Blast Service Management

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Improving Processes. Instilling Expertise.

DYNO
Dyno Nobel

SCHOOL OF MINES
1874
COLORADO

SANDVIK

Discussion Points

- Risk Assessment
- Liability Reduction
- Return to you
  - ✓ Financial
  - ✓ Efficiency
- Take Away Point

QUARRY ACADEMY

Risk Assessment

- Perform a risk assessment for drill services and blast services
  - ✓ Evaluate the risk – develop solutions to reduce
  - ✓ Goal to reduce current liability or potential liability

- Minimum impact to the surrounding community
- Evaluate the risk of conducting business with a supplier or potential supplier
- Reevaluate the risk assessment for major changes with existing suppliers

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Liability Reduction

- **Minimizing the current and potential liability**
  - ✓ **Your customers**
  - ✓ **Your suppliers**
- **Accept the liability**
  - ✓ **Increased cost to your company**
  - ✓ **Repair of equipment is less expensive than alternatives**
- **Transfer the liability**
  - ✓ **Situation where conductor ignores SOP's**
  - ✓ **Possibility for insurance claim**
- **Maintain customer relations**
  - ✓ **Promptly handle all complaints**
  - ✓ **Working to strength existing relationships**

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Dyno Nobel Risk Management

- **Perform a risk assessment for all new business at all customer locations is a customary procedure for Dyno Nobel**
  - ✓ **This survey will be done at no cost to the customer**
  - ✓ **Goal is to evaluate the risk and design a plan together with our blasters to keep liability at a minimum**

- **Minimum impact to the surrounding community**
- **Evaluate the risk of conducting business with customer or potential customer**
- **Perform a risk assessment for major changes with existing customer**

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Dyno Nobel Liability Reduction

- **Eight years ago!**
- **Dyno Nobel Americas fires approximately 100 blasts per day**
  - ✓ **Approximately 150 flyrock incidents annually**
    - Many aren't reported
    - These numbers don't represent customer flyrock incidents
  - ✓ **Loss to the bottom line approximately $4 million dollars per year**
  - ✓ **Loss of sales**
  - ✓ **Loss of insurance to do business**
  - ✓ **Interruption of normal business flow**

Information from Summa Insurance
Ralph Gremmel

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Liability Reduction Benefits

- Eight years ago – Dyno Nobel had no choice
- Liability was to great and risk to high not to take over all aspects of the blast event
- In 2005 our blast damage payout was under $100,000
- In 2006 our blast damage payout was under $150,000
- In 2007 our blast damage payout was under $100,000
  - ✓ The number of blast event we initiated more than tripled since we have implemented training, blast appraisal programs and pattern layout
  - ✓ What sales are required to add $3.8 million to the bottom line per year?
  - ✓ Increased sales – preferred shot service supplier

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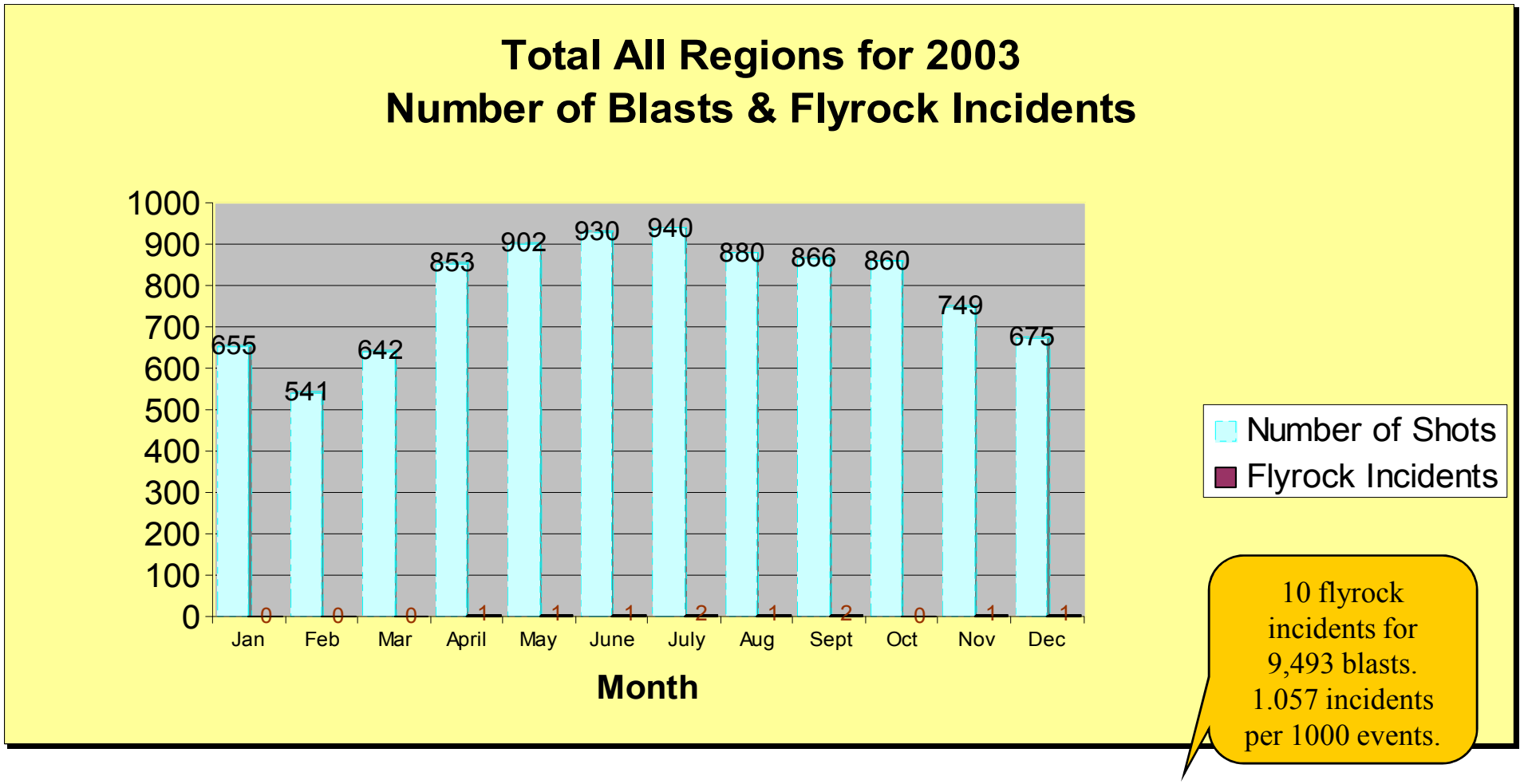
Number of Shots and Flyrock Events



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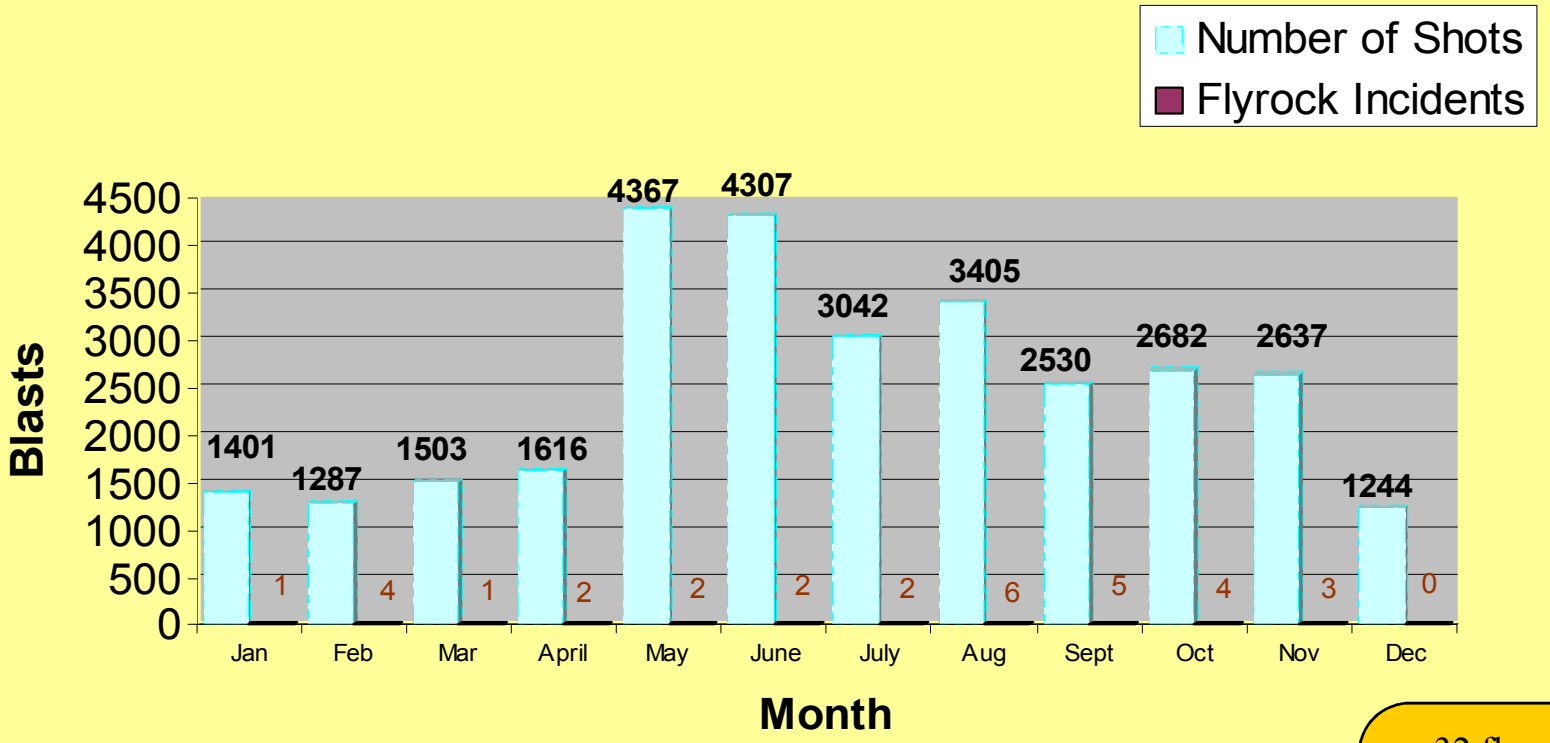
Total for 2007 By Month
Total Blasts & Flyrock Incidents



32 flyrock incidents with 30,021 blasts. 1.07 incidents per 1000 events.

Compared to 2003 for 300 % growth

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Tracking – Recent Blasting Incidents

- **Flyrock incidents**
  - ✓ **Defining flyrock incident**
  - ✓ **Defining near miss incidents – HHA or no HHA**
- **Initiation systems misfires**
  - ✓ **4 of the misfires are known to be missed connections.**
  - ✓ **1 shrapnel cutoff, and 1 tubing obstruction.**
  - ✓ **2 misfires at one quarry cost in excess of $20,000.00 for clean up and a loss of a blaster for over a week.**
- **4 Poor blast performance**
  - ✓ **All associated with geology.**

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Misfire Becomes Flyrock Incident

- The blast consisted of 13 holes, two of which were 6¾” and eleven of which were 6 ¼” on a 104’ face.
- The pattern was a 17’ x 19’ pattern with the front row inverted so that there was19 feet of burden and 17 feet spacing.
- Since there was no drill log provided and the crushing plant was within the 300’ distance, a Hold Harmless Agreement was obtained prior to the start of loading holes.

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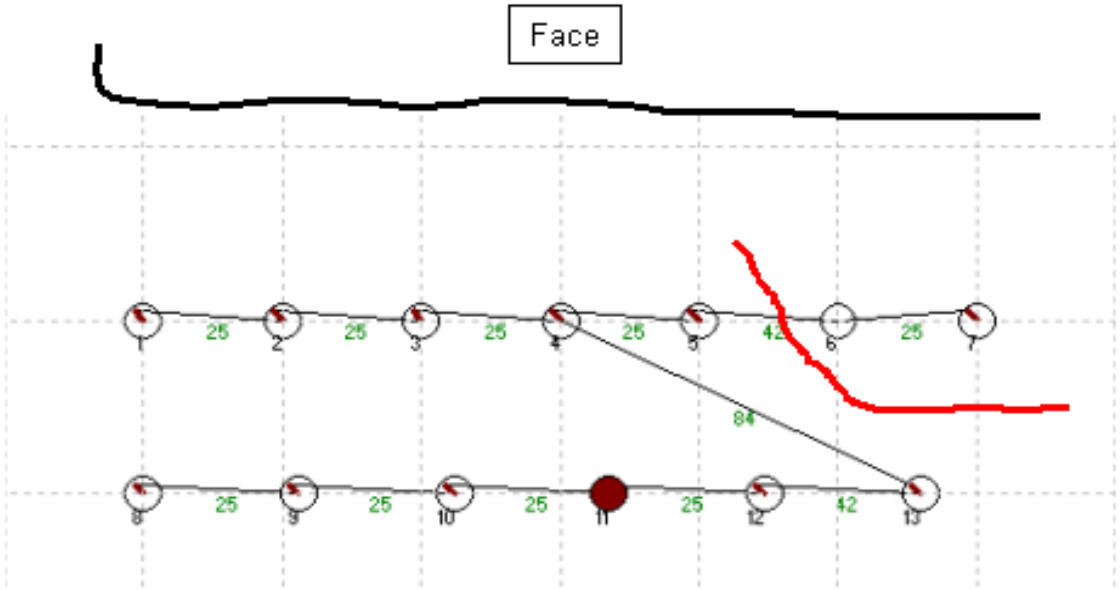

Diagram 1

The misfire occurred along the red line between the holes number 5 and number 6. The drawing below shows the timing used to re-shoot the remaining holes.

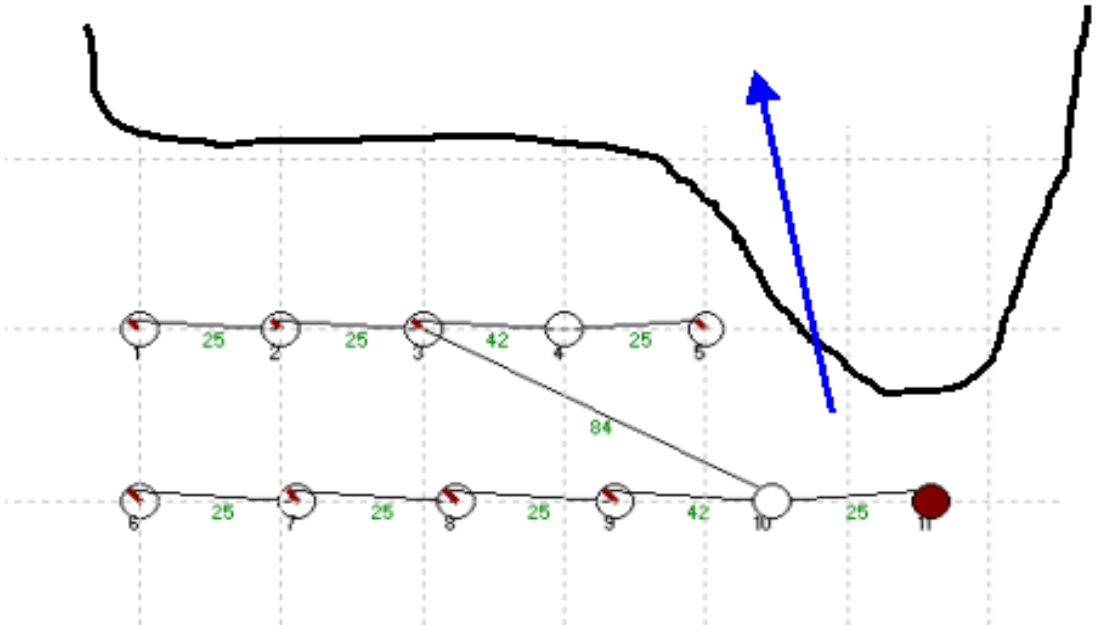

Diagram 2

The 84 ms timing was moved one hole to the left to allow for proper timing. The blue arrow represents the location and direction where the flyrock came from.

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Paused video illustrates the flyrock

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Damage To Electrical Shack And Wires

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Flyrock Hits Conveyor In Front Of Blast

- The shot consisted of 23 5.5” holes 91’-98’ deep drilled on a 16’ x 18’ pattern.
- The blaster used an inverted flashlight to check for hole deviation and noted the direction and loss of light on a separate sheet of paper.
- The calculated deviation using our formula from the Open Pit module was 5.2’ –8.3’. The blaster did attempt to have a Hold Harmless Agreement signed but they refused. He still attached the HHA to the blast report noting the concern.

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Flyrock Hits Conveyor In Front Of Blast

- The calculated deviation using our formula from the Open Pit module was 5.2' –8.3'. The blaster did attempt to have a Hold Harmless Agreement signed but they refused. He still attached the HHA to the blast report noting the concern.
- The customer said it "was not the Blaster's fault" and that they took care of the repairs noting that the blaster had pointed up the hazard that was present.

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Identification Of Problem Leads To Success!

- Since the blaster identified the problem with hole deviation we verified with the Boretrack and quarry now insist on the drill contractor using down hole hammer drill.
- The pattern was expanded from a 16’ x 20’ to a 20’ x 24’.
- No more floor problems and productivity has increased 22%!

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Discussion Review

- Risk Assessment
- Liability Reduction
- Return to you
  - ✓ Financial benefits
  - ✓ Efficiency performance
- Take Away Point
  - ✓ Managing risks and reducing liabilities ensures short term and long term sustainability
  - ✓ How does your operation manage blasting supplier risks?
  - ✓ Do you have a risk assessment program for your blasting supplier?

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