Blasting Plan

Hawks Pointe Plat 6

Roscoe, IL

Northern Illinois
Service Co.

SX Blasting
N59 W14601 Bobolink Avenue
Menomonee Falls, WI 53051

1. Scope of Blasting Project

The Blasting will occur for the Hawks Pointe Plat 6 project in The Village of Roscoe, IL. The purpose of the blasting operation is to fracture the 800 C.Y. of bedrock in order for Northern Illinois Service to excavate the project utilities. SX Blasting is anticipating blasting multiple times a day between the hours of 9:00 AM & 5:00 PM. Blasting will take place for 12-15 days. Weather permitting.

2. Types of blasting

The blasting procedure that is going to be utilized for the project is a basic 3'x4' staggered pattern. The pattern size, spacing, and charge weight is determined by the quality and volume of bedrock encountered on-site. The specific setup and layout is further explained below.

3. Location of Shots and Proximity to Existing Structures.

In this particular case, the blasting is taking place withing 500 ft of existing residences. SX Blasting will be working with property owners for pre/post blast inspections. SX Blasting will be using the existing clay/sand overburden and Rubber Tire Blasting Mats if needed to prevent debris from flying into the air as the actual blasting occurs.

4. Hole-to-Hole Propagation Mitigation:

Using the proposed drill pattern, explosive, and delay timing, Hole to Hole propagation is not anticipated for the following reasons;

***Only Cartridge Explosives will be used to prime and charge the holes**.* The amount of explosives per bore hole will be limited by using a smaller pattern and hole diameter if necessary.

***Shot timing will be designed in a manner to reduce the risk of propagation.**

Type of Explosives/Initiation System to be used:

Austin Shock Star Non-Electric

Surface: Delay and in the hole Detonator Assembly17/350 Millisecond Delay

Austin Ex Gel 2" x 16"

Ex Gel is a high-energy premium specialty dynamite product that is pre-compression resistant.

Connectors (non-electric)

Austinite WR

(*All Blasting materials will be stored in BATF approved magazines (off-site); the Blasting Agents and Detonators will be stored in separate magazines and will be separated by the distance required by ATF P 5400.7 table 555.220.)*

6. Drill and Blast Pattern:

The drilling and blasting program will be based on a 3'x4' staggered pattern for this project with a 3" diameter hole. The drill pattern will be established using a scale distance factor of 55. This shot

pattern may be adjusted on a site-specific basis to compensate for the different geology and nearby structures.

7. Charge Weight and Delays:

Delays will be used to control the vibration as well as limiting the transmission of energy below the damage levels at any structure. The delay pattern will be created to provide the most efficient use of energy to fracture the rock without creating excessive vibration. The main type of delays will be Austin MS-17ms over 350ms. The amount of explosives used in each hole will be limited to the scale of distance and the volume of material blasted. SX Blasting may also utilize a decking system to further reduce the pounds per delay to reduce any excessive ground vibration.

8. Flyrock Control Plan:

A licensed Blaster will carefully design and install all of the shots to control fly rock when on-site. In addition, all hole loading activity, and blast mat placement will also be under the supervision of the same licensed Blaster in charge. He will communicate continually with the drillers to obtain information on the quality of the rock in each shot in order to make the necessary field adjustments that may need to take place. SX Blasting will also install a quality minus 3/8" crushed stone stemming material to completely fill the drill holes above the explosives. This standard practice has been used on U.S. Corps of Engineers projects for decades to reduce the chance for fly rock.

9. Site Security Before, During and After the Blasting Procedure:

The Blaster in Charge is responsible for posting personnel at designated locations creating a 100' diameter perimeter around the blast zone to ensure that there is a "clear area" during the shot procedure. The guards/flaggers will be made up of SX Blasting employees as well as the General Contractor's employees if needed. Before, during, and after the blasting operation the SX Blasting Licensed Blaster will be in complete control of the site and will be able to communicate with all of the posted guards at all times. The 100' clear area, as well as communication is to be maintained during the entire shot procedure. Any occupants of buildings within the 100' clear area will be notified to remain inside during the shot procedure or to standby, if applicable, where the Blaster-In-Charge deems safe, if outside during the procedure.

10. Signage and Signaling Procedure:

Guards will maintain direct communication with the Blaster-In-Charge via two-way radio or line of sight and carry STOP paddles if traffic needs to be paused. Guards will be stationed 5 minutes prior to the BLASTING SIGNAL.

Blast warning signs and Blast Signal signs will be placed at every access point to the blast area. The Blast Warning sign is 36" X 36" square, and reads BLASTING ZONE AHEAD and the Signal signs will be 18" X 24" and states the sequence of warning horn blasts.

WARNING SIGNAL

A 1-Minute series of long blasts 5 minutes prior to blast signal

BLASTING SIGNAL

A series of short blasts 1 minute prior to the shot

ALL CLEAR

A Prolonged horn blast following the inspection of Blast Area

Once ALL CLEAR has been signaled the Blaster-in-Charge will release the guards and notify the site manager that work may resume.

11. Peak Particle Velocity and Control:

Each blast will be monitored using Seismographic Equipment (Geo Sonics Model SSU 5500); this equipment will provide a direct peak particle velocity (PPV) reading that is indicated on a tape, as well as a decibel reading capturing sound levels.

After each blast, the peak particle velocity and decibel readings will be recorded and placed into a blast report that can be provided to the owner if requested. The chart below is used as a guideline by SX Blasting Inc.

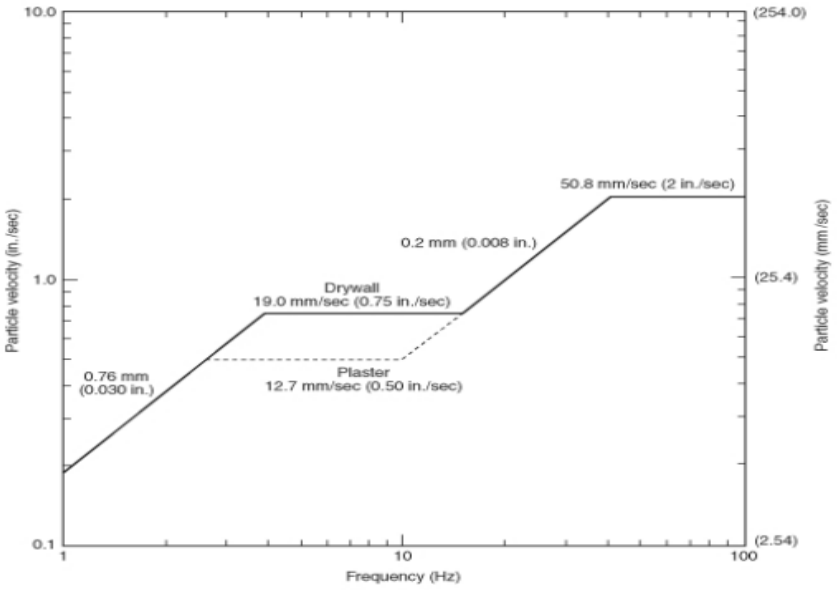

Figure 7.44 – Blasting Level Chart

History: CR 06–120: cr. Register February 2008 No. 626, eff. 3–1–08; CR 17–034: r. (4) (d), cr. (5) Register March 2018 No. 747 eff. 4–1–18.

12. Record Keeping:

The Seismograph that SX Blasting will be using will print a report and will be attached to the shot report (Blast Log) after every blast. Blasting Logs and Seismograph reports will be turned in to the General Contractor at the end of each day for review and kept for reference.

13. House Keeping:

SX Blasting employees will keep the blast site clean at all times. All empty bags, boxes, and debris will be disposed of in proper containers. At the end of a blast all detonated cap ends will be cut off and disposed of with the bags and boxes that contained the materials needed to perform the blast.

Richard Boening, Operations Manager

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Menomonee Falls, WI 53051

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Attachment A
Safety Plan

SX Blasting
N59 W14601 Bobolink Avenue
Menomonee Falls, WI 53051

Drilling & Blasting Safety Plan

Hawks Pointe Plat 6

Roscoe, IL

Northern Illinois Service Co.

SX Blasting
N59 W14601 Bobolink Avenue
Menomonee Falls, WI 53051

Table of Contents

1.Introduction

SX Blasting is committed to providing a safe workplace for its employees and all others at or near our worksites. Our goal is to conduct blasting operations in the safest manner possible while minimizing the risk of injuries and damage to property. This blasting safety plan defines our company policy regarding all work in which explosives are stored, transported and used. This safety policy will be communicated to our employees, contractors and suppliers through on-site training and regular safety meetings. These policies do not supersede any federal, state or local regulations regarding explosives or blasting work. Compliance with these policies and all applicable federal, state and local regulations will be strictly enforced.

Many policy guidelines refer to the "blast site" and "Blaster-in-Charge." For the purposes of this safety plan and federal regulations, the blast site is defined as the area where explosive material is handled during loading, including an area extending 50 feet in all directions from loaded blastholes or explosive materials. For the purposes of this safety plan, the Blaster-in-Charge is: T.B.D.

2.Blaster-in-Charge

The designated blaster-in-charge shall have complete authority over all personnel within the blast site and is responsible for all blasting activities that occur at the project. The Blaster-in-Charge shall hold all required blasting licenses, have appropriate experience and training and generally be responsible for the following:

2.1 Maintaining an explosives storage and transportation system that is safe and in compliance with all applicable regulations.

2.2 Implementing the specific blast plans that have been approved for the project.

2.3 Overseeing that all drilling and blasting work is done in a safe and efficient manner.

2.4 Inspecting field equipment to ensure its safety readiness.

2.5 Blast clearing and guarding operations.

2.6 Continuously monitoring the work habits of the blasting crew and providing corrective actions when necessary.

2.7 Ensuring that all appropriate blasting plans, reports and explosive storage records are kept and submitted as required by the project documents and regulatory agencies.

3. Hazard and Risk Assessment

The general and site-specific blasting hazards and environmental impacts will be defined for each blasting site. Blasting plans and procedures will incorporate all reasonable measures necessary to eliminate negative impacts on persons and minimize negative impacts on property and the environment. The following general hazard areas shall be reviewed to help identify potential site-specific hazards and controls for each blast site.

3.1 Define public and commercial access and traffic volumes.

3.2 Determine the relative location and condition of nearby structures.

3.3 Determine vibration and air overpressure limits (or peak water pressure limits—if blast is underwater).

3.4 Determine public and regulatory notification requirements.

3.5 Know the location and condition of all nearby utilities that are above and below the ground or water surface.

3.6 Define who is responsible for any damage, or claims of damage, to any nearby property.

3.7 Study the local area blasting history with respect to incidents, damage claims, or litigation.

3.8 Determine specific environmental impacts that might require special blasting control measures.

3.9 Define hazardous material notification requirements for employees and develop a program to implement it.

3.10 Stray current tests will be performed at blast sites before any electric detonators are used. If extraneous electricity causes current flow exceeding 0.05 amperes at a blast site, electric detonators will not be used.

4. Explosive Storage

If temporary explosive storage magazines are used on or near the site, the Blaster-in-Charge will ensure that full compliance with federal, state and local regulations governing explosive storage is maintained.

4.1 The Blaster-in-Charge will thoroughly review and understand all regulations enforced by the Federal Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) regulations, as described in the Organized Control Act of 1970, Title XI–Regulation of Explosives–Public Law 91-492 as amended by the Safe Explosives Act of November 25, 2003 with regard to:

4.2 Magazine construction requirements.

4.3 Locking requirements.

4.4 Inventory record keeping requirements.

4.5 Explosive loss reporting requirements. Immediately report by calling:1-888-ATF-BOMB

4.6 Table of distance requirements

4.7 Required magazine permits will be obtained as required by local or state authorities.

4.8 Emergency action plans will be submitted to local emergency response agencies.

5. On-Site Explosive Transportation

The Blaster-in-Charge will ensure that:

5.1 All vehicles will have appropriate safety equipment, will be properly loaded and will display adequate explosive warning signs as required by all state and federal regulations.

5.2 Passengers shall not accompany explosives.

5.3 Equipment or other materials must never share the same cargo space with explosives.

5.4 Explosive vehicles, safety equipment and day boxes shall be regularly inspected, maintained and cleaned.

5.5 All explosives, and any traces of explosives, must be removed from transportation equipment before it is serviced.

5.6 Explosives day boxes shall be properly built and marked as required by OSHA regulations.

5.7 When detonators and explosives are transported in a day box, they shall be separated by a four-inch hardwood or equivalent partition.

5.8 Only vehicles that are used for transporting or loading explosives shall be allowed on the blast site.

5.9 Proper shipping papers shall accompany explosives when they are delivered to and from the jobsite.

5.10 Explosive transportation must be undertaken under the supervision of a person who is familiar with the hazards involved and familiar with the actions required in the event of fire or other abnormal occurrence.

6. Blast Design

In many blast applications, it is often impossible to fully satisfy all of the design objectives. Therefore, some sort of trade-off analysis is needed to balance design sacrifices based on priority. In blast design work, there are usually two general types of goals:

1) safety goals
   and
2) operational goals.

Whenever safety goals conflict with operational goals, the safety concerns shall have the highest priority. For instance, producing minus 12-inch rock might be an operational objective while controlling fly-rock is a safety goal. Since the safety goals must have the highest priority, the blast plan might specify the use of a conservative amount of stemming to control rock movement, thus sacrificing rock fragmentation in the collar area. The following guidelines shall be used to evaluate all blast design choices:

6.1 Blast designs shall never compromise safety, and safety goals shall have the highest design priority.

6.2 While satisfying all primary design objectives, blast designs shall be as simple as possible.

6.3 The blast designer(s) must have thorough knowledge and understanding of the blast requirement and constraints for each individual application. If the lead blaster is unfamiliar with a particular application, design, or product, outside help shall be obtained from a consultant or explosive supplier representative who is familiar with the application or product.

6.4 Blast design geometry shall be appropriate for the application. The geology of the blast site and area control requirements must be considered when selecting hole size, explosive diameter, stemming height and all other design dimensions.

6.5 Initiation systems must provide adequate protection against stray current hazards.

6.6 Delay timing schemes shall be as simple as possible, while providing adequate burden relief and sufficiently advanced in-hole energized to prevent surface cut-off failures.

7.Blast Planning

Good advance planning and preparation work will improve blasting productivity and safety. Blast planners shall:

7.1 Determine the number, skill and experience requirements of drillers, blasters and helpers required to perform the work.

7.2 Prepare a blasting work schedule that allows for unforeseen problems or delays.

7.3 Develop plans for dealing with special environmental conditions that might occur during this work. Examples are lightning, floods, cold or hot weather, etc.

7.4 Define and obtain any special equipment that may be needed for the blasting work.

7.5 Plan to have back-up units to replace critical instruments like blasting machines and non-electric initiating devices.

7.6 The functionality of all critical instruments like blasting machines, testers, and seismographs shall be tested the day before each scheduled blast.

7.7 Spare batteries and other essential parts for blasting instruments shall be kept at the jobsite. Evaluate local services and carefully screen potential product and service providers.

7.8 Investigate explosive storage and delivery options. If it is necessary to establish a temporary magazine site, allow several months to negotiate leases and to allow for permitting.

8. Drilling

8.1 All drillers must have adequate experience and operating knowledge about each drill before they operate it.

8.2 Drillers shall perform safety inspections on all drills before they are operated. Any conditions that might cause unsafe operation shall be corrected before any drill is put into service.

8.3 Drills must be routinely serviced and lubricated as specified by the manufacturer.

8.4 All safety equipment, like hose release guards, must be properly installed.

8.5 Drillers shall monitor bit wear and penetration rates and drillers shall vary feed pressure hammer rates and other operating variables to achieve maximum bit life.

8.6 The Blaster-in-Charge shall establish a system for marking hole collar locations. Drillers shall collar holes as close as possible to the designed collar location and they shall carefully align the drill boom to guide the drill stem along the intended hole path.

8.7 The driller's primary goal is to drill properly aligned and clean holes. Driller should vary hole-flushing rates and determine which drill settings are producing the cleanest and most accurately placed holes.

8.8 Holes shall never be drilled in any positions where there is any chance they might intersect another live hole. Unless a specific condition requires drilling next to an existing hole, the minimum collar distance from a loaded hole must be greater than the planned depth of the new hole.

8.9 For surface blasting, drillers shall note any unusual conditions or adjustments to the original plan. Drill log information shall be submitted to the Blaster-in-Charge at the end of each drilling shift.

9. Blast Round Charging Operations

9.1 Use of the following personal protective equipment is mandatory:

9.1.1 Protective headgear: hardhat

9.1.2 Protective footwear: hard toe boots (Site Specific)

9.1.3 Protective eyewear: safety glasses

9.2 The following protective equipment may be used, and under certain conditions, supervisors may require their use:

9.2.1 Gloves

9.2.2 Ear protection: plugs or muffs

9.2.3 Protective clothing

9.2.4 Respirators

9.3 Safety Review Meetings: The Blaster-in-Charge shall assemble all blast crew personnel to conduct a safety review meeting before explosive loading work begins. The following issues shall be addressed at each safety review meeting:

9.3.1 Identify the Blaster-in-Charge.

9.3.2 Review personal safety responsibilities.

9.3.3 Review site specific hazards.

9.3.4 Review loading plans and procedures.

9.3.5 Assign work responsibilities.

9.3.6 Review equipment requirements and safe operation procedures.

9.3.7 Review emergency and site security procedures.

9.3.8 Review requirement that open flames or sparks must not occur on the blast site and that smoking is absolutely prohibited.

9.3.9 Confirm that the crew has the proper tools to safely perform loading and site security tasks. Equipment not specifically approved for blasting work shall not be used. Check the following (tool requirements will vary):

9.3.9.1 Non-sparking loading poles, powder punches, knives, etc.

9.3.9.2 Blasting machines or non-electric starters

9.3.9.3 Testing equipment; blasters' galvanometers/multimeters

9.3.9.4 Measuring tapes with non-sparking weights

9.3.9.5 Warning sirens

9.3.9.6 Radios, blasting area warning signs, traffic vests, first aid kit and drinking water

9.4 Blast Site Inspection:

The Blaster-in-Charge and loading crew shall inspect the blast site before loading begins. Hazards or conditions that might expose explosives to excessive pressure, heat or friction shall be corrected prior to loading. If the inspection reveals that blast-hole re-drilling is required, the re-drilling shall be done before loading commences.

9.5 All needed explosives, stemming material and other supplies shall be brought to the blast site before commencing hole-charging operations. All mobile equipment, not expressly used and approved for hole-charging charging operations shall always be kept a safe distance away from blast holes once loading begins.

9.6 All equipment and all non-essential equipment and people shall be removed from blast sites once hole charging operations begin.

9.7 Blast holes will be inspected before holes are charged.

9.8 Primers shall be prepared just before they are loaded.

9.9 When column separation is suspected, a second primer using the same delay detonator as the first primer shall be loaded into the separated portion of the column.

9.10 If damage to an initiator lead is suspected, the hole shall be re-primed with a similar primer.

9.11 When it is necessary to operate mobile equipment on the blast site, the Blaster-in-Charge shall closely monitor every movement and setup. Extreme care must be taken to ensure that detonators, initiator leads and explosives are not run over, snagged or otherwise damaged by mobile equipment. No non-essential vehicles shall be allowed on the blast site.

9.12 No sparking materials or loose rocks shall be allowed to enter blast holes after they contain explosives.

9.13 Crew members shall immediately report any dangerous conditions, such as overloaded holes, to the Blaster-in-Charge who shall develop measures to safely control the condition.

9.14 Records detailing the quantities of explosives brought to the site and used each day shall be accurately kept.

10. Initiation System Hook-Up Procedures

10.1 Blasting machines and non-electric starters must be stored away from the blast area while blasts are loaded and tied in.

10.2 Only persons designated by the Blaster-in-Charge shall participate in blast hookups. All other persons shall vacate the blast site.

10.3 Blast crews shall only use connections and hookups that are approved by the product manufacturer.

10.4 Blast hookup shall not begin until all holes have been loaded and stemmed, the blast site is clear of all vehicles and unnecessary people, and no hazards that might delay the blast exist in the blasting security zone.

10.5 The Blaster-in-Charge and one other crewmember shall independently inspect and double-check all hookups.

10.6 To prevent hookup mistakes caused by rushing to meet a blasting time limit, blasting work schedules shall allow adequate time for careful blast hookup work.

10.7 When blast hookups are completed more than one half hour before blast time, the hookup shall be inspected again just prior to detonation.

11 Blast Area Clearing and Security Procedures

11.1 Pre-blast review meeting: Before blasting, the Blaster-in-Charge shall assemble all blast crew personnel to review the blast area security plan and blast emergency plan. The Blaster-in-Charge shall cover the following issues and responsibilities at each pre-blast meeting:

11.1.1 Acknowledge the shot is properly loaded, hooked up, secured and ready for detonation.

11.1.2 Review the blasting firing time schedule.

11.1.3 Review tag/out procedures that will ensure no persons are underground when the blast occurs.

11.1.4 The Blaster-in-Charge shall specify who shall fire the shot and define the safe shot initiation location.

11.1.5 Review the communication system that shall be used between the Blaster-in-Charge and all blast area security personnel.

11.1.6 Specify what signals shall be used to announce:

11.1.6.1 Pre-blast warnings

11.1.6.2 Blast time

11.1.6.3 All clear

11.1.6.4 Blast countdown suspension

11.1.7 Outline general emergency plans that shall be used in the event of an accident or other unplanned event.

11.1.8 Review procedures for handling misfires.

11.2 Clearing and guarding procedures:

11.2.1 The Blaster-in-Charge shall coordinate blasts with all concerned parties on an approved blasting schedule.

11.2.2 A tag/out procedure will be used to ensure no persons are underground when blasts occur. A safe area around the shaft collar or tunnel portal will be established, cleared and secured.

11.2.3 When the area is secure, a primary initiating device shall be connected to the shot approximately five minutes before the scheduled blasting time.

11.2.4 The Blaster-in-Charge shall then have the five-minute blast warning signal given to warn all in the area that a blast is impending.

11.2.5 Four minutes later, the one-minute blast warning signal shall be given if all persons, including the shot-initiator, are in a safe location and all guards confirm that the blast area is still secure.

11.2.6 At blast time, if the blast area is secure, the Blaster-in-Charge shall fire or instruct the designated shot firer to fire the blast.

11.2.7 After post blast fumes have dissipated to safe levels–as verified by testing—the Blaster-in-Charge shall inspect the shot area. This examination shall look for the following:

11.2.7.1 Dangerous rock conditions

11.2.7.2 The presence of undetonated explosives and/or initiators

11.2.7.3 Abnormal blast conditions and any other hazards

11.2.8 If misfires or other hazards are present, the Blaster-in-Charge shall supervise the removal of the hazard by the most appropriate means available.

11.2.9 When the area is clear of hazards the Blaster-in-Charge shall give the “all clear” signal allowing work to resume in the area.

12 Misfire Procedures:

When blasting misfires occur or are suspected, their existence and extent must be carefully established under the direction of the Blaster-in-Charge. Under these circumstances, the Blaster-in-Charge shall do the following:

12.1 Ensure that no one enters the blast area and it remains secured for at least 15 minutes.

12.2 Develop a plan involving a minimum of people to safely re-fire, wash out or recover un-shot explosives before any other normal work resumes near the blast site.

12.3 Record the location of any potentially undetonated explosives on the blast report.

12.4 Expand the blast security area if fly-rock potential is increased when misfires are re-blasted.

13. Blast Emergency Plan

The elements of specific blast emergency plans shall vary based on the unique conditions that exist at each job site. Emergency plans shall contain the following:

13.1 Include a posted list of all emergency response telephone numbers including the following: ambulance, hospital, OSHA or MSHA district office, police, state regulatory authorities, home phone numbers of all site employees.

13.2 Clearly communicate with all site workers and supervisors.

13.3 Define notification procedures for contacting supervisors, family and regulatory agencies based on the nature of an incident or accident.

13.4 For each work site, the location of first aid kits and the identity of trained first aid providers shall be known by all workers at the site.

14.BlastReports

Individual blast reports shall be prepared for each blast. Blast reports shall include the following:

14.1 Blast date, time, location, and Blast number.

14.2 Blast geometry, including, but not limited to hole size(s), hole depths, drill pattern, number of holes, bench height and sub-drilling.

14.3 Blast-hole loading summaries, including typical hole loads, explosive types, primers, detonator delays, stemming type and quality and total explosive consumption by product.

14.4 Shot volume and powder factor calculations.

14.5 Initiation timing scheme, including in-hole delays, surface delays and planned hole firing times.

14.6 Blast effect monitoring data (if applicable), such as ground vibration levels, air overpressure and peak water pressure (if applicable).

14.7 Notes about blast results, unusual conditions, occurrences or special precautions.

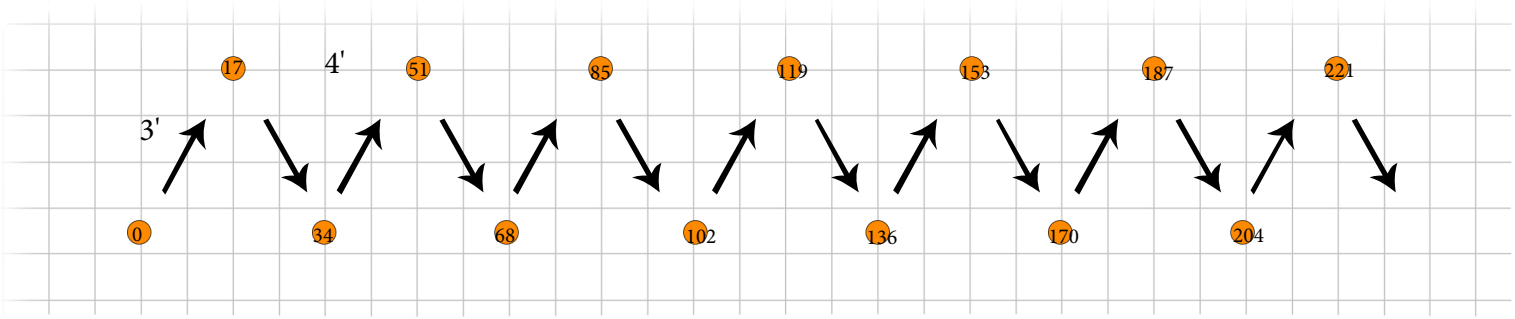
14.8 Name and signature of the Blaster-in-Charge.

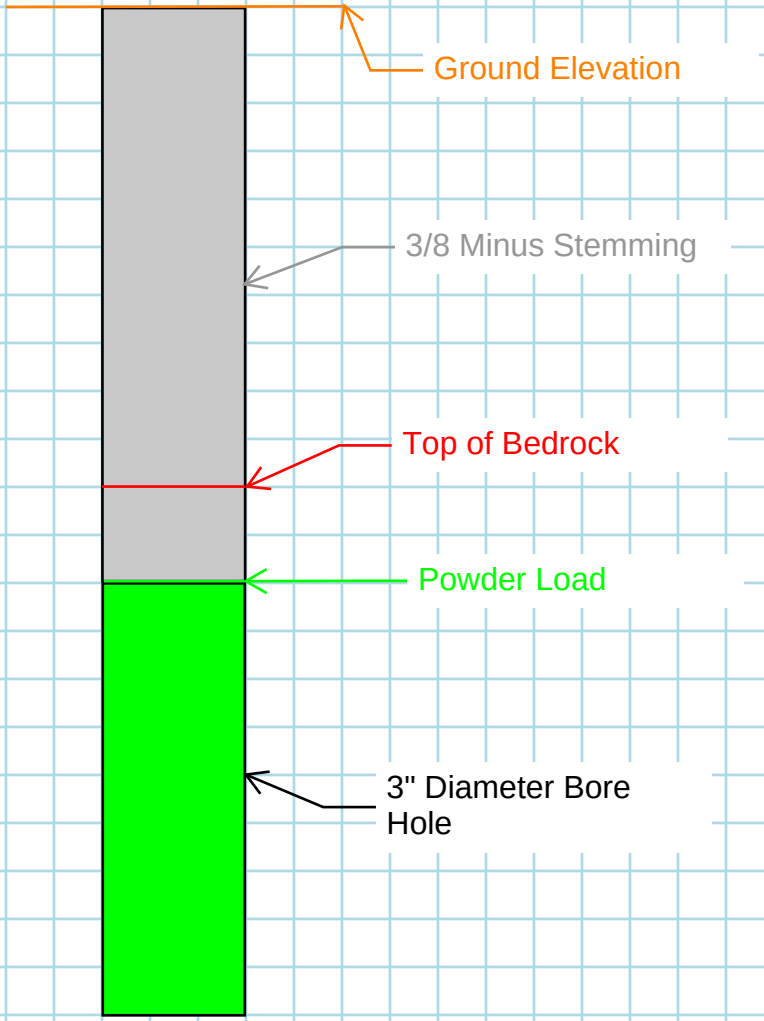
Attachment B
Blast Pattern and Hole Design

SX Blasting
N59 W14601 Bobolink Avenue
Menomonee Falls, WI 53051

Trench Rock Design

3' x 4' Staggered




Ground Elevation
3/8 Minus Stemming
Top of Bedrock
Powder Load
3" Diameter Bore Hole

Attachment C
Technical Data Sheets

SX Blasting
N59 W14601 Bobolink Avenue
Menomonee Falls, WI 53051

PRODUCT INFORMATION
BROCHURE

1.5D

Austinite

Austinite is a series of ammonium nitrate/fuel oil blasting agent products for a variety of blasting applications.

PRODUCT OVERVIEW

ADVANTAGES

Austinite 15

- Contains only high-quality technical-grade ammonium nitrate
- Optimized fuel ratio for oxygen balanced detonation.
- Excellent free flowing handling characteristics.
- Packaged in 50lb, multi-wall paper bags.

Austinite WR 300

- Simply dewater borehole and load the WR300 before water returns.
- Provides full borehole coupling.
- 10% higher VOD than conventional ANFO.
- Packaged in 50lb, multi-wall paper bags.

Austinite 7 HE

- Added Aluminum produces higher heat of reaction than conventional ANFO.
- 37% higher energy than conventional ANFO.
- Expanded patterns are possible resulting in decreased blasting costs.
- Packaged in 50lb, multi-wall paper bags.

TECHNICAL DESCRIPTION

Austinite 15 is a bagged ammonium nitrate/fuel oil (ANFO) blasting agent mixture designed for a variety of blasting applications.

Austinite WR 300 is a bagged ammonium nitrate/fuel oil (ANFO) blasting agent mixture designed for use in dewatered borehole applications with the addition of Guar Gum to aid in water resistance.

Austinite 7 HE is a bagged ammonium nitrate/fuel oil (ANFO) blasting agent mixture designed for use in borehole applications requiring higher energy levels than conventional ANFO with the addition of aluminum for increased energy.

STANDARD TECHNICAL DESCRIPTION

Ammonium nitrate/fuel oil mixture

Issued: 01/23 | Last revised: 01/23

APPLICATION RECOMMENDATIONS

- Austine Series Products must be in direct contact with an appropriate size packaged emulsion product or cast booster.
- Additional primers may be required depending on geological and borehole conditions.
- Austinite 15 is designed for use in blasting applications where bulk agents aren't practical.
- Austinite WR 300 is designed for use in blasting applications where boreholes have been previously dewatered.
- Austinite 7 HE is designed for use in blasting applications where the energy requirement within the borehole is greater than conventional ANFO.

PROPERTIES

Properties		Austinite 15	Austinite WR 300	Austinite 7 HE
Density [g/cc]		0.82	0.90	0.85
Relative Bulk Strength ‡		100	101	117
Relative Weight Strength (1)		100	111	121
Oxygen Balance [%] (1)		-1.3	-4.2	-5.9
Gas Volume		1,062	1,058	967
Water Resistance		Poor	Good	Poor
Heat of Explosion		2,157	2,185	2,523
Fume Class		1	1	1
Velocity of detonation (2)	[ft/s]	15,045	16,007	15,045
	[m/s]	4,586	4,879	4,588

Notes:
(1) Theoretical values based on Austin modeling, which assumes ideal detonation. Values calculated with other codes may differ.
(2) The velocity of detonation will depend on application, diameter, and confinement.
‡ Energy values are calculated using Explo 5, a thermo-dynamic computer code employed by Austin Powder Company. Other computer codes may give different values. ANFO = 100 @ 0.82 g/cc.

STANDARD PACKAGING

Austinite Series products are packaged in 50 lb. multi-wall paper and 25 kg plastic valve bags.

SHELF LIFE, STORAGE & DISPOSAL

- Shelf life is three months from date of manufacture under good storage conditions.
- Store in accordance with all applicable local, state, provincial and federal laws.
- Disposal of explosive materials can be hazardous. Methods of safe disposal of explosives may vary depending on the user's situation. Please contact an Austin Powder Technical Representative for information on safe practices.

TRANSPORT – UN CLASSIFICATION

Shipping Name: Explosive, Blasting, Type B
Class & Division: 1.5D
ID Number: UN 0331

US DOT REFERENCE NUMBER

EX-9303284

Austin Powder, 25800 Science Park Drive, Cleveland, OH 44112 USA
austinpowder.com | info@austinpowder.com | Phone 1-800-321-0752 | Fax 1-216-464-4418

PRODUCT INFORMATION
BROCHURE

1.1D

DYNAMITE SERIES

Austin Powder Company's **dynamites** are specially formulated nitroglycerin based products that deliver superior results in many blasting applications. Their high quality and excellent energy characteristics make them an effective and efficient product.

PRODUCT OVERVIEW

TECHNICAL DESCRIPTION

Nitroglycerin based products.

PRIMING

Use a high-strength detonator (Rock★Star®, Shock★Star® or equivalent).

ADVANTAGES

- Excellent water resistance.
- High velocity for rapid shattering action.
- All purpose explosive for many types of blasting.
- High density permits explosive power to be concentrated where the most energy is required.

Issued: 01/23 | Last revised: 01/23

PROPERTIES

Properties		Apcogel B-1™ (Semi-Gel)	60% Extra Gelatin
Density [g/cc]		1.26	1.43
Detonation Pressure [kb]		125	104
Relative Bulk Strength ‡		144	195
Fume Class		1	1
Water Resistance		Good	Excellent
Velocity of detonation	[ft/s]	15,400	17,700
	[m/s]	4,694	5,395

‡ Energy is calculated using TIGER, a thermo-dynamic computer code used by Austin Powder Company. Other computer codes may give different values. ANFO = 100 @ 0.82 g/cc.

STANDARD PACKAGING DETAILS

Cartridge Style	Cartridge Size		Weight – Lbs. per Case	Sticks per Case
	[in]	[mm]		
60% Extra Gelatin	1 x 8	25 x 200	45	140
	1 ⅛ x 8	28 x 200	45	100
	1 ¼ x 8	32 x 200	44	88
	1 ½ x 16	38 x 400	42	30
	2 x 8	50 x 200	43	34
	2 x 16	50 x 400	43	17
	2 ½ x 16	65 x 400	40	10
Apcogel B-1	1 ¼ x 8	32 x 200	38	88
	1 ½ x 16	38 x 400	36	30
	2 x 8	50 x 200	39	34
	2 x 16	50 x 400	39	17
	2 ½ x 16	65 x 400	37	10

Note: All dimensions and weights are nominal.

SHELF LIFE, STORAGE & DISPOSAL

- Shelf life is one year from the date of manufacture under good storage conditions.
- Store in accordance with all applicable local, state, provincial and federal laws.
- Disposal of explosive materials can be hazardous. Methods of safe disposal of explosives may vary depending on the user's situation. Please contact an Austin Powder Technical Representative for information on safe practices.

TRANSPORT – UN CLASSIFICATION

Shipping Name: Explosive, Blasting, Type A
Class & Division: 1.1D
ID Number: UN 0081

US DOT REFERENCE NUMBER

EX-9303286

Austin Powder, 25800 Science Park Drive, Cleveland, OH 44112 USA
austinpowder.com | info@austinpowder.com | Phone 1-800-321-0752 | Fax 1-216-464-4418

PRODUCT INFORMATION
BROCHURE

1.1D

EAGLE CAST BOOSTERS

Austin Powder's **Eagle Family of Cast Boosters** are high-density molecular explosives designed to produce high detonation pressures for optimum initiation of blasting agents. The Eagle Family of cast boosters are designed to be initiated by non-electric, electric and electronic detonators with a minimum base charge of 450mg of PETN. Eagle cast boosters are not designed for use with detonating cord.

PRODUCT OVERVIEW

TECHNICAL DESCRIPTION

Austin Powder Eagle cast boosters are manufactured with molecular explosives consisting of PETN and TNT, both of which are sensitive to severe impact, heat or friction. As with all explosives, Eagle boosters must be transported, stored and handled with care. Avoid any impact with solid surfaces.

APPLICATION RECOMMENDATIONS

- Austin Powder Eagle Cast Boosters are ideal for priming bulk agents in boreholes that are 2" or larger in diameter.
- Eagle cast boosters are NOT designed for use with detonating cord.

PRIMING RECOMMENDATIONS

- Eagle cast boosters can be initiated by non-electric, electric and electronic detonators with a minimum of a 450mg PETN base charge.
- Eagle cast boosters are NOT designed for use with detonating cord.

ADVANTAGES

- Eagle cast boosters detonate in excess of 24,000 ft. /sec (7,380 m/sec)
- Eagle cast boosters detonate with a pressure over 225 kb ensuring optimum steady state velocity for blasting agents
- Eagle cast boosters feature a fully enclosed detonator well with an internal detonator locking device
- Eagle cast boosters are poured in high visibility, impact resistant Orange polypropylene cups, and can be used in temperatures ranging from -40F - 150F
- Eagle cast boosters are highly resistant to water and oil, and feature an excellent shelf life

Issued: 01/23 | Last revised: 01/23

PROPERTIES

Properties		Value
Nominal Density [g/cm^3]		1.68
Relative Weight Strength [ANFO=100] (1)		187
Relative Bulk Strength [ANFO=0.85 g/cm^3] (1)		384
Velocity of detonation (2)	[ft/s]	24,924
	[m/s]	7,597
Detontion Pressure [kb]		239

Notes:
(1) Theoretical values based on Austin modeling, which assumes ideal detonation. Values calculated with other codes may differ.
(2) The velocity of detonation will depend on application, diameter, and confinement.
‡ Energy values are calculated using Explo 5, a thermo-dynamic computer code employed by Austin Powder Company. Other computer codes may give different values.
ANFO = 100 @ 0.82 g/cc.

STANDARD PACKAGING

Product Name	Weight		Outside Diameter		Length		Unit Per Case	Minimum Hole Diameter	
	[oz]	[g]	[in]	[mm]	[in]	[mm]		[in]	[mm]
Eagle 150	5.3	150	1.6	41	4.6	117	2	2	50
Eagle 225	8	225	1.7	43	4.8	123	64	2	50
Eagle 340	12	340	2.1	53	4.8	123	49	2.5	63
Eagle 450	16	450	2.3	58	4.8	123	36	3	76
Eagle 500*	18	510	2.6	66	4.5	115	30	4	101
Eagle 900	32	900	3.1	78	4.8	123	18	4	101

*Features a double capwell (3-hole)
Notes: All dimensions and weights are nominal. Other sizes are available upon request

STANDARD PACKAGING DETAILS

Eagle boosters are used as priming blasting agents. They are NOT designed for use with detonating cord

SHELF LIFE, STORAGE & DISPOSAL

- Shelf life is five years from date of manufacture, under good storage conditions.
- Store in accordance with all applicable local, state, provincial and federal laws.
- Disposal of explosive materials can be hazardous. Methods of safe disposal of explosives may vary depending on the user's situation. Please contact an Austin Powder Technical Representative for information on safe practices.

TRANSPORT – UN CLASSIFICATION

Shipping Name: Boosters
Class & Division: 1.1D
ID Number: UN 0042

US DOT REFERENCE NUMBER

EX-1993030285

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1.5D

HYDROMITE 600 SERIES

Hydromite 600 Series is a booster-sensitive emulsion explosive with a putty-like texture.

ADVANTAGES

- Good borehole coupling characteristics when cartridges are cut
- Exhibits excellent water resistance
- Superior resistance to dynamic pre-compression from adjacent boreholes

PRODUCT OVERVIEW

TECHNICAL DESCRIPTION

Hydromite 610 is a thickened emulsion explosive product packaged in tough plastic film cartridges.

Hydromite 611 an emulsion explosive with a putty-like texture packaged in Woven Poly Plastic (WPP) cartridges.

APPLICATION RECOMMENDATIONS

Hydromite 600 Series products are an ideal column load option for blasting applications where the use of bulk blasting agents may not be practical or economical.

PRIMING

Hydromite 600 Series products must be in direct contact with a minimum of a 1/3 lb cast booster. Depending on borehole and geologic conditions, additional primers may be required.

Issued: 11/2022 | Last revised: 11/22

PROPERTIES

Properties		Hydromite 610	Hydromite 611
Density [g/cc]		1.21	1.20
Oxygen Balance [%] (1)		-3.0	-9.3
Gas Volume [l/kg]		1,092	1,102
Relative Weight Strength [ANFO=100] (1)		91	89
Relative Bulk Strength [ANFO=0.82 g/cm^3] (1) ‡		134	130
Heat of Explosion		1,962	1,904
Detonation Pressure		97	98
Fume Class		1	1
Velocity of detonation (confined) (2)	[ft/s]	19,871	19,931
	[m/s]	6,057	6,075

Notes:
(1) Theoretical values based on Austin modeling which assumes ideal detonation. Values calculated with other codes may differ.
(2) The velocity of detonation will depend on application, diameter and confinement.
‡ Energy values are calculated using Explo 5, a thermo-dynamic computer code employed by Austin Powder Company. Other computer codes may give different values. ANFO = 100 @ 0.82 g/cc.

STANDARD PACKAGING

Cartridge Type	Cartridge Size		Cartridge Weight		Case Count
	[in]	[mm]	[lb]	[kg]	#
Plastic Film	2 x 16	50 x 400	2.38	1.08	21
	2 ½ x 16	63 x 400	3.33	1.51	15
Woven Polypropylene (WPP)	4 x 20	102 - 1219	20	9.07	100
	4.5 x 30	114 x 1473	30	13.61	70

Notes:
All dimensions and weights are nominal. Other sizes are available upon request

STANDARD TECHNICAL DESCRIPTION

Booster-sensitive emulsion/ANFO blend

SHELF LIFE, STORAGE & DISPOSAL

- Store in accordance with all applicable local, state, provincial, and federal laws.
- The disposal of explosives needs to comply with local and national laws. Contact Austin Powder with disposal questions.
- One year from the date of manufacture under good storage conditions.

TRANSPORT – UN CLASSIFICATION

Shipping Name: Explosive, Blasting, Type E
Class & Division: 1.5D
ID Number: UN0332

US DOT REFERENCE NUMBER

EX-1993050178 Hydromite 610
EX-1993050178 Hydromite 611

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austinpowder.com | info@austinpowder.com | Phone 1-800-321-0752 | Fax 1-216-464-4418

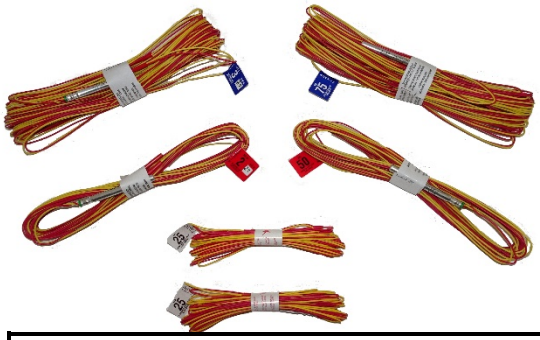
Rock★Star®Detonators

PRODUCT INFORMATION BROCHURE

Rock★Star electric detonators are designed to provide the precise control necessary to produce accurate and consistent blasting results in a variety of blasting applications in the mining, quarrying and construction industries.

ADVANTAGES

- Minimum 720 mg PETN base charge far exceeds the standard #8 strength detonator.
- Industries strongest aluminum shell reduces the possibility of water hammer effect.
- HDPE insulation for added protection from extraneous currents.
- Wide selection of delay intervals provide greater flexibility in blast design.



Electrical Data	
No Fire Current	0.25 amps
All Fire Current	1.00 amps
Series Ignition Current	1.50 amps
No Fire Impulse	2.5 mJ/ohms
All Fire Impulse	5.5 mJ/ohms
Electrostatic Sensitivity	
Double Wire to Shell	10 kV/300 pF/15 mJ
Pin to Pin	10 kV/300 pF/15 mJ

PROPERTIES

Rock★Star MS Delay Sequence													
Delay #	0	1	2	3	4	5	6	7	8	9	10	11	12
MS Time	0	25	50	75	100	125	150	175	200	225	250	275	300
Delay #	13	14	15	16	17	18	19	20	22	24	26	28	30
MS Time	325	350	375	400	425	450	475	500	600	700	800	900	1000

Length	**[ft]**	16	20	24	30	40	60	80
	[m]	4.9	6.1	7.3	9.1	12.2	18.3	24.4
Total Resistance [Ω]*		1.6	1.78	1.9	1.65	1.85	2.25	2.7

Rock★Star LP Delay Sequence*														
Delay #	0	1	2	3	4	5	6	7	8	9	10	11	12	13
MS Time	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500

** Available in 20' length only*

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Rock★Star Detonators

STANDARD TECHNICAL DESCRIPTION

Electric millisecond and long period delay detonators

STANDARD PACKAGING DETAIL

Rock★Star MS and LP Packaging						
Length		Case Weight		Case Count	NEQ per Case [g]	Wire Configuration
[ft]	[m]	[lb]	[kg]			
16	4.9	6.1	2.8	40	40	Short Fold
20	6.1	6.6	3.0	40	40	Short Fold
24	7.3	5.5	2.5	40	40	Short Fold
30	9.1	6.6	3.0	15	15	Long Fold
40	12.2	6.6	3.0	15	15	Long Fold
60	18.3	6.6	3.0	10	10	Long Fold
80	24.4	7.7	3.5	10	10	Long Fold

** All Rock★Star 24' (7.3 m) and less, have 22 AWG (0.6 mm) copper wire.*
*** All Rock★Star 30' (9.1 m) and more, have 20 AWG (0.8 mm) copper wire.*

Rock★Star MS and LP Recommended Firing Current				
Circuit Type	Single Detonator	Single Series	Parallel Series	Parallel
DC [Amps]	0.5	1.5	1.5	1.0–10.0/Detonator
AC [Amps]	0.5	2.0	2.0	1.0–10.0/Detonator

Case Dimension:	11 ¼" x 7 5/8" x 5"
	286mmx x194mm x 127mm

STORAGE

Store in accordance with all applicable local, state, provincial and federal laws.

SHELF LIFE

For optimum accuracy, use within five years from date of manufacture under good storage conditions.

TRANSPORTATION DATA

UN CLASSIFICATION

Shipping Name: Detonators, Electric
Class & Division: 1.4B
ID Number: UN 0255

US DOT REFERENCE NUMBER

EX-2006030288
EX-2010080268

For more information and service locations in your area, please contact Austin Powder Company's headquarters:

AUSTIN POWDER

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2/22/06 | 01/31/2020

Shock★Star® MS Detonators

PRODUCT INFORMATION BROCHURE

Shock★Star MS Series In-Hole Delays are available in a sequence of 31 whole number periods from instantaneous (0 ms) to 1000 ms. They are designed to be used as down-hole detonators for the initiation of cast boosters, high explosives or pneumatically loaded ANFO. In-Hole Delays come equipped with a T-Connector for compatibility with detonating cord initiation or can be initiated by an electric or non-electric detonator or approved shock tube starter device.

ADVANTAGES

- 900 mg base charge of PETN to ensure strong initiation energy under even the most extreme conditions.
- Delay composition encased in a zinc jacket to prevent performance loss due to transient pressure from nearby detonating holes.
- Equipped with a tear-proof delay tag that lists DSC, delay time, delay period and length of the detonator.
- Manufactured with bright yellow shock tubing for high visibility.

STANDARD TECHNICAL DESCRIPTION

Non-electric, millisecond delay detonators

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Shock★Star® MS Detonators

STANDARD PACKAGING DETAIL

IN-HOLE MS DETONATORS				
Length		Coil Style	Quantity	NEQ Grams
(ft)	(m)			
12	3.7	Fast 8	70	70
16	4.9	Fast 8	70	70
20	6.1	Fast 8	60	60
30	9.2	Fast 8	60	60
40	12.2	Fast 8	50	50
50	15.3	Fast 8	40	40
60	18.3	Fast 8	40	40
80	24.4	Fast 8X	30	30
100	30.5	Fast 8X	20	20
120	36.6	Fast 8X	20	20
130	39.7	Spool	10	10
150	45.8	Spool	10	10
160	48.8	Spool	10	10
180	54.9	Spool	10	10
200	61.0	Spool	10	10

Available Periods – MS Delays

Period#	0	1	2	3	4	5
Delay (ms)	0	25	50	75	100	125
Period#	6	7	8	9	10	11
Delay (ms)	150	175	200	225	250	275
Period#	12	13	14	15	16	17
Delay (ms)	300	325	350	375	400	425
Period#	18	19	20	22	24	26
Delay (ms)	450	475	500	600	700	800
Period#	28	30				
Delay (ms)	900	1000				

STORAGE

Store in accordance with all applicable local, state, provincial and federal laws.

SHELF LIFE

For optimum accuracy, use within three years from date of manufacture under good storage conditions.

TRANSPORTATION DATA

UN CLASSIFICATION

Shipping Name: Detonators Assemblies, Non-Electric
Class & Division: 1.1B, 1.4B (depending on case count)
ID Number: UN 0361

US DOT REFERENCE NUMBER

EX-2012070727
EX-2012081113

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For more information and service locations in your area, please contact Austin Powder Company's headquarters:

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1/2/02 | r 01/31/2020

Shock★Star ® Dual-Delays

PRODUCT INFORMATION BROCHURE

Shock★Star Dual-Delays combine In-Hole Delays and Quick-Relay Connectors in one product. This combination offers convenience for storage and inventorying of one product instead of two and often reduces space requirements for transportation. Connecting of blast patterns is generally faster with Dual-Delays as fewer connections are required in total. Additionally, fewer individual products used in the blast pattern reduces clutter at connection points and makes visual inspections easier. For millisecond delay blasting, Dual-Delays are available in a variety of delay configurations.

ADVANTAGES

- 900 mg base charge of PETN to ensure strong initiation energy under even the most extreme conditions (in-hole detonator only).
- Delay composition encased in a zinc jacket to prevent performance loss due to transient pressure from nearby detonating holes.
- Equipped with a tear-proof color-coded delay tag that lists DSC, delay time, delay period and length of the detonator.
- Manufactured with bright yellow shock tube for high visibility.
- Surface connector has eight tube capacity and is color-coded to surface delay time.
- Locking tabs positioned on the side of the block snap closed, securely locking tubing in place.

STANDARD TECHNICAL DESCRIPTION

Non-electric, millisecond delay detonators

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Shock★Star Dual-Delays

STANDARD PACKAGING DETAILS

Dual-Delay Detonators (DDD)

Length (ft)	Length (m)	Coil Style	Quantity	NEQ Grams
12	3.7	Fast 8	70	105
16	4.9	Fast 8	70	105
20	6.1	Fast 8	60	90
24	7.3	Fast 8	60	90
30	9.2	Fast 8	50	75
40	12.2	Fast 8	50	75
50	15.3	Fast 8	40	60
60	18.3	Fast 8	30	45
80	24.4	Fast 8 X	30	45
100	30.5	Fast 8 X	20	30
120	36.6	Fast 8 X	20	30
140	42.7	Fast 8 X	20	30
160	48.8	Spool	8	12
225	68.6	Spool	8	12

Available Delay Configurations		
17/350	25/350	42/350
17/375	25/375	42/375
17/450	25/450	42/450
17/475	25/475	42/475
17/500	25/500	42/500
17/700	25/700	42/700
Long Period (LP) – 200/5000		

STORAGE

Store in accordance with all applicable local, state, provincial and federal laws.

SHELF LIFE

For optimum accuracy, use within three years from date of manufacture under good storage conditions.

TRANSPORTATION DATA

UN CLASSIFICATION

Shipping Name: Detonators Assemblies, Non-Electric
Class & Division: 1.4B
ID Number: UN 0361

US DOT REFERENCE NUMBER

EX-2012070728
EX-2012081112

For more information and service locations in your area, please contact Austin Powder Company's headquarters:

AUSTIN POWDER

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1/2/02 | r 08/28/20

Shock★Star® Surface Connectors

PRODUCT INFORMATION BROCHURE

Shock★Star Surface Connectors include Quick-Relay Connectors and Surface Delay Connectors.

Shock★Star Quick-Relay Connectors are especially designed for the initiation of other shock tube detonators as a delay between holes or decks within a hole. Quick-Relay Connectors are equipped with connector blocks able to contain 8 outgoing shock tubes yet have a lowered base charge to reduce noise levels and shrapnel cut-off concerns. These detonators are available in 9 delays from instantaneous (0 ms) to 200 ms. **(Quick-Relay Connectors should never be used to attempt initiation of detonating cord)**.

Shock★Star Surface Delay Connectors are powerful, versatile detonators designed for compatibility with both shock tube and detonating cord initiation systems. Connector blocks are able to hold up to 8 outgoing shock tubes or initiate 10 to 200 grain detonating cord. These detonators are available in 8 delays from instantaneous (0 ms) to 200 ms.

ADVANTAGES

- Connector blocks color-coded to the delay time of the detonator.
- Equipped with a tear-proof delay tag that lists DSC, delay time and length of the detonator as well as being color coded to match the connector block.
- Manufactured with red shock tubing for easy differentiation from down-hole detonators when visually inspecting a connected blast pattern.

Quick-Relay Connector

Surface Delay Connector

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Shock★Star® Surface Connectors

STANDARD TECHNICAL DESCRIPTION

Non-electric, millisecond delay detonators for inter-deck, inter-hole or inter-row connections

STANDARD PACKAGING DETAILS

Quick Relay Connectors QRC & SDC				
Length		Coil Style	Quantity	NEQ Grams
(ft)	(m)			
12	3.7	Lariat	100	50
20	6.1	Lariat	100	50
30	9.2	Lariat	80	40
40	12.2	Lariat	60	30
50	15.3	Lariat	40	20
60	18.3	Lariat	40	20

Quick Relay Color Codes	
9 ms	Green
17 ms	Yellow
25 ms	Red
33 ms	Orange
42 ms	White
67 ms	Light Blue
100 ms	Purple
200 ms	Black

H-PAK Optional Packaging				
Length		Coil Style	Quantity	NEQ Grams
(ft)	(m)			
12	3.7	Lariat	15	7.5
20	6.1	Lariat	15	7.5
30	9.2	Lariat	10	5
40	12.2	Lariat	10	5
50	15.3	Lariat	10	5
60	18.3	Lariat	10	5

Quick Relay Connector Available Delays			
9 ms	17 ms	25 ms	33 ms
42 ms	67 ms	100 ms	200 ms
Surface Delay Available Delays			
9 ms	17 ms	25 ms	42 ms
67 ms	100 ms	200 ms	

STORAGE

Store in accordance with all applicable local, state, provincial and federal laws.

SHELF LIFE

For optimum accuracy, use within one year from date of manufacture under good storage conditions.

TRANSPORTATION DATA

UN CLASSIFICATION

Shipping Name: Detonator Assemblies, Non-Electric
Class & Division: 1.4B
ID Number: UN 0361

US DOT REFERENCE NUMBER

EX-2014080651

For more information and service locations in your area, please contact Austin Powder Company's headquarters:

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1/2/02 | r 07/15/2020

SSU 5500

Portable Printing Seismic Monitor with CompactFlash™ Media Card

The benefits are very clear!

- Convenient, versatile and complete vibration & sound monitoring system
- Removable 128 MB CompactFlash™ memory card for storing 10,000 full waveform events
- Data from the card can be transferred using any compact PC card slot (internal or USB)
- Large thermal printer
- Standard QWERTY keyboard
- Basic compliance reporting software package included

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SSU 5500

The SSU 5500 is a convenient, easy to use complete vibration and sound monitoring system. Its most significant feature is the removable 128 MB CompactFlash™ memory card. The card greatly increases memory allowing the 5500 to record 10,000 full waveform events regardless of recording time. Data from the card can be transferred using any compact flash PC card slot (internal or USB). It has a tough, weather resistant case, full QWERTY-style keyboard and heavy-duty twist-lock metal cable connectors. External ports allow the case to remain closed during monitoring operations. A large thermal printer provides for instant reports in the field. The 2-hertz high-pass microphone and all other standard accessories fit easily into the case. The four-line LCD makes on-site programming easy and permits the user to view results on-screen. The integrated timer will turn the unit on and off at pre-selected times to conserve battery power. The timesaving template utility can be used to store repetitive setup configurations.

The SSU 5500 has three recording modes: 1) triggered - either seismic or sound, 2) continuous (histogram) and 3) sustained trigger. Sustained trigger mode delays processing and permits real time collection of contiguous waveform data up to a cumulative total of approximately 4.2 minutes. Data can be collected in either imperial (US customary) or metric units. The included basic compliance and reporting software package can be used for analysis and preparation of standard or customized reports.

GeoSonics® is a leader in seismograph innovation, design, manufacturing and vibration consulting. Because we use the equipment we design, a user-friendly interface, ruggedness and reliability are not just goals – they are standards.

GeoSonics®…always a step ahead!

Removable 128 MB Compact Flash™ memory card able to record 10,000 full waveform events.

A full QWERTY keyboard, 80 character LCD screen and thermal printer make the SSU 5500 very user friendly.

Instrument connection ports come standard with caps to protect connecting pins.

Features & Specifications

STANDARD FEATURES:

- Removable 128 MB Compact Flash™ data card with 10,000 event memory regardless of record type or size.
- Four-line by 20-character LCD for on-site data display.
- Full QWERTY-style keyboard with shortcut buttons.
- 42 column facsimile-style printer.
- Heavy-duty twist-lock metal cable connectors.
- Internal, rechargeable lead acid batteries.
- Flexible interface and extensive options available for custom configurations.

GENERAL SPECIFICATIONS:

- Weight: 22.2 lbs (10.1 kg)
- Dimensions: 16 x 13 x 6.75 in (41 x 33 x 17 cm).
- Operating Temperature: 0 to 130° F (-18 to 54° C).
- One (1) year warranty on parts and labor.
- Extended warranties and service contracts also available.
- 42 column thermal linehead printer with motor-drive take-up; up to 140 events per roll of paper.

STANDARD FEATURES (Continued):

- Two (2) independent threshold alarm output ports.
- External geophone meets ISEE density recommendations.
- Toughest weather resistant structural case on the market.
- Six (6) template locations for recurring set up data.
- Imperial and metric operation.
- Free standard analysis and compliance software.
- Designed & manufactured in the USA.

OPTIONAL ACCESSORIES:

- Hydrophones (instrument modifications required).
- Accelerometers to 50 g's or higher (instrument modifications required).
- Amplifiers (10x-100x).
- Optically isolated dual alarm control for dialers, pagers and remote alarm notifications.
- Advanced seismic analysis software package.

RECORDING MODES:

Seismic Trigger:	Resolution:	0.0025 in/sec. (0.06 mm/sec.).
	Printout graph time scaling:	From 0.5 to 5 inches for 1 second (5 second recording).
	Range:	Up to 5.120 in/sec. (130 mm/sec.)(other ranges available).
	Frequency Response Range:	2 to 250 Hz (3 dB) / 2 to 1,000 Hz (Nyquist).
	Sampling Rate:	Up to 2,000 samples / second / channel.
	Recording Intervals:	1 to 15 seconds.
	Accuracy:	5% within one year (multipoint calibration within 3%).
	Calibration:	Internal dynamic.
Sound Trigger:	Range (Linear):	78 to 142 dB (other ranges available).
	Frequency Range (3 dB):	2 to 250 Hz (3 dB) / 2 to 1,000 Hz (Nyquist).
	Accuracy:	±10% or 1 dB within one year (multi-frequency calibrated).
	Calibration:	Internal electronic.
Continuous (Histogram):	Recording Intervals:	Selectable: 1,2,5,10,15,30 and 60 seconds.
	Printout, list:	Prints highest peak particle velocity and maximum overpressure during selected intervals.
	Printout, graph:	Histogram of highest PPV and air overpressure as a bar graph with optional summary printed based on selected on number of intervals per summary.
Sustained Trigger:	Multiple record/real time:	Consecutive waveform recordings up to 4.2 minutes

GeoSonics

Warrendale, PA 15086
Ph. 800-992-9395 Fax 724-934-2999
www.geosonics.com

BLASTING MATS

A1Blasting

Our blasting mats are made from the rubber of recycled truck and car tires, and compacted up to 1400 PSI. The mats are available in a variety of different sizes and weights.

If ordering in large volumes, or require custom dimensions place an order online.

Weight: approximately 35 - 45bs/sqft

SIZE

10x15

CONTACT FOR CUSTOM QUOTE

Collections: Blasting Mats, Featured Products

SHARE






RELATED ITEMS

Custom Blasting Mat From Conveyor Belt

Landfill Cover Mats

Attachment D
Blast Log Sheets

Project Information- Pre/Post Blast
Inspections
Notifications
Blasting Sign
SX Blasting Inc. Project Examples

SX Blasting
N59 W14601 Bobolink Avenue
Menomonee Falls, WI 53051

SX BLASTING, INC.

SX Blasting, Inc.
N59 W14601 Bobolink Avenue
Menomonee Falls, WI 53051
(262) 252-3200

DAILY BLASTING LOG

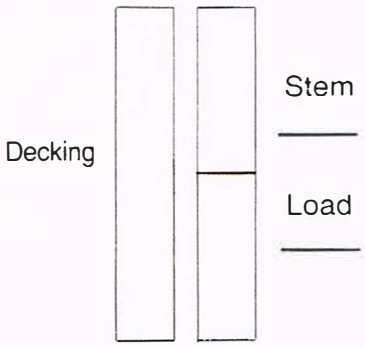
Name _____/License # _____ Signature _____

Operation or Job _____ Address or Station Blast Location & Number Map Attached Below

Date _____ Time of Blast _____

Weather conditions _____ Street _____

Blast Layout



Pattern & Delays

Visual illustration of distribution of delays and pattern

Burden _____ Spacing _____ Rock Depth _____ Cuts _____

Hole Depth _____ Hole Diameter _____ Holes per delay _____

Scale Distance to nearest structure Includes distance to nearest structure and/or utility. _____ ÷ 55 X itself = Pounds per delay _____

Depth top stemming _____ Depth stemming between decks _____

Total Pounds used _____ Type initiation _____

Number of holes _____ Length or caps _____ WR or anfo _____

Seismograph # _____ L_____ T_____ V_____ Db _____

C-O Reading _____ Comments Explanation of product used (Types of caps and blasting Product _____

_____

_____

SX Blasting Inc. Pre/Post Blast Inspections & Notifications

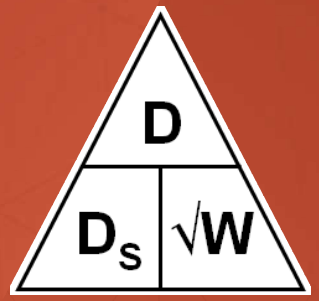
Scaled Distance Formula

Pre Blast Inspection letters will be mailed out to residents with a tax address within 500’ of the blast zone. Residents will be given the opportunity to have a free Inspection of their property if they choose. SX Blasting will give two additional notices to property owners after the original letter has been sent. After the third attempt SX Blasting Inc. will begin the blasting operation.

Notification Letters will also be sent by mail to residents within a 1,500’ Radius of the blast zone. The Notification letter will give a brief explanation of the project and when the blasting will occur. All letters will have contact information for a SX Blasting Inc. team member for questions or concerns.

Post Blast Inspections will be done if a property owner feels there has been damage by the blasting operation. Once SX Blasting receives a call or email from a property owner, SX Blasting Inc. will respond to the property within 1-3 days to assess the property. We will look at the area of concern as well as the original inspection video to decide if the damage was there before the blasting operation or not. SX Blasting will give notice before blasting to those residents with pets that may be sensitive to noise if they choose to do so.

Scaled Distance Formula
The scaled distance formula factor that will be utilized for the Hawks Pointe Plat 6 project is 55.
With the scaled distance of 55 and at 165' equals 9lbs. per delay.
Scaled distance at 1,000' would be equal to 330.578 lbs. per delay.
Scaled Distance formula attached below.



Scaled Distance

(Square Root Scaled Distance)

ISEE International Society of Explosives Engineers

MAURER & SCOTT

Factors That Influence Ground Vibration

Explosive Charge Weight

As charge weight increases so does vibration amplitude.

Distance from the Explosive Charge

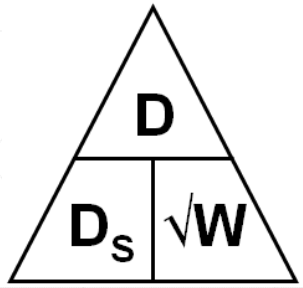
As distance increases, vibration amplitude will decrease.

Geology

Variations will occur due to different geologic conditions and orientation of the blast.

Distance and Charge Weight are used to define **Scaled Distance.**

Scaled Distance

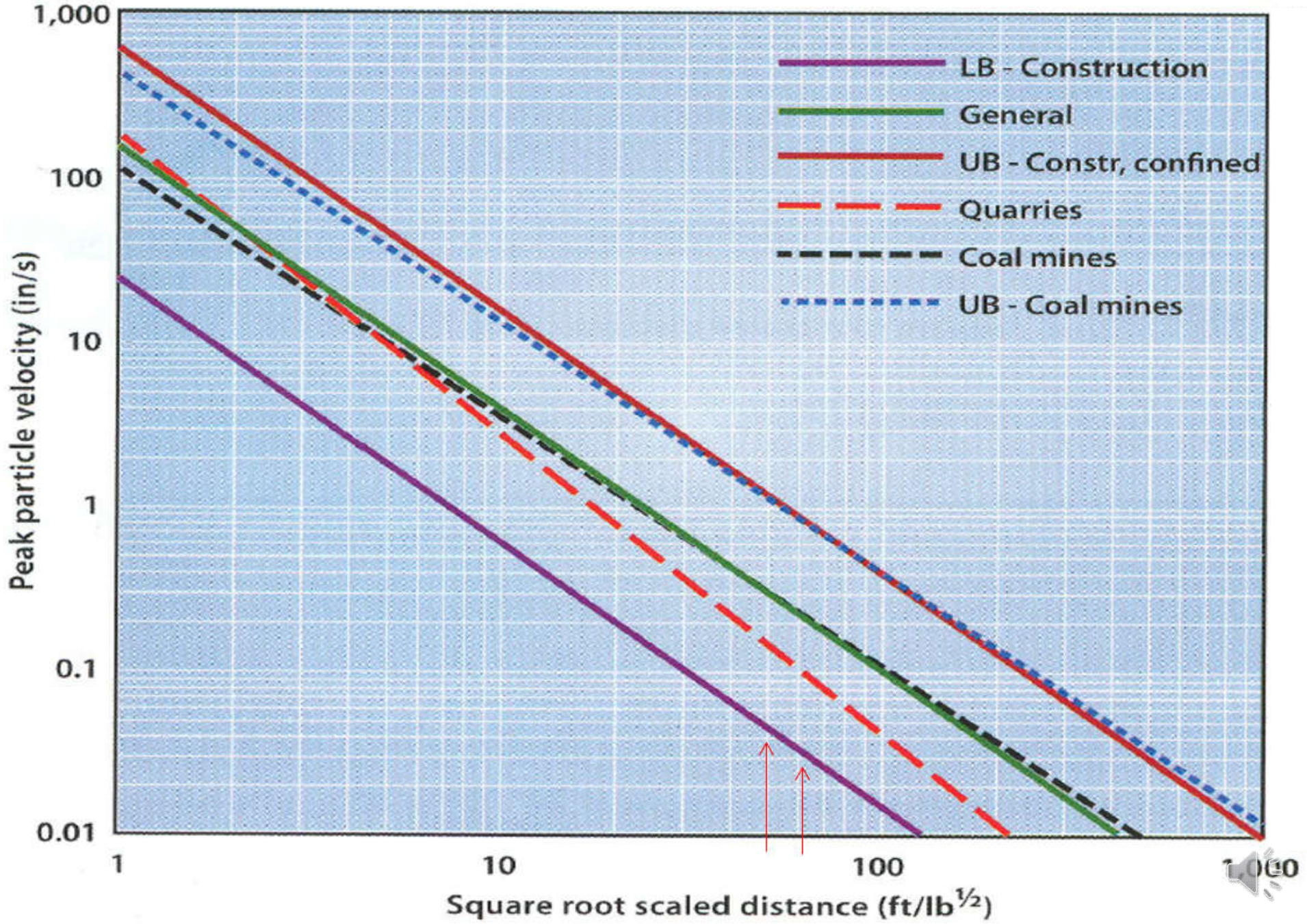


Scaled Distance will give the blaster an *"indication"* of the effect that a given amount of explosives will have on a structure at a given distance.

Scaled Distance is a good starting point to determine:

- How many Lbs.-per-delay you can shoot.
- What hole diameter to use.
- If deck loading might be needed.

OSM – Ground vibration amplitude vs. square root scaled distance.



Scaled Distance Recommendations

For vibration control the OSM chart recommended.

Scaled Distance: **50** (25-300'), **55** (301-5,000'), **65** (>5,001')

Quarry

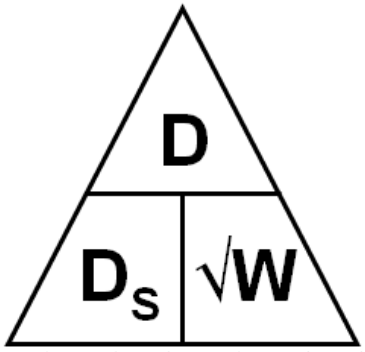
Scaled Distance: **>30**

*Consider **>40** with complaint issues.*

Construction

Scaled Distance: **>25**

Calculating Scaled Distance



$$D_s = \frac{D}{\sqrt{W}}$$

$$W = \left(\frac{D}{D_s}\right)^2$$

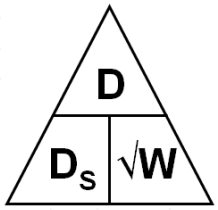
D = Distance
W = Explosive Weight
D_s = *Scaled Distance*

$$D = D_s \times \sqrt{W}$$

Square Root Key

*Square Key**

Finding Scaled Distance

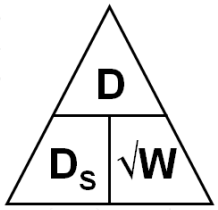


What is the Scaled Distance if you're blasting **500 lbs.** of explosives at a distance of **1,000 ft**.?

$$\frac{1{,}000 \text{ ft.}}{\sqrt{500} \text{ lbs.}} = 44.72 \text{ Ds}$$

Square Root Key

Finding Scaled Distance



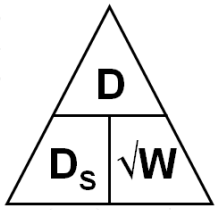
What is the Scaled Distance if you're blasting **23 lbs.** of explosives at a distance of **150 ft**.?

$$\frac{150 \text{ ft.}}{\sqrt{23} \text{ lbs.}} = 31.27 \text{ Ds}$$

Square Root Key

Finding Max Lbs.

(for a given Scaled Distance)



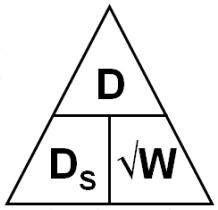
How many Lbs. can you blast at a **Scaled Distance of 40** when the nearest structure is **1,000 ft**. away?

$$\left(\frac{1{,}000 \text{ ft.}}{40 \ D_s}\right)^2 = 625 \text{ lbs.}$$

Square Key

Finding Max Lbs.

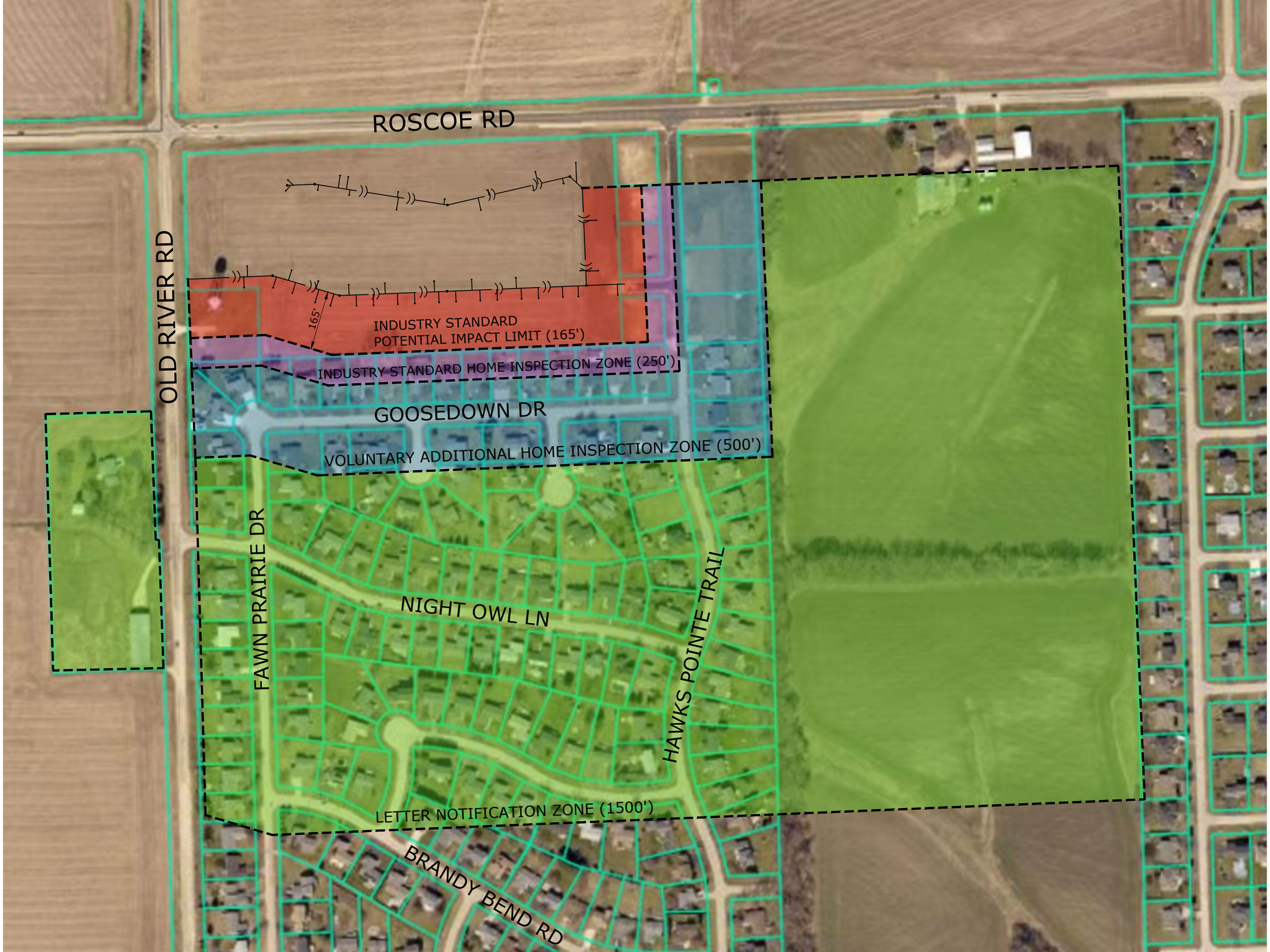
(for a given Scaled Distance)



How many Lbs. can you blast at a **Scaled Distance of 25** when the nearest structure is **100 ft**. away?

$$\left(\frac{100 \text{ ft.}}{25 \ D_s}\right)^2 = 16 \text{ lbs.}$$

Square Key


ROSCOE RD
OLD RIVER RD
165'
INDUSTRY STANDARD
POTENTIAL IMPACT LIMIT (165')
INDUSTRY STANDARD HOME INSPECTION ZONE (250')
GOOSEDOWN DR
VOLUNTARY ADDITIONAL HOME INSPECTION ZONE (500')
FAWN PRAIRIE DR
NIGHT OWL LN
HAWKS POINTE TRAIL
LETTER NOTIFICATION ZONE (1500')
BRANDY BEND RD


BLASTING
ZONE
AHEAD
SX
BLASTING

ILLINOIS DEPARTMENT OF NATURAL RESOURCES
OFFICE OF MINES AND MINERALS

EXPLOSIVE LICENSE

LICENSE NUMBER 0010118

ISSUE 10/22/2025

EXPIRATION 10/22/2028

RESTRICTIONS
None

Brandon Eugene Rolsma

[redacted]

[redacted]

SEX	HT	WT	EYES	HAIR
M	6'01"	300	Brown	Brown

BIRTH DATE: 2/8/1980

GENERAL COMPANY EXPERIENCE

SX Blasting Inc. has been assisting the upper Midwest with their rock-blasting needs for the last eighteen (18) years. SX Blasting was registered as a Corporation with the State of Wisconsin in October 2007. We have the ability to perform subdivision and site work, road cuts, ponds, trench rock, tower foundations, deep excavations, shafts, and radio towers. SX Blasting has done blasting for the Transmission Power lines, foundations, test holing, wind turbines, cable trenches, road cuts, basements, Sewer, Water and Storm sewer Trenches.

Our team of highly qualified Blasters and Drillers are constantly focused on our customer, and our track record shows that we consistently deliver the most difficult projects on time and on budget. We are proud of our reputation for safety and quality of work done for our customers. Below we have elaborated on a few projects which speak to our overall contracting experience. We are happy to provide additional documentation on any of these projects upon request.

NOTABLE PROJECT EXPERIENCE

Hilltop Brewery Expansion- New Glarus, Wi
SX Blasting Inc.-Subcontractor to Keller, Inc
Timeline: 2025
Type of Work: Blasting
Project Scope: Drill and Blast for new brewery addition next to existing brewery and in close proximity to main brewery water well with no issues or brewery shutdowns.

Washington Street Siphon Project- Wausau, Wi
SX Blasting Inc.-Subcontractor to A-1 Excavating
Timeline: 2025
Type of Work: Blasting
Project Scope: Drill & Blast site utilities 20’ from existing residences and utilities with no issues.

2025 West Side Reconstruction-Sartell, MN
SX Blasting Inc.-Subcontractor to C&L Excavating
Timeline: 2025
Type of Work: Blasting
Project Scope: Drill and Blast for site utilities and mass rock within 50’ of residences and utilities with no issues.

Hobby Lobby- Lake Delton, Wi
SX Blasting Inc.-Subcontractor to Top Tier Construction
Timeline: 2025
Type of Work: Drilling and Blasting
Project Scope: Drill and Blast site utilities and building mass/footing rock within 20’ of existing buildings with no issues.

2025 Street and Utility Improvement Project- Stevens Point, Wi
SX Blasting Inc.-Subcontractor to A-1 Excavating
Timeline: 2025
Type of Work: Drilling and Blasting

Project Scope: The purpose of this project was to blast new utilities. Blasting occurred within 10’ from gas mains and 20’ of the existing residences with no issues.

Epic Systems- Verona, Wi
SX Blasting Inc.-Subcontractor to Edgerton Contractors
Timeline: 2010-Present
Type of Work: Blasting- Millions of cubic yards over the course of 15 years.
Project Scope: The purpose of this project was to drill and blast for the building of new office buildings, Auditoriums, Parking structures and site utilities.

The Springs at Meadowbrook- Waukesha, WI
SX Blasting Inc.- Subcontractor to Top Tier Construction
Timeline: Fall 2023/Summer 2024
Type of Work: Blasting
Project Scope: Mass and Open cut Blasting. Blast 6’-18’ of rock 10’ from existing gas service and 150’ from houses with no issues.

Reedsburg Wastewater Improvement- Reedsburg, WI
SX Blasting Inc.- Subcontractor to Integrity Grading
Timeline: Fall Spring 2024-Fall 2024
Type of Work: Blasting
Project Scope: Drill and Blast approximately 100,000 CY. 50’-100’ from Existing Structures with no issues.

Heritage Hills Phase 7- Waunakee, WI
SX Blasting Inc. Subcontractor to Moll Construction
Timeline: 2024
Type of Work: Blasting
Project Scope: Drill and Blast mass/trench rock for excavation, Blast 10’-15’ of Rock 50’ from existing structures with no issue.

6th Avenue East Extension- Duluth, MN
SX Blasting Inc.- Subcontractor to Northland Constructors
Timeline: Spring/Summer 2024
Type of Work: Blasting
Project Scope: Drill and Blast mass/trench rock for excavation, Blast 5’-10’ off existing parking structure with no issues.

KEY PERSONNEL

Dick Boening
General Manager, Blaster
Dick is the General Manager of SX Blasting Inc. He is responsible for the oversight of all operations, project management, project estimating and procurement. Dick has been involved in blasting construction for over 38 years and holds a Class 1 and Class 6 Blasting License.

Blasters/Licenses
Kris Keller- Class 6 Department of Safety & Professional Services
Nick Baker- Class 6 Department of Safety & Professional Services
Josh Silvestri- Class 6 Department of Safety & Professional Services
Adam Cisneros- Class 7 Department of Safety & Professional Services
Dick Boening- Class 1 and 6 Department of Safety & Professional Services
Brandon Rolsma- Class 6 Department of Safety & Professional Services
Illinois Department of Natural Resources Office of Mines & Minerals Explosive License
SX Blasting Inc.- Federal Permit to Purchase/Possess Explosives

Our Blasters have multiple years of experience in the drilling and blasting field. Our Blasters range from Class 1-7 in Wisconsin. Some hold out of state licenses as well. Our Blasters bring much experience and expertise to SX Blasting and are extremely knowledgeable of blasting practices in a wide variety of situations.