Buckley Powder Co. BLAST REPORT

SERVICE SITE LOCATION: Louviers

BLAST NUMBER: 4 bench-5 BLAST TIME: 12:10 pm BLAST DATE: 07/26/2017

CUSTOMER: MARTIN MARIETTA MATERIA MINE: RED CANYON ADDRESS: Colorado Springs, CO

ROCK TYPE: Granite Tons/Yd3: 2.00 EXPECTED VIBRATION: 0.490 IPS

LOCATION OF BLAST

LOCATION OF BLAST IN MINE: North BENCH: Level 1

BLAST GPS POINTS: N 038 36 24.18000 & W -104 56 47.52000

WEATHER

WEATHER: Partly Cloudy CEILING: High TEMPERATURE: 91 F WIND DIRECTION & SPEED: Northeast 5 MPH

NEAREST NON-OWNED STRUCTURE

NAME: North Hillside GPS Points: N 038 36 22.41000 & W -104 56 31.21980

DISTANCE: 1,304 (FT) DIRECTION: 97°

SEISMOGRAPH DATA

	LOCATION	DISTANCE	GPS POINTS	CALIBRATION DATE
1	North Hillside	1,304 (FT)	N 038 36 22.41000 & W -104 56 31.21980	10/21/2016

	L	(F)	T	(F)	V	(F)	AIR (db)	SEISMOGRAPH	SERIAL	OPERATOR
1	0.058	9	0.110	10	0.073	15	148	VibraTech 9835	9835	

BLAST DATA

		EXPLOSIVES SIZE, TYPE & WEIGHT		
NUMBER OF HOLES (EA)	70	SIZE	TYPE	WEIGHT
HOLE DIAMETER (IN)	5	0.75	SPARTAN 350SR	104.25
HOLE DEPTH (FT)	10 - 48	BULK	TITAN 1000 XL	22,360
FACE HEIGHT (FT)	45			
SUB DRILLING (FT)	3			
AVG. STEM FACE HOLES (FT)	13			
STEM OTHER HOLES (FT)	13.080			
BURDEN FRONT ROW (FT)	17			
BURDEN OTHER ROWS (FT)	1 - 17			
SPACING FRONT ROW (FT)	14			
SPACING OTHER ROWS (FT)	1 - 17		TOTAL WEIGHT (LB):	22,464.25

DETONATORS USED IN BLAST: Electronic MATS USED: No STEM TYPE: 3/4 x 1/2 CRUSHED TOTAL DRILL DEPTH: 3,322 (FT

TYPE	MFG	DATE CODE	USED	TYPE	MFG	DATE CODE	USED
DIGISHOT DETONATOR 50FT	Dyno Nobel Global	29MY17	139	SPARTAN 350SR	Dyno Nobel Global	15NO17	139

CU YDS IN SHOT: 27,370 SCALED DISTANCE FACTOR: 37 % OF ANFO: 0

TONS IN SHOT: 54,741 HOLES/DELAY : 4 FUEL OIL % (BULK): 0

MAX LBS/DELAY: 1,215 AVERAGE LBS/HOLE: 321

POWDER FACTOR (TONS/LB): 2.44 POWDER FACTOR POUNDS/YD3: 0.82

BLASTERS NAME: Farmer, Jimmie BLASTERS NUMBER & STATE: 1-035-0748 Colorado

BLASTERS SIGNATURE: J. A Farmer SITE SAFETY INSPECTION PERFORMED: Yes

NUMBER OF PERSONNEL ON SITE: 8

REMARKS : Matt Klepher Profiled the face with the drone a day earlier and bore tracked all holes. 13' face stemming Except three holes on the east face these hole at 16' stemming. all others at 13' Face holes cup density at 1.15, and the main holes at 1.07 cup. One boulder in the middle 11' with one cap and booster 25# We had one hole that riffled up a little . Pretty good breakage the back break is straight. Rod put set backs at 40' Backbreak at 13'.

START TIME	END TIME	TOTAL TIME	TRUCK NUMBERS
7:00 AM	10:30 AM	03:30	5013, 5092

APPENDIX A

Date: 7/26/12 Location: Mm Red (Anfo) shot # : _____

BLASTER'S CHECKLIST

Must be filled out as you go!

PRE-TRIP CHECKLIST

yes / no / NA		yes / no / NA		yes / no / NA	
✓	Measuring Tapes and lead ends	✓	Scientific Calculator	✓	Drill Logs
✓	Burden pole Tape/ Profiler	✓	Pocket Mirror	✓	Shot reports
✓	Loading Poles	✓	Empty Shot bags	✓	Hold Harmlesses
✓	Marking Paint	✓	Powder Punch	✓	Seismographs
✓	Starter and primers	✓	GPS	✓	Density Cup and Scales
✓	Blasting Signs & cones	✓	Non sparking Knife	✓	Two Way Radios / fully
✓	Sirens in working order	✓	Wire strippers	✓	Wheel Chocks
✓	Set back stakes	✓	Splices	✓	Harness & Lanyard / "T" post
✓	Digitial video camera & Tripod	✓	Flash Light & Batteries	✓	First Aid Kits

PRESHIFT CHECKLIST

yes / no / NA	
✓	Inspect blast area for Unsafe Working Conditions (including face) for voids, cracks, caves, etc..
✓	Ensure all employees have their site specific training.
✓	Secure blast site with warning signs and cones (including floor in front of face)
✓	Check shot access including traffic activity
✓	Pre shift inspections on all equipment -*OK and safe to operate* (includes back up alarms, brakes, horns, etc..)
✓	Mark fall zone area at least six(6) feet from the crest
✓	Inspect Harness/ Lanyard ***before each use*** if needed for fall zone or on top of trucks
✓	Insure all needed products are present-enough boosters, detonators etc
✓	Calculate Minimum Burden and Measure front row burden with burden pole or profiler (Document)
✓	Check drill log and all holes for proper depth and blockage
✓	Insure blast design is consistent with closest structures requirements
✓	Any need for calling assistance (Hold Harmless, equipment to close, drilling problems, etc...)
✓	Conduct pre-blast safety meeting with blast crew. *If there is not a timing diagram, detonator tie-in must be discussed at the*
	Calculate pounds per delay: Expl density x expl diam^2 x .3405 = _____ lbs/ ft x avg powder column= _____ lbs/hole x expected _____ holes / delay =_____ lbs/delay
✓	Calculate scale distance: 1) Distance _____2) divided by lbs/delay _____ 3) hit square root then equals_____ =S.D. (4)
	Calculate expected vibratiion: S.D.(4)_____ Push 1/x on calculator. Push (yx) key then 1.6 hit equals x 160 = _____exp. vib.

TIE-IN CHECKLIST

yes / no / NA		
✓	Shot tie inspected and signed off by two persons prior to shot including lead line *(include names below)*	
	JDF	Luke R Anfo
✓	Blast area is cleared and blocked before attaching starter cap and lead line	
✓	Blaster in charge in communication with all guards at this time	
✓	Blaster in charge will insure blast area has been cleared and guarded before the siren is sounded	
✓	After proper waiting time blaster in charge will contact all guards before firing blast	
✓	Seismograph located at nearest off site structure or at the Property Line related to nearest off-site	
✓	Video Recording Made of Shot	

POST BLAST CHECKLIST

yes / no / NA	
✓	Maintain guards until shot is cleared and "all clear" is sounded
✓	Check for misfires, undetonated explosives or burning product and other dangers
✓	Sound all clear that is audible to all parties
✓	Dispose of lead line in approved manner
✓	Dispose of empty boxes in approved methods only
✓	Complete all required paper work prior to leaving customer location- shipping Papers, delivery ticket, Blaster's
✓	Make one final check of blast site before leaving property to insure no materials have been left
	and that no hazards are present that may have been missed during clearing process
✓	

Must completed and turned in daily- end of shift

Blaster In Charge JDF

Seismic Analysis
Velocity Waveform Analysis

Serial Number:	9835
Firmware Version:	0C-06.05
Event Date:	07/26/2017 12:08:37 (UTC -06:00)
Event number:	12
Recording Time:	5 s
Client:	Martin Marietta
Operation:	Red Canyon Quarry
Location:	North Hill Side
Distance:	
Operator:	Vibra Tech
Comment:	Pueblo, Colorado
Seismic Trigger:	0.02 in/s
Sound Trigger:	133 dB

Additional Info:

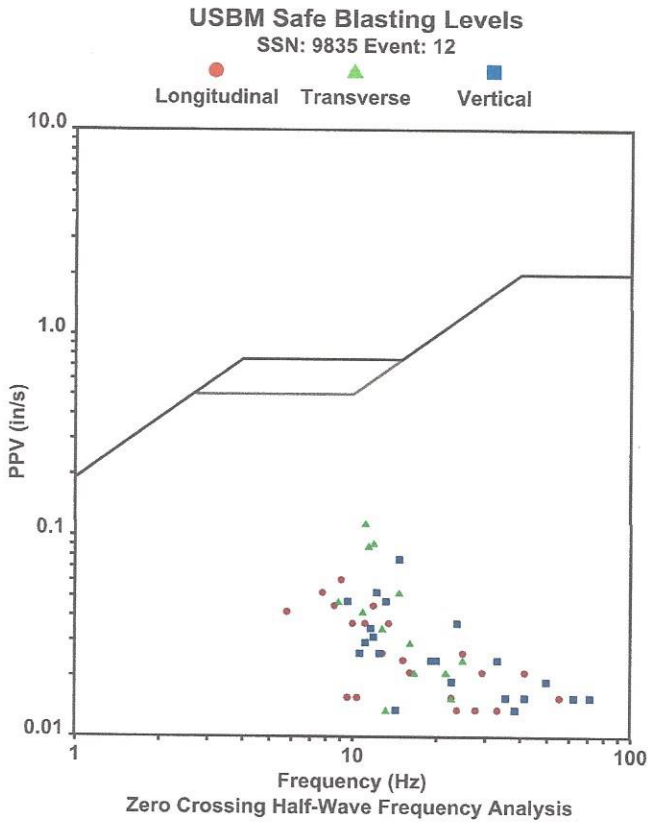
j-GEO-16060
N38 36 22 W104 56 31

Summary Data

	L	T	V
PPV (in/s):	0.058	0.11	0.073
FREQ (HZ):	9.1	10.9	14.7
PD (.001"):	0.97	1.56	0.7
PPA (g):	0.026	0.026	0.026

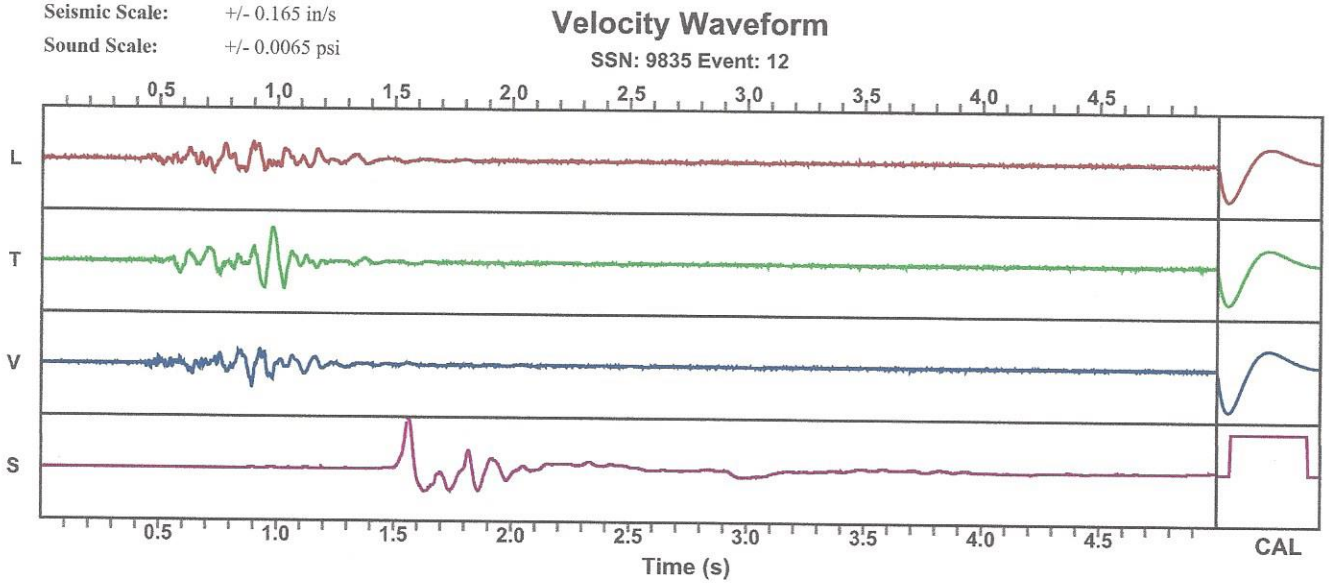
Peak Vector Sum: 0.12 in/s
Peak Air Pressure: 127 dB
0.0065 psi @ 3.4 HZ

Shaketable Calibrated
On: 10/21/2016 (UTC -06:00)
By: Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40203 U.S.A.



Waveform Graph Scale

Time Scale: 0.1 s
Seismic Scale: +/- 0.165 in/s
Sound Scale: +/- 0.0065 psi



Seismic Analysis
Velocity Waveform Analysis

Serial Number:	10696
Firmware Version:	0C-06.05
Event Date:	07/26/2017 12:08:40 (UTC -06:00)
Event number:	4
Recording Time:	5 s
Client:	Martin Marietta
Operation:	Red Canyon Quarry
Location:	Front Entrance
Distance:	
Operator:	Vibra Tech
Comment:	
Seismic Trigger:	0.02 in/s
Sound Trigger:	133 dB

Additional Info:

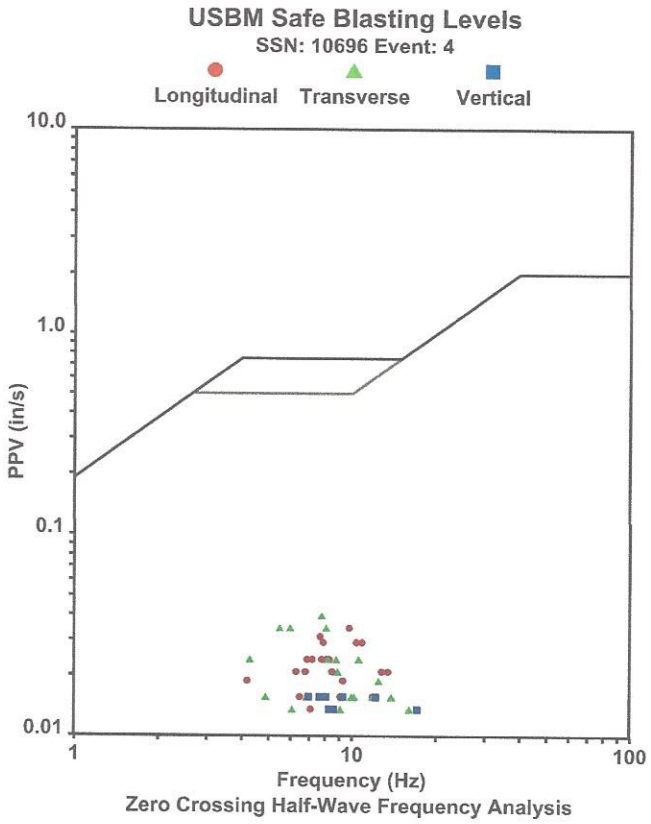
j-GEO-16222
N38 36 04 W104 56 59

Summary Data

	L	T	V
PPV (in/s):	0.033	0.038	0.015
FREQ (HZ):	9.3	7.8	6.4
PD (.001"):	0.62	0.86	0.35
PPA (g):	0.013	0.013	0.013

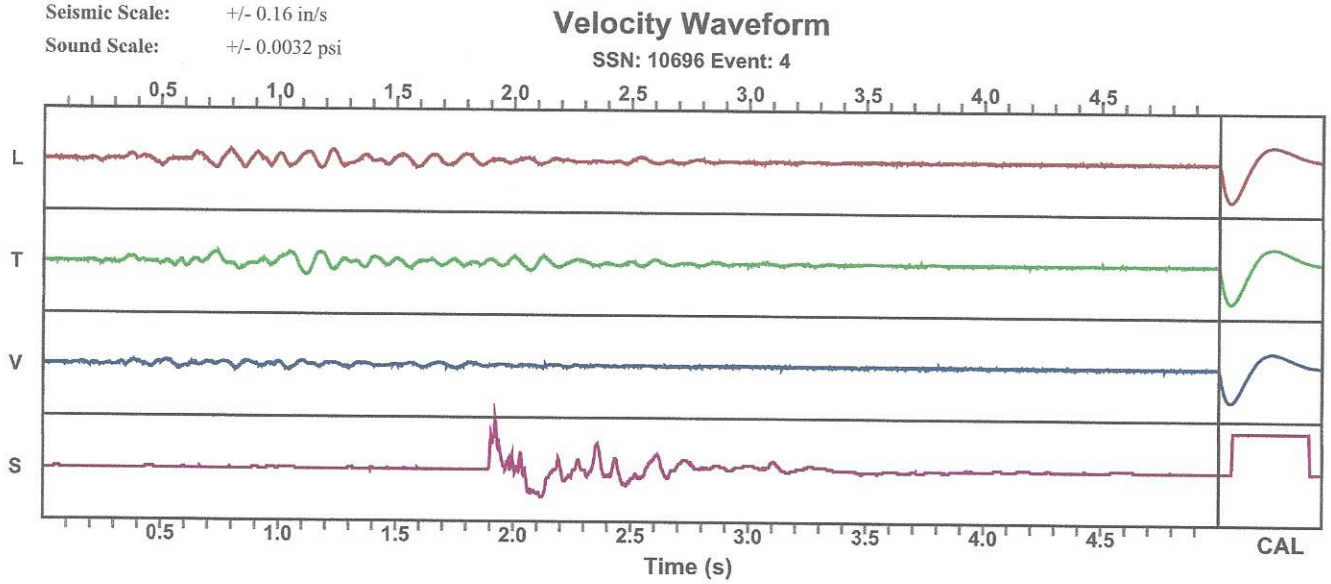
Peak Vector Sum: 0.045 in/s
Peak Air Pressure: 120 dB
0.0032 psi @ 6.5 HZ

Shaketable Calibrated
On: 04/13/2017 (UTC -06:00)
By: Vibra-Tech, Inc.
2700 Holloway Road - Suite 113
Louisville, KY 40203 U.S.A.



Waveform Graph Scale

Time Scale: 0.1 s
Seismic Scale: +/- 0.16 in/s
Sound Scale: +/- 0.0032 psi

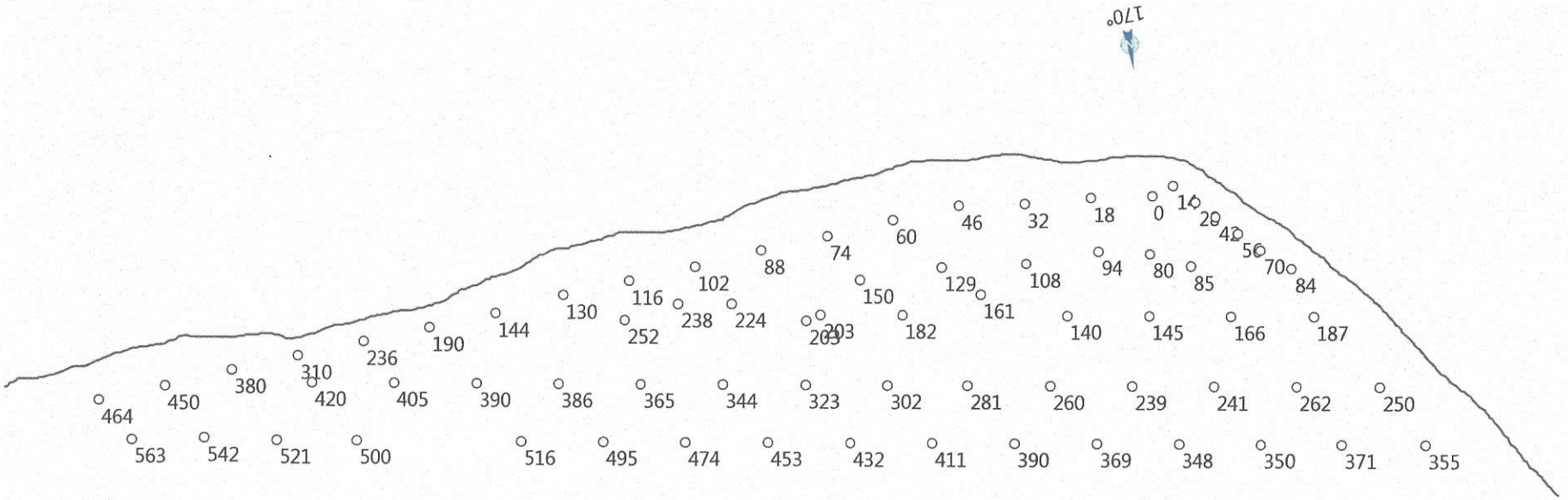


Buckley Powder Co.

CUSTOMER NAME: RED CANYON
BENCH: Level 1
BLASTER'S NAME: Farmer, Jimmie

DIAGRAM

BLAST DATE: 07/26/2017
BLAST NUMBER: 4 bench-5



Shot: 4 bench-5

Bench: Level 1

Customer: MARTIN MARIETTA MATERIALS

Site: Louviers

Load Sheet Report

Mine: RED CANYON	Shot: 4 bench-5	Date: 7/26/2017	Time: 12:10PM
Blaster: Farmer, Jimmie	License: 1-035-0748	Material: Granite	Holes: 70
Diameter: 5 (IN)	Burden: 15 (FT)	Spacing: 16 (FT)	Primers: 139
Exp. Vibration: 0.49 IPS	Fr. Burden: 17 (FT)	Fr. Spacing: 14 (FT)	Total Exp.: 22,464 (LB)
Fuel: 0 (LB)	AN: 0 (LB)	ANFO: 0 (LB)	Emulsion: 22,360 (LB)
Depth: 10 - 48 (FT)	YD3: 27,370 Tons: 54,741	Tons/Lb: 2.44	Gallons of Fuel: 0
Max Lbs/Delay: 1,215 (LB)	Holes / 8ms: 4	Location: N 038 36 24.18000	& W-104 56 47.5200
Temperature: 91° F	Wind Dir: Northeast	Wind Speed: 5 MPH	Ceiling: High
Conditions: Partly Cloudy		Method of Detonation: Electronic	
Pre-Blast Inspection Performed: Yes / No		Initiation: Electronic	
Load Started: 7:00 AM	Load Ended: 10:30 AM	Total Load Time: 03:30	

Comments: Matt Klepher Profiled the face with the drone a day earlier and bore tracked all holes. 13' face stemming Except three holes on the east face these hole at 16' stemming. all others at 13' Face holes cup density at 1.15, and the main holes at 1.07 cup. One boulder in the middle 11' with one cap and booster 25# We had one hole that riffled up a little . Pretty good breakage the back break is straight. Rod put set backs at 40' Backbreak at 13'.

Crew

Name	Hours	Name	Hours
Anthony Archelta	5	Garry McCulley	5
Jeff Hammer	8	Justin Banks	8
Luke Reel	5	Luke Swearingen	5
Matt Klepfer	8	Matthew Gillette	5
Rod Schuch	8		

Trucks Used: 5013, 5092

Inventory

Description	Date Code	Out	Description	Date Code	Out
SPARTAN 350SR	15NO17	139	DIGISHOT DETONATOR 50FT	29MY17	139

Services

Service	Quantity	Service	Quantity

Product Totals

Product	Total (LB)
SPARTAN 350SR	104.25
TITAN 1000 XL	22,360

Row	Col	Depth	Rise	Stem	Wet?	Product	Hole Total (LB)
A	1	48	35	13	No	SPARTAN 350SR	1.5
A	1	48	35	13	No	TITAN 1000 XL	323.958
A	2	48	35	13	No	SPARTAN 350SR	1.5
A	2	48	35	13	No	TITAN 1000 XL	323.958
A	3	48	35	13	No	SPARTAN 350SR	1.5
A	3	48	35	13	No	TITAN 1000 XL	323.958
A	4	48	35	13	No	SPARTAN 350SR	1.5
A	4	48	35	13	No	TITAN 1000 XL	323.958
A	5	48	32	16	No	SPARTAN 350SR	1.5
A	5	48	32	16	No	TITAN 1000 XL	215
A	6	48	32	16	No	SPARTAN 350SR	1.5
A	6	48	32	16	No	TITAN 1000 XL	215
A	7	48	32	16	No	SPARTAN 350SR	1.5
A	7	48	32	16	No	TITAN 1000 XL	215
A	8	48	35	13	No	SPARTAN 350SR	1.5
A	8	48	35	13	No	TITAN 1000 XL	323.958
A	9	48	35	13	No	SPARTAN 350SR	1.5
A	9	48	35	13	No	TITAN 1000 XL	323.958
A	10	48	35	13	No	SPARTAN 350SR	1.5
A	10	48	35	13	No	TITAN 1000 XL	323.958
A	11	48	35	13	No	SPARTAN 350SR	1.5
A	11	48	35	13	No	TITAN 1000 XL	323.958
A	12	48	35	13	No	SPARTAN 350SR	1.5
A	12	48	35	13	No	TITAN 1000 XL	323.958
A	13	48	35	13	No	SPARTAN 350SR	1.5
A	13	48	35	13	No	TITAN 1000 XL	323.958
A	14	48	35	13	No	SPARTAN 350SR	1.5
A	14	48	35	13	No	TITAN 1000 XL	323.958
A	15	48	35	13	No	SPARTAN 350SR	1.5
A	15	48	35	13	No	TITAN 1000 XL	323.958
A	16	48	35	13	No	SPARTAN 350SR	1.5
A	16	48	35	13	No	TITAN 1000 XL	323.958
A	17	48	35	13	No	SPARTAN 350SR	1.5
A	17	48	35	13	No	TITAN 1000 XL	323.958
A	18	48	35	13	No	SPARTAN 350SR	1.5
A	18	48	35	13	No	TITAN 1000 XL	323.958
A	19	48	35	13	No	SPARTAN 350SR	1.5
A	19	48	35	13	No	TITAN 1000 XL	323.958
A	20	48	35	13	No	SPARTAN 350SR	1.5
A	20	48	35	13	No	TITAN 1000 XL	323.958
A	21	48	35	13	No	SPARTAN 350SR	1.5

A	21	48	35	13	No	TITAN 1000 XL	323.958
A	22	48	35	13	No	SPARTAN 350SR	1.5
A	22	48	35	13	No	TITAN 1000 XL	323.958
A	23	48	35	13	No	SPARTAN 350SR	1.5
A	23	48	35	13	No	TITAN 1000 XL	323.958
B	1	48	35	13	No	SPARTAN 350SR	1.5
B	1	48	35	13	No	TITAN 1000 XL	331.310
B	2	48	35	13	No	SPARTAN 350SR	1.5
B	2	48	35	13	No	TITAN 1000 XL	331.310
B	3	48	35	13	No	SPARTAN 350SR	1.5
B	3	48	35	13	No	TITAN 1000 XL	323.958
B	4	48	35	13	No	SPARTAN 350SR	1.5
B	4	48	35	13	No	TITAN 1000 XL	323.958
B	5	48	35	13	No	SPARTAN 350SR	1.5
B	5	48	35	13	No	TITAN 1000 XL	323.958
B	6	48	35	13	No	SPARTAN 350SR	1.5
B	6	48	35	13	No	TITAN 1000 XL	323.958
C	1	48	35	13	No	SPARTAN 350SR	1.5
C	1	48	35	13	No	TITAN 1000 XL	331.310
C	2	48	35	13	No	SPARTAN 350SR	1.5
C	2	48	35	13	No	TITAN 1000 XL	331.310
C	3	48	35	13	No	SPARTAN 350SR	1.5
C	3	48	35	13	No	TITAN 1000 XL	331.310
C	4	48	35	13	No	SPARTAN 350SR	1.5
C	4	48	35	13	No	TITAN 1000 XL	331.310
C	5	48	35	13	No	SPARTAN 350SR	1.5
C	5	48	35	13	No	TITAN 1000 XL	331.310
C	6	48	35	13	No	SPARTAN 350SR	1.5
C	6	48	35	13	No	TITAN 1000 XL	331.310
C	7	48	35	13	No	SPARTAN 350SR	1.5
C	7	48	35	13	No	TITAN 1000 XL	331.310
C	8	48	35	13	No	SPARTAN 350SR	1.5
C	8	48	35	13	No	TITAN 1000 XL	331.310
C	9	48	35	13	No	SPARTAN 350SR	1.5
C	9	48	35	13	No	TITAN 1000 XL	331.310
C	10	48	35	13	No	SPARTAN 350SR	1.5
C	10	48	35	13	No	TITAN 1000 XL	331.310
D	1	48	35	13	No	SPARTAN 350SR	1.5
D	1	48	35	13	No	TITAN 1000 XL	331.310
D	2	48	35	13	No	SPARTAN 350SR	1.5
D	2	48	35	13	No	TITAN 1000 XL	331.310
D	3	48	35	13	No	SPARTAN 350SR	1.5
D	3	48	35	13	No	TITAN 1000 XL	331.310

D	4	48	35	13	No	SPARTAN 350SR	1.5
D	4	48	35	13	No	TITAN 1000 XL	331.310
D	5	48	35	13	No	SPARTAN 350SR	1.5
D	5	48	35	13	No	TITAN 1000 XL	331.310
D	6	48	35	13	No	SPARTAN 350SR	1.5
D	6	48	35	13	No	TITAN 1000 XL	331.310
D	7	48	35	13	No	SPARTAN 350SR	1.5
D	7	48	35	13	No	TITAN 1000 XL	331.310
D	8	48	35	13	No	SPARTAN 350SR	1.5
D	8	48	35	13	No	TITAN 1000 XL	331.310
D	9	48	35	13	No	SPARTAN 350SR	1.5
D	9	48	35	13	No	TITAN 1000 XL	331.310
D	10	48	35	13	No	SPARTAN 350SR	1.5
D	10	48	35	13	No	TITAN 1000 XL	331.310
D	11	48	35	13	No	SPARTAN 350SR	1.5
D	11	48	35	13	No	TITAN 1000 XL	331.310
D	12	48	35	13	No	SPARTAN 350SR	1.5
D	12	48	35	13	No	TITAN 1000 XL	331.310
D	13	48	35	13	No	SPARTAN 350SR	1.5
D	13	48	35	13	No	TITAN 1000 XL	331.310
D	14	48	35	13	No	SPARTAN 350SR	1.5
D	14	48	35	13	No	TITAN 1000 XL	331.310
E	1	48	35	13	No	SPARTAN 350SR	1.5
E	1	48	35	13	No	TITAN 1000 XL	331.310
E	2	48	35	13	No	SPARTAN 350SR	1.5
E	2	48	35	13	No	TITAN 1000 XL	331.310
E	3	48	35	13	No	SPARTAN 350SR	1.5
E	3	48	35	13	No	TITAN 1000 XL	331.310
E	4	48	35	13	No	SPARTAN 350SR	1.5
E	4	48	35	13	No	TITAN 1000 XL	331.310
E	5	48	35	13	No	SPARTAN 350SR	1.5
E	5	48	35	13	No	TITAN 1000 XL	331.310
E	6	48	35	13	No	SPARTAN 350SR	1.5
E	6	48	35	13	No	TITAN 1000 XL	331.310
E	7	48	35	13	No	SPARTAN 350SR	1.5
E	7	48	35	13	No	TITAN 1000 XL	331.310
E	8	48	35	13	No	SPARTAN 350SR	1.5
E	8	48	35	13	No	TITAN 1000 XL	331.310
E	9	48	35	13	No	SPARTAN 350SR	1.5
E	9	48	35	13	No	TITAN 1000 XL	331.310
E	10	48	35	13	No	SPARTAN 350SR	1.5
E	10	48	35	13	No	TITAN 1000 XL	331.310
E	11	48	35	13	No	SPARTAN 350SR	1.5

E	11	48	35	13	No	TITAN 1000 XL	331.310
E	12	48	35	13	No	SPARTAN 350SR	1.5
E	12	48	35	13	No	TITAN 1000 XL	331.310
E	13	48	35	13	No	SPARTAN 350SR	1.5
E	13	48	35	13	No	TITAN 1000 XL	331.310
E	14	48	35	13	No	SPARTAN 350SR	1.5
E	14	48	35	13	No	TITAN 1000 XL	331.310
E	15	48	35	13	No	SPARTAN 350SR	1.5
E	15	48	35	13	No	TITAN 1000 XL	331.310
E	16	48	35	13	No	SPARTAN 350SR	1.5
E	16	48	35	13	No	TITAN 1000 XL	331.310
F	1	10	0.5	9.5	No	SPARTAN 350SR	0.75
F	1	10	0.5	9.5	No	TITAN 1000 XL	25