Appendix D – Dredging Equipment Cut Sheets
800 X2 Specifications

Standard Equipment

- KAB 855 sliding/reclining air-suspension seat with adjustable 4-inch armrests, lumbar support and retractable seat belt
- Safety glass front window with auto lock, windshield washer and wiper with intermittent speeds, Lexan side and rear tinted windows
- 4-position tilting consoles with memory position and hydraulic lock-out
- Auto climate control ac and heat
- Air filtration system with micro filter, horn, interior light, digital clock, hour meter, floor mat, cup holder, sun shade, storage, LH and RH rear view mirrors
- Travel alarm with cancel switch
- Vandal guarding with both-on POS capability
- EPA Tier III diesel engine
- Common rail fuel injection
- Turbocharger with intercooler
- Neutral safety start
- Idle start
- Glow plug pre-heat
- Auto engine warm-up
- Reverse/cooling fan
- Auto idling system
- One-speed
- Dual remote filter oilers with water separator
- Double element air filter with in-cab restrictor indicator
- Reversible fan
- External fuel gauge
- Remote, full-flow engine oil filter
- Grease pump engine oil drain
- EPF Engine Protection
- Emergency engine stop
- Open-center hydraulic system
- Four selectable work modes including attachment mode
- Auto power boost
- Auto swing priority
- Pre-set auxiliary pump settings - 10
- Auxiliary valve
- Stackable main control valve
- Auxiliary pipe brackets
- Control levers pre-wired for auxiliary
- Pattern change mechanism
- Long undercarriage
- Sealed and lubricated track chain
- Two-speed with auto shift and straight travel
- Planetary drive
- Spring-applied, hydraulic release brake
- Hydraulic track adjust
- Swing guard belly pan
- Attachment control valve
- Vandal locks with common key
- 27,600 lb (12,500 kg) counterweight with lifting eyes
- Hand rail
- Tool box
- Cathodic
- EMES (Extended Maintenance System) 1,000 hour service interval throughout entire attachment except bucket
- HD bucket linkage
- Attachment control valve
- Arm and boom speed assistance
- Arm and boom regeneration
- Arm and boom holding valves
- Cylinder cushion
- Centralized lubrication
- Bucket anti-clatter device
- Illuminated LCD service monitor
- On-board diagnostic system
- Anti-theft device
- 12-volt accessory outlet
- 70-watt work lights on boom and upper

Options

- Booms: 27’ 7” - 8” (8.40 m) Standard
- 23’ 5” - 7” (7.25 m) Mass
- Arms: 9’ 6” - 3” (2.96 m)
- 12’ 3” - 6’ (3.68 m)
- 14’ 7” - 4.5’ (4.47 m)
- 16’ 8” - 5’ (5.02 m)
- Tracks: 36” - (900 mm) - 3 bar-grouser
- 26” - (650 mm) - 2 bar-grouser
- 30” - (750 mm) - 2 bar-grouser
- Hydraulic system:
  - Single-acting with switch activation
  - Multifunction with switch activation
  - Thumbs hydraulic with switch activation
- Coupler
- ESCO quick-coupler
- Hydraulic counterweight removal
- Fine swinging
- Fog guard
- Front-guard - mash or bars
- Full-length track guards

Swing
- Swing speed: 0 – 6.0 rpm
- Tail swing: 194.1 rpm
- Swing torque: 196,600 lbf-ft (268.5 kN·m)

Hydraulic System
- Open-center system, two variable displacement axial piston pumps and one gear pump for pilot controls. main control valve with one 4-spool valve and one 4-spool valve with auxiliary spool - stackable, oil cooler; auto power boost; boom and arm holding valves, swing ring gear, 6 micron return filter, brass.
- Hydraulic Pumps
  - Maximum flow: 2 x 130 gpm (2 x 150 l/min)
  - Pilot pump maximum flow: 7 gpm (27 l/min)
- Relief Valve Settings
  - Boom, Arm / (1) 450 psi (31 bar)
  - Power Boost Mode: 490 psi (34 bar)
  - Standard: 360 psi (25 bar)
- Travel circuit: 490 psi (34 bar)

Hydraulic Cylinders
- Number of cylinders – bore x rod x stroke
- Boom: 2 – 7.9 x 5.5 x 74.5
- (200 mm x 140 mm x 1,900 mm)
- Arm: 1 – 8.5 x 5.9 x 86.2
- (215 mm x 150 mm x 2,200 mm)
- Bucket: 1 – 7.5 x 5.1 x 61.2
- (190 mm x 130 mm x 1,555 mm)
- (Mass excavator):
  - 1 – 8.5 x 5.9 x 86.2
  - (215 mm x 150 mm x 2,200 mm)

Hydraulic Oil Filtration
- Return filter: 6 micron
- Filter flow: 8 micron
- Suction bronze: 100 micron

Engine
- Isuzu 4M60/1Y15S-02 Tier 3 turbocharged diesel engine with electronic fuel control, 6-cylinder, water-cooled, EGR with cooler, air-to-air intercooler, fuel cooler, auto idle start, neutral safety start, glow plugs, auto warm-up, EPF engine protection, dual stage fuel filter, remote oil filter, closed oil drain.
- SAE net horsepower: 495 HP (369 kW)
- With fan pump: 495 HP (369 kW)
- Without fan pump: 532 HP (397 kW)
- Maximum torque: 1,680 lb-ft (2,300 N-m)
- Displacement: 17.6 L
- Starter: 24V 170 W
- Alternator: 90 amperes
- 140 amp hours

Cab and Controls
- Pressure cast with climate control ac and heat with dedicated LCD monitor, illuminated switch switches, low-effort controls pre-wired for hydraulic, control pumps, charging system, Lexan touch side glass, safety glass front window with automatic isolating system and vandall cover, intermittent windshield wiper, emergency rear view mirror, polycarbonate roof hatch with sunshade, stainless steel cabin suspension with four fluid mountings, KAB rockercasing air-suspension seat, sliding 6-position tilting control consoles, AVFM radio, digital clock, glove box, seat belt, cup holder, storage compartments, floor mat, boot tray, sun visors, 32-in (800 mm) digital clock, 24-volt cigarette lighter, 12-volt outlet, travel alarm, ashtray, coat hooks, cup holder, storage compartments, floor mat, boot tray, sun visors, 32-in (800 mm) digital clock, 24-volt cigarette lighter, 12-volt outlet, travel alarm.
- Auxiliary power for accessories, right- and left-side controls.
- LH and RH rear view mirrors.
- AM/FM stereo with mute button, digital clock, floor mat, footrests, center consol3e, AM/FM radio, digital clock, dome light, seat belt, coat hooks, cup holder, storage compartments, floor mat, boot tray, sun visors, 32-in (800 mm) digital clock, 24-volt cigarette lighter, 12-volt outlet, travel alarm, ashtray, 24-volt cigarette lighter, 12-volt outlet, travel alarm.
- Front-guard: 3 per side
- Track roller: 3 per side
- Track link pitch: 10.24” (262 mm)
- Shoe width: 78.5 (1,993 mm)
- Ground pressure: 33.52 psi (0.96 bar)

Coolant and Lubricant Capacity

Fuels: 7.28 gal. (27 l)
- Diesel: 3.58 gal. (13.8 l)
- Oil: 3.57 gal. (13.5 l)
- Gasoline: 3.57 gal. (13.5 l)

Cooling System
- Capacity: 35 gal. (133 l)

Swing
- Swing speed: 0 – 6.0 rpm
- Tail swing: 194.1 rpm
- Swing torque: 196,600 lbf-ft (268.5 kN·m)

Attachment
- Excavator Boom (Standard): 27’ 7” - 8” (8.40 m)
- Excavator Boom (Mass): 23’ 5” - 7” (7.25 m)

Available Arms (Standard)
- Digging Force:
  - 12’ 4” boom: 178,800 lbs (81,100 kg)
  - 19’ 4” boom: 220,160 lbs (99,900 kg)
  - 14’ 11” boom: 295,410 lbs (134,000 kg)
- Bucket (19’ 4” boom): 44,110 lbs (20,000 kg)
- Bucket (14’ 11” boom): 78,010 lbs (35,400 kg)

Available Arms (Mass)
- Digging Force:
  - 9’ 2” boom: 71,200 lbs (32,200 kg)
  - 12’ 0” boom: 105,600 lbs (47,900 kg)
- Bucket (9’ 2” boom): 96,670 lbs (43,400 kg)
- Bucket (12’ 0” boom): 105,600 lbs (47,900 kg)

Operating Weight
- Standard Excavator: Working weight with 29’ 5” (750 mm) draw, 27’ 7” - 8” (8.40 m) boom, 27,600 lb. (12,500 kg) counterweight
- Mass Excavator: Working weight with 26’ 5” (750 mm) draw, 23’ 5” - 7” (7.25 m) boom, 9’ 2” (2.9 m) arm, 7,600 lb. (3400 kg)
- Standard Excavator: 178,600 lbs (81,000 kg)
- Mass Excavator: 178,800 lbs (81,100 kg)
800 X2 Specific tions

Working Ranges

800 X2

Machine equipped with 27’ 7” (8.40 m) boom

<table>
<thead>
<tr>
<th>Arm</th>
<th>12’ 0” Arm (3.66 m)</th>
<th>14’ 7” Arm (4.44 m)</th>
<th>16’ 5” Arm (5.00 m)</th>
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<tbody>
<tr>
<td>A.</td>
<td>Maximum reach</td>
<td>40’ 6” (12.31 m)</td>
<td>49’ 2” (14.99 m)</td>
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<td>@ ground level</td>
<td>45’ 3” (13.81 m)</td>
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<td>B.</td>
<td>Maximum reach</td>
<td>45’ 5” (13.86 m)</td>
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<td>@ ground level</td>
<td>42’ 9” (13.07 m)</td>
<td>44’ 7” (13.59 m)</td>
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<td>C.</td>
<td>Maximum dig depth</td>
<td>28’ 1” (8.57 m)</td>
<td>30’ 9” (9.39 m)</td>
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<td>@ ground level</td>
<td>29’ 2” (8.86 m)</td>
<td>31’ 2” (9.54 m)</td>
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<td>D.</td>
<td>Maximum dig height</td>
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<td>167°</td>
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<tr>
<td>E.</td>
<td>Maximum dump height</td>
<td>13’ 1” (3.99 m)</td>
<td>15’ 8” (4.78 m)</td>
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<tr>
<td>F.</td>
<td>Digging depth - 8 (2.44 m) level bottom</td>
<td>28’ 1” (8.57 m)</td>
<td>30’ 9” (9.39 m)</td>
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<td>G.</td>
<td>Bucket rotation</td>
<td>167°</td>
<td>167°</td>
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<td>H.</td>
<td>Maximum vertical wall depth</td>
<td>21’ 2” (6.44 m)</td>
<td>25’ 5” (7.75 m)</td>
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800 X2 Mass Excavator

Machine equipped with 23’ 5’’ (7.35 m) boom

<table>
<thead>
<tr>
<th>Arm</th>
<th>9’ 9” Arm (2.98 m)</th>
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<tr>
<td>A.</td>
<td>Maximum reach</td>
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<tr>
<td></td>
<td>@ ground level</td>
</tr>
<tr>
<td>B.</td>
<td>Maximum reach</td>
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<td>@ ground level</td>
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<tr>
<td>C.</td>
<td>Maximum dig depth</td>
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<tr>
<td>D.</td>
<td>Maximum dig height</td>
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<tr>
<td>E.</td>
<td>Maximum dump height</td>
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<tr>
<td>F.</td>
<td>Digging depth - 8 (2.44 m) level bottom</td>
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<tr>
<td>G.</td>
<td>Bucket rotation</td>
</tr>
<tr>
<td>H.</td>
<td>Maximum vertical wall depth</td>
</tr>
</tbody>
</table>

Preliminary Transportation Specific tions

Catwalk

Weight:
- Right side - 3 sections: Total weight: 414 lbs. (188 kg)
- Left side - 4 sections: Total weight: 454 lbs. (206 kg)
  - Dimension A: 3’ 6” (10.66 m)
  - Dimension B: 4’ 3” (12.91 m)
  - Dimension C: 4’ 3” (12.91 m)
  - Dimension D: 4’ 7” (13.92 m)

Boom with Arm Cylinder and Piping

Arm with Bucket Cylinder and Linkage

Boom Cylinder

Weight: 1,775 lbs. (805 kg)
  - Dimension A: 1’ 3” (40 m)
  - Dimension B: 9’ 7” (2.93 m)
  - Dimension C: 2’ 2” (0.67 m)
Hydraulic Clamshell Bucket - Model HC5 & HC6

**CYLINDERS**
* 5 or 6 inch Bore
* Oversized and pressure tested
* Designed for underwater applications

**OPTIONAL CUTTING EDGES**
* Bolt on reversible bottom and partial side lips
* Bolt on teeth
* Rubber sealed lip
  * Weld on or Bolt on (Patent No. 9,388,023)
* Lap sealed lip - weld on only
* Round Nose
* Radius Corners

**PINS & BUSHINGS**
* Pins are machined from 4140 heat treated steel
* Bushings are extra heavy, thick walled and made of chromium molybdenum 4140/42
- Material upgrades available for pins, bushings, lips and bowl plates
- Dust or environmental covers available

**ROTATION**
* Design available for direct mount, knock-around or power rotation
* Underwater rotation option available

**Cylinders**
* Designed for underwater applications

**Pins & Bushings**
* Pins are machined from 4140 heat treated steel
* Bushings are extra heavy, thick walled and made of chromium molybdenum 4140/42

**One Year Warranty Against Manufacturer Defects**
# Hydraulic Clamshell Bucket - Model HC5 & HC6

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<th>Height Open</th>
<th>Height Closed</th>
<th>Length Open</th>
<th>Length Closed</th>
<th>Width</th>
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<th>Model HC6 Weight</th>
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<td>5’ 0”</td>
<td>7’ 8”</td>
<td>8’ 8”</td>
<td>7’ 0”</td>
<td>4’ 2”</td>
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<tr>
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<td>8’ 7”</td>
<td>10’ 4”</td>
<td>7’ 3”</td>
<td>5’ 8”</td>
<td>6,000</td>
<td>6,600</td>
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<td>3.5 cu yd</td>
<td>5’ 4”</td>
<td>8’ 7”</td>
<td>10’ 4”</td>
<td>7’ 3”</td>
<td>6’ 0”</td>
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<td>8’ 7”</td>
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<td>9’ 0”</td>
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<td>11’ 1”</td>
<td>8’ 8”</td>
<td>12,000</td>
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*COMMON SIZES LISTED—ANVIL CAN MANUFACTURE CUSTOM SIZE BUCKETS TO FIT YOUR REQUIREMENTS

* All weights include 360 power rotation, subtract 200lbs for no rotation

REV. 11.4.16

PO Box 216/261 Highway 19
Slaughter, Louisiana 70777
USA

225.654.8222

www.anvilattachments.com

sales@anvilattachments.com
**600 LX Tier 3 Material Handler**

### Standard Equipment

- **InteLux® Computer Control System**
- **Five selectable working modes**
- **Auto Work Mode**
- **Attachment Work Mode**
- **Auto power-up mode**
- **Free swing control**
- **Cushioned attachment control**
- **Auto power swing**
- **Illuminated LCD service monitor**
- **Self-diagnostic system**
- **Tier III Isuzu diesel engine with electronic control**
- **Auto idle start**
- **Auto engine warm up**
- **Auto idling system**
- **One-touch idle**
- **Low idle up**
- **Reversible cooling fan**
- **Fuel cooler**
- **Low noise/low vibration cab floating on 6 fluid filled mounts**
- **Sliding/reclining, suspension cloth upholstery seat**
- **3-position tilting consoles**
- **Climate control heater and air conditioner**
- **4th position on left console for storage**
- **Low noise/low vibration cab floating and lumbar support, retracting seat belt lock-out and exiting the cab also serves as control**
- **Safety glass front windows with automatic lock and intermission rise-up windshield wiper and washer, large LEAN® rear / side windows**
- **12 volt accessory outlet for cell phones / audio extras**
- **Horn, interior lighting, AM/FM STEREO radio, digital clock, floor mat, cigarette lighter**
- **Rear view mirror, coat hook, storage compartment**
- **Gate lock and gate lock lever (control lock-out device)**
- **Single pedal travel**
- **Travel alarm**
- **Common key for cab & house doors, engine hood, tool box, and fuel cap**
- **Vandalism locks/grafting**
- **Hand grab rails both sides**
- **Nephron® hydraulic filtration system**
- **Boom and arm holding valves**
- **Integral cylinder cushioning**
- **Upper and lower undercovers**
- **Long undercarriage**
- **Sealed and lubricated track**
- **Fastening Straps**
- **Young 54’ reach 3-piece material handling attachment or Young 55’ reach 2-piece material handling attachment**

### Options

- **25 kW Baudler generator with Hubbell controller. Hydraulic driven package installed. Includes attachment magnet link.**
- **72” manual tilt cab riser with platform, stairs and railing**
- **90” manual tilt cab riser with platform, stairs and railing**
- **Clamshell bucket - standard weight material model (up to 3,000 lbs per cubic yard)**
- **Hydraulic cab riser: factory installed**

### Travel Dimensions - Hydraulic Riser

- **Young 2-piece ... number of cylinders – bore x rod x stroke**
- **Boom / arm / bucket**
- **Swing circuit**
- **Travel circuit**
- **Maximum flow**
- **Boom / arm / bucket**
- **Swing circuit**
- **Travel circuit**

### Hydraulic System

- **Two variable displacement axial piston pumps and one gear pump for pilot controls, one 4-spool valve and one 5-spool valve with auxiliary spool**

### Hydraulic Pumps

- **Two variable volume piston pumps provide power for attachment, swing and travel**
- **Boom / arm / bucket**
- **Swing circuit**
- **Travel circuit**

### Lubricant and Coolant Capacity

- **Manufacturer**
- **Lubricant**
- **Coolant**
- **Lubricant and Coolant Capacity**

### Cab and Controls

- **Cab mounted on 6 fluid filled mountings. Features include safety glass windows, sliding front window with auto lock. Windshield washer and wiper, heater, air conditioner, AM/FM radio with auto-tuner, floor mat, skylight window and right and rear side mirrors. KAB 515 operators seat with manual weight adjustment, seat height and tilt adjustment, adjustable headrest, backrest angle adjustment, adjustable pivoting arm rests and seat belt. Control pattern selector valves. Reliable soft-touch switches.**
- **Heater output**
- **A/C output**
- **Swing**
- **Fixed displacement axial pump motor. Internal ring gear with grease cavity for swing pinion. Swing bearing is single row shear type ball bearing. Swing cushion valve and dual stage relief valves for smooth swing deceleration and stops. Mechanical disc swing brake. Swing speed**
- **Tail swing**
- **Swing torque**
- **Undercarriage**
- **Control Valve**
- **Central Valve**
- **Control Valve**

### Engine

- **Isuzu® AH-61UX1X55S six cylinder, diesel engine turbocharged with air cooled intercooler, electronic fuel injection, 362 Net HP (270 kW) without fan pump, 329 Net HP (249 kW) with fan pump, 4 cycle, water cooled, double element air filter with restriction indicator, EPA Tier III compliant.**
- **SAE net horsepower ... 1,950 rpm Maximum torque ... 1,058 lbs. ft (1,453 Nm) @ 1,450 rpm**
- **Starters**
- **Alternator**
- **Air cleaner**
- **Governor**
- **Electronic Battery**

### Travel System

- **Variable displacement axial piston motor, two speed independent hydraulics travel with compact drive, disc type parking brakes. All hydraulic components mounted within the width of side frame.**
- **Max. travel speed**
- **Gravability**
- **Traction Force**
- **Lubricant and Coolant Capacity**

### Attachment Options

- **Young 2-piece**
- **Young 3-piece**

### Operating Weight

- **Working weight with 29.5” (750 mm) shoes, 50’ 2-piece attachment, 6’ cab riser**
- **Working weight with 29.5” (750 mm) shoes, 54’ 3-piece attachment, 6’ cab riser**
### 600 LX Tier 3 Material Handler

#### Travel Dimensions

- **Height:** 37' 9" (11.5 m)
- **Lifting Capacities:**
  - End Side:
    - Front: 5' 3" (1.60 m)
    - Rear: 5' 3" (1.60 m)
  - Side:
    - Front: 12' 2" (3.72 m)
    - Rear: 12' 2" (3.72 m)
- **Lift Dimensions:**
  - Front: 3.6 m
  - Rear: 3.6 m
  - Side: 3.29 m
- **Lift Clearances:**
  - Front: 3.6 m
  - Rear: 3.6 m
  - Side: 3.29 m

### Lifting Capacities

#### 600 LX Material Handler w/ two piece 55' (16.76 m) Young Attachment

<table>
<thead>
<tr>
<th>Grapple Pos</th>
<th>Height</th>
<th>10° (0.18 m)</th>
<th>15° (0.27 m)</th>
<th>20° (0.44 m)</th>
<th>25° (0.67 m)</th>
<th>30° (1.01 m)</th>
<th>35° (1.52 m)</th>
<th>40° (2.03 m)</th>
<th>45° (2.45 m)</th>
<th>50° (3.05 m)</th>
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<td>End</td>
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</table>

#### Notes:

1. Lifting capacities shown should not be exceeded. Weight of all lifting accessories must be deducted from the above lifting capacities.
2. Lifting capacities are in compliance with ASME B30.25 SCRAPP & MATERIAL HANDLERS.
3. Lifting capacities are based on machine standing on firm, uniform supporting surfaces. User must make allowances for jobs such as soft or uneven ground, sudden dropping of loads, or other unfavorable job conditions.
4. Lifting capacities shown do not exceed 75% of minimum lifting loads or 87% of hydrostatic capacities.
5. Capacities marked with an asterisk (*) are limited by hydraulic capacities.
6. Lash-up position must be low.
7. Operator should be fully acquainted with the Operator's Manual & Operating Safety Booklet, furnished by the manufacturer before operating the machine.
8. Capacities apply only to the machine as originally manufactured & normally equipped by LBX Company LLC.
The Flexifloat Construction System

Robishaw Engineering’s Flexifloat Construction System® is a combination of standardized, interlocking flotation modules and modular attachments for use in inland-marine, heavy construction projects such as bridge building, underwater excavation, expedient bridging and material transport. The system is optimally designed for use in shallow water and in locations that are inaccessible to conventional barges and inland-marine construction equipment.

Components of the Flexifloat System are designed and dimensioned for ease of handling, freedom of transport and simplicity of assembly. All units are sized for efficient road-transport by conventional tractor/trailers.

The Flexifloat System incorporates a simple high-strength, integral locking system that enables flotation modules to be interconnected side-to-side, end-to-end or end-to-side. Using ordinary hand tools, construction crews can easily assemble individual modules into larger, custom-shaped assemblies capable of providing the necessary buoyancy and stability for on-deck construction machinery and supplies.

Modular attachments, including ramp and rake sections, anchoring spuds, hydraulic and mechanical winch systems and ancillary attachments allow further customization of assemblies to meet the specific needs of the user.

The Flexifloat Construction System provides flexible and economic solutions to marine construction needs.
**Built Tough, Sized for the Job**

Flexifloats are precision-built, steel pontoons specifically designed for shallow-draft, inland-marine environments. They are heavily reinforced to withstand repeated use under extreme load conditions. The internal design is optimized to provide high structural rigidity and exceptional deck-bearing capacity.

Flexifloats are manufactured in three different depths, or **Series**. Additionally, there are two standard lengths within each series; full-length **Quadrafloats**, and half-length **Duofloats**. These depth and length combinations permit the user to size and shape a barge to match specific job requirements.

<table>
<thead>
<tr>
<th>Series</th>
<th>Width</th>
<th>Depth</th>
<th>Duofloats</th>
<th>Quadrafloats</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-50</td>
<td>7.5'</td>
<td>3.8'</td>
<td>15'</td>
<td>30'</td>
</tr>
<tr>
<td>S-50</td>
<td>10'</td>
<td>5'</td>
<td>20'</td>
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</tr>
<tr>
<td>S-70</td>
<td>10'</td>
<td>7'</td>
<td>20'</td>
<td>40'</td>
</tr>
</tbody>
</table>
Easy and Economical to Transport

Flexifloats are optimally dimensioned for truck transport either as single or multiple, stacked units. To facilitate handling, a simple, single-point, recessed lifting device is centrally located in the deck of each unit.
Fast Connections, No Loose Parts

Flexifloat sectional barges are connected by a high-strength locking system. Utilizing opposing “male” and “female” locks, the connection is simple, quick and positive. The locking system is completely integral to both modules and attachments and has no separate pins, bolts, or other loose parts which may be lost or damaged.

Locks are designed for on-deck operation by inexperienced personnel using ordinary hand tools. The design and manufacture of the locking system is so precise that, once engaged, the connection is near-rigid with no discernible play between modules.
**Shaped Assemblies, Strong and Versatile**

Flexifloat modules are easily connected side-to-side, end-to-end or end-to-side to form larger platforms of various shapes suitable for all types of marine transport and construction applications. Hulls configured with the proper combination of Quadrafloat and Duofloat modules provide significant increases in structural strength and overall barge versatility.
Easily Add Attachments to Meet Project Requirements

Standardized attachments and accessories are available which may be added to Flexifloat platforms to enhance their operational capability. Attachments are truck-transportable and, in most cases, incorporate the same locking system so that they may be quickly and easily added to any assembly.
Whatever the Job

Flexifloat modular barges and attachments can be assembled into floating and elevated platforms that will effectively solve the flotation and bridging problems found in shallow-water marine applications.

There is virtually no limit to the practical application of Flexifloat technology.

Crane Barges
Pile Driving Barges
Dredge Barges
Elevated Platforms
Floating Docks
Expedient Bridging
Ferries & Transports
Drilling Barges
The Robishaw Value Equation Includes Experience, Free Consultation and Nationwide Inventory.

Robishaw Engineering’s staff is uniquely qualified to assist our clients and prospective customers with a comprehensive analysis of their flotation needs and provide recommendations and economical solutions to their marine requirements.

**Analysis**

Working closely with clients, we develop and analyze information as to the scope of work to be performed, site conditions, access and environmental restrictions, as well as the types, weights and layouts of the equipment to be used.

**Design**

To insure proper application of the equipment, each Flexifloat assembly is uniquely designed and configured by our engineers to provide the minimum possible draft while maintaining adequate stability and absolute structural integrity under anticipated environmental and operational load conditions.

**Field Support**

Although Flexifloat equipment requires no special training for assembly and installation, Robishaw engineers are available upon customer request to provide on-site consultation and assistance.

Technical services are available free of charge and backed by qualified, on-site assistance and continuing support. Our business philosophy is based on total dedication and service to our clients, whenever and wherever they require it.

**Availability**

Flexifloat equipment is available for rental or purchase from in-stock inventories of both new and used equipment. Inventory yards are located throughout the U.S. to reduce transportation time and costs to the user.

**Give Us a Call**

800.877.1706
www.flexifloat.com
info@flexifloat.com
Appendix E – Safety Data Sheets
**Section 1 – Product Identification**

**Product Identifier**

**Product Name:** Portland Cement

**Product Codes:** Portland Cement Type I, IA, II, IIA, III, IIIA, IV, IVA, V, VA, White Cement, CSA Type GU, MS, HE, LH, HS.

This SDS covers many products. Individual constituents will vary.

**Synonyms:** Cement, cement powder, portland cement, hydraulic cement

**Product Form:** Solid / powder

**Intended Use of Product:** Portland cement is used as a binder in combination with water and aggregates to form concrete. It is also used as a component of masonry mortar and other building and construction materials.

**Name, Address and Telephone of Responsible Party**

Holcim (US) Inc.
24 Crosby Drive
Bedford, MA 01730
(888) 646-5246

**Emergency Contact Information:**
CHEMTREC: 1-800-424-9300

---

**Section 2 – Hazards Identification**

**Classification of the Substance or Mixture**

**Classification (GHS-US)**

- Skin Corrosion 1B
- Eye Damage 1
- Skin Sensitizer 1B
- Specific Target Organ Toxicity: Single Exposure (Lungs) 3

**Label Elements**

**Hazard Pictograms**

[Diagram of hazard pictograms]

**Signal Word**

Danger

**Hazard Statements**

Causes severe skin burns and eye damage

May cause an allergic skin reaction

May cause respiratory irritation

**Precautionary Statements**

**Prevention**

- Do not breathe dust.
- Wear protective gloves/protective clothing/eye protection/face protection
- Wash thoroughly after handling.
- Do not handle until all safety precautions have been read and understood.

**Response**

- **If inhaled:** Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor.
- **If in eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a doctor.
- **If on skin:** Take off immediately all contaminated clothing. Rinse skin with water. Wash contaminated clothing before reuse.
- **If swallowed:** Rinse mouth. Do NOT induce vomiting. Immediately call a poison center/doctor.

**Storage**

Store locked up.

**Disposal**

Dispose of contents/container in accordance with local/state/national regulations.

**Other Hazards**

Exposure may aggravate those with pre-existing eye, skin or respiratory conditions or illness.
### Section 3 – Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Component/Ingredient</th>
<th>CAS #</th>
<th>Percent Present (Range)</th>
</tr>
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<tbody>
<tr>
<td>Portland cement</td>
<td>65997-15-1</td>
<td>100</td>
</tr>
<tr>
<td>Tricalcium silicate</td>
<td>12168-85-3</td>
<td>20 - 70</td>
</tr>
<tr>
<td>Dicalcium silicate</td>
<td>10034-77-2</td>
<td>10 - 60</td>
</tr>
<tr>
<td>Tetracalcium aluminoferrite</td>
<td>12068-35-8</td>
<td>5 - 15</td>
</tr>
<tr>
<td>Gypsum (Calcium Sulfate)</td>
<td>13397-24-5</td>
<td>2 - 10</td>
</tr>
<tr>
<td>Tri-calcium Aluminate</td>
<td>12042-78-3</td>
<td>1 - 15</td>
</tr>
<tr>
<td>Limestone (Calcium Carbonate)</td>
<td>1317-65-3</td>
<td>0 - 20</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>1309-48-4</td>
<td>&lt; 1 - 4</td>
</tr>
<tr>
<td>Nuisance Dusts (Particulates not otherwise regulated)</td>
<td>None</td>
<td>&lt; 1 - 5</td>
</tr>
<tr>
<td>Crystalline Silica (Quartz)</td>
<td>14808-60-7</td>
<td>0 - &lt; 1</td>
</tr>
</tbody>
</table>

#### Other Components
Cement is made from materials mined from the earth and processed using energy provided by fuels. Additional materials, such as fly ash, kiln dust and slag may also be introduced into the cement manufacturing process. A chemical analysis of cement may reveal trace amounts of naturally occurring but potentially harmful chemical compounds such as free crystalline silica, organic compounds, potassium and sodium compounds, heavy metals including cadmium, chromium (including hexavalent chromium), nickel and lead. Other trace constituents may include calcium oxide (also known as free lime or quick lime) and organic compounds from grinding aids such as amine acetate salts, glycols and 1,2-ethanediol.

### Section 4 – First Aid Measures

#### Description of First Aid Measures

- **Eyes**: Rinse eyes and under lids cautiously with clean water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.
- **Skin**: Remove contaminated clothing. Remove dry material from skin, but avoid creating dust. Wash with plenty of water. If skin irritation occurs, get immediate medical advice/attention.
- **Inhalation**: Remove person to fresh air away from dust and keep comfortable for breathing. If coughing persists, obtain medical attention.
- **Ingestion**: Do not induce vomiting. If subject is conscious, rinse the mouth with water to remove any material and drink plenty of water to dilute any swallowed material. Do not give drink or attempt to force water to an unconscious person. Get medical advice/attention.

#### Important Symptoms and Effects (Acute and Delayed)

- **Eyes**: Causes serious eye irritation and may scratch eye surface due to particle abrasion. May cause chemical burns resulting in corneal damage.
- **Skin**: Causes skin irritation if exposed to moisture on skin creating redness, dryness and itching. Extended exposure to wet material will result in chemical burns to skin, possibly severe.
- **Inhalation**: May irritate nose and throat if dust is inhaled. Prolonged or repeated inhalation of respirable dust may lead to respiratory tract or lung damage.
- **Ingestion**: May cause irritation and burns of mouth, throat, stomach and digestive tract if swallowed.

#### Recommendations for Immediate Medical Care or Special Treatment

Seek immediate medical attention for inhalation of large quantities of dust or exposure of wet material over large areas of skin. Seek immediate medical attention if material comes into contact with eyes and cannot be immediately removed.

### Section 5 – Fire Fighting Measures

#### General Fire Hazards
None. Material is not considered flammable or combustible.

#### Extinguishing Media
Use water or water spray to extinguish any fires involving this material.

#### Extinguishing Media to Avoid
None.

#### Hazards of Combustion
None.

#### Fire Fighting Recommendations
Firefighters should always wear full protective gear to fight any fire.

Refer to Section 9 for flammability information.
Section 6 – Accidental Release Measures

Precautions
Avoid creating dust. Prevent material from entering sewers, drains, ditches or waterways.

Personal Protection
Wear respiratory protection and protective eyewear/clothing to avoid eye or skin contact.

Emergency Procedures
Ventilate area and avoid creating dust. Remove unnecessary persons from area.

Containment Procedures
Barricade solid material to prevent additional spillage.

Clean Up Procedures
Scoop or vacuum up spilled material while avoiding dust creation. Scoop up wet material and place in approved container. Allow wet material to harden before disposal.

Section 7 – Handling and Storage

Safe Handling Practices
Avoid contact with skin or eyes. Avoid breathing dust. Use only in well ventilated areas. Wear appropriate personal protective equipment to prevent eye or skin contact and use respiratory protection equipment if dusty or in poorly ventilated areas.

Safe Storage Measures
Store in well-ventilated areas away from moisture and incompatible materials. If stored in containers, keep containers closed when not in use.

Incompatible Materials
Water/moisture exposure will cause material to generate heat. Keep away from fluoride compounds, strong acids, alkalines, and oxidizers. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas.

Section 8 – Exposure Controls & Personal Protection

Exposure Limits for Individual Components

<table>
<thead>
<tr>
<th>Component</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
<th>NIOSH REL</th>
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</thead>
<tbody>
<tr>
<td>Portland cement</td>
<td>15 mg/m³ (T); 5 mg/m³ (R)</td>
<td>1 mg/m³ (R)</td>
<td>10 mg/m³ (T); 5 mg/m³ (R)</td>
</tr>
<tr>
<td>Tricalcium silicate</td>
<td>15 mg/m³ (T); 5 mg/m³ (R)</td>
<td>Not listed</td>
<td>10 mg/m³ (T); 5 mg/m³ (R)</td>
</tr>
<tr>
<td>Dicalcium silicate</td>
<td>15 mg/m³ (T); 5 mg/m³ (R)</td>
<td>Not listed</td>
<td>10 mg/m³ (T); 5 mg/m³ (R)</td>
</tr>
<tr>
<td>Tetracalcium aluminoferrite</td>
<td>15 mg/m³ (T); 5 mg/m³ (R)</td>
<td>Not listed</td>
<td>10 mg/m³ (T); 5 mg/m³ (R)</td>
</tr>
<tr>
<td>Gypsum (Calcium Sulfate)</td>
<td>15 mg/m³ (T); 5 mg/m³ (R)</td>
<td>10 mg/m³ (T)</td>
<td>10 mg/m³ (T); 5 mg/m³ (R)</td>
</tr>
<tr>
<td>Tri-calcium Aluminate</td>
<td>15 mg/m³ (T); 5 mg/m³ (R)</td>
<td>Not listed</td>
<td>10 mg/m³ (T); 5 mg/m³ (R)</td>
</tr>
<tr>
<td>Limestone (Calcium Carbonate)</td>
<td>15 mg/m³ (T); 5 mg/m³ (R)</td>
<td>10 mg/m³</td>
<td>10 mg/m³ (T); 5 mg/m³ (R)</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>15 mg/m³</td>
<td>10 mg/m³ (I)</td>
<td>Not established</td>
</tr>
<tr>
<td>Nuisance Dusts (PNOR)</td>
<td>15 mg/m³ (T); 5 mg/m³ (R)</td>
<td>10 mg/m³</td>
<td>Not established</td>
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<tr>
<td>Crystalline Silica (Quartz)</td>
<td>10 mg/m³ (R) /(% SiO₂ + 2)</td>
<td>0.025 mg/m³ (R)</td>
<td>0.05 mg/m³ (R)</td>
</tr>
<tr>
<td></td>
<td>30 mg/m³ (T) /(% SiO₂ + 2)</td>
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</table>

Exposure Controls

Engineering Controls
Use outdoors in well-ventilated areas; otherwise employ natural or mechanical ventilation to maintain exposure within applicable limits.

Personal Protection
Avoid contact with skin or eyes. Avoid creating or breathing dust.

Face and Eyes
Safety glasses with side shields or protective goggles should be worn while using this product. For extremely dusty conditions, non-vented goggles or goggles with indirect venting are recommended. Avoid contact lens wear when using this product.

Body
Long sleeved shirts and trousers should be worn while using this material. Wear water-proof boots. If working in dusty conditions, impervious over garments are recommended.

Respiratory
If exposure levels cannot be maintained below acceptable limits, suitable particulate-filtering facemasks or respirators approved by MSHA/NIST should be worn in accordance with the user’s respiratory protection program and OSHA/MSHA guidelines.

Hands
Protective gloves with wrist/arm cuffs should be worn to avoid direct contact with skin.

Section 9 – Physical and Chemical Properties

<table>
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<th>Physical State</th>
<th>Solid, powder</th>
<th>Specific Gravity</th>
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</thead>
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<tr>
<td>Appearance &amp; Color</td>
<td>Grey/off-white powder</td>
<td>Flash Point/Method</td>
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<tr>
<td>Odor</td>
<td>None</td>
<td>Auto Ignition Temperature</td>
<td>Not determined</td>
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<tr>
<td>pH</td>
<td>&gt;12 (in water)</td>
<td>Lower Flammability Limit</td>
<td>Not applicable</td>
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<tr>
<td>Boiling Point</td>
<td>Not applicable</td>
<td>Upper Flammability Limit</td>
<td>Not applicable</td>
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<td>Solubility (Water)</td>
<td>Slight (&lt;5%)</td>
<td>Octanol/H₂O Coefficient</td>
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<td>Evaporation Rate</td>
<td>Not applicable</td>
<td>Viscosity</td>
<td>Not applicable</td>
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<tr>
<td>Melting Point</td>
<td>Not determined</td>
<td>Freezing Point</td>
<td>Solid at room temperature</td>
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<tr>
<td>Vapor Density</td>
<td>Not applicable</td>
<td>Explosion Risk: Static</td>
<td>Not considered a hazard</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not applicable</td>
<td>Explosion Risk: Shock</td>
<td>Not considered a hazard</td>
</tr>
</tbody>
</table>
# Section 10 – Stability and Reactivity

**Reactivity**
Reacts with water creating heat and calcium hydroxide.

**Chemical Stability**
Stable at standard temperature and pressures.

**Hazardous Reactions**
None. Hazardous polymerization will not occur.

**Conditions to Avoid**
Moisture or wetting will cause exothermic heating as product cures.

**Incompatible Materials**
Avoid contact with strong acids, oxidizers, aluminum and ammonium salts.

**Decomposition Hazards**
Reacts with water to form calcium hydroxide which can irritate/damage skin. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas.

# Section 11 – Toxicological Information

**Product: Portland cement**

**Acute Toxicity**
Not classified.

**LD50/LC50 Data**
Not classified.

**Skin Corrosion/Irritation**
Causes irritation or chemical burns if exposed to moisture on skin.

**Critical Eye Damage/Irritation**
Causes serious eye injury due to chemical burns or mechanical irritation.

**Respiratory or Skin Sensitization**
Not reported/no data available.

**Germ Cell Mutagenicity**
Not reported/no data available.

**Teratogenicity**
Not reported/no data available.

**Carcinogenicity**
Material contains trace amounts of crystalline silica, which may cause lung cancer through repeated or prolonged exposure to dust.

**Specific Organ Toxicity (Single Exposure)**
Not reported/no data available.

**Specific Organ Toxicity (Repeated Exposure)**
May cause damage/disease to lungs through repeated or prolonged exposure.

**Reproductive Toxicity**
Not reported/no data available.

**Aspiration Respiratory Hazard**
Not reported/no data available.

**Symptoms: Inhalation**
Coughing, sneezing, mucous discharge and dyspnea. Extended contact may lead to chemical burns.

**Symptoms: Skin Contact**
Redness and itching. Extended contact may lead to chemical burns.

**Symptoms: Eye Contact**
Redness and itching. Extended contact may lead to corneal abrasion/ulceration.

**Symptoms: Ingestion**
Irritation and chemical burns of mouth and throat.

**Other Toxicological Information**
No additional data available.

<table>
<thead>
<tr>
<th>Components</th>
<th>Toxicity</th>
<th>Carc: IARC</th>
<th>Carc: NTP</th>
<th>Carc: OSHA</th>
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<tr>
<td>Portland cement (refer to Section 16 for more information)</td>
<td>No data</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Tricalcium silicate</td>
<td>No data</td>
<td>Not listed</td>
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<td>Not listed</td>
</tr>
<tr>
<td>Dicalcium silicate</td>
<td>No data</td>
<td>Not listed</td>
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<td>Not listed</td>
</tr>
<tr>
<td>Tetracalcium aluminoferrite</td>
<td>No data</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Gypsum (Calcium Sulfate)</td>
<td>Oral LD50 Rat &gt;2000 mg/kg</td>
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<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Tri-calcium Aluminate</td>
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<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Limestone (Calcium carbonate)</td>
<td>Oral LD50 Rat 6450 mg/kg</td>
<td>Not listed</td>
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<td>Not listed</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>Oral LD50 Rat 810 mg/kg</td>
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<td>Not listed</td>
</tr>
<tr>
<td>Nuisance Dusts (PNOR)</td>
<td>No data</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Crystalline Silica (Quartz) (refer to Section 16 for more information)</td>
<td>Oral LD50 Rat &gt;22,500 mg/kg / LC50 Carp &gt;10,000 mg/L (72 hr)</td>
<td>Group 1</td>
<td>Known</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

# Section 12 – Ecological Information

**General Ecotoxicity**
Not classified.

**Persistence and Degradability**
Not reported/no data available.

**Bioaccumulation Potential**
Not reported/no data available.

**Mobility in Soil to Groundwater**
Not reported/no data available.

**Environmental Fate**
Not reported/no data available.

**Other Environmental Precautions or Information**
Avoid release to the environment. Prevent material from entering sewers, drains, ditches or waterways.
Section 13 – Disposal Considerations

Disposal Methods
Dispose as an inert, non-metallic mineral in accordance with applicable federal, state, and local regulations.

Special Considerations
Avoid creation or breathing dust during disposal. Avoid contact with skin and eyes. Refer to Section 8 for personal protection measures.

Other Disposal Information
Prevent material from entering sewers, drains, ditches or waterways.

Section 14 – Transport Information

Proper Shipping Name
N/A – not regulated.

Hazard Class
N/A – not regulated.

UN Shipping ID Number
N/A – not regulated.

Packing Group
N/A – not regulated.

Environmental/IMDG Codes
N/A – not regulated.

Section 15 – Regulatory Information

Federal
This product contains one or more chemical components or ingredients that may require identification and/or reporting under SARA Section 302, SARA Section 311/312/313, CERCLA and/or TSCA. An examination of the components of this product should be conducted by a qualified environmental professional to determine if such identification or reporting is required by federal law.

- Components: Portland cement, Silica (Crystalline)

State
This product contains one or more chemical components or ingredients that are included or listed on the hazardous substances lists for one or more of the following states: California, Maine, Minnesota, New Jersey, Pennsylvania and Rhode Island. An examination of the components of this product should be conducted by a qualified environmental or safety and health professional to determine the specific requirements for those states.

- Components: Portland cement, Limestone (calcium carbonate), Gypsum (calcium sulfate), Silica (Crystalline)

The state of California requires the following statement (Proposition 65) in regards to this material:

- WARNING! This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

Section 16 – Other Information

Date of last revision: May 2, 2015
Prepared and reviewed by: Holcim (US) Inc. Occupational Safety & Health

Additional information regarding portland cement:
Wet portland cement can cause caustic burns to unprotected skin, sometimes referred to as cement burns. Cement burns may result in blisters, dead or hardened skin, or black or green skin. In severe cases, these burns may extend to the bone and cause disfiguring scars or disability.

Employees cannot rely on pain or discomfort to alert them to cement burns because cement burns may not cause immediate pain or discomfort. By the time an employee becomes aware of a cement burn, much damage has already been done. Accordingly, the safest method to use portland cement is to avoid contact with exposed skin completely. Cement burns can get worse even after skin contact with cement has ended. Any employee experiencing a cement burn is advised to see a health care professional immediately.

Skin contact with wet portland cement can also cause inflammation of the skin, referred to as dermatitis. Signs and symptoms of dermatitis can include itching, redness, swelling, blisters, scaling, and other changes in the normal condition of the skin. Contact with wet portland cement can cause a non-allergic form of dermatitis (called irritant contact dermatitis) which is related to the caustic, abrasive, and drying properties of portland cement.

In addition, hexavalent chromium [Cr(VI)] which may be found in portland cement in trace amounts, can cause an allergic form of dermatitis (allergic contact dermatitis, or ACD) in sensitized employees who work with wet portland cement. When an employee is sensitized, that person’s immune system overreacts to small amounts of Cr(VI), which can lead to severe inflammatory reactions upon subsequent exposures. Sensitization may result from a single Cr(VI) exposure, from repeated exposures over the course of
months or years, or it may not occur at all. After an employee becomes sensitized, brief skin contact with very small amounts of Cr(VI) can trigger ACD. ACD is long-lasting and employees can remain sensitized to Cr(VI) years after their exposure to portland cement has ended. Medical tests (e.g. skin patch tests) are available that can confirm whether an employee has become dermally sensitized to Cr(VI).

Employees who work with wet portland cement and experience skin problems, including seemingly minor ones, are advised to see a health care professional for evaluation and treatment. In cement-related dermatitis, early diagnosis and treatment can help prevent chronic skin problems.

Additional information regarding crystalline silica:
The major concern is silicosis, caused by the inhalation and retention of respirable (extremely small) crystalline silica dust particles. Silicosis can exist in several forms. Chronic or ordinary silicosis (often referred to as simple silicosis) is the most common form of silicosis, and can occur after many years of exposure to relatively low concentrations of airborne respirable crystalline silica dust. Complicated silicosis or progressive massive fibrosis (PMF) may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease. Acute silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis can be fatal.

IARC: The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs."

NTP: The National Toxicology Program (NTP), in its Thirteenth Annual Report on Carcinogens, classified "silica, crystalline (respirable)" as a known human carcinogen.

OSHA: Crystalline silica (quartz) is not regulated as a human carcinogen by the Occupational Safety and Health Administration.

Other important information:
While the information provided in this document is believed to provide a useful summary of the hazards of portland cement, the information in this document cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product.

The data furnished in this document do not address hazards that may be posed by other materials when mixed with portland cement. Users should review other relevant safety data sheets before working with this product.

The information presented in the Safety Data Sheet is based on current knowledge and publications and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not be interpreted as guaranteeing any specific property of the product.

SELLER MAKES NO WARRANTY, EXPRESSED OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HOLCIM (US) INC., EXCEPT THAT THE PRODUCT SHALL CONFORM TO CONTRACTED SPECIFICATIONS.

--END OF SAFETY DATA SHEET--
Safety Data Sheet (SDS)


<table>
<thead>
<tr>
<th>Section 1. Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Name</strong></td>
</tr>
<tr>
<td>Calciment®</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Chemical Name</strong></td>
</tr>
<tr>
<td>Calcium Oxide, Calcium Carbonate, Calcium Hydroxide</td>
</tr>
<tr>
<td><strong>Uses</strong></td>
</tr>
<tr>
<td>Soil Stabilization, De-Watering, Solidification, Fixation, Neutralization, Desulphurization, Agriculture, Cement</td>
</tr>
</tbody>
</table>

SECTION 2. HAZARDS IDENTIFICATION

**Classification of the substance or mixture**

![GHS03 Exclamation Mark](image)

GHS03 Exclamation Mark

![GHS05 Corrosion](image)

GHS05 Corrosion

**Signal word** Danger

**Hazard-determining components of labeling**

Calcium Oxide, Calcium Carbonate, Calcium Hydroxide

**Hazard Statements**

H303 May be harmful if swallowed

H315 Causes skin irritation

H319 Causes serious eye irritation

H335 May cause respiratory irritation

**Precautionary statements**

P101 If medical advice is needed, have product container or label at hand
Section 3. Composition

<table>
<thead>
<tr>
<th>Component</th>
<th>Formula</th>
<th>% Wt.</th>
<th>CAS No.</th>
<th>PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium Carbonate</td>
<td>CaCO₃</td>
<td>0-30</td>
<td>1317-65-3</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>Calcium Oxide</td>
<td>CaO</td>
<td>20-80</td>
<td>1305-78-8</td>
<td>2 mg/m³</td>
</tr>
<tr>
<td>Calcium Hydroxide</td>
<td>Ca(OH)₂</td>
<td>0-10</td>
<td>1305-62-0</td>
<td>5 mg/m³</td>
</tr>
<tr>
<td>Calcium Magnesium Carbonate</td>
<td>CaMg(CO₃)₂</td>
<td>0-30</td>
<td>16389-88-1</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>Crystalline Silica Quartz</td>
<td>SiO₂</td>
<td>0-10</td>
<td>14808-60-7</td>
<td>0.1 mg/m³ respirable</td>
</tr>
<tr>
<td>Aluminum Oxide</td>
<td>Al₂O₃</td>
<td>0-15</td>
<td>1344-28-1</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>Ferric Oxide</td>
<td>Fe₂O₃</td>
<td>0-5</td>
<td>1309-37-1</td>
<td>15 mg/m³</td>
</tr>
<tr>
<td>Magnesium Oxide</td>
<td>MgO</td>
<td>0-60</td>
<td>1309-48-4</td>
<td>5 mg/m³</td>
</tr>
<tr>
<td>Sulfur</td>
<td>SO₂</td>
<td>0-10</td>
<td>7704-34-9</td>
<td>10 mg/m³</td>
</tr>
</tbody>
</table>

SECTION 4. First-Aid Measures

Effects:

Inhalation: **Acute:** Irritation, sore throat, cough, sneezing. **Chronic:** Persistent coughing and breathing problems. Long-term exposure to silica can cause a chronic lung disorder, silicosis.

Eyes: **Acute:** Severe irritation, intense tearing, burns. **Chronic:** Possible blindness when exposure is prolonged.

Skin: **Acute:** Removes natural skin oils, blotches, itching and superficial burns in case of sweating. **Chronic:** No known effects.

Ingestion: **Acute:** Sore throat, stomach aches, cramps, diarrhea, vomiting. **Chronic:** No known effects.

Treatments:

Inhalation: Move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration.

Eyes: Immediately flush eyes with large amounts of water for at least 15 minutes. Pull back the eyelid to make sure all the lime dust has been washed out. Seek medical attention immediately. Do not rub eyes.

Skin: Flush exposed area with large amounts of water. Seek medical attention immediately.

Ingestion: Give large quantities of water or fruit juice. Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing.
### SECTION 5. Fire-Fighting Measures

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flash Point:</strong></td>
<td>Non-flammable</td>
</tr>
<tr>
<td><strong>Autoignition Temperature:</strong></td>
<td>Non-flammable</td>
</tr>
<tr>
<td><strong>Inflammability Limits:</strong></td>
<td>None, Non combustible solid, but will support combustion by liberation of oxygen</td>
</tr>
<tr>
<td><strong>Explosion Risk:</strong></td>
<td>None by itself, but heat produced by reaction with strong acids can generate steam and pressure</td>
</tr>
<tr>
<td><strong>Hazardous Combustion Products:</strong></td>
<td>Decomposes to produce calcium oxide (CaO), which can react with water to produce steam and pressure</td>
</tr>
<tr>
<td><strong>Extinguishing Media:</strong></td>
<td>Use dry chemical fire extinguisher. Do not use water or halogenated compounds, except that large amounts of water may be used to deluge small quantities of lime kiln dust. Use appropriate extinguishing media for surrounding fire conditions.</td>
</tr>
<tr>
<td><strong>Fire Fighting Instructions:</strong></td>
<td>Keep personnel away from and upwind of fire. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (self-contained breathing apparatus).</td>
</tr>
</tbody>
</table>

### SECTION 6. Accidental Release Measures

<table>
<thead>
<tr>
<th>Precaution</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual and collective precautions:</strong></td>
<td>Avoid creating conditions which release dust – use mechanical vacuums to remove dust from work spaces.</td>
</tr>
<tr>
<td><strong>Avoid inhalation of Dust:</strong></td>
<td>Wear respiratory protection – minimum NIOSH N-95 Dust Mask.</td>
</tr>
<tr>
<td><strong>Cleaning methods (Leaks &amp; Spills):</strong></td>
<td>Use personal protective equipment (eyes, skin and inhalation, see Section 8). Use dry methods (vacuuming, sweeping) to collect spilled materials. Avoid generating dust. For large spills, evacuate area downwind of clean-up area operations to minimize dust exposure. For small spills, store spilled materials in dry, sealed plastic or metal containers. Dust residue on surfaces may be washed with water.</td>
</tr>
<tr>
<td><strong>Precautions for the protection of the environment:</strong></td>
<td>May not be released into surface waters without controls (increases pH).</td>
</tr>
<tr>
<td><strong>Waste Disposal:</strong></td>
<td>Dispose according to federal, provincial/state and local environmental regulations.</td>
</tr>
</tbody>
</table>

### SECTION 7. Handling and Storage

<table>
<thead>
<tr>
<th>Section</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Handling:</strong></td>
<td>In open air or in ventilated places, avoid skin and eye contact, avoid creating airborne dust.</td>
</tr>
<tr>
<td><strong>Storage:</strong></td>
<td>Store in dry places sheltered from humidity. Keep away from acids. Keep out of reach of children.</td>
</tr>
</tbody>
</table>
SECTION 8. Exposure Controls/Personal Protection

**Exposure Limits:**

- Calcium Carbonate: \(15 \text{ mg/m}^3\) (total dust), \(5 \text{ mg/m}^3\) (respirable) (OSHA); \(10 \text{ mg/m}^3\) (ACGIH, O. Reg. 833);
- Calcium oxide: \(5 \text{ mg/m}^3\) (OSHA); \(2 \text{ mg/m}^3\) (ACGIH, O. Reg. 833);
- Calcium Magnesium Carbonate: \(10 \text{ mg/m}^3\) (ACGIH, OSHA)
- Calcium Magnesium Oxide: \(2 \text{ mg/m}^3\) (ACGIH, OSHA)
- Magnesium Carbonate: \(10 \text{ mg/m}^3\) (total dust), \(5 \text{ mg/m}^3\) (respirable) (OSHA); \(5 \text{ mg/m}^3\) (ACGIH, O. Reg. 833); \(10 \text{ mg/m}^3\) (ACGIH, O. Reg. 833);
- Calcium Hydroxide: \(mg/m^3\) (total dust), \(5 \text{ mg/m}^3\) (respirable) (OSHA); \(5 \text{ mg/m}^3\) (ACGIH, O. Reg. 833)
- Magnesium oxide: \(15 \text{ mg/m}^3\) (OSHA); \(10 \text{ mg/m}^3\) (ACGIH, O. Reg. 833)
- Silica (crystalline quartz): \(2.5 \text{ mg/m}^3\) (total dust), \(0.8 \text{ mg/m}^3\) (respirable) (OSHA); \(0.5 \text{ mg/m}^3\) (respirable – ACGIH); \(0.1 \text{ mg/m}^3\) (O. Reg. 845)

**Engineering Controls:** Use ventilation and dust collection to control exposure to below applicable limits.

**Respiratory Protection:** Wear NIOSH N-95 Dust Mask.

**Eye Protection:**

Eye protection (chemical goggles, safety glasses and/or face shield) should be worn where there is a risk of lime exposure. Contact lenses should not be worn when working with lime products.

**Hand Protection:**

Use clean dry gloves.

**Skin Protection:**

Cover body with suitable clothes (long sleeves shirts and trousers). Use over the angle waterproof caustic resistant footwear.

SECTION 9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Solid, white/tan/gray powder</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>NA</td>
</tr>
<tr>
<td>pH</td>
<td>12.4 pH graduated solution at 25º C</td>
</tr>
<tr>
<td>Melting Point</td>
<td>1410º C</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>1565º C</td>
</tr>
<tr>
<td>Flash Point</td>
<td>NA</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>NA</td>
</tr>
<tr>
<td>Flammability</td>
<td>NA</td>
</tr>
<tr>
<td>Upper/Lower Flammability</td>
<td>NA</td>
</tr>
<tr>
<td>Vapor Pressure (+tº)</td>
<td>Non volatile.</td>
</tr>
<tr>
<td>Vapor Density (air=ml)</td>
<td>Non volatile.</td>
</tr>
<tr>
<td>Relative Density</td>
<td>720-1130 kg/ m³</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>0.100 – 1.125g/100g – reactive with water to product Ca(OH)_2 with large amounts of heat</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>NA</td>
</tr>
<tr>
<td>Auto-Ignition Temperature</td>
<td>NA</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>580ºC</td>
</tr>
<tr>
<td>Viscosity</td>
<td>NA</td>
</tr>
</tbody>
</table>
### SECTION 10. Stability and Reactivity

<table>
<thead>
<tr>
<th>Stability:</th>
<th>Stable products, not very soluble.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decomposition temperature:</td>
<td>580ºC, forms calcium oxide (CaO) and water.</td>
</tr>
<tr>
<td>Reactivity:</td>
<td>Reacts with acids to form calcium salts while generating heat. Reacts with carbon dioxide in air to form calcium carbonate.</td>
</tr>
<tr>
<td>Conditions to avoid:</td>
<td>Vicinity of incompatible materials.</td>
</tr>
<tr>
<td>Incompatible materials:</td>
<td>Acids; reactive fluoridated, brominated or phosphorous compounds; aluminum (may form hydrogen gas), reactive powdered metals; organic acid anhydrides; nitro-organic compounds; interhalogenated compounds.</td>
</tr>
<tr>
<td>Hazardous decomposition products:</td>
<td>Calcium oxide (CaO).</td>
</tr>
</tbody>
</table>

### SECTION 11. Toxicological Information

<table>
<thead>
<tr>
<th>Toxicity:</th>
<th>LD$_{50}$ oral (rat) for calcium hydroxide is 7340 mg/kg. This product is not listed by MSA, OSHA, or IARC as a carcinogen, but this product may contain crystalline silica, which has been classified by IARC as (Group 1) carcinogenic to humans when inhaled in the form of quartz or cristobalite. No reported Carcinogenicity, Reproductive Effects, Teratogenicity or Mutagenicity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure Limits:</td>
<td>Refer to Section 8.</td>
</tr>
<tr>
<td>Irritancy:</td>
<td>Can cause severe irritation of eyes, skin, respiratory tract and gastrointestinal tract.</td>
</tr>
<tr>
<td>Chronic Exposure:</td>
<td>Inhalation of silica can cause a chronic lung disorder, silicosis.</td>
</tr>
</tbody>
</table>

### SECTION 12. Ecological Information

Alkaline substance that increases pH to 12.4 in a saturated water solution at 25ºC. Calcium hydroxide gradually reacts with CO$_2$ in air to form calcium carbonate (CaCO$_3$). Calcium carbonate is ecologically neutral. Uncontrolled spillage in surface waters should be avoided since the increase pH could be detrimental to fish. Harmful to aquatic life in high concentration.
SECTION 13. Disposal Considerations

Dispose according to federal, provincial/state and local environmental regulations.

SECTION 14. Transportation Information

Classification:  
TDG: Not listed for ground transportation  
HMR: Not listed for ground transportation

TDG: Transportation of Dangerous Goods Regulation (Canada)  
HMR: Hazardous Materials Regulation (USA)

SECTION 15. Regulatory Information

Symbol:  
WHMIS Rating  
D2A, E  
NFPA RATING  
HEALTH-3 SPECIFIC HAZARD – ALK  
FLASH POINTS-0  
REACTIVITY-1  
HMIS RATING  
HEALTH-2 SPECIFIC HAZARD – ALK  
FLASH POINTS-0  
REACTIVITY-1

SECTION 16. Other Information

Original Prepared: 05/13/13  
Revision Date: 07/15/13  
Revision #: 0

Calciment can be removed from vehicles using rags dampened with dilute vinegar. After applying dilute vinegar, vehicles (especially chrome surfaces) must be washed with water.

The information contained herein is believed to be accurate and reliable as of the date hereof. However, Mintek Resources, Inc. makes no representation, warranty or guarantee as to results or as to the information's accuracy, reliability or completeness. Mintek has no liability for any loss or damage that may result from use of the information. Each user is responsible to review this information, satisfy itself as to the information's suitability and completeness, and circulate the information to its employees, customers and other appropriate third parties.
Appendix F – Trudeau Mining Permit
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Facility DEC ID 5-1544-00011

PERMIT
Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To: TRUDEAU SAND & GRAVEL INC
PO BOX 235
SARANAC LAKE, NY 12983-0235
(518) 891-1940

Facility: TRUDEAU SAND PIT
NYS RT 3/3 MILES NE OF SARANAC LAKE
(SARANAC LAKE, NY 12983

Facility Location: in ST ARMAND in ESSEX COUNTY
Facility Principal Reference Point: NYTM-E: 572.2 NYTM-N: 4913.8
Latitude: 44°22'26.0" Longitude: 74°05'37.5"

Authorized Activity: The mining of sand and gravel with material processing on lands owned by the permittee. Approved operations will affect 39.4 acres over the permit term. The affected area is a portion of a 96 acre life of mine area, as identified in the approved mined land use plan.

Permit Authorizations

Mined Land Reclamation - Under Article 23, Title 27
Permit ID 5-1544-00011/00002 (Mined Land ID 50085)
Renewal Effective Date: 7/23/2016 Expiration Date: 7/22/2021

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: KEVIN R BLISS, Deputy Regional Permit Administrator
Address: NYSDEC Region 5 Warrensburg Sub-Office
232 Golf Course Rd
Warrensburg, NY 12885

Authorized Signature: [Signature]
Date 7/6/16

Page 1 of 6
SUMMARY AND AUTHORIZATION

This permit amends Permit 90-71CR5 to authorize continuation of a commercial sand and gravel extraction in an area classified Rural Use and Industrial Use, by the Official Adirondack Park Land Use and Development Plan Map in the Town of St. Armand, Essex County.

This amended permit shall expire unless recorded in the Essex County Clerk's Office on or before February 6, 2017, in the names of all persons listed above and in the names of all owners of record of any portion of the project site on the recordation date.

The project shall be undertaken in compliance with all conditions stated herein. Failure to comply with this permit is a violation and may subject the permittee, successors, and assigns to civil penalties and other legal proceedings.

This amended permit does not convey any right to trespass upon the lands or interfere with the riparian rights of others in order to undertake the authorized project, nor does it authorize the impairment of any easement, right, title or interest in real or personal property. Nothing contained in this amended permit shall be construed to satisfy any legal obligations of the permittee to comply with all applicable laws and regulations or to obtain any governmental approval or permit from any entity other than the Agency, whether federal, State, regional or local.

PROJECT SITE

1. The project site is a 122± acre vacant parcel of land located on the west side of NYS Route 3, 3± miles north of the Village of Saranac Lake in the Town of St. Armand, which is owned by Trudeau Sand and Gravel, Inc., the applicant. It is