Information Management Systems 304

Jeff Averett

QUARRY ACADEMY

Improving Processes. Instilling Expertise.

DYNO Dyno Nobel

SANDVIK

Course Agenda

- Overview of Information Technology tools related to blasting
- Getting it all together
  - ✓ How to collect & store beneficial information
  - ✓ What value does this information provide?
  - ✓ How do we make the information meaningful?
- Other tools

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Electronic Shot Reporting

- **We have a legal requirement to document blasting activities**
  - ✓ **This requirement can be leveraged to provide useful information that can help define future blasting parameters**
  - ✓ **Electronic Reporting can also increase the productivity of your blasters**
    - Can reduce the amount of time needed to create a report
    - Reduces errors
    - Ensures consistency
- **Combining with other electronic data makes optimization easier**

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Electronic Shot Report - [Shot # 1026 - JUNCTION CITY MINING : 2nd Bench]

File Shot Tools View Window Help

Shot | Hole loading | Seismograph | Forms | Diagram

General

Date and time: 10/26/2009 02:00 PM
Owned by: ANDERSON COLUMBIA COMPANY
Mine: JUNCTION CITY MINING
Shot number: 1026
Status: Active
Order / Project #: 63254 19
Purchase order number:
Blaster: Jeff Averett
License: ABC123

Laid out by: John Watson

Load start/end: 07:00 AM 12:00 PM
Scheduled

Comments:

Conditions

Temperature: 58 Fahrenheit
Barometer: 30.12 in/Hg
Weather: Clear
Wind: 6 MPH Southwest
Ceiling: Unlimited Foot

Shot Parameters | Delay Information | Services and Personnel | Results

Bench: 2nd Bench
Location: Southeast
Material: Granite
Face type: Multiple
Min. face height: 0 Max: 0

Blast type: Production
Initiation: DigiShot
Method: Electronic
Pattern: Square

Grid map:
Map date: 1/ 1/2000
Desired powder factor: 2.00 Tons/lb
Specific gravity: 2.70
Tons/Yd3: 2.27

Personnel: 4
Shovel number: 142
Protection used:
Mats used
Video captured

((Burden x Spacing x Depth) / 27) x 2.27 = Tons

Shot GPS Points

GPS data display mode: Latitude & Longitude (D)

Latitude	Longitude
32.64010	84.51200
0.00000	0.00000

Save succeeded. DigiShot Logged on as: JAVERETT

Electronic Shot Report - [Shot # 1026 - JUNCTION CITY MINING : 2nd Bench]

File Shot Tools View Window Help

Shot | Hole loading | Seismograph | Forms | Diagram

Drag a column header here to group by that column.

Sel	Lock	Row	Column	Burden	Spacing	Drill Depth	Hole	Sub-Drill	Stem	Diameter	Explosive Weight	Total Weight	Angle	Wet	Truck
		A	1	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	2	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	3	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	4	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	5	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	6	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	7	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	8	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	9	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		A	10	10.00	10.00	42.00	40.00	2.00	12.00	4.000	190.68	192.18	0		
		B	1	10.00	10.00	42.00	40.00	2.00	10.00	4.000	204.30	205.80	0		
		B	2	10.00	10.00	42.00	40.00	2.00	10.00	4.000	204.30	205.80	0		
		B	3	10.00	10.00	42.00	40.00	2.00	10.00	4.000	204.30	205.80	0		

Loading | Advanced | Options | Date Codes

Content and Loading Defaults

Rows / Holes / Decks per Hole: 3 | 10 | 1

Frontline Burden / Spacing: 10.0 | 10.0

Burden / Spacing: 10.0 | 10.0

Drill / Hole / Sub-drill Depth: 42.0 | 40.0 | 2.0

Stem / Interdeck Length: 10.0

Diameter: 4.000

Wet

Dewatered

Stemming: CLEAN CRUSHED STONE

Explosive: TITAN 1040 SD

1st Primer: SPARTAN 350

Quantity: 2

2nd Primer:

Quantity: 0

Truck:

Operator:

Replace Active

Hole configuration

Load method: Stem length | Apply

Target deck / length: Deck #1

Total holes: 30

Explosive scale weight: 0

Use top grid hole dimensions

	Row	Start	End	Burden	Spacing	Decks	Drill	Depth	Stem	Dia.
▶	A	1	10	10.0	10.0	1	42.0	40.0	12.0	4.000
	B	1	10	10.0	10.0	1	42.0	40.0	10.0	4.000
	C	1	10	10.0	10.0	1	42.0	40.0	10.0	4.000
*		1	1	0.0	0	1	0.0	0.0	0.0	0.000

Save succeeded. DigiShot Logged on as: JAVERETT

Electronic Shot Report - [Shot # 1026 - JUNCTION CITY MINING : 2nd Bench]

File Shot Tools View Window Help

Shot | Hole loading | Seismograph | Forms | Diagram

GPS data display mode: Latitude & Longitude (D)

Seismograph	Location	Operator	License	Serial Number	Calibration Date	Event Number	Latitude	Longitude	Distance	Use	Trigge
New Seismo..	Roper Residence	David Anderson		1	07/22/2008	357	32.64415	84.51437	1649.00	☑	☐
Vibra Tech	JUNCTION CITY..	Bo Griffith		9511	06/30/2008	754	32.64272	84.50635	1984.00	☑	☐
							0.00000	0.00000	0.00	☑	☐

Detail

- ☑ Calculate distance to closest corner, if available
- ☑ On save, calculate expected vibration, if available
- ☐ Allow nearest structure override
- ☐ Calculate seismograph reading expected vibration in memory, if available (may exhibit delay)
- ☑ Automatically add fixed seismographs on new shot
- ☐ Automatically add non-owned structures for portable seismographs on new shot

Expected vibration: 0.08

Confinement (H factor): 160.0

Save succeeded. DigiShot Logged on as: JAVERETT

Electronic Shot Report - [Shot # 1026 - JUNCTION CITY MINING : 2nd Bench]

File Shot Tools View Window Help

Shot | Hole loading | Seismograph | Forms | Diagram

1. Pre-Blast Checks | 2. Loading Checks | 3. Post-Blast Checks

Pre-Blast Checklist

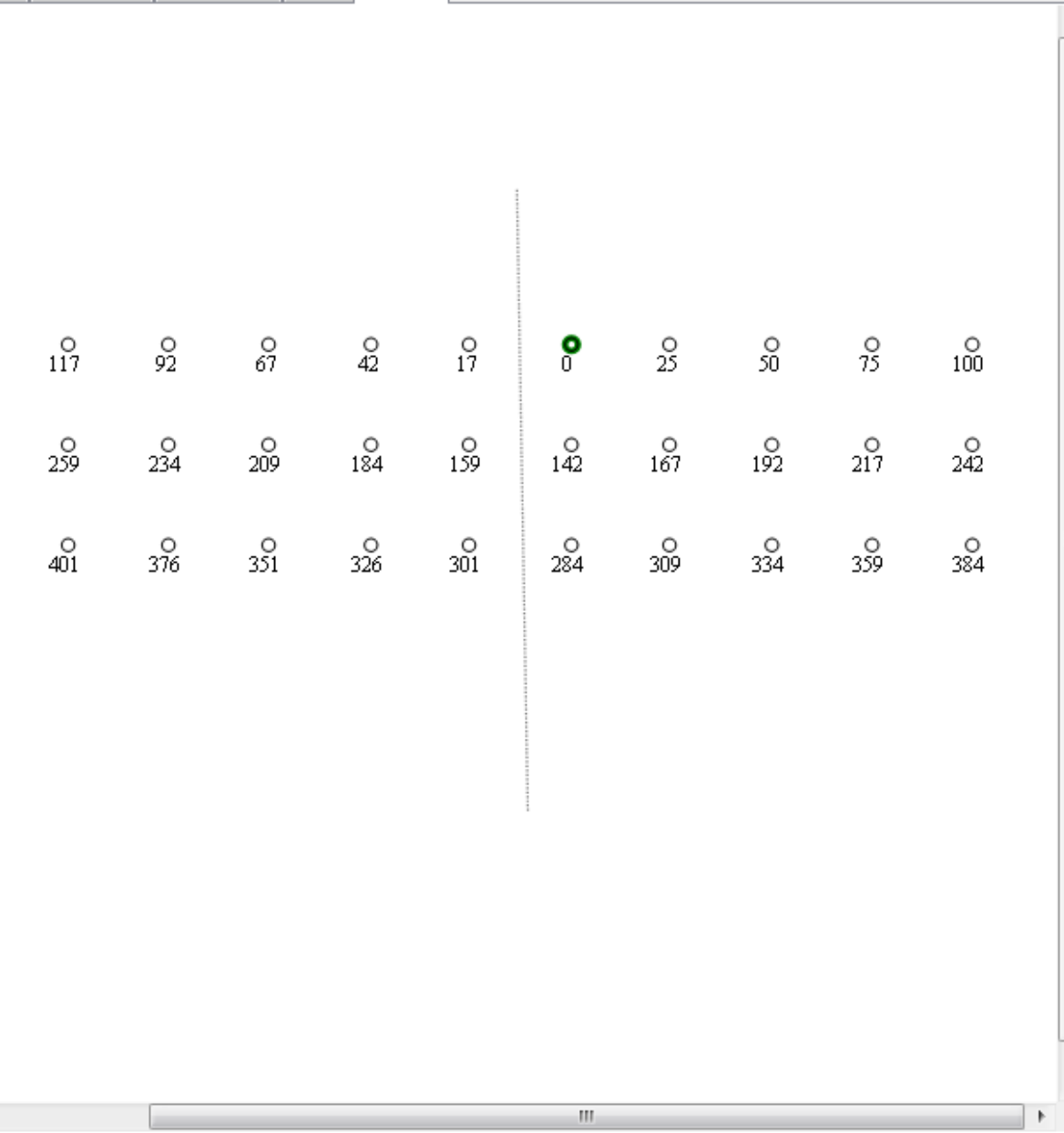
Form Completed ☑

1. Performed a pre-use inspection of all equipment and vehicles? ☑
2. Sign in and notify the mine management that we are on site and ready to load shot? ☑
3. Reviewed drilling log? ☑
4. Reviewed seismic report from previous blast in this area? ☑
5. Confirmed seismic monitoring and instrument placement for this shot? ☑
6. Inspected the blast area for personnel or equipment working, broken down or other items that need to be addressed before loading? ☑
7. Established blast site security and high wall safety zone by use of cones, markers, tape blasting signs or yellow blasting men? ☑
8. Inspected the face for cracks, caves, overhangs or light burden area? ☑
9. Inspected the blast site surface for cracks, slippery conditions and highwall hazards? ☑
10. Checked for stray current, if applicable? ■
11. Placed stemming next to holes? ☑
12. Checked actual layout versus diagram and measured burden and spacing at various points within the shot? ☑
13. Held a tailgate meeting with the crew to assign duties and discuss the specifics of the shot? ☑
14. Tape and check holes for proper depth, blockage and water? ☑
15. Profile front row of holes for burden? ☑
16. Calculated expected vibration at nearest non-company owned structure? ☑
17. Expected Vibration IPS: 0.08
18. Structure or Seismograph: Roper Residence

Save succeeded. DigiShot Logged on as: JAVERETT

File Shot Tools View Window Help

Hole loading | Seismograph | Forms | Diagram



Commands

Clear Delays

Select Hovered

Select Clicked

Initiation Line

Zoom: 124 Fit

Display: Hole delays

Options

Timing | Hole | Advanced | Report | Analysis | Histogram

Delay: DIGISHOT DETONATOR 50FT

Target:

Begin delay assignment from top deck

Delays per deck: 2

Initial delay L/R: 17 0

In deck offset:

Between deck offset: 0

Between hole offset: 25

Between row offset: 142 Apply

Existing delays will be replaced with the configuration specified.

succeeded. DigiShot Logged on as: JAVERETT

Electronic Shot Report - [Report]

File Shot Tools View Window Help

Main Report

EB-37
Rev. 09/06

State of West Virginia
Department of Environmental Protection - Office of Explosives and Blasting

Shot No. 1026

BLASTING LOG

General Information

Permittee ANDERSON COLUMBIA COMPANY JUNCTION CITY MINING **Permit No.**

Operator Name 19 **Date/Time** 10/26/09 2:00 pm

(Approved MR-19 Contract Operator, if applicable)

Company Conducting Blast Dyno Nobel Inc.

(Contract blaster i.e.; shot service, if applicable)

Location of Blast Grid Map N/A N 32 38 24.3601 & W 84 30 43.2000 Production

(Specify grid designation from blasting grid map, GPS location if available, and type of shot.)

Nearest Protected Structure Roper Residence NAD 87

(Specify name of homeowner/structure owner and structure number from blasting map)

Direction and Distance to Nearest Protected Structure (Feet) 1,649 334°

Nearest Other Structure JUNCTION CITY MINING

(Specify name of owner, identifying no., describe i.e.; gas well, gas line, power line, water line, barn, etc.)

Direction and Distance to Nearest Other Structure (Feet) 1,984 61°

Weather Conditions Clear 58 **Wind Direction and Speed** SW 6

(Include estimated temperature, precipitation, sky conditions, speed and direction wind is blowing from shot)

Type(s) of Materials Blasted Granite

Mats or Other Protection N/A

Blast Information

Type(s) of Explosives: **Blasting Agent** TITAN 1040 **Density** 1.25

(Include percent blend of emulsion to anfo) *(Product density in g/cc)*

High Explosives: (Boosters) *(Include type, unit weight and number used)* SPARTAN 350G(0.75 lb) 60 EA

Total Weight of Explosives: **Blasting Agent** 5992.80 **lbs. + Boosters** 45.00 **lbs. =** 6037.80 **lbs.**

Blast Hole Data: **Number** 30 **Diameter** 4.000 **Depth** 40.00 **Burden** 10 **Spacing** 10

(For varying hole depth, diameter, stemming, burden and/or spacing, list additional data in 'Comments' and illustrate on 'sketch' on page 2)

Powder Column: 28.00 - 30.0 ft **Stemming:** **Type of Material** CLEAN CRUSHED STONE **Length** 10.00 - 12.0 ft

Delay Type, Brand and Delay Periods DS DET 50FT 50', DS SURFACE 1000FT 1,000'

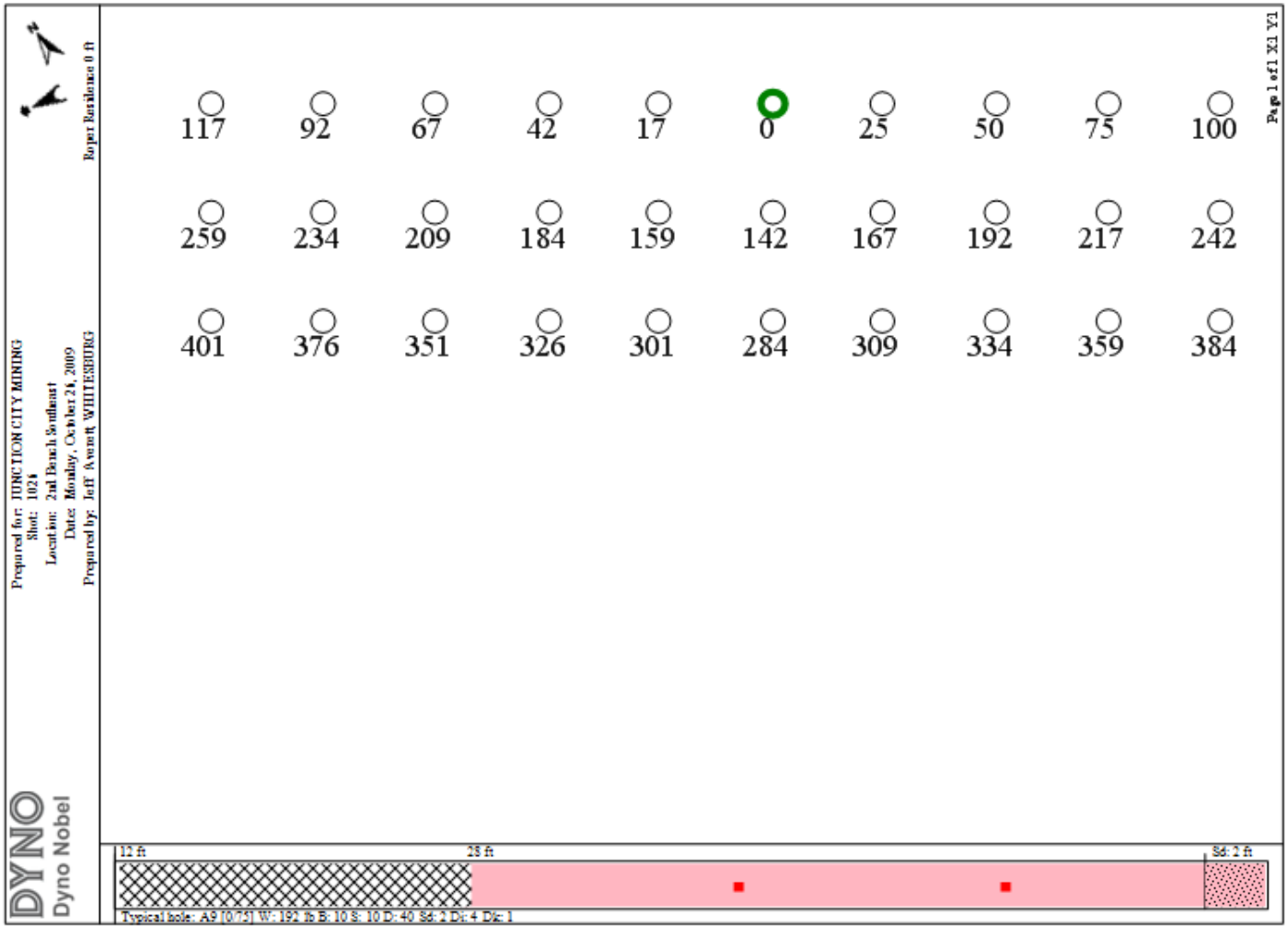
Current Page No.: 1 Total Page No.: 1+ Zoom Factor: 100%

Validating ... DigiShot Logged on as: JAVERETT

Electronic Shot Report - [Print preview]

File Shot Tools View Window Help

Close Page 1



End printing Shot #1026 diagram. DigiShot Logged on as: JAVERETT

Data Organization

- **A well planned relational database is key**
  - ✓ **A good understanding of your available data and reporting requirements is critical**
  - ✓ **Plan for future growth**
  - ✓ **Ensure your IT infrastructure is correctly sized and maintained**
- **Information should be accessible to key users in your organization**
- **Central data storage provides many benefits...it also provides some of the biggest challenges**
  - ✓ **Make sure you have a plan to get all key information to a central location**

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Data Reporting

- Online reporting provides a good way to allow people to run reports on demand no matter where they are
- You should be able to extract data in different formats for further manipulation and portability
- Dedicate the time to review the reports regularly and continually look for ways to improve how information is tracked and presented

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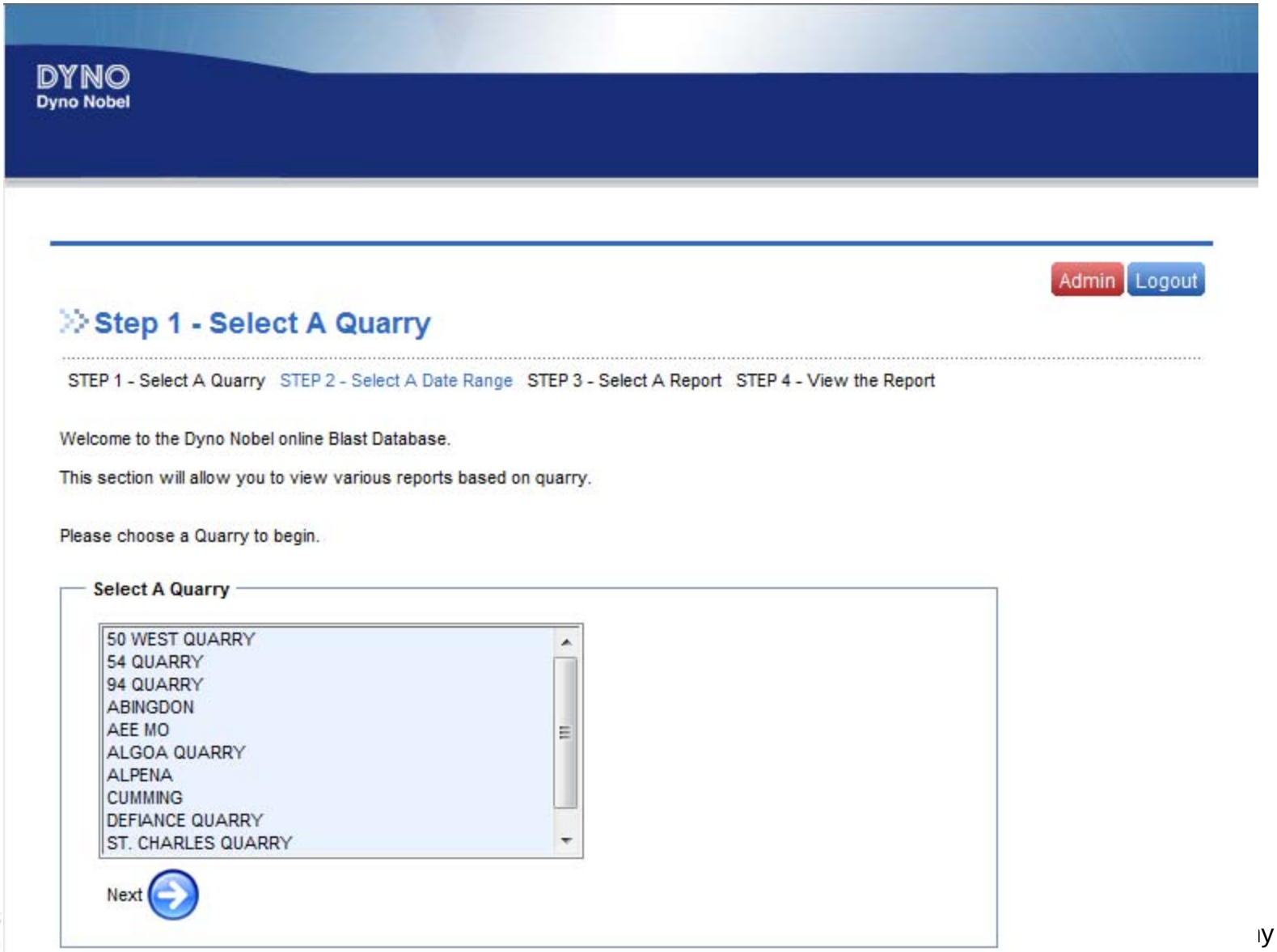
Web Reporting



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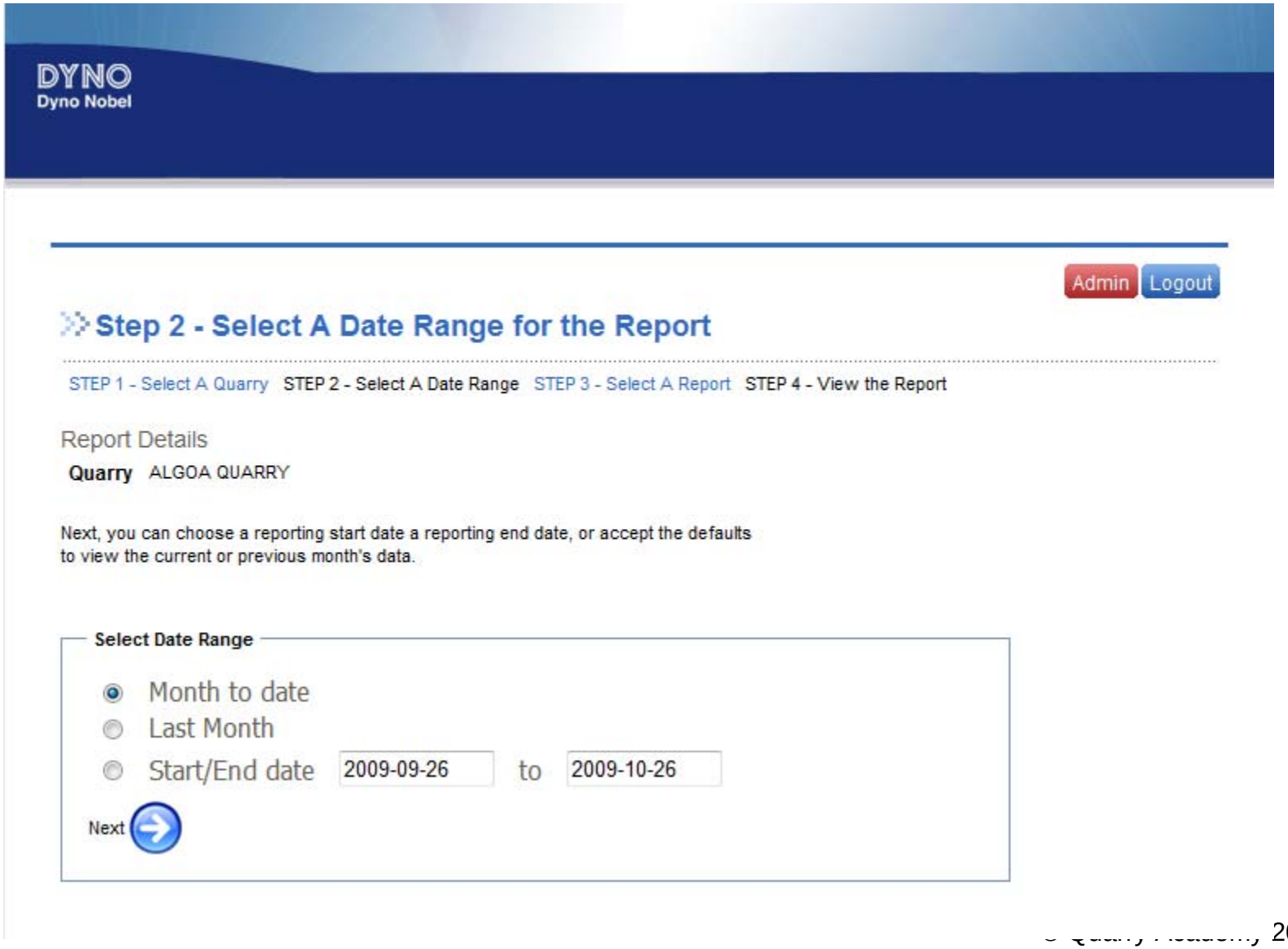
Web Reporting



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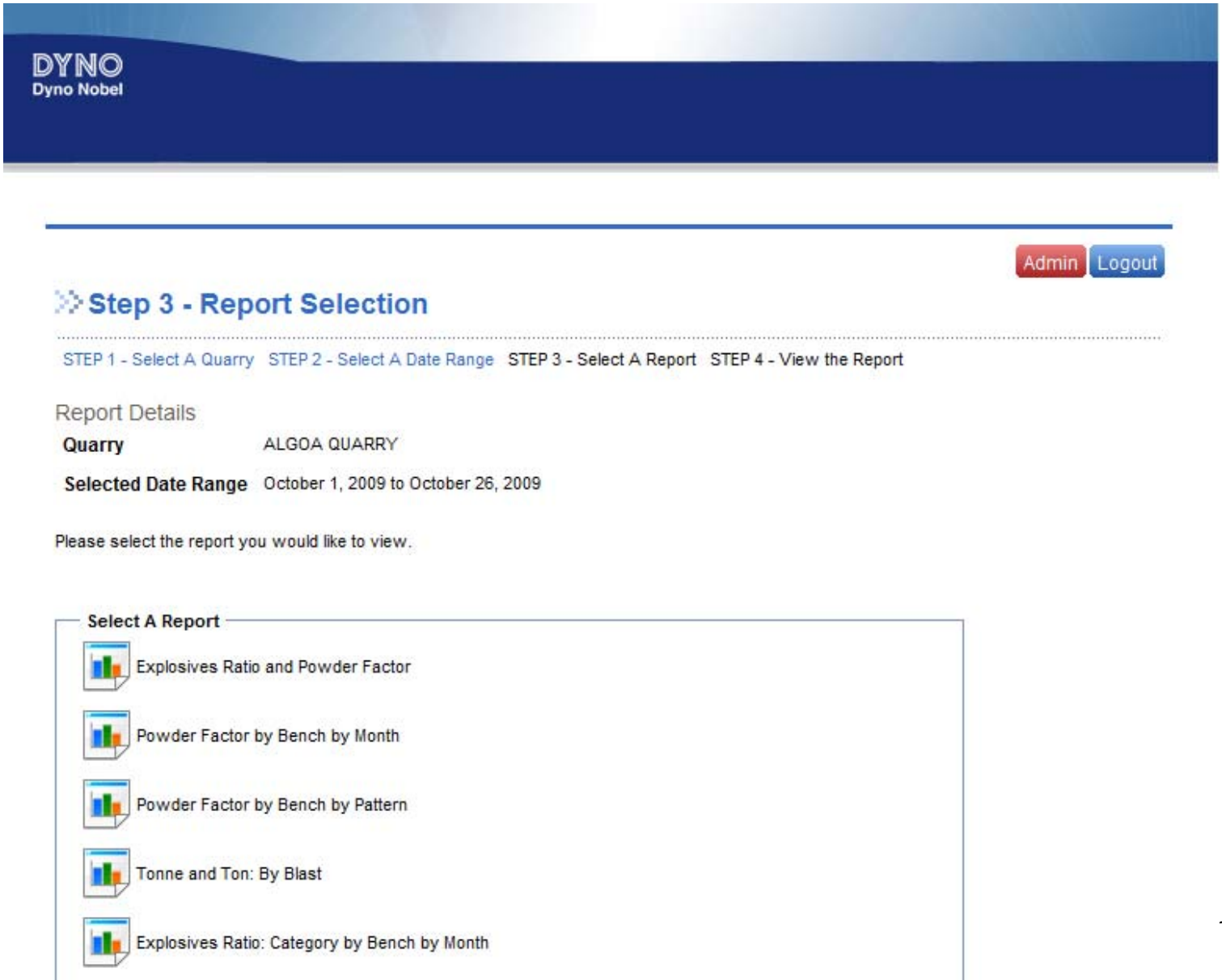
Web Reporting



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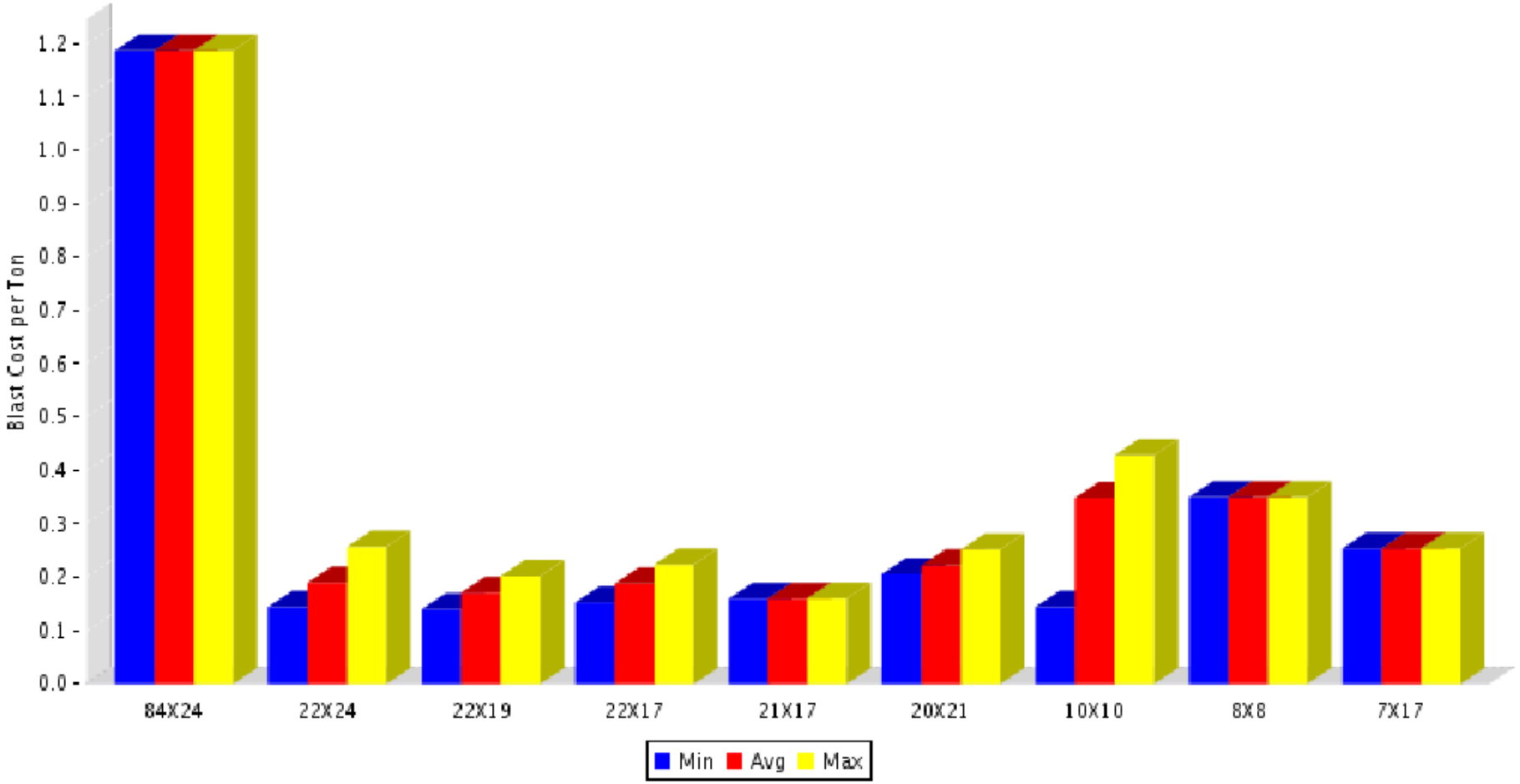
Blast Cost per Ton

LOWER BENCH



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Quarry Report

Shot No.	Date	Bench	Material Type	Blast Type	R. Den.	Holes	Tons Shot	Total Explosives	Powder Factor	People On Site
08L3B-1	03/06/2008	LOWER	Limestone	Development	2.66	26	103326	55783	1.85	1
08U26-B-2	04/02/2008	UPPER BENCH	Limestone	Production	2.66	20	117080	48469	2.42	1
08L3B-2	04/14/2008	LOWER	Limestone	Production	2.66	16	61303	34418	1.78	1
08L3c-2	04/28/2008	LOWER	Limestone	Production	2.66	13	49954	27924	1.79	1
08U26-c-3	05/01/2008	UPPER BENCH	Limestone	Production	2.66	20	105092	43461	2.42	1
08L3A-2	05/08/2008	LOWER	Limestone	Production	2.66	21	81854	44245	1.85	1
08U20A-1	05/20/2008	UPPER BENCH	Limestone	Production	2.66	18	105596	42508	2.48	1
08L3B-2-2	05/23/2008	LOWER	Limestone	Production	2.66	13	49428	27925	1.77	1
08U20A-1-1	05/29/2008	UPPER BENCH	Limestone	Production	2.66	18	92992	37344	2.49	1
08U19-A-1	06/10/2008	UPPER BENCH	Limestone	Production	2.66	29	159711	68481	2.33	1
08L-2D-1	06/17/2008	LOWER	Limestone	Production	2.66	26	101749	56379	1.8	1
0820UC-1	06/29/2008	UPPER BENCH	Limestone	Production	2.66	27	149740	60138	2.49	1
0812a-1	07/03/2008	LOWER	Limestone	Production	2.66	18	63056	34926	1.81	1
08L6-1	07/14/2008	LOWER	Limestone	Production	2.66	18	67877	27584	2.46	1
08L1A-1	07/25/2008	LOWER	Limestone	Production	2.66	14	52759	23743	2.22	1
08LL-1	07/28/2008	LOWER	Limestone	Development	2.66	51	29855	15798	1.89	1

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Shot Design Tools

- Allow a way to test different shot scenarios
- Look at potential problems before the shot is loaded
- When using electronic detonators you can tie the shot in on a computer and push the timing to the detonator through the blasting machine
  - ✓ Allows complex shots to be timed easily

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