carcinogen, the workers should continue to wear appropriate suits and gloves, as well as a full-face air-purifying respirator. The respirator should be equipped with a combination organic vapor and acid gas cartridge in combination with a High Particulate Air (HEPA) filter, since particulate filter, since during the demonstration, the workers complained of an odd smell, which may have been from the breakdown of the fiberglass.
2.0 INTRODUCTION

2.1 OENHP Safety and Health Assessment

On August 14, 2001, three safety professionals from OENHP performed a human factors assessment in a containment called a PermaCon facility located in the high bay building at FIU located at 10555 West Flagler Street, Miami, Florida, 33174. The team consisted of John Kovach, Jeana Harrison, and Aaron Ondo.

The PermaCon is equipped with dual-hinged panels for access, two standard doors with stainless steel covering on the inside face, two type A transfer panels, two make-up air inlets, five windows on the side panels, and ten portals on the roof to allow for external lighting. The PermaCon dimensions are 20 x 16 x 12 feet. A portable HEPA filtration unit is connected to rear air outlets to generate negative pressure in the PermaCon during evaluations. The HEPA filtration unit draws 1,720 cubic feet of air each minute (cfm) at 1 inch static pressure (sp) water gauge (wg) and 1,060 cfm at 9 inches sp wg. HEPA unit efficiency is 99.97% for 0.3-micrometer particles.

2.2 Technology Description and Operation

The Evolution 180 circular saw was tested on a specially prepared 4 x 4 x 8 foot fiberglass-reinforced plywood crate at FIU in August 2001. This saw was also used in a special demonstration in which a one-quarter inch stainless steel plate was cut numerous times in a 15-minute time period. In conjunction with FIU's evaluation of efficiency and cost, this report covers the hazard analysis and safety evaluation that the Operating Engineers National Hazmat Program (OENHP) conducted during the test.

The Evolution 180 is a portable, hand held metal cutting circular saw with a 7-inch diameter blade. The blade is contained within the main housing and has a retractable lower blade guard to prevent access to the blade during operation. The saw is equipped with a chip collector, held in place by a wing nut. The maximum cutting thickness for metal is one-quarter inch, and can cut steel tubing and pipe 2 inches in diameter. The unit is operated with an on/off guarded trigger switch, and is supported with the hand guide mounted to the side of the saw. An adjustable lever sets the depth of the cut. The retractable blade guard protects the operator from access during shutdown. The machine's circuitry will automatically shut the saw motor off if excessive overload is detected. Blade changes are accomplished using the blade spindle lock that holds the blade in place, during removal of the locking bolt.

3.0 METHODOLOGY

3.1 Methodology for Assessment of Safety Issues

The team completed a Job Hazard Analysis (JHA) after the evaluation. This is a well-established tool. The JHA systematically identifies all of the steps required to operate a piece of equipment or complete a task. The potential hazards of each step are listed and the methods to control these hazards are identified. The information from the JHA was then used to create a Technology Safety Data Sheet (TSDS). This innovative tool
is required by the DOE for all of the technologies funded by the Office of Science and Technology. See Section 6.0 for completed safety analyses.

3.2 Methodology for Assessment of Health Issues

Noise levels, total nuisance dust, and fiberglass dust were evaluated during the dismantling of the 4 x 4 x 8 foot fiberglass-reinforced plywood crate. All samples were measured during the approximate one-half hour operation of the Evolution 180 circular saw.

3.2.1 Noise Sampling

Personal noise levels were evaluated using Quest Q-300 data-logging noise dosimeters. These instruments were pre- and post-calibrated at 114.0 dBA with a Quest Q-10 acoustical calibration unit. Noise sampling was conducted during the dismantling of the crate and during a special demonstration that included the cutting of a 1/4-inch stainless steel plate.

3.2.2 Nuisance Dust

Dust monitoring was conducted by drawing air with a MSA Escort Elf air-sampling pump through a pre-weighed PVC 37-millimeter (mm) filter in a closed-face cassette. Sampling and analysis followed the National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods (NMAM) 0500 gravimetric method for total dust. The cassettes were pre-weighed by Galson Laboratories, an American Industrial Hygiene Association-Accredited lab. Pre- and post-sampling calibration was accomplished with a BIOS International DryCal DC1 primary calibration system. The level of quantification reported by the lab was 0.05 mg.

3.2.3 Fiberglass Dust

Fiberglass dust monitoring was conducted by drawing air with a MSA Escort Elf air-sampling pump through a MCE 25-mm filter in an open-faced cowl. Analysis was conducted with phase contrast microscopy using NMAM 7400, Revision #3, which is a fiber-counting method. The cowls were prepared and analyzed by Galson Laboratories. Pre- and post-sampling calibration was performed in the same manner as the nuisance dust samples.

4.0 RESULTS AND DISCUSSION

4.1 Safety Issues

The Evolution 180 circular saw is a straightforward machine for cutting metals that has numerous safeguards. During the cutting of the fiberglass-reinforced plywood crates, operators experienced binding of the saw and smoking of the sawdust in the chip collector. In this application, the blade became hot, causing the sawdust in the chip collector to smoke. Care should be exercised to use the machine for the appropriate application, with the proper blade selection, operator training, and PPE.
Table 6.3.1 contains a summary of the safety and health features for the five saws used in the demonstration.

4.2 Health Issues

4.2.1 Noise

The OSHA Action Level for noise exposure under 29 CFR 1910.95 is 85 dBA, averaged over an 8-hour time period. From OSHA’s Hearing Conservation Amendment of 1983, exceeding this level means the employer must administer a continuing, effective hearing conservation program. OSHA also requires that workers exposed above 90 dBA as an 8-hour TWA must be protected – preferably through engineering or administrative controls. If neither is feasible, the employer must provide PPE, such as earmuffs or earplugs.

Personal noise sampling indicated that neither worker was over the Action Level while dismantling the crates with TWA’s of 69.1 and 68.8 dBA. The personal noise sample taken during the special demonstration with the stainless steel plate had a TWA of 69.8 dBA. These data are not entirely representative as they were gathered during a simulation and not at the actual worksite. Additional sampling should be conducted on-site, but the workers should wear hearing protection until it is determined that it is no longer necessary. Noise data for all of the saws used in the demonstration are listed in Table 6.3.2.

4.2.2 Nuisance and Fiberglass Dust

Air sampling was performed while the workers dismantled the fiberglass-reinforced crates. Results from the total nuisance dust (i.e. particulate not otherwise regulated) and fiberglass dust samples for all saws in the demonstration are listed in Table 6.3.2. The total nuisance dust sample for the Evolution 180 circular saw was 3.5 mg/m$^3$, which is lower than the OSHA PEL of 15 mg/m$^3$ and the ACGIH TLV of 10 mg/m$^3$. The fiber analysis yielded 1.74 f/cc, which is above the PEL of 1 f/cc.

5.0 RECOMMENDATIONS

When the saw was used to cut the crate, the sawdust collected in the chip collector overheated and began to smoke. This could be a fire hazard. Although the nuisance dust levels were low, fiberglass dust levels were higher than the PEL. Fiberglass dust is known to be a strong skin irritant and is a possible human carcinogen. Therefore, the workers should continue to wear the appropriate suits and gloves, as well as a full face air-purifying respirator equipped with a combination organic vapor and gas cartridge with a particulate filter. These respirator cartridges are necessary because the workers complained of an odd smell during the demonstration that may have been from the breakdown of the fiberglass. Engineering controls should be used to eliminate these problems whenever possible. Examples of engineering controls include two specialized ventilation systems: a downdraft hood and a capturing hood with a flexible duct (see Section 6.4 for figures). With a downdraft hood, a crate would sit on the top of the hood so the dust would be pulled down into the hood. A ventilation system such as this requires specialized knowledge and should be designed by a ventilation engineer.
## 6.0 APPENDIX

### 6.1 Job Hazard Analysis

### Job Hazard Analysis

**Evolution 180 Circular Saw (OENHP #: 2001-03, Version A)**

<table>
<thead>
<tr>
<th>Sequence of Job Steps</th>
<th>Potential Accident or Hazard</th>
<th>New Procedure or Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1: Construction/Start-up</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Pre-operation inspection | • Saw or cord damage may cause shock | • Inspect saw for obvious damage and frayed/cut cord.  
• Check for misalignment of blade.  
• Check to ensure that blade is installed properly (not backward).  
• Check for binding of moving parts. |
| Powering saw | • Failure of on/off switch and/or retractable blade guard may cause kickback or cuts/abrasions | • Inspect blade guards.  
• Inspect on/off switch.  
• Use qualified personnel and manufacturer-authorized parts. |
| | • Wrong amperage extension cord causing an electrical hazard | • Inspect extension cord to verify adequacy to handle saw amperage. |
| | • Failure of on/off switch; failure on | • Remove power from the saw by using proper method to unplug tool i.e. grip plug and remove from outlet (socket). |
| | • Ungrounded outlet causing an electrical hazard | • Inspect outlet to verify proper grounding and polarity by checking the outlet with a receptacle circuit tester.  
• Use an outlet with a ground fault circuit interrupter (GFCI). |
| | • Abnormal noise or vibration due to improper mounting of blade may cause kickback, cuts, and/or abrasions. | • Turn off the saw.  
• Remove power to the saw.  
• Check proper mounting of blade.  
• Use qualified personnel and manufacturer-authorized parts. |
| **Phase 2: Operation** | | |
| Operation of saw in horizontal and vertical motions | • Blade exposed when guard is retracted, may lead to cuts or abrasions | • Train users on proper positioning of saw.  
• Check guard for sticking.  
• Use leather-work gloves.  
• Pick up and store saw properly. |
# Job Hazard Analysis

**Evolution 180 Circular Saw (OENHP #: 2001-03, Version A)**

<table>
<thead>
<tr>
<th>Sequence of Job Steps</th>
<th>Potential Accident or Hazard</th>
<th>New Procedure or Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>(<strong>Continued</strong>)</td>
<td></td>
<td>(<strong>Continued</strong>)</td>
</tr>
<tr>
<td>Operation of saw in</td>
<td></td>
<td>(<strong>Continued</strong>)</td>
</tr>
<tr>
<td>horizontal and vertical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>motions</td>
<td></td>
<td>(<strong>Continued</strong>)</td>
</tr>
</tbody>
</table>

  - Vibration to hands during use may lead to vibration-induced nerve damage known as Raynaud’s Syndrome.
  - Secure working piece.
  - Ensure that adjustable shoe is in firm contact with the cutting surface – helps to reduce vibration.
  - Wear gloves with vibration-dampening material.
  - Control personnel duty time.

  - Excessive heat at blade cutting edge leading to exposure to a hot surface.
  - Do not force tool.
  - Inspect condition of blades and replace worn blades.

  - Kickback of saw may cause sprain or strain.
  - Avoid pinching blade.
  - Secure working surface using supports such as wedges.
  - Do not force tool.
  - Utilize proper ergonomic position.
  - Wear hand and eye protection.

  - Static loading of the saw may cause worker fatigue.
  - Maintain proper work position.
  - Control personnel duty time.

### Phase 3: Maintenance (Emergency and Routine)

- **Cleaning**
  - Exposure to energized parts.
  - Remove power source before beginning maintenance (use proper lockout/tagout procedures).
  - Use qualified personnel and

  - Exposure to contamination.
  - Use safety and health information such as Material Safety Data Sheets (MSDS’s) for proper procedures and necessary personal protective equipment.

- **Blade replacement**
  - Changing blades may cause cuts and abrasions.
  - Follow manufacturer’s procedures.
  - Wear leather work gloves.

### Phase 4: Shutdown (Emergency and Routine)

- **Remove power**
  - Shock
  - Use proper method to unplug tool i.e. grip plug and remove from socket (outlet).

### Phase 5: Decontamination/Decommissioning

- **Wipe the saw to remove contamination**
  - Exposure of operator or maintenance personnel to site-specific contaminants
  - Use safety and health information such as Material Safety Data Sheets (MSDS’s) for proper procedures and necessary personal protective equipment.
### Technology Safety Data Sheet

#### Evolution 180 Circular Saw (OENHP #: 2001-03, Version A)

<table>
<thead>
<tr>
<th>Section 1: Technology Identity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Name(s):</td>
<td>Emergency Contact:</td>
</tr>
<tr>
<td>Evolution 180 Circular Saw</td>
<td>Telephone: (319) 391-1300</td>
</tr>
<tr>
<td></td>
<td>FAX: (319) 391-2323</td>
</tr>
<tr>
<td></td>
<td>E-mail: <a href="mailto:jancy@jancyslugger.com">jancy@jancyslugger.com</a></td>
</tr>
<tr>
<td>Manufacturer’s Name and Address:</td>
<td>Information Contact:</td>
</tr>
<tr>
<td>Jancy Engineering</td>
<td>Same as Emergency Contact</td>
</tr>
<tr>
<td>2735 Hickory Grove Road</td>
<td></td>
</tr>
<tr>
<td>Davenport, Iowa 52804</td>
<td></td>
</tr>
<tr>
<td>Date Prepared:</td>
<td>TSDS Version Number:</td>
</tr>
<tr>
<td>8/23/01</td>
<td>2001-03-A</td>
</tr>
<tr>
<td>Prepared By:</td>
<td></td>
</tr>
<tr>
<td>John Kovach, MS; Jeana Harrison; Aaron Ondo, MS; Bruce Lippy, CIH, CSP</td>
<td></td>
</tr>
</tbody>
</table>

#### Section 2: Technology Description

The Evolution 180 circular saw is a portable, handheld metal cutting tool with a 7-inch diameter blade. The blade is contained within the main housing and has a retractable lower blade guard to prevent access to the blade during operation. The saw is equipped with a chip collector, held in place by a wing nut. The maximum cutting thickness for metal is one-quarter inch, can cut steel tubing, and pipe two inches in diameter. The unit is operated with an on/off guarded trigger switch, and is supported by the hand guide mounted to the side of the saw. An adjustable lever sets the depth of cut. The retractable blade guard protects the operator from access during shutdown. The machine’s circuitry will automatically shut the saw motor off if excessive overload is detected. Blade changes are accomplished using the blade spindle lock that holds the blade in place, during removal of the locking bolt.

#### Section 3: Technology Pictures

![Figure 1](image1.png) An operator cutting a metal pipe with the Evolution 180.

![Figure 2](image2.png) An operator cutting a 1/4-inch steel plate with the Evolution 180.
# Technology Safety Data Sheet

## Evolution 180 Circular Saw (OENHP #: 2001-03, Version A)

### Section 4: Safety Hazards

#### Hazard Category:
- 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

<table>
<thead>
<tr>
<th>A. Buried Utilities, Drums, and Tanks</th>
<th>Hazard Rating: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Buried utilities, drums, and tanks are not associated with this technology.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Chemical (Reactive, Corrosive, Pyrophoric, etc)</th>
<th>Hazard Rating: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Chemical use is not associated with this technology.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Confined Space</th>
<th>Hazard Rating: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Confined space is not a hazard associated with this technology.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>D. Electrical</th>
<th>Hazard Rating: 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Shock due to insufficient amperage in cord and/or ungrounded outlets may occur.</td>
<td></td>
</tr>
<tr>
<td>• Performing maintenance or blade changes while machinery is energized may lead to shock. Following lockout/tagout procedures will reduce this risk.</td>
<td></td>
</tr>
<tr>
<td>• Exposure to a damaged extension cord may lead to shock.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E. Explosives</th>
<th>Hazard Rating: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Explosives are not associated with this technology.</td>
<td></td>
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<table>
<thead>
<tr>
<th>F. Fire Protection</th>
<th>Hazard Rating: 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The facility fire protection plan should cover this tool, as it does not present an additional fire hazard.</td>
<td></td>
</tr>
<tr>
<td>• Heat generated by this saw when cutting wood might cause the sawdust in the chip collector to ignite.</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>G. Gas Cylinders</th>
<th>Hazard Rating: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Gas cylinders are not used with this technology.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H. Ladders/Platforms</th>
<th>Hazard Rating: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Electrical shock is possible when used with metal ladders or platforms.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I. Lockout/Tagout</th>
<th>Hazard Rating: 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The facility’s lockout/tagout procedures and manufacturer’s recommended procedures should cover this tool.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J. Mechanical Hazards</th>
<th>Hazard Rating: 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cuts or abrasions may occur from contact with saw blade during use and blade changes.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K. Moving Vehicles</th>
<th>Hazard Rating: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This saw does not utilize any moving vehicles, although one will be used to move the fiberglass-reinforced crates to the decommissioning area. The workers should be aware of the normal hazards associated with moving vehicles.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L. Overhead Hazards</th>
<th>Hazard Rating: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• During dismantlement of the fiberglass-reinforced crates, pieces of crate could fall upon completion of a cut or when the top of the crate is removed. Workers should wear hard hats when working on crates.</td>
<td></td>
</tr>
</tbody>
</table>
## Technology Safety Data Sheet
### Evolution 180 Circular Saw (OENHP #: 2001-03, Version A)

### M. Pressure Hazards
- **Hazard Rating:** N/A

### N. Slips/Trips/Falls
- **Hazard Rating:** 1
  - Electrical cords should be properly managed during cutting operations.
  - Work area should be kept clean and organized to eliminate possible tripping hazards.

### O. Suspended Loads
- **Hazard Rating:** N/A
  - Suspended loads are a site-specific hazard and are not part of this technology.

### P. Trenching/Excavation
- **Hazard Rating:** N/A
  - Trenching and excavation are not used for this technology.

## Section 5: Health Hazards

### A. Inhalation
- **Hazard Rating:** 2
  - Inhalation hazards are highly dependent upon the type of material being cut.
    - General inhalation hazards associated with woodworking:
      - Wood dust
      - Plywood resins
    - Inhalation hazards associated with the disassembly of fiberglass-reinforced plywood crates:
      - Fiberglass dust (possible human carcinogen)
      - Fiberglass resins
      - Vapors and formaldehyde

### B. Skin Absorption
- **Hazard Rating:** 2
  - Skin absorption is largely based upon the material being cut.
  - Fiberglass dust causes skin irritation (associated with the disassembly of fiberglass-reinforced plywood crates).

### C. Noise
- **Hazard Rating:** 1
  - A noise assessment should be conducted on-site during actual use of the technology to determine the type of hearing protection required.
  - Excessive noise from tool and cutting operations may cause hearing damage.
  - Excessive noise from ventilation and filtration system, as well as any noise from nearby operations, may cause hearing damage.

### D. Heat Stress/Cold Stress
- **Hazard Rating:** 2
  - Heat stress is generally site-specific, although there are heat stress issues associated with this tool.
  - Heat stress can be generated by personal protective equipment such as: Tyvek suits, full-face respirators, and gloves.
  - Heat from hand tool during extended tool duty time may cause heat stress.
  - Extended worker duty time could cause heat stress, especially if the worker is working in hot conditions or wearing personal protective equipment.

### E. Ergonomics
- **Hazard Rating:** 2
  - Hand/arm vibration from the tool may cause nerve damage known as Raynaud’s Syndrome.
  - Static and awkward operating postures may cause pain in the hands and/or arms.
  - Awkward lifting of tool may cause pain in the hands and/or arms.

### F. Ionizing Radiation
- **Hazard Rating:** N/A
  - Ionizing radiation is site-specific.

### G. Non-ionizing Radiation
- **Hazard Rating:** N/A
  - Non-ionizing radiation is site-specific.
### H. Biological Hazards

<table>
<thead>
<tr>
<th>Hazard Rating:</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• There are no biological hazards associated with this technology.</td>
<td></td>
</tr>
</tbody>
</table>

### I. Other

<table>
<thead>
<tr>
<th>Hazard Rating:</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>• None</td>
<td></td>
</tr>
</tbody>
</table>

### Section 6: Phase Analysis

#### A. Construction/Start-up
- Identify hazards through a pre-job analysis to determine personal protective equipment required.
- Inspect saw for obvious damage that may cause excessive vibration and potential for electrical shock.
- Select proper blade for each job so that worker fatigue and kickback is minimized and to reduce potential for sprains.
- Check power cords for proper amperage, frays, and cuts to protect against electrical shock.
- Ensure blades are straight and the teeth are sharp to reduce amount of force needed and to minimize vibration.
- Ensure blades are properly mounted to start work to avoid kickback or sprain.

#### B. Operation
- Maintain proper work position, don’t overextend arms.
- Wear proper safety protection for hands (leather work gloves with rubber grips), eyes (safety glasses or goggles), and ears (ear plugs or ear muffs), and respiratory protection (depends upon the operation).
- Do not bind the blade between work pieces; do not force tool.
- Change blade only while the tool is not energized and use approved lockout/tagout procedures.
- Use proper amperage power cord and a grounded outlet.

#### C. Maintenance (Emergency and Routine)
- Check for damage to the saw and frayed cord.
- Perform all maintenance with the power off (unplug saw) and use approved lockout/tagout procedures.
- Conduct maintenance with qualified personnel and use manufacturer’s authorized parts.

#### D. Shutdown (Emergency and Routine)
- Keep blade away from body while shutting down the tool.
- Grip plug and remove from socket (outlet).
- Maintain proper ergonomic position to avoid cuts and abrasions by the blade.

#### E. Decontamination/Decommissioning
- Use approved decontamination procedures.
- Discard unit using approved procedures.

### Section 7: Worker Protection Measures

#### A. Exposure Monitoring
- Noise sampling should be conducted during the actual use of the tool to determine the actual noise levels and the proper personal protective equipment necessary.
- Air sampling should be conducted during the actual use of the tool to determine levels of site-specific contaminants in the air. Nuisance dust is associated with woodcutting and fibers are associated with the cutting of fiberglass-reinforced crates.
B. Worker Training

Worker training should include the following elements:
- Pre-job walk through
- Manufacturer’s operating procedures
- Respirator training
- Personal protective equipment to be used
- Hearing conservation program, including the proper use of ear plugs
- Lockout/tagout procedures
- Electrical training
- Recognition of heat stress symptoms
- Recognition of ergonomic issues and symptoms

C. Medical Surveillance

- Audiograms must be administered if the noise levels are above 85 decibels. Workers whose personal noise sample yields results greater than 85 decibels must be placed in a hearing conservation program, which includes audiograms.

D. Engineering Controls

- No additional engineering controls are recommended.

E. Administrative Controls

- Worker training
- Controlled duty time of personnel and the equipment

F. Personal Protective Equipment

- Gloves
- Safety glasses or goggles
- Hearing protection

Section 8: Emergency Preparedness

- Emergency response procedure should identify how the hazards identified in this TSDS are being addressed. Each worker should be trained and understand how to respond.

Section 9: Comments, Lessons Learned, and Special Considerations

- No additional comments, lessons, or special considerations.
6.3 Summary of All Saws

During the week of August 13-16, 2001, five saws were tested on specially prepared 4 x 4 x 8 foot plywood and fiberglass reinforced plywood crates at FIU. The following tables summarize the results of the OENHP evaluation. Table 6.3.1 summarizes the safety features for the saws tested, and table 6.3.2 summarizes the results of noise and dust measurements obtained during these operations.

Table 6.3.1. Comparison of Safety and Health Features for Saws During the Simulation.

<table>
<thead>
<tr>
<th>Saw (OENHP #)</th>
<th>Blade Guarding</th>
<th>Power Switch</th>
<th>Thermal Overload</th>
<th>Electrical Cord/Plug</th>
<th>Dust Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeWalt Reciprocating (2001-01-A)</td>
<td>Blade partially exposed at all times</td>
<td>On/off switch</td>
<td>No overload or thermal shutoff</td>
<td>Double insulated cord</td>
<td>No control of dust at point of cut</td>
</tr>
<tr>
<td>Milwaukee Worm Drive Circular (2001-02-A)</td>
<td>Upper and retractable lower guard</td>
<td>On/off switch</td>
<td>No overload or thermal shutoff</td>
<td>Grounded plug</td>
<td>No control of dust at point of cut</td>
</tr>
<tr>
<td>Porter-Cable Circular (2001-04-A)</td>
<td>Upper and retractable lower guard</td>
<td>On/off switch</td>
<td>No overload or thermal shutoff</td>
<td>Double insulated cord</td>
<td>Directional discharge away from worker; vacuum attachment for dust collection</td>
</tr>
<tr>
<td>Evolution 180 Circular (2001-03-A)</td>
<td>Upper guard, chip collector, retractable lower guard</td>
<td>On/off switch</td>
<td>Overload shutoff</td>
<td>Double insulated cord</td>
<td>Metal chip collector</td>
</tr>
<tr>
<td>Adamant Circular (2001-05-A)</td>
<td>Blade partially exposed at all times</td>
<td>Interlocking on/off switch</td>
<td>Stall overload, and shutoff</td>
<td>Grounded plug</td>
<td>No control of dust at point of cut</td>
</tr>
</tbody>
</table>

Table 6.3.2. Comparison of Industrial Hygiene Sampling Data from the Simulation.

<table>
<thead>
<tr>
<th>Saw</th>
<th>Nuisance Dust (mg/m$^3$)</th>
<th>Fiberglass Dust (f/cc)</th>
<th>Noise TWA - Dosimeter 1 (dBA)</th>
<th>Noise TWA - Dosimeter 2 (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeWalt Reciprocating</td>
<td>10.69</td>
<td>1.70</td>
<td>88.3</td>
<td>90.6</td>
</tr>
<tr>
<td>Milwaukee Worm Drive Circular</td>
<td>36.07</td>
<td>Void$^1$</td>
<td>82.7</td>
<td>84.6</td>
</tr>
<tr>
<td>Porter-Cable Circular #1</td>
<td>3.53</td>
<td>12.9</td>
<td>77.1</td>
<td>78.3</td>
</tr>
<tr>
<td>Porter-Cable Circular #2</td>
<td>22.05</td>
<td>Void$^1$</td>
<td>89.7</td>
<td>90.0</td>
</tr>
<tr>
<td>Evolution 180 Circular</td>
<td>3.5$^2$</td>
<td>1.74$^2$</td>
<td>69.1</td>
<td>68.8$^2$ / 69.8$^3$</td>
</tr>
<tr>
<td>Average ± Standard Deviation</td>
<td>15.2 ± 13.9</td>
<td>5.5 ± 6.5</td>
<td>81.4 ± 8.5</td>
<td>80.4 ± 9.7</td>
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<tr>
<td>Coefficient of variation</td>
<td>91.8</td>
<td>118.5</td>
<td>10.4</td>
<td>12.0</td>
</tr>
</tbody>
</table>

$^1$ Void: Filter was overloaded – sample could not be analyzed.

$^2$ Evolution 180 with fiberglass-reinforced plywood crate

$^3$ Evolution with ⅛-inch stainless steel only
6.4 Figures and Drawings

6.4.1 Drawing of a Downdraft Hood

6.4.2 Drawing of a Capture Hood
6.5 Industrial Hygiene Data

Certificates of Analysis for laboratory data are available upon request via the contact information in the front of this document.

6.5.1 Noise Sampling Data

Industrial Hygiene Noise Sampling Data: Noise

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<tr>
<th>Project:</th>
<th>Calibrator</th>
<th>Address:</th>
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<tbody>
<tr>
<td>FIU - Saws</td>
<td>Quest Technologies</td>
<td>Hemispheric Center for Environmental Technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Florida International University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1055 West Flagler St, CEAS 2100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Miami, FL 33174</td>
</tr>
<tr>
<td></td>
<td>QC-10</td>
<td>Cal. Date: 6/6/2001</td>
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</tbody>
</table>

<table>
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<tr>
<th>Sampling Data</th>
<th>No. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Quest Technologies</td>
</tr>
<tr>
<td>Job title/description:</td>
<td>300</td>
</tr>
<tr>
<td>Cal. Date:</td>
<td>6/6/2001</td>
</tr>
<tr>
<td>Calibrator:</td>
<td>QC 0010</td>
</tr>
<tr>
<td>Exchange Rate (3 to 6 dB):</td>
<td></td>
</tr>
<tr>
<td>Dose Criterion (80 to 90 dB):</td>
<td></td>
</tr>
<tr>
<td>Response (Slow or Fast):</td>
<td></td>
</tr>
<tr>
<td>PPE Used:</td>
<td>full face-piece respirator with G/V cartridges, Tyvek suits, ear plugs, Tyvek suits, gloves</td>
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</tbody>
</table>

Calibration

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<th>Date (M/D/Y)</th>
<th>Time (24H:M)</th>
<th>Target (dB)</th>
<th>Actual (dB)</th>
<th>Diff. (%)</th>
<th>Date (M/D/Y)</th>
<th>Time (24H:M)</th>
<th>Target (dB)</th>
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<th>Diff. (%)</th>
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<td>0.79</td>
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<td>0.44</td>
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Noise Data and Information

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<th>Stop (24H:M)</th>
<th>Time (min)</th>
<th>Lav (dB)</th>
<th>TWA (dB)</th>
<th>Lmax (dB)</th>
<th>Lpk (dB)</th>
<th>8hr % Dose</th>
<th>8 hr Proj. % Dose</th>
</tr>
</thead>
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<td>9:45</td>
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<td>110.9</td>
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<td>P</td>
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<td>299.20</td>
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<td>P</td>
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<td>13:57</td>
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<td>114.7</td>
<td>118.6</td>
<td>96.02</td>
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Location Description

A  DeWalt Reciprocating Saw
B  Evolution 180 Saw - used with pump #2
C  Milwaukee Saw - used with pump #2
D  Porter Cable Saw #1 - Used with pump #3
E  Porter Cable Saw #2 - Used with pump #3

Calibration by: Jeana M. Harrison  Signature:  Date:
Sampling by: Jeana M. Harrison  Signature:  Date:
**Industrial Hygiene Noise Sampling Data: Noise**

**Calibrator**

- Mfr.: Quest Technologies
- Model: QC-10
- Serial No.: QE7030012
- Cal. Date: 37048

**Sampling Data**

- Mfr.: Quest
- Model: 300
- Serial No.: QC 7010093
- Cal. Date: 6/6/2001
- Exchange Rate (3 to 6 dB): 
- Dose Criterion (80 to 90 dB): 
- Filter Weighting (A, B, or C): 
- Response (Slow or Fast):

**Calibration**

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<th>Target (dB)</th>
<th>Actual (dB)</th>
<th>Diff. (%)</th>
<th>Date (M/D/Y)</th>
<th>Time (24H:M)</th>
<th>Target (dB)</th>
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<th>Diff. (%)</th>
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<tr>
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<td>0.09</td>
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<td>10:55</td>
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<td>113.9</td>
<td>0.09</td>
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</table>

**Noise Data and Information**

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<tr>
<th>Location</th>
<th>Type (P or A)</th>
<th>Date (M/D/Y)</th>
<th>Start (24H:M)</th>
<th>Stop (24H:M)</th>
<th>Time (min)</th>
<th>Lav (dB)</th>
<th>TWA (dB)</th>
<th>Lmax (dB)</th>
<th>Lpk (dB)</th>
<th>8 hr Dose</th>
<th>8 hr Proj. Dose</th>
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<tbody>
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<td>J</td>
<td>P</td>
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<td>8:25</td>
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<td>100.7</td>
<td>90.0</td>
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**Location Description**

- F: Dewalt Reciprocating Saw
- G: Evolution 180 with crates - used with pump #3
- H: Milwaukee - used with pump #3
- I: Porter Cable #1 - used with pump #2
- J: Porter Cable #2 - used with pump #4
- K: Evolution 180 with 1/4" stainless steel

**Calibration by:** Jeana M. Harrison  
**Sampling by:** Jeana M. Harrison
### 6.5.2 Air Sampling Data

**INTERNATIONAL UNION OF OPERATING ENGINEERS**  
**INTERNATIONAL ENVIRONMENTAL TECHNOLOGY AND TRAINING CENTER**  
1293 Airport Road Beaver, WV 25813  
(304) 253-8674  Fax: (304) 253-1384

**Industrial Hygiene Air Sampling Data: Information**

- **Mfr.:** SKC  
- **Lot No.:** 762  
- **Cassette:** 37 mm  
- **Filter:** PVC  
- **Pore size:** 5.0 µm  
- **Face:** O/C Closed

**Analytical Method:** 500  
**Tube:** NA

- **Date:** (m/d/y)  
- **Time (H:M):**  
- **Temp (°F):**  
- **Pres. (Hg):**  
- **RH (%):**

### Personal Sampling Data

- **Name:**  
- **Job title/description:**  
- **Analytical Method:** 500  
- **Tube:** NA

- **PPE used:** full-facepiece respirator with G/V cartridges, ear plugs, Tyvek suits, gloves

- **Ventilation:** HEPA vacuum for containment

### Use 24 hour Military Time (24HH:MM)

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Type</th>
<th>Date (M/D/Y)</th>
<th>Instrument</th>
<th>Serial No.</th>
<th>Start Time (H:M)</th>
<th>Stop Time (H:M)</th>
<th>Total (min)</th>
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<tr>
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<td>8575</td>
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<td>2</td>
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<td>15:51</td>
<td>71</td>
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</tbody>
</table>

**Sample No. 111**  
Location: Inside Permacon with DeWalt

**Task:** Cutting fiberglass reinforced plywood boxes

**Comments:**

**Sample No. 112**  
Location: BLANK

**Blank No.**  
**Task:**

**Comments:**

**Sample No. 113**  
Location: Inside Permacon with Evolution 180

**Blank No.**  
**Task:** Cutting fiberglass reinforced plywood boxes

**Comments:**

**Sample No. 114**  
Location: Area outside Permacon; near inlet

**Blank No.**  
**Task:** Cutting fiberglass reinforced plywood boxes

**Comments:**

**Sampling by:** Jeana M. Harrison  
**Signature:**

**Sampling by:** Jeana M. Harrison  
**Signature:**
# Industrial Hygiene Air Sampling Data: Information

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<tr>
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</tr>
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<td></td>
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</thead>
<tbody>
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<td>Comments:</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Location: Inside Permacon with Milwaukee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Task: Cutting fiberglass reinforced plywood boxes</td>
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<tr>
<td>Comments:</td>
<td>Lost filtration in Permacon for 5 minutes</td>
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<table>
<thead>
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<tr>
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<table>
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### Industrial Hygiene Air Sampling Data: Information

**Project:** FIU - Saws  
**Address:** Hemispheric Center for Environmental Technology  
**Address:** Florida International University  
**Address:** 10555 West Flagler St, CEAS 2100  
**C/S/Z:** Miami, FL 33174  
**Phone:** 305-348-2590  
**Fax:** 305-348-6308

**Personal Sampling Data**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Analytical Method:</th>
<th>Mfr.:</th>
<th>Media:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500</td>
<td>SKC</td>
<td></td>
</tr>
</tbody>
</table>

**PPE used:** full-facepiece respirator with G/V cartridges, ear plugs, Tyveck suits, gloves

**Ventilation:** HEPA vacuum for containment

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Date (M/D/Y)</th>
<th>Type</th>
<th>Time (H:M)</th>
<th>Instrument Serial No.</th>
<th>Fume</th>
<th>Use 24 hour Military Time (24HH:MM)</th>
<th>Total (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>119</td>
<td>8/15/01</td>
<td>B</td>
<td>13:30</td>
<td>8572</td>
<td>4</td>
<td>Start  Stop Start  Stop Start  Stop  Start  Stop</td>
<td>30</td>
</tr>
<tr>
<td>120</td>
<td>8/15/01</td>
<td>A</td>
<td>13:35</td>
<td>8572</td>
<td>4</td>
<td>14:00</td>
<td>25</td>
</tr>
<tr>
<td>121</td>
<td>8/16/01</td>
<td>P</td>
<td>8:25</td>
<td>8682</td>
<td>2</td>
<td>9:30  10:25</td>
<td>90</td>
</tr>
<tr>
<td>122</td>
<td>8/16/01</td>
<td>A</td>
<td>8:30</td>
<td>8682</td>
<td>2</td>
<td>10:25</td>
<td>115</td>
</tr>
</tbody>
</table>

**Comments:**

**Sample No. 119**  
Location: BLANK

**Sample No. 120**  
Location: Outside Permacon; near inlet

**Sample No. 121**  
Location: Inside Permacon with Porter Cable #2

**Sample No. 122**  
Location: Outside Permacon; near inlet

**Comments:**

**Sample No. 119**  
Location: Outside Permacon; near inlet

**Sample No. 120**  
Location: Outside Permacon; near inlet

**Sample No. 121**  
Location: Inside Permacon with Porter Cable #2

**Sample No. 122**  
Location: Outside Permacon; near inlet

**Comments:**

**Sampling by:**  
Jeana M. Harrison  
Signature: Date:  
Jeana M. Harrison  
Signature: Date:
# Industrial Hygiene Air Sampling Data: Information

<table>
<thead>
<tr>
<th>Mfr.</th>
<th>Cassette</th>
<th>Filter</th>
<th>Pore size</th>
<th>Face</th>
<th>Analytical Method</th>
<th>Tube</th>
<th>Treat.</th>
<th>Date</th>
<th>Time (H:M)</th>
<th>Temp (°F)</th>
<th>Pres. (&quot;Hg)</th>
<th>RH (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKC</td>
<td>37 mm</td>
<td>PVC</td>
<td>5.0 µm</td>
<td>O/C</td>
<td>500</td>
<td>NA</td>
<td>NA</td>
<td>8/16/01</td>
<td>8:30</td>
<td>10:25</td>
<td>115</td>
<td></td>
</tr>
</tbody>
</table>

**Project:** FIU - Saws  
**Address:** Hemispheric Center for Environmental Technology  
**C/S/Z:** Miami, FL 33174  
**Phone:** 305-348-2590  
**Fax:** 305-348-6308

**Personal Sampling Data**

- **Name:** Jeana M. Harrison  
- **Job title/description:**  
- **Location:** BLANK  
- **Task:**  
- **Comments:**  

**Samples**

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Type</th>
<th>Date (M/D/Y)</th>
<th>Instrument</th>
<th>Serial No.</th>
<th>Use 24 hour Military Time (24HH:MM)</th>
<th>Total (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>B</td>
<td>8/16/01</td>
<td></td>
<td></td>
<td>8:30-10:25</td>
<td>115</td>
</tr>
<tr>
<td>0</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>0</td>
</tr>
</tbody>
</table>

**Comments:**

- Ventilation: HEPA vacuum for containment  
- PPE used: full-facepiece respirator with G/V cartridges, ear plugs, Tyveck suits, gloves  
- **other:**  

**Address:** 3737 West Flagler St, CEAS 2100  
**Phone:** 305-348-2590  
**Fax:** 305-348-6308  
**Phone:** 305-348-2590  
**Fax:** 305-348-6308

**Sampling by:** Jeana M. Harrison  
**Signature:**  
**Date:**

**Sampling by:** Jeana M. Harrison  
**Signature:**  
**Date:**
# Industrial Hygiene Air Sampling Data: Information

**Project:** FIU - Saws  
**Address:** Hemispheric Center for Environmental Technology  
**Address:** Florida International University  
**Address:** 10555 West Flagler St, CEAS 2100  
**C/S/Z:** Miami, FL 33174  
**Phone:** 305-348-2590  
**Fax:** 305-348-6308  

## Personal Sampling Data

<table>
<thead>
<tr>
<th>Name:</th>
<th>Date:</th>
<th>Min:</th>
<th>Max:</th>
<th>Tube:</th>
<th>Face:</th>
<th>Open/Closed</th>
<th>RH (%)</th>
<th>Others Sampling Method</th>
<th>PPE Used:</th>
<th>Ventilation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeana M. Harrison</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Use 24 hour Military Time (24HH:MM)

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Date (M/D/Y)</th>
<th>Instrument Serial No.</th>
<th>Start (M/D/Y)</th>
<th>Stop (M/D/Y)</th>
<th>Total (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B176962</td>
<td>8/13/01</td>
<td>8572</td>
<td>13:40</td>
<td>15:33</td>
<td>113</td>
</tr>
<tr>
<td>B176969</td>
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<td>14:40</td>
<td>15:50</td>
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<tr>
<td>B177013</td>
<td>8/14/01</td>
<td>8682</td>
<td>9:20</td>
<td>9:47</td>
<td>27</td>
</tr>
<tr>
<td>B176956</td>
<td>8/14/01</td>
<td>8682</td>
<td>10:50</td>
<td>11:47</td>
<td>57</td>
</tr>
</tbody>
</table>

## Sample Details

- **Sample No. B176962**  
  **Location:** Inside Permacon with DeWalt Reciprocating Saw  
  **Task:** B176962  
  **Comments:**

- **Sample No. B176969**  
  **Location:** BLANK  
  **Task:** B176969  
  **Comments:**

- **Sample No. B177013**  
  **Location:** Inside Permacon with Evolution 180  
  **Task:** 177106  
  **Comments:** Evolution saw began to smoke, therefore use was discontinued

- **Sample No. B176956**  
  **Location:** Inside Permacon with Milwaukee  
  **Task:** 177106  
  **Comments:**

---

**PPE used:** full face-piece respirator with G/V cartridges, ear plugs, Tyvek suits, gloves

**Ventilation:** HEPA vacuum for containment

---

**Sampling by:** Jeana M. Harrison  
**Signature:**  
**Date:**
# Industrial Hygiene Air Sampling Data: Information

**Mfr.:**

**Lot No.:**

**Cassette:** mm

**Filter:**

**Pore size:** µm

**Face:** (O/C)

**Analytical Method:**

**Tube:**

**Treat.:** (m/d/y)

**Date (m/d/y):**

**Time (H:M):**

**Temp:** (°F)

**Pres.:** (Hg)

**RH:** (%)

## Personal Sampling Data

**Name:**

**Job title/description:**

**PPE used:** full face-piece respirator with G/V cartridges, ear plugs, Tyvek suits, gloves

**Ventilation:** HEPA vacuum for containment

## Contaminant(s) Sampled

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>P,A,B</th>
<th>Date (M/D/Y)</th>
<th>Instrument Name</th>
<th>Serial No.</th>
<th>Use 24 hour Military Time (24HH:MM) Total (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B177106</td>
<td>B</td>
<td>8/14/01</td>
<td>Zefon</td>
<td>9:25</td>
<td>11:47</td>
</tr>
<tr>
<td>B176951</td>
<td>P</td>
<td>8/15/01</td>
<td>Zefon</td>
<td>8575</td>
<td>3</td>
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<tr>
<td>3</td>
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<td>13:57</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B177168</td>
<td>B</td>
<td>8/15/01</td>
<td>Zefon</td>
<td>13:30</td>
<td>14:00</td>
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<tr>
<td>B176997</td>
<td>P</td>
<td>8/16/01</td>
<td>Zefon</td>
<td>8575</td>
<td>3</td>
</tr>
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<td>8:25</td>
<td>9:30</td>
<td>9:50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Sample No.

**Location:** BLANK

**Task:**

**Comments:**

---

**Location:** Inside Permacon with Porter Cable #1

**Task:**

**Comments:**

---

**Location:** BLANK

**Task:**

**Comments:**

---

**Location:** Inside Permacon with Porter Cable #2

**Task:**

**Comments:**

---

**Sampling by:** Jeana M. Harrison

**Signature:**

**Date:**

---

**Sampling by:** Jeana M. Harrison

**Signature:**

**Date:**
# Industrial Hygiene Air Sampling Data: Information

## Project: FIU - Saws

### Address:
Florida International University  
10555 West Flagler St, CEAS 2100  
Miami, FL 33174  

### Phone:
305-348-2590  
Fax: 305-348-6308

## Personal Sampling Data

<table>
<thead>
<tr>
<th>Name:</th>
<th>Job title/description:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PPE used:</th>
<th>Ventilation:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Contaminant(s) Sampled and Media

<table>
<thead>
<tr>
<th>Contaminant(s) Sampled</th>
<th>Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust: 0</td>
<td>Mfr.: Zefon</td>
</tr>
<tr>
<td>Fume: 0</td>
<td>Lot No.: 2522</td>
</tr>
<tr>
<td>Gas: 0</td>
<td>Cassette: 25 mm</td>
</tr>
<tr>
<td>Mist: 0</td>
<td>Filter: MCE</td>
</tr>
<tr>
<td>Vapor: 0</td>
<td>Pore size: 0.8 µm</td>
</tr>
<tr>
<td>Other: Fiberglass (fiber count)</td>
<td>Face: (O/C) open</td>
</tr>
</tbody>
</table>

### Analytical Method and Tube:

<table>
<thead>
<tr>
<th>Analytical Method</th>
<th>Tube:</th>
</tr>
</thead>
<tbody>
<tr>
<td>7400</td>
<td>na</td>
</tr>
</tbody>
</table>

### Date (M/D/Y), Time (H/M), Temp (°F), Pres. ("Hg), RH (%)

<table>
<thead>
<tr>
<th>Start</th>
<th>Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30</td>
<td>10:25</td>
</tr>
</tbody>
</table>

### Use 24 hour Military Time (24HH:MM)

<table>
<thead>
<tr>
<th>Total (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>115</td>
</tr>
</tbody>
</table>

### Personal Sampling Data

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Date (M/D/Y)</th>
<th>Instrument Serial No.</th>
<th>Pump Use 24 hour Military Time (24HH:MM)</th>
<th>Total</th>
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<tbody>
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<td>8:30 10:25 115</td>
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</table>

### Sample No. B176957

- **Location:** BLANK
- **Blank No.** Task:

### Comments:

**Sample No. 0**

- **Location:**  
- **Blank No.** Task:

### Comments:

**Sample No. 0**

- **Location:**  
- **Blank No.** Task:

### Comments:

**Sample No. 0**

- **Location:**  
- **Blank No.** Task:

### Comments:

**Sampling by:** Jeana M. Harrison  
**Signature:**  
**Date:**

**Sampling by:** Jeana M. Harrison  
**Signature:**  
**Date:**

---

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6.6 Acronym List

ACGIH  American Conference of Governmental Industrial Hygienists
AIHA  American Industrial Hygiene Association
cfm  Cubic feet per minute
dBA  Decibels in A-weighted scale
DOE  Department of Energy
f/cc  Fibers per cubic centimeter
FIU  Florida International University
HCET  Hemispheric Center for Environmental Technology
HEPA  High Efficiency Particulate Air
IUOE  International Union of Operating Engineers
JHA  Job Hazard Analysis
mg/m³  Milligrams per cubic meter
MSDS  Material Safety Data Sheet
NETL  National Energy Technology Laboratory
NIOSH  National Institute for Occupational Safety and Health
NMAM  NIOSH Manual of Analytical Methods
OENHP  Operating Engineers National Hazmat Program
OSHA  Occupational Safety and Health Administration
PEL  Permissible Exposure Limit
PPE  Personal protective equipment
REL  Recommended Exposure Limit
sp. wg.  Static pressure water gauge
TLV  Threshold Limit Value
TSDS  Technology Safety Data Sheet
TWA  Time-weighted average