Avoiding Exposure to oxides of nitrogen (NOx) fumes from surface blasts
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Chair: Fume Steering Group  
Mining and Explosives Companies,  
CFMEU, Mines and Explosives Inspectorate
Seminar Introduction

• Welcome and administration
• Objective of Seminar
  – Improve knowledge and understanding of fume particularly
    • Toxicology
    • How to prevent fume
    • How to manage a fume event
      • Monitoring
      • Fume Management Plan
      • Fume Management Zone
    • How to manage an exposure to fume
  – Information sources
    • Queensland Guidance Note No 20 v 2

Fume we are referring to at these seminars is the visible gas nitrogen dioxide
Open and transparent

- Must take into account:
  - Commercial sensitivities
  - Intellectual property

- Keep the discussion based on fact not conjecture
- Establish a parking lot
- Open forum at end
QUEENSLAND EXPLOSIVES INSPECTORATE

Strategies for fume prevention

Blasting Activity

- Blast design
- Presence of Water
- Competent Operators
- Product selection
- Explosives in specification
- Monitor PES
- Potential Exposed Sites
- Pre-firing review
- Appropriate Standards / Codes
- Awareness
- Investigation of events
- Education/Training/Advice
- Emergency Response

Under construction

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Actions

- Continue collection of data.
- Conduct detailed investigations to new protocols.
- FSG (Fume Steering Group) to meet every three months to review data (sunset in July 2012).
- Issue the Guidance Note for operations – update in early 2012 based on feedback from seminars, investigations and data gathering.
- Recommend that competencies be adopted as a requirement for all mine sites.
- Upgrade competency packages to include information from Guidance Note and FSG (Fume Steering Group).
- Continue to review with explosives manufacturers matters regarding improvement of product for mine conditions.
Key Points

• Data is data there is much analysis to be done
• A mine needs to have:
  – Pre firing review
  – Fume Management Plan
  – Monitoring Plan
Outline QGN 20

• Where is it
• Improving QGN 20
QGN Structure

• 7 sections
  – Introduction and Background
  – Causes of fume
  – Prevention of Fume
  – Management of a fume event
  – Management of a fume exposure
  – Investigation of Fume events and audit and review
  – Conclusion
Appendices

- Definitions
- Legislation
- Properties of Nitrogen Dioxide
- Occupational exposure standards and health effects of NOx
- MSDS
- Causes and Mitigations
- Prefiring review
- Information for treatment medical staff
- NOx rating scale
- Guideline to Investigating Fume Events
Guidance Note 20 Management of oxides of nitrogen in open cut blasting v 1.1

- Follows the three principles:
  - Prevention of fumes
  - Management of a fume event
  - Treatment of fume exposures
- Identifies persons/organisations that can prevent fume
- Identifies activities that can lead to fume
- Factors outside that contribute to fume
- Includes investigation guideline
- Causes of fume and identification of persons responsible
- Toxicology of Nitrogen Dioxide
- Monitoring requirements
- Collection of Data
- Incident reporting
- DRAFT DOCUMENT
FUME SURVEY STATISTICS from DATA
Data Set from first collection in April

- Three data points
  - May 162
  - July 490
  - August 902
  - September 1400
Fume is generated

• About 49% of blasts are (Level 1,2,3,4, or 5)
• About 51% of blasts have zero fume
Fume Events against Supplier Blasts (840 blasts)

Note this is based on number of blasts that fume – some suppliers conduct different number of blasts.

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Fume Rating vs Ground type vs Sleep time

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Fume Rating vs Ground type vs Powder factor
Fume Rating vs Ground type vs Hole depth
Fume Rating vs Hole depth vs Water in holes

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<table>
<thead>
<tr>
<th>Fume Rating</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td>307</td>
<td>120</td>
<td>79</td>
<td>69</td>
<td>50</td>
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<tr>
<td>No</td>
<td>132</td>
<td>25</td>
<td>21</td>
<td>14</td>
<td>14</td>
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<tr>
<td>Total</td>
<td>439</td>
<td>145</td>
<td>100</td>
<td>83</td>
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% Water in Holes: 69.9% 82.8% 79.0% 83.1% 78.1% 92.9%
# Damp sides

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<tr>
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<tr>
<td>Yes</td>
<td>286</td>
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<tr>
<td>No</td>
<td>151</td>
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<tr>
<td>Total</td>
<td>437</td>
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<tr>
<td>% Damp Sides</td>
<td>65.4%</td>
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Fume events vs Blasts (minesite)
Exclusion Zone Fume Breach 15 Apr 2011 - 18 July 2011

- Fume zone rate breach
<table>
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<tr>
<th>Period</th>
<th>Number of blasts for stated period</th>
<th>BEZ breaches</th>
<th>BEZ Breach Rate</th>
<th>BEZ breach rate</th>
<th>Persons sent for examination and some held for observation</th>
<th>Fume events off mine lease</th>
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<td>15/4 - 16/5</td>
<td>162</td>
<td>9</td>
<td>1 in 18</td>
<td>0.056</td>
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<td>16/5 – 18/7</td>
<td>418</td>
<td>13</td>
<td>1 in 32</td>
<td>0.031</td>
<td>5</td>
<td>4</td>
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<tr>
<td>18/7 – 25/8</td>
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<td>6</td>
<td>1 in 54</td>
<td>0.019</td>
<td>6</td>
<td>1</td>
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INCIDENT REPORT

- Blast exclusion zone
- Fume management zone

- Any category fume cloud that leaves the blast exclusion zone is an incident and must be reported.
Oxides of nitrogen (NOx) fumes from surface blasts