STATE OF COLORADO

Lennberg - DNR, Patrick <patrick.lennberg@state.co.us>

GCC Cedarwood Mine TR-2 Prelim Adequacy Review Response

1 message

Amy Veek <aveek@gcc.com> Fri, Feb 17, 2023 at 2:22 PM
To: Amber Michels - DNR <amber.michels@state.co.us>, "Lennberg - DNR, Patrick" <patrick.lennberg@state.co.us>
Cc: "Federico, Dick" <dfederico@gcc.com>, Rojo Jesus <jrojo@gcc.com>

Good Afternoon Amber,

See attached for GCC's response the DRMS's preliminary adequacy review of the TR-2 application for the Cedarwood Mine. Please let me know if you have any questions concerning this submittal.

Thanks,

Amy

cid:image005.png@01D8532B.339D36F0

Amy Veek

Environmental Engineer

O: 719-647-6861

C: 719-250-6141

GCC.com

2 attachments

GCC_TR-02_Cedarwood Response Submittal 2.17.2023.pdf
183K

Cedarwood Blast Plan_Feb 2023.pdf
9660K

February 17, 2023

Submitted Via Email

Amber Michels
Division of Reclamation Mining and Safety
1313 Sherman St., Rm. 215
Denver, CO 80203

RE: GCC Rio Grande, Inc., Cedarwood Mine, Permit No. M-1977-317, Technical Revision 02, Response to DRMS Preliminary Adequacy Review

Dear Ms. Michels:

GCC Rio Grande, Inc., Cedarwood Mine (GCC) received the Division of Reclamation, Mining and Safety's (DRMS) preliminary adequacy review comments dated December 27, 2022, for Technical Revision 02 (TR-2) to permit No. M-1977-317. The purpose of TR-2 is to update the blasting plan for the Cedarwood Mine. This submittal responds to the comments and questions included in the preliminary adequacy review. For convenience, the below response follows the numbering established in the adequacy review letter and includes the original DRMS comments in italicized text followed by GCC's response.

<u>GCC Responses to the DRMS Preliminary Adequacy Review</u>

1. *Pursuant to Rule 6.5(4) an operator who proposes blasting is required to provide an appropriate blasting, vibration, geotechnical and structural engineering analyses that off-site areas will not be adversely affected by blasting. While the Rules do not provide details of the exact type of analysis or demonstration that needs to be conducted, the Division typically follows the protective standards accepted by the Office of Surface Mining, Reclamation and Enforcement and the Colorado Dept. of Labor and Employment, Division of Oil and Public Safety Explosives Regulations (Colorado 7 C.C.R. 1101-9). In the application the operator states there is no need for a pre-blast survey as there are no structures within 300 feet of the mine. Currently, the Division uses a minimum distance of one half (1/2) mile from the permit boundary for a pre-blast survey. Please develop a pre-blast survey, a blast notification schedule, and a blast plan that addresses all structures, including water wells and public roads, within a ½ mile of the permit boundary.*

<u>GCC Response</u>: See enclosed revised blasting plan that incorporates the blasting impacts to structures within ½ mile of the mining permit boundary.

2. *Commit to generating and filing a Blast Report for each shot and retained for 3 years for inspection upon demand. The report shall contain the following:*
    - *a). Location date and time of blast,*
    - *b). Name, signature and license number of blaster-in-charge,*
    - *c). Identification, direction and distance in feet from the nearest blast hole to the nearest potentially affected structure, such as any dwelling, school, church, or community or institutional building either:*
        - *i). not located in the permit area; or*

ii). Not owned nor leased by the person who conducts the mining operations
d). Weather conditions, including: temperature, wind direction, and approximate velocity,
e). Type of material blasted,
f). Sketches of the blast pattern including number of holes, burden spacing, and delay pattern. Sketches shall also show decking, if holes are decked to achieve different delay times within a hole,
g). Diameter and depth of holes,
h). Types of explosives used,
i). Total weight of explosives used per hole and maximum weight of explosives used per 8-millisecond period,
j). Initiation system,
k). Type and length of stemming,
l). Mats or other protections used,
m). Type of delay detonator and delay periods used,
n). Number of persons in the blasting crew; and
o). Seismographic records where required including:
i). Type of instrument sensitivity and the calibration signal of the gain setting or certification of annual calibration,
ii). Exact location of instrument, the blast date and time, and the instrument distance from the blast

GCC Response: Please see the enclosed revised blasting plan's Attachment 2 for an example blast report that will be used for blasting activities at the Cedarwood Mine.

If you have any questions regarding this submittal or need any additional information, please contact me at (719) 647-6861.

Sincerely,

Amy Veek
Environmental Engineer
GCC Rio Grande, Inc.

Enclosure:
1. Revised Blasting Plan

cc (via email)
P. Lennberg, DRMS
D. Federico, GCC
J. Rojo, GCC

Blast Plan GCC Cedarwood Quarry

Mine Location: Pickney Rd, Rye, CO
GPS: 37.92722, -104.76118

Revision date: February 17, 2023

Blast design specifics

- Hole diameter- 5”
- Drill pattern – 12’x12’
- Drill depth – 20-24’
- Total number of holes in shot- ~180
- Charge weight per hole – 156lb
- Charge weight per delay- 312
- Total weight of explosives- 30,000 lbs.
- Total volume produced- 24,000 cy
- Primer - 3/4 lb. cast primer
- Detonator – 40’ EZ-Det NONEL
- Surface delay programming- 17,25 ms on spacing ; 42,67,91 ms on burden
- Initiation – Nonel Remote
- Blasting agent – Titan XL 1000 density- 1.15
- Stemming height- 8’
- Powder factor –1.3 tons/lb.
- Projected PPV at 500’-. .776 i.p.s.
- Projected PPV at 1000’- .256 i.p.s.
- Nearest protected structure- 2,950 ft.

Blast Schedule

- Blasting will take place between 1 hour after sunrise to 30 minutes after sunset on weekdays.
- No blasting will take place on weekends or holidays.
- Buckley Powder will notify GCC quarry management of blasting schedule.

Pre-blast surveys

- See Attachment 1 for impact analysis of nearby structures that are within 1/2 of mining permit boundary.

Transport / Storage of Explosives

- At no time will explosives be left unattended.
- Pre and Post inventory checks will be done.
- Authorized Buckley Powder Co. personnel only will handle explosive material
- Blast area to be barricaded and signs posted to prevent unauthorized entry.
- All explosives will be delivered in D.O.T. approved vehicle. Driver will be licensed for transport of explosives.
- Any products not used in days blasting operation will be returned to storage magazines.

Drill Logs

- Drill log to be completed by driller for each hole drilled
- Drill log to be reviewed by blaster in charge prior to loading
- Any necessary changes to blast design/hole loads will be made after review of drill log

Ground Vibration and Air Blast

- All blasting events to be monitored and readings recorded in blast report to include: peak particle velocity transverse, vertical, and longitudinal. Also to include peak sound pressure, time, date, and location of monitor. PPV shall not exceed 2.0 in/sec.

- Over pressure (air blast) limitation. Air-over pressure at the nearest dwelling house, school, church, or otherwise occupied buildings shall not exceed 133 dB (0.0129 psi).

- Blast will be monitored in location nearest the closest structure to the blast location.

Blast Site Security/Safety

- Blasters checklist to be completed during the shot loading process.
- Prior to blasting all personnel will evacuate to muster point established by blaster in charge.
- All access roads will be blocked, and blaster in charge will maintain radio contact with blockers.
- Audible warning to be given prior to blast.
- Blaster in charge will check area to insure all persons and equipment are out of blast area.
- Blaster in charge will contact each blocker and get verbal confirmation that access is blocked, and area is clear prior to firing shot.
- After firing of shot, blast area is to remain evacuated until blaster in charge inspects the shot, deems it safe to re-enter and gives the “all clear”.

Blast report and documentation

- All blasting events will be documented in blast report. See Attachment 2 for and example blast report that will be used.
- Blast report will contain all criteria listed in DRMS “Key Elements of a Blasting Plan”
- Blast reports to be completed within 24 hours of blasting event

Attachment 1 – Blasting Impacts on Structures Near the Cedarwood Mine

BLASTING IMPACTS ON STRUCTURES CLOSE TO THE CEDARWOOD MINE

All blasting work will be performed by an experienced contract blasting company, that will manage all explosive transportation and storage activities. Explosive transport vehicles will satisfy all stringent vehicle standards as required by the Federal Department of Transportation (DOT). After blasting, unused explosives are secured in approved explosive magazines.

Once explosives enter the mine site, their transportation and use are regulated by the Federal Mine Safety and Health Administration (MSHA) and by the Colorado Department of Labor.

All blasts will be controlled by a certified blaster who passed a written licensing examination and met the experience requirements set forth by the Colorado Department of Labor. Licensed blasters and contractors are required to be knowledgeable about and comply with all regulations governing explosives and blasting. When a regulation from one agency is more stringent than that of another, the more stringent of the two regulations will apply.

When explosive changes detonate in rock, most of the chemical energy is used in breaking and displacing the rock mass; however, some energy is kinetically released from of vibration, causing strain waves, airborne noise, concussion and flying rock.

In this section, GCC Rio Grande Inc. (GCC) evaluates the potentially damaging effects that blasting might have on people, animals, and property near the Cedarwood Mine. GCC also recommends specific measures that will be employed to mitigate blasting impacts.

Impacts of Blast-induced Ground Motion and Fracturing

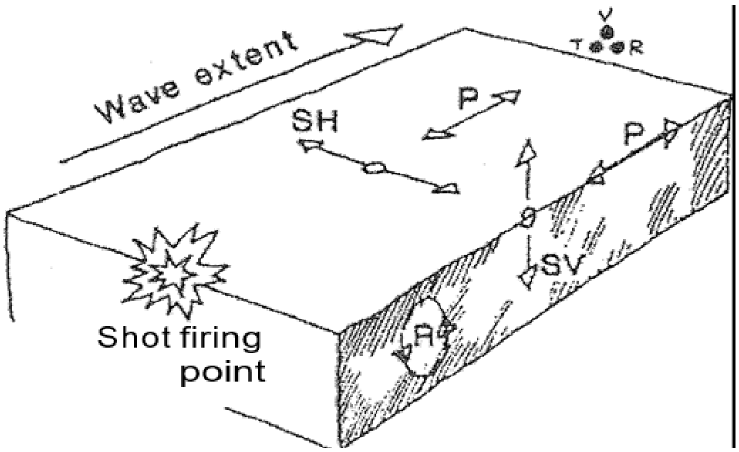
The purpose of this section is to evaluate the relative potential for all forms of damage that might occur due to blast-induced ground motion or radial cracking. This section examines their effects on neighboring property and utility lines and pipes. A short review of blast vibration dynamics is also included at the beginning of the section to summarize the various ground motion measures that are used in structural damage evaluations.

Review of Blasting Vibration Phenomena

When explosive charges detonate in rock, nearly all of the available energy is used in breaking and displacing the rock mass; however, a small portion of the energy is released in the form of vibration waves, which radiate away from the blast charges. When these elastic strain-waves pass through rock or earth, they cause an oscillating motion in the ground particles.

Abbreviations:

SH - Shear wave, horizontal
SV - Shear wave, vertical
R - Rayleigh wave
p - Compressional wave



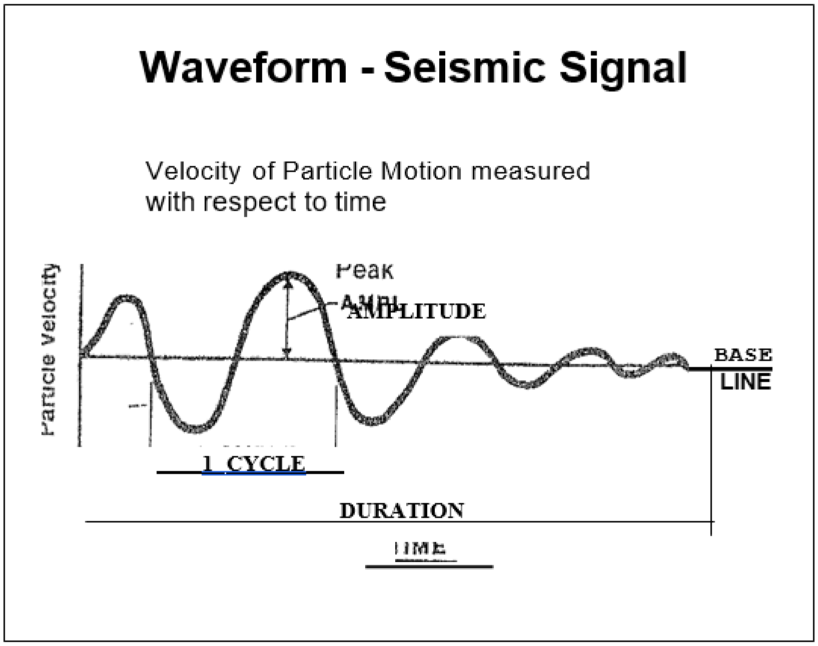
Vibration \Waves

Seismic waves decay with distance as they travel through the surrounding areas. These waves have different forms, such as body and surface waves. Their characteristics will vary somewhat with changes in the local geology, but the rate at which they dissipate is reasonably consistent, and allows controlled blasting operations by means of relationships between distance and the explosive charge quantities. Each time the distance is doubled, the vibration intensity drops to about 1/3" of its former value. The consistency of ground motion attenuation is supported by research done by the U.S. Bureau of Mines (Nichols et al., 1979). The researchers found that under widely varying conditions, if a sealed distance of 50-ft/lb^{112} is used to limit charge weights, it is highly unlikely that ground motion would cause any damage. For the purposes of ground vibration assessments, scaled distance (SD) is distance from the blast divided by the square root of the maximum charge weight per delay. The log-log linear relationship between scaled distance and predicted peak particle velocity (ppv) is shown below:

ppv = K(SD)'" and SD=D/ W

Where:		
	ppv =	Peak Particle Velocity (inch/sec.)
	KandM=	Site Attenuation Constants
	SD=	Scaled Distance (ft/lb^{1}n)
	D=	Distance (ft)
	W=	Maximum charge weight per delay (lbs)

These ground vibrations are elastic waves, meaning that the ground particles move as the wave passes and quickly come to rest exactly as they were before the wave arrived. The average person is quite sensitive to ground motion, and can feel the vibration at levels several orders of magnitude lower than motion at damage threshold levels. Ground particle motion occurring at velocities as low as 0.50 mm/s (0.02 in/s) can be detected by the human body.



Particle Vibration Time History

Vibrating ground motion can be characterized by measuring particle displacement, velocity, and vibration frequency.

Displacement is a measure of ground particle travel distance or directional position with respect to time. Particle velocity measures the speed of the movement while acceleration is the rate of velocity change. Vibration frequency is a measure of how mane oscillations a ground particle makes in each second of time.

Both governmental agencies and private sector investigators have conducted considerable research to determine how ground motion might influence the stability of rock and soil structures, or cause damage to typical structures. For instance, from U.S. Bureau of Mines studies (Bulletin 656, 1979 and RI 8507, 1980) researchers have recommended conservative criterion that most government agencies, including Colorado, have adopted in commercial blasting regulations. To prevent blast-induced ground motion from even approaching damage thresholds, these regulations establish extremely cautious limits on peak particle velocity (ppv). Some damage prevention regulations also consider the frequency of ground motion. Other researchers have evaluated the effects of ground motion on people, buried pipelines, water wells, and many other structures. In this investigation, GCC has analyzed the potential risk of blast-induced vibration damage or disturbances to structures and/or persons located near the Cedarwood Mine.

Potential for Damage to Structures from Blast-Induced Ground Motion:

The United States Bureau of Mines, in RI8507 (1980) made the following conclusions regarding the potential for damage caused by blast-induced ground motion.

"Practical safe criteria for blasts that generate low frequency ground vibrations are 19 nm/s (0.75 in/s) for modern gypsum board houses and 12.7 nm/s (0.50 in/s) for plaster on lath interiors. For frequencies above 40 Hz, a safe particle velocity maximum of 51 nm/s (2.0 in/s) is recommended for all houses."

It should be noted that the USBM RI 8507 recommendations are designed to prevent even threshold damage in residences of lower-quality construction. Threshold damage was defined as follows:

"Threshold damage was defined as the occurrence of cosmetic damage; that is, the most superficial interior cracking of the type that develops in all homes independent of blasting."

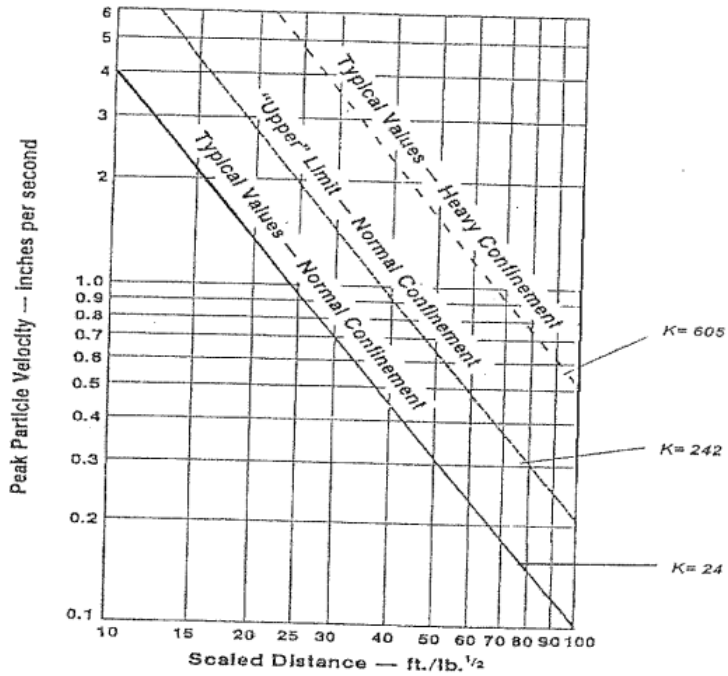
In an earlier USBM study (Bulletin 656, Nichols et al., 1971), it was concluded that if at least 8 milliseconds of delay time separate charges, their effect on ground motion is not cumulative. The "8-millisecond rule" remains as industry and regulatory standard for defining "separate" delays.

Blasting researchers, over many years, have developed and verified the validity of using scaled relationships to predict vibration intensity at various distances. These relationships use scaling theory to define the relationship between ground vibration particle velocity, charge weight, and distance. Distance is scaled by the square root of charge weight to create a single dependent variable called scaled distance (SD). Various forms of this relationship are shown below:

ppv = K(SD)'" and SD=D/(W)^1/2

Where:	ppv=	Peak Particle Velocity (inch/sec.)
	KandM=	Site Attenuation Constants
	SD=	Scaled Distance (ft/lb^{112})
	D=	Distance (ft)
	W=	Maximum charge weight per delay (lbs)

When plotted on a log-log graph, data points defined by scaled distance and measured particle velocity generally fall between boundaries defined by Oriard (1972), as shown in Figure below. The slope of plotted data (m) is usually around -1.6 and the K factor for predicting particle velocity in the upper limit of the normally confined charges is 242. For cautious predictions, GCC has used a K factor of 300 in all calculations for estimating particle velocities in the various analyses done in this report.



The Colorado Division of Labor blasting regulations require blasters to use a minimum scaled distance (SD) of 55 ft/lb[112] when calculating maximum charge weights. Charges determined with this formula are designed to ensure that ground motion does not approach levels that might cause even cosmetic damage (0.5 in/sec.).
GCC divided the structures into two categories: the main and the secondary. The main structures are the houses, wells and large structures. The secondary are roads, fences, pipe lines and power lines.

Potential Damage for Main Structures

The closest main structure is the well with DWR Permit No. 301604 located approximately 380 feet from the nearest boundary of Cedarwood Mine DRMS Permit No M1977-317. This well is the closest main structure to the blasting operations, therefore, it will be used as worst case scenario on the calculation for the maximum explosive weight delayed by 8 msec. Such explosive weigh should not exceed a ppv of 0.5 in/sec.

ppy(@380ft)= $300(SD)^{-1.6}$ =0 .5 in/sec

SD=$300/0.5^{1.6}$ =54.49 ft/Ib

SD=$380ft/W^{1/2}$ =54.49 ft/Ib

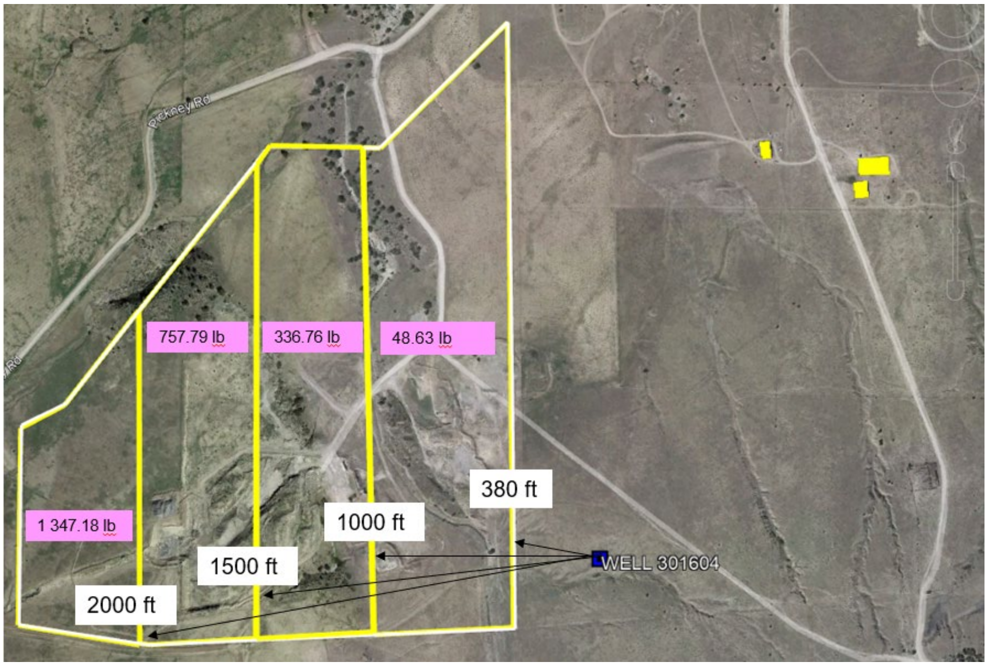
W=(380ft/54.49 ft/Ib)^2=**48.63 lbs (@380 ft)**

W=(1000ft/54.49 ft/Ib)^2=**336.76 lbs (@1000 ft)**

W=(1500ft/54.49 ft/Ib)^2=**757.79 lbs (@1500 ft)**

W=(2000ft/54.49 ft/Ib)^2=**1 347.18 lbs (@2000 ft)**

Base in this analysis, the mining permit has been divided in zones according to the max weight of explosives delayed 8 msec in order to avoid damage to any structures around the permit boundaries. See below for a simplified depiction of the nearest main structures to the permit boundary and for a more detailed depiction of the various structures located within 2 miles of the permit boundary see the attached map.

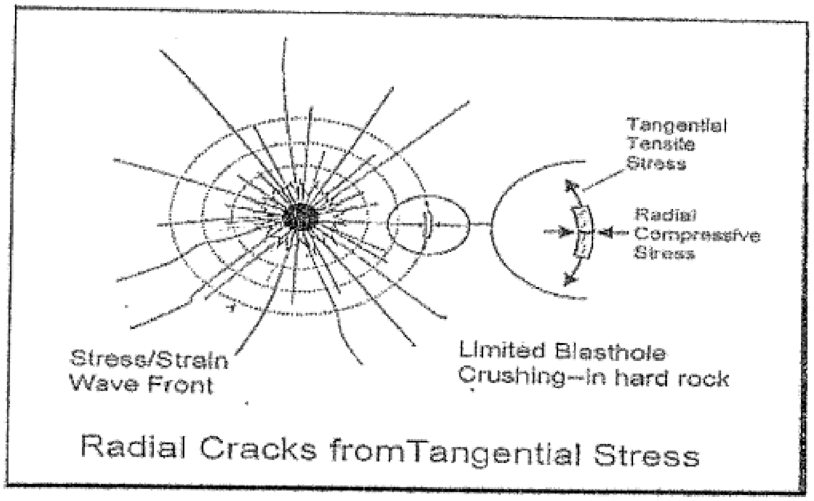


Since all other private property is located at greater distances than the well with DWR Permit No. 301604, vibration intensities will further attenuate to values less than .5 in/sec at the more distant structures; therefore, since blast induced ground motion at nearby structures will be an order of magnitude lower than the threshold of damage, GCC believes that the Cedarwood mine will cause no vibration damage to adjacent property.

Potential for Damage to Secondary Structures

When explosive charges detonate in rock, most of the energy is used to break and displace the blasted burden of rock between the charge and the nearest free face; however, other energy is released in the form of ground vibration, air overpressure (concussion), elastic strain waves and high-pressure gas pulses. When blasting occurs very close to buried utility lines (within about 10 ft), damage can occur in the line lies within ground that is physically ruptured by the blast.

Crushing usually occurs in the rock very near the charge. The extent of this compressive and shear failure zone is usually limited to one or two charge radii. Beyond the plastic crushing zone, the rock or ground is temporarily deformed by the elastic strain waves. For some distance, tangential strain intensity exceeds the rock's strength and new fractures are created. The magnitude of strain wave energy and induced particle motion decreases as distance from the charge increases. Rock damage is a result of the induced strain, which is generally proportional to the particle velocity.



Process of Radial Fracturing around Explosive Charges

Near-field damage can be estimated by applying the findings from several carefully controlled blast-induced rock damage studies. Researchers have used many different measuring techniques to predict the rock damage zone- Cracking Radius (CR) is based on the radius (Ro) of longitudinal explosive charges. These studies have used core loges, borehole periscopes, permeability tests and various other measures to determine the extent of blast damage.

Results from carefully controlled and documented blast damage studies by the U.S. Bureau of Mines (RI 7901, 1983) and Butkovitch & Hearst (1976) indicate that the extent of localized blast hole damage in the form of cracking is generally a function of radial charge diameter, explosive type, and rock characteristics. It is important to note that the damage findings in R1 790 I are consistent with those of other researchers. In light of this correlation, it is reasonable to conclude that their damage prediction formula (CR= 20 to 26 R_0) can be used to predict the extent of rock rupture damage.

Assuming the highest rupturing ratio (CR 26 R_0), the blasting at GCC using up to 6-inch diameter charges, maximum rupturing would not extend more than about 81 inches (6.8 ft) beyond the blast holes. To prevent any possibility of damage to the buried telephone lines, GCC will maintain a minimum distance of 50 ft between buried lines and the nearest blast hole. At this distance, it is extremely unlikely that blasting or any other normal mining activities would cause any damage to buried utility lines.

Regulations Governing Blasting and Explosive Use

A review of all Federal and Colorado agencies and regulations governing the security, transportation, and use of explosives follows.

Mine Safety & Health Administration
MSI-IA has enforcement authority over blasting and the use of explosives at all U.S. Mines. MSI-IA regulations governing all aspects of explosive use are fom1d in the Code of Federal Regulations (CFR 30). These extensive regulations govern all aspect of explosive handling and blasting activities.

Colorado State Division of Labor
The Colorado State Division of Labor administers regulations governing blast permitting, explosive storage, transportation, and explosive use.

Bureau of Alcohol, Tobacco, and Firearms (BATF)
Title 27, CFR Part 55, Commerce in Explosives, defines the authority of BATF as defined by Congress in the Organized Crime Control Act of 1970. In general, the regulations contained in this part relate to commerce in explosives and implement Title XI, Regulation of Explosives (18 U.S.C. Chapter 40; 84 Stat. 952), of the Organized Crime Control Act of 1970 (84 Stat. 922).

BATF regulates:

(l) The interstate or foreign commerce in explosive materials;
(2) The licensing of manufacturers and importers of, and dealers in, explosive materials;
(3) The issuance of user permits;
(4) The conduct of business by licensees and operations by permits;
(5) The storage of explosive materials;
(6) The records and reports required of licensees and permittees;
(7) Relief from disabilities under this part;
(8) Exemptions, unlawful acts, penalties, seizures, and forfeitures.

In summary, for most commercial explosive users, BATF regulates all of the storage of explosives and issues federal licenses to companies that manufacture explosives for use in their own operations.

Department of Transportation (DOT)
DOT has authority over all shipments of hazardous materials within or through the United States and its possessions. Shipments of hazardous materials by truck, plane, ship, or other modes are governed by the authority and regulations of the DOT. The enforcement branches of the DOT are: the Federal Highway Administration (FH:WA), the Federal Aviation Administration (FAA), the U.S. Coast Guard (USCG), and the Federal Railroad Administration (FRA).

Office of Hazardous Materials:
DOT's Office of Hazardous Materials (OHMT) is responsible for developing and publishing rules regarding classification and transportation of hazardous materials. These rules are published in the U.S. Code of Federal Regulations, Title 49 (49 CFR), primarily in Parts 106, 107, 171-179, 383, and 390-399.

Following is a listing of DOT regulations in 49 CFR, that govern explosives transportation:

Part 390	General
Part 391	Qualification of Drivers
Part 392	Driving of Motor Vehicles
Part 393	Parts and Accessories Necessary for Safe Operation
Part 394	Notification, Reporting, and Recording of Accidents
Part 395	Hours of Service and Drivers
Part 396	Inspection, Repair, and Maintenance
Part 397	Transportation of Hazardous Materials; Driving ru1d Parking Rules
Part 399	Employee Safety and Health Standards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343
GCC
PUEBLO
CEDARWOOD
SIMBOLOGY
MINING PERMIT A
0.5 MILE BUFFER
BUILDINGS
ROADS
FENCES
POWER LINES
ELECTRICA POLE
WELL

Attachment 2 – Example Blast Report

BUCKLEY POWDER COMPANY

DYNO

Dyno Nobel Inc

BUCKLEY POWDER CO

BILL OF LADING / DELIVERY TICKET

7800 N. MOORE ROAD

LITTLETON, CO 80125

303-350-5150

SHIPPERS NO..

5508316

Shipper	Customer Name		Date	Page Numbers
BUCKLEY POWDER CO.	GCC - Salt Canyon		10/21/2022	
DELIVERY ADDRESS	CITY	STATE	COUNTY	CREDIT ISSUED
Hwy 115	Penrose	CO	Fremont	
BPC FED. ATF PERMIT NUMBER	CUSTOMER FED ATF PERMIT NUMBER		DRIVER	VEHICLE & TRAILER #
5-CO-035-20-1E-00067	NA			
BPC STATE LICENSE #	CUSTOMER STATE LICENSE PERMIT #		CUST JOB / NUMBER	CUSTOMER PO #
2-005-0106	N/A			

ATF DATE CODE	NO. PKGS	QTY	PRODUCT DESCRIPTION	PRICE	AMOUNT
			yards TONS		
2745 x 11 x 12 / 27			13420 x 2.0 = 26,840 x	~~1.018~~ 1.018 =	total 27,323.12
			Tons shot rock: 26,840		
			mob Fee		1500.00
				total	28,823.12
			Shot # 10212022		

THIS IS TO CERTIFY THAT THE ABOVE-NAME MATERIALS WERE RECEIVED IN GOOD CONDITION. I HAVE REVIEWED THE TYPE AND AMOUNT AND I AGREE THAT IT MATCHES THE AMOUNTS ON THIS PAPERWORK. I HAVE RECEIVED A COPY OF THE PRODUCT SDS SHEETS FOR THESE PRODUCTS. I UNDERSTAND THEIR WARNING AND I WILL FOLLOW THEIR INSTRUCTIONS.

RECEIVER - CONSIGNEE SIGNATURE DATE 10/21/22

BUYER ASSUMES ALL RISK AND LIABILITY FOR RESULTS OBTAINED BY THE USE OF THE MATERIAL COVERED BY THIS ORDER. BUYER ACKNOWLEDGES THAT THEIR MAY BE FEDERAL AND/OR STATE LAWS REGULATING THE USE AND/OR POSSESSIONS OF THE MATERIALS COVERED BY THIS ORDER AND BUYER ASSUMES FULL RESPONSIBILITY FOR COMPLIANCE WITH SAID LAWS

BILL to if different: Address:

Buckley Powder Co. BLAST REPORT

SERVICE SITE LOCATION: Louviers ORDER NO.: D5508316

BLAST NUMBER: 10212022 BLAST TIME: 1:53 pm BLAST DATE: 10/21/2022

CUSTOMER: GCC MINE: GCC SALT CANYON ADDRESS: Penrose, CO

ROCK TYPE: Gypsum Tons/Yd3: 2.00 EXPECTED VIBRATION: 0.000 IPS

LOCATION OF BLAST

LOCATION OF BLAST IN MINE: North BENCH: Bench 1

BLAST GPS POINTS: N38.54182 & W-104.97078

WEATHER

WEATHER: Clear CEILING: Unlimited TEMPERATURE: 75 F WIND DIRECTION & SPEED: West 28 MPH

NEAREST NON-OWNED STRUCTURE

NAME: Cell Tower GPS Points: N38.52853 & W-104.96889

DISTANCE: 4,882 (FT) DIRECTION: 173º

SEISMOGRAPH DATA

	LOCATION	DISTANCE	GPS POINTS		CALIBRATION DATE
1	GCC SALT CANYON	1,078 (FT)	N38.54117	& W-104.96710	12/07/2021

	L	(F)	T	(F)	V	(F)	AIR (db)	SEISMOGRAPH	SERIAL	OPERATOR
1	0.030	33.3	0.020	31.3	0.030	16.1	124	VibraTech SSU 300(	2607	Wright, Jerry

BLAST DATA

		EXPLOSIVES SIZE, TYPE & WEIGHT		
NUMBER OF HOLES (EA)	183	SIZE	TYPE	WEIGHT
HOLE DIAMETER (IN)	4			
HOLE DEPTH (FT)	7 - 15	0.75	SPARTAN 350	137.25
FACE HEIGHT (FT)	15	BULK	TITAN 1000 XL	7,220
SUB DRILLING (FT)	0			
STEM FACE HOLES (FT)	7			
STEM OTHER HOLES (FT)	7, 6, 5, 4			
BURDEN FRONT ROW (FT)	11			
BURDEN OTHER ROWS (FT)	11			
SPACING FRONT ROW (FT)	12			
SPACING OTHER ROWS (FT)	12		TOTAL WEIGHT lb:	7,357.25

DETONATORS USED IN BLAST: Electronic MATS USED: No STEM TYPE: 3/8 CRUSHED STONE TOTAL DRILL DEPTH: 2,185 (FT)

TYPE	MFG	DATE CODE	USED	TYPE	MFG	DATE CODE	USED
DIGISHOT DETONATOR 100FT	Dyno Nobel Global	10FE20	1	DIGISHOT SURFACE WIRE	Dyno Nobel Global		1,000
EZDET 25/350 30 FT	Dyno Nobel Global	20SE21	59	EZDET 25/350 30 FT	Dyno Nobel Global	01NO21	125
EZTL 17MS 20FT	Dyno Nobel Global	18NO19	10	EZTL 42MS 20FT	Dyno Nobel Global	02MY22	10
EZTL 67MS 30 FT	Dyno Nobel Global	07MA22	6	SPARTAN 350	Dyno Nobel Global	08AU22	184

CU YDS IN SHOT: 10,487 SCALED DISTANCE FACTOR: 411 % OF ANFO: 0

TONS IN SHOT: 20,974 HOLES/DELAY : 3 FUEL OIL % (BULK): 0

MAX LBS/DELAY: 141 AVERAGE LBS/HOLE: 41

POWDER FACTOR (TONS/LB): 2.85 POWDER FACTOR POUNDS/YD3: 0.70

BLASTER'S NAME: Wright, Jerry BLASTER'S NUMBER & STATE: 1-035-38300 Colorado

BLASTER'S SIGNATURE: Jerry Wright SITE SAFETY INSPECTION PERFORMED: Yes

NUMBER OF PERSONNEL ON SITE: 3

REMARKS : Digi box 01FA. ESR diagram averaged. Drill log and dot sheet from Gary/ BPC. 11' x12' pattern. 4" holes. Entire pattern drilled at 15' depth. Per GCC request, back filled 100 holes. Ramp pattern. Rows 1-4 kept at 15'. Row 5 at 11' depth. Row 6 at 10' depth. Row 7 at 9' depth. Row 8 at 8' depth. Row 9 at 7' depth. Titan 1000 XL bulk. 1.15 cup density. Loaded holes, by weight . Rows 1-4 @ 50 lbs. per hole. Rows 5-6 @ 40 lbs. per hole. Rows 7-8 @ 30 lbs. per hole. Row 9 @ 20 lbs. per hole. Hole D19 double primed. Stuck primer.

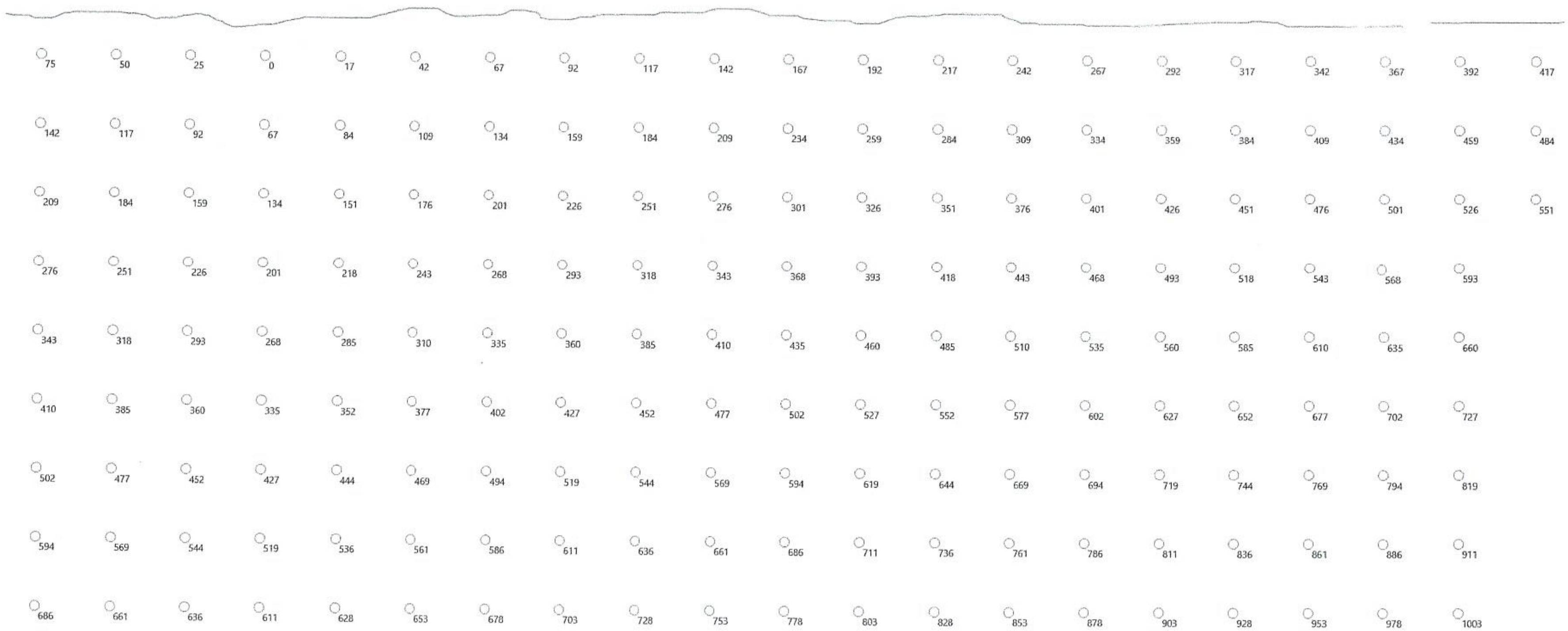
START TIME	END TIME	TOTAL TIME	TRUCK NUMBERS
7:00	12:30	5:30	5130

Buckley Powder Co.

CUSTOMER NAME: GCC SALT CANYON
BENCH: Bench 1
BLASTER'S NAME: Wright, Jerry

DIAGRAM

BLAST DATE: 10/21/2022
BLAST NUMBER: 10212022



Shot: 10212022

Bench: Bench 1

Customer: GCC

Site: Louviers

Load Sheet Report

Mine:	GCC SALT CANYON	Shot:	10212022	Date:	10/21/2022	Time:	1:53PM
Blaster:	Wright, Jerry	License:	1-035-38300	Material:	Gypsum	Holes:	183
Diameter:	4 (IN)	Burden:	11 (FT)	Spacing:	12 (FT)	Primers:	183
Exp. Vibration:	0.00 IPS	Fr. Burden:	11 (FT)	Fr. Spacing:	12 (FT)	Total Exp.:	7,357 lb
Fuel:	0 lb	AN:	0 lb	ANFO:	0 lb	Emulsion:	7,220 lb
Depth:	7 - 15 (FT)	YD3: 10,487	Tons: 20,974	Tons/Lb:	2.85	Gallons of Fuel:	0
Max Lbs/Delay:	141 lb	Holes / 8ms:	3	Location:	N38.54182	& W-104.97078	
Temperature:	75° F	Wind Dir:	West	Wind Speed:	28 MPH	Ceiling:	Unlimited
Conditions:	Clear			Method of Detonation:	Electronic		
Pre-Blast Inspection Performed:	Yes / No			Initiation:	Remote Electronic		
Load Started:	7:00	Load Ended:	12:30	Total Load Time:	5:30		

Comments: Digi box 01FA. ESR diagram averaged. Drill log and dot sheet from Gary/ BPC. 11' x12' pattern. 4" holes. Entire pattern drilled at 15' depth. Per GCC request, back filled 100 holes. Ramp pattern. Rows 1-4 kept at 15'. Row 5 at 11' depth. Row 6 at 10' depth. Row 7 at 9' depth. Row 8 at 8' depth. Row 9 at 7' depth. Titan 1000 XL bulk. 1.15 cup density. Loaded holes, by weight . Rows 1-4 @ 50 lbs. per hole. Rows 5-6 @ 40 lbs. per hole. Rows 7-8 @ 30 lbs. per hole. Row 9 @ 20 lbs. per hole. Hole D19 double primed. Stuck primer.

Crew

Name	Hours	Name	Hours
Brad Jessee	5.5	Edson Holland	4
Jerry Wright	7		

Trucks Used: 5130

Inventory

Description	Date Code	Out	Description	Date Code	Out
DIGISHOT SURFACE WIRE		1,000	EZTL 17MS 20FT	18NO19	10
EZTL 42MS 20FT	02MY22	10	EZTL 67MS 30 FT	07MA22	6
SPARTAN 350	08AU22	184	EZDET 25/350 30 FT	20SE21	59
EZDET 25/350 30 FT	01NO21	125	DIGISHOT DETONATOR 100FT	10FE20	1

Services

Service	Quantity	Service	Quantity

Product Totals

Product	Total lb
SPARTAN 350	137.25
TITAN 1000 XL	7,220.000

Row	Col	Depth	Rise	Stem	Wet?	Product	Hole Total lb
A	1	15	8	7	No	SPARTAN 350	0.75
A	1	15	8	7	No	TITAN 1000 XL	51.521
A	2	15	8	7	No	SPARTAN 350	0.75
A	2	15	8	7	No	TITAN 1000 XL	51.521
A	3	15	8	7	No	SPARTAN 350	0.75
A	3	15	8	7	No	TITAN 1000 XL	51.521
A	4	15	8	7	No	SPARTAN 350	0.75
A	4	15	8	7	No	TITAN 1000 XL	51.521
A	5	15	8	7	No	SPARTAN 350	0.75
A	5	15	8	7	No	TITAN 1000 XL	51.521
A	6	15	8	7	No	SPARTAN 350	0.75
A	6	15	8	7	No	TITAN 1000 XL	51.521
A	7	15	8	7	No	SPARTAN 350	0.75
A	7	15	8	7	No	TITAN 1000 XL	51.521
A	8	15	8	7	No	SPARTAN 350	0.75
A	8	15	8	7	No	TITAN 1000 XL	51.521
A	9	15	8	7	No	SPARTAN 350	0.75
A	9	15	8	7	No	TITAN 1000 XL	51.521
A	10	15	8	7	No	SPARTAN 350	0.75
A	10	15	8	7	No	TITAN 1000 XL	51.521
A	11	15	8	7	No	SPARTAN 350	0.75
A	11	15	8	7	No	TITAN 1000 XL	51.521
A	12	15	8	7	No	SPARTAN 350	0.75
A	12	15	8	7	No	TITAN 1000 XL	51.521
A	13	15	8	7	No	SPARTAN 350	0.75
A	13	15	8	7	No	TITAN 1000 XL	51.521
A	14	15	8	7	No	SPARTAN 350	0.75
A	14	15	8	7	No	TITAN 1000 XL	51.521
A	15	15	8	7	No	SPARTAN 350	0.75
A	15	15	8	7	No	TITAN 1000 XL	51.521
A	16	15	8	7	No	SPARTAN 350	0.75
A	16	15	8	7	No	TITAN 1000 XL	51.521
A	17	15	8	7	No	SPARTAN 350	0.75
A	17	15	8	7	No	TITAN 1000 XL	51.521
A	18	15	8	7	No	SPARTAN 350	0.75
A	18	15	8	7	No	TITAN 1000 XL	51.521
A	19	15	8	7	No	SPARTAN 350	0.75
A	19	15	8	7	No	TITAN 1000 XL	51.521
A	20	15	8	7	No	SPARTAN 350	0.75
A	20	15	8	7	No	TITAN 1000 XL	51.521

A	21	15	8	7	No	SPARTAN 350	0.75
A	21	15	8	7	No	TITAN 1000 XL	51.521
B	1	15	8	7	No	SPARTAN 350	0.75
B	1	15	8	7	No	TITAN 1000 XL	51.521
B	2	15	8	7	No	SPARTAN 350	0.75
B	2	15	8	7	No	TITAN 1000 XL	51.521
B	3	15	8	7	No	SPARTAN 350	0.75
B	3	15	8	7	No	TITAN 1000 XL	51.521
B	4	15	8	7	No	SPARTAN 350	0.75
B	4	15	8	7	No	TITAN 1000 XL	51.521
B	5	15	8	7	No	SPARTAN 350	0.75
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B	6	15	8	7	No	SPARTAN 350	0.75
B	6	15	8	7	No	TITAN 1000 XL	51.521
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B	20	15	8	7	No	TITAN 1000 XL	51.521

B	21	15	8	7	No	SPARTAN 350	0.75
B	21	15	8	7	No	TITAN 1000 XL	51.521
C	1	15	8	7	No	SPARTAN 350	0.75
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D	20	15	8	7	No	TITAN 1000 XL	51.521

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E	1	11	5	6	No	TITAN 1000 XL	35.045
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E	2	11	5	6	No	TITAN 1000 XL	35.045
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E	3	11	5	6	No	TITAN 1000 XL	35.045
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E	4	11	5	6	No	TITAN 1000 XL	35.045
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E	9	11	5	6	No	TITAN 1000 XL	35.045
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F	1	11	5	6	No	TITAN 1000 XL	35.045

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F	19	11	5	6	No	SPARTAN 350	0.75
F	19	11	5	6	No	TITAN 1000 XL	35.045
F	20	11	5	6	No	SPARTAN 350	0.75
F	20	11	5	6	No	TITAN 1000 XL	35.045
G	1	9	4	5	No	SPARTAN 350	0.75
G	1	9	4	5	No	TITAN 1000 XL	28.036
G	2	9	4	5	No	SPARTAN 350	0.75
G	2	9	4	5	No	TITAN 1000 XL	28.036

G	3	9	4	5	No	SPARTAN 350	0.75
G	3	9	4	5	No	TITAN 1000 XL	28.036
G	4	9	4	5	No	SPARTAN 350	0.75
G	4	9	4	5	No	TITAN 1000 XL	28.036
G	5	9	4	5	No	SPARTAN 350	0.75
G	5	9	4	5	No	TITAN 1000 XL	28.036
G	6	9	4	5	No	SPARTAN 350	0.75
G	6	9	4	5	No	TITAN 1000 XL	28.036
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G	8	9	4	5	No	SPARTAN 350	0.75
G	8	9	4	5	No	TITAN 1000 XL	28.036
G	9	9	4	5	No	SPARTAN 350	0.75
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G	10	9	4	5	No	TITAN 1000 XL	28.036
G	11	9	4	5	No	SPARTAN 350	0.75
G	11	9	4	5	No	TITAN 1000 XL	28.036
G	12	9	4	5	No	SPARTAN 350	0.75
G	12	9	4	5	No	TITAN 1000 XL	28.036
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G	13	9	4	5	No	TITAN 1000 XL	28.036
G	14	9	4	5	No	SPARTAN 350	0.75
G	14	9	4	5	No	TITAN 1000 XL	28.036
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G	17	9	4	5	No	TITAN 1000 XL	28.036
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G	19	9	4	5	No	TITAN 1000 XL	28.036
G	20	9	4	5	No	SPARTAN 350	0.75
G	20	9	4	5	No	TITAN 1000 XL	28.036
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H	2	9	4	5	No	TITAN 1000 XL	28.036
H	3	9	4	5	No	SPARTAN 350	0.75
H	3	9	4	5	No	TITAN 1000 XL	28.036

H	4	9	4	5	No	SPARTAN 350	0.75
H	4	9	4	5	No	TITAN 1000 XL	28.036
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H	11	9	4	5	No	SPARTAN 350	0.75
H	11	9	4	5	No	TITAN 1000 XL	28.036
H	12	9	4	5	No	SPARTAN 350	0.75
H	12	9	4	5	No	TITAN 1000 XL	28.036
H	13	9	4	5	No	SPARTAN 350	0.75
H	13	9	4	5	No	TITAN 1000 XL	28.036
H	14	9	4	5	No	SPARTAN 350	0.75
H	14	9	4	5	No	TITAN 1000 XL	28.036
H	15	9	4	5	No	SPARTAN 350	0.75
H	15	9	4	5	No	TITAN 1000 XL	28.036
H	16	9	4	5	No	SPARTAN 350	0.75
H	16	9	4	5	No	TITAN 1000 XL	28.036
H	17	9	4	5	No	SPARTAN 350	0.75
H	17	9	4	5	No	TITAN 1000 XL	28.036
H	18	9	4	5	No	SPARTAN 350	0.75
H	18	9	4	5	No	TITAN 1000 XL	28.036
H	19	9	4	5	No	SPARTAN 350	0.75
H	19	9	4	5	No	TITAN 1000 XL	28.036
H	20	9	4	5	No	SPARTAN 350	0.75
H	20	9	4	5	No	TITAN 1000 XL	28.036
I	1	7	3	4	No	SPARTAN 350	0.75
I	1	7	3	4	No	TITAN 1000 XL	21.027
I	2	7	3	4	No	SPARTAN 350	0.75
I	2	7	3	4	No	TITAN 1000 XL	21.027
I	3	7	3	4	No	SPARTAN 350	0.75
I	3	7	3	4	No	TITAN 1000 XL	21.027
I	4	7	3	4	No	SPARTAN 350	0.75
I	4	7	3	4	No	TITAN 1000 XL	21.027

I	5	7	3	4	No	SPARTAN 350	0.75
I	5	7	3	4	No	TITAN 1000 XL	21.027
I	6	7	3	4	No	SPARTAN 350	0.75
I	6	7	3	4	No	TITAN 1000 XL	21.027
I	7	7	3	4	No	SPARTAN 350	0.75
I	7	7	3	4	No	TITAN 1000 XL	21.027
I	8	7	3	4	No	SPARTAN 350	0.75
I	8	7	3	4	No	TITAN 1000 XL	21.027
I	9	7	3	4	No	SPARTAN 350	0.75
I	9	7	3	4	No	TITAN 1000 XL	21.027
I	10	7	3	4	No	SPARTAN 350	0.75
I	10	7	3	4	No	TITAN 1000 XL	21.027
I	11	7	3	4	No	SPARTAN 350	0.75
I	11	7	3	4	No	TITAN 1000 XL	21.027
I	12	7	3	4	No	SPARTAN 350	0.75
I	12	7	3	4	No	TITAN 1000 XL	21.027
I	13	7	3	4	No	SPARTAN 350	0.75
I	13	7	3	4	No	TITAN 1000 XL	21.027
I	14	7	3	4	No	SPARTAN 350	0.75
I	14	7	3	4	No	TITAN 1000 XL	21.027
I	15	7	3	4	No	SPARTAN 350	0.75
I	15	7	3	4	No	TITAN 1000 XL	21.027
I	16	7	3	4	No	SPARTAN 350	0.75
I	16	7	3	4	No	TITAN 1000 XL	21.027
I	17	7	3	4	No	SPARTAN 350	0.75
I	17	7	3	4	No	TITAN 1000 XL	21.027
I	18	7	3	4	No	SPARTAN 350	0.75
I	18	7	3	4	No	TITAN 1000 XL	21.027
I	19	7	3	4	No	SPARTAN 350	0.75
I	19	7	3	4	No	TITAN 1000 XL	21.027
I	20	7	3	4	No	SPARTAN 350	0.75
I	20	7	3	4	No	TITAN 1000 XL	21.027

BUCKLEY POWDER COMPANY

WORKPLACE EXAMINATION/ PRE BLAST TAILGATE MEETING

BPC Employee's and/or Customer Employees Attending the Workplace Examination:

Blaster	Attendees
Jerry Wright	Brad Jesse
	Edson Holland
	Jarred Mayne

Date: 10/21/2021 **Time:** ~~830~~ 7:00 **Location:** Salt Canyon

Topics to be discussed: Check mark topics discussed which may include the following.

1	✓	Danger Zone Designation (6' mark):	Painted [Burm ✓] Tape [ ] Cones [ ]
2	✓	Verify Employee PPE:	Hard hat [✓] High Visibility [✓] Fall protection [ ] Safety toe boots [✓] Safety Glasses [✓] Other [ ]
3	✓	Emergency Instructions:	911 meet at gate
4	✓	Blast Site Security & Barricading:	signs cones burms
5	✓	Weather conditions / concerns:	clear
6		High Wall Conditions:	
7		Ground / Floor Conditions:	
8	✓	Loading Procedures (Gassing needs):	1.15 cup Density
9	✓	Specific Tie-in Instructions:	Nonel
10	✓	Stemming Requirements:	varied - Loading change per GCC Request.
11	✓	Density Requirements & Holes:	1.15 cup. 183 holes
12		Fall Protection Needs (highwall & trucks):	
13		Blast Warning Procedures:	
14	✓	Road Blockades:	BPC
15		*other:*	

Description of Adverse Conditions: ______________________ Date Corrected______

______________________ Date Corrected______

Description of other Safety related items discussed (other than topics above)

If defects were discovered, were they corrected prior to beginning any work?

APPENDIX N

BUCKLEY POWDER
BLAST RESULTS EXPECTATIONS

The below-identified Owner/Operator does hereby acknowledge that BUCKLEY POWDER has specified for the reasons listed below why the results of this blast may not be optimum, desirable or normal. BUCKLEY POWDER by this document is informing The Owner/Operator of the expected outcome and the Owner/Operator therefore agrees to release, indemnify, save harmless and assume the defense on behalf of BUCKLEY POWDER or any one or more of BUCKLEY POWDER'S officers, directors, agents, and employees, arising in any way from the firing of the shot, including any claim for personal injury, loss of life or damage to or loss of property, loss of anticipate profits, consequential damages or incidental damages and this release and indemnity shall extend to all related costs, charges and expenses of BUCKLEY POWDER (including legal cost). It is further agreed that in the event of unacceptable results of the blast, the Owner/Operator shall be responsible for the full payment to BUCKLEY POWDER for the products and services rendered.

Expected outcome and reasons for the expected outcome: GCC Requested 5 Row be back filled. ~~the~~
Hole depth 7' to 11' ~~[illegible]~~ last 5 Rows
Because of pattern size may not move or get the brakge desired - possible oversize

Date 10/21/22

Location Salt Canyon / GCC

Owner/Operator ______________________

Operation Name ______________________

THE OWNER/OPERATOR AND BUCKLEY POWDER, ACKNOWLEDE THAT THEY HAVE READ AND UNDERSTAND THIS AGREEMENT, INCLUDING THE RELEASE AND INDEMITY PROVISIONS, AND AGREE TO BE BOUND BY ITS TERMS. THIS AGREEMENT SHALL SUPERSEDE ANY PRIOR AGREEMENT BETWEEN THE PARTIES WITH RESPECT TO THE SUBJECT MATTER CONTAINED HEREIN.

BUCKLEY POWDER	OWNER/OPERATOR
BY Jerry Wright	BY [signature] Dick Federico
TITLE Blaster	TITLE Quarry Manager

GeoSonics Inc. Seismic Analysis
Velocity Waveform Analysis

Serial No:	28191 v9.5		
Date:	10/21/2022 13:53:36		
Event No:	28		
Record Time:	5.0 s		
Client:			
Operation:			
Location:			
Distance:			
Operator:			
Comment:			
Seismic Trigger:	0.02 in/s		
Sound Trigger:	133 db		

Summary Data

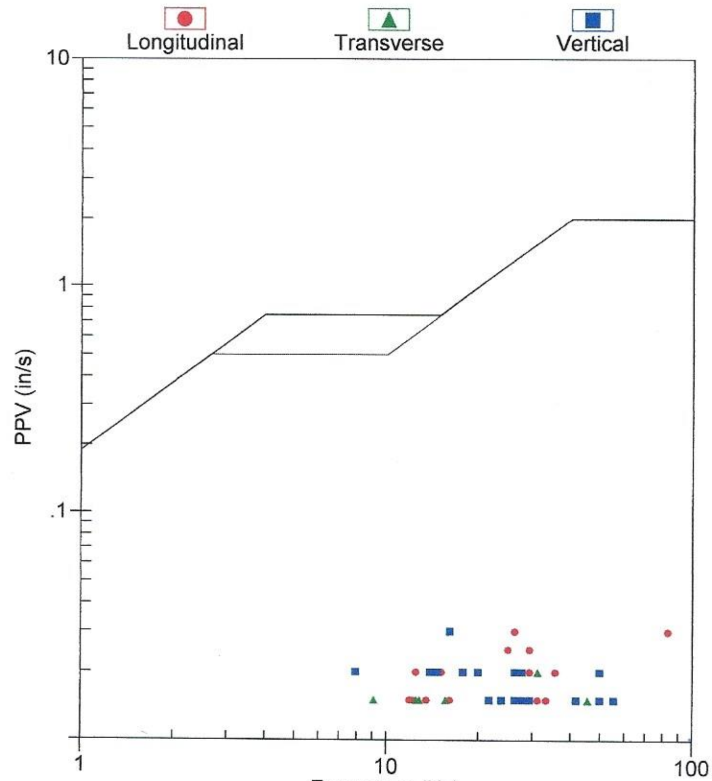
	L	T	V
PPV (in/s)	0.03	0.02	0.03
FREQ (Hz)	33.3	31.3	16.1
PD (.001")	0.3	0.3	0.2
PPA (g)	0.03	0.03	0.03
Peak Vector Sum :	0.04 in/s		
Peak Air Pressure:	124 db		
	0.00467 PSI @ 13.9 Hz		

Additional Info:

Shaketable Calibrated: 12/07/2021
By: GeoSonics Inc.
359 Northgate Drive
Warrendale, PA 15086 U.S.A.
TEL: 724.934.2900 FAX: 724.934.2999

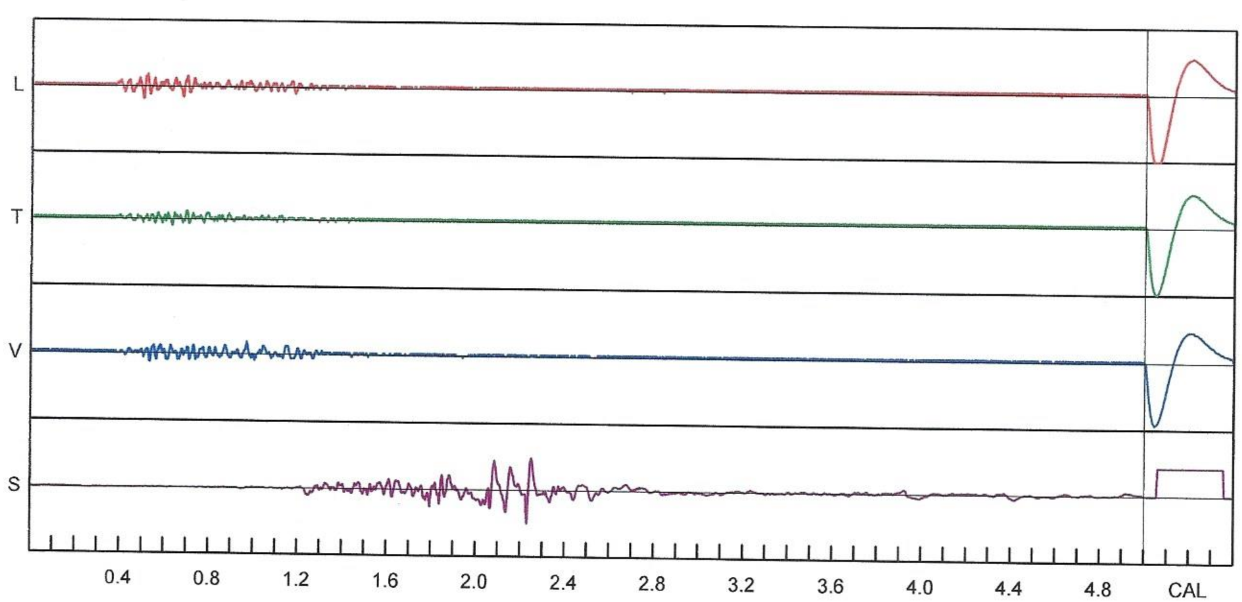
Velocity Waveform Graph Scale
Time Scale: 0.100 s
Seismic Scale: +/- 0.16 in/s
Sound Scale: +/- 0.0091 PSI

USBM Safe Blasting Levels
SN: 28191 Event: 28



Zero Crossing Half-Wave Frequency Analysis

Velocity Waveform
SN: 28191 Event: 28



Time (s)

Printed: October 21, 2022 **File:** #069_028.EV3 (GeoSonics Inc. AnalysisNET v8.1.57)