BULGA OPTIMISATION PROJECT (Open Cut Extension)
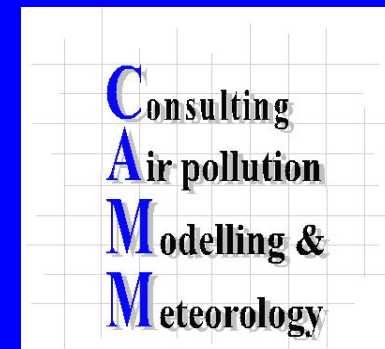
Review & Public Hearing

Submission - Air Impact Assessment

25 June 2014

Consulting
Air pollution
Modelling &
Meteorology

Qualifications & Experience

Dr Graeme Ross

- **Managing Director**

  Consulting Air pollution Modelling & Meteorology (CAMM)

- **Formally Professor & Foundation Director of Centre for Applied Mathematical Modelling (CAMM), Monash University**

Qualifications

- **Ph.D., Monash University, 1977**

- **B.Sc., University of Melbourne, 1967**

- **TSTC, Secondary Teachers College (Melb.), 1965**

Relevant Experience

- **30+ years experience in model development & application to air impact assessment projects**

- **Former Chair, Modelling Special Interest Group, CASANZ**

Presentation Outline

- **Background & Introduction**

- **Additional Results:**

    - **Year 4 Scenario**

    - **Simulated Year 3 Scenario**

- **Concluding Remarks**

- **Recommendation**

Background & Introduction

- CAMM engaged by Mushroom Composters Pty Ltd to review the air impact assessment modelling conducted by Pacific Environment (PAE) in support of the Bulga Optimisation Project.

- PAE/Bulga Coal Mine (BCM) provided input files used to generate impact assessment results for:
    - Year 4 Scenario
    - Top soil stripping for Year 3

- CAMM conducted independent checking of the PAE results, with a particular focus on an assessment of impacts at the Mushroom facility itself.

- CAMM produced additional impact assessment results for a simulated Year 3 scenario when the Eastern Embankment activities are to the west and closest to the Mushroom facility.

- CAMM presented summary results to PAE and BCM –see Appendix G of Environmental Assessment Report - NSW Planning &Environment

Environmental Assessment Report - NSW Planning & Environment
Key Outcomes

- Air quality criteria from 'Approved Methods' apply at Mushroom Facility

- Criteria not satisfied – PAE & CAMM results

- 'Additional Mitigation' measures proposed by BCM have merit – but need independent review/analysis by Todoroski Air Sciences

Additional Mitigation - Comments

- **BCM propose a range of proactive management & mitigation measures based on factors including:**

    - Consideration of the Mushroom Facility (MF) operating hours

    - Identification of 'adverse' meteorological conditions

    - Results of a sensitivity analysis conducted by PAE

- **The implementation of a management strategy to avoid/minimise non-compliance at MF may be feasible, but is not demonstrated on the basis of the results & information presented to date**

- **The following additional results help to illustrate the need for further analysis.**

Additional Results
24-hour PM$_{10}$

Ambient criterion – 50 ug/m^3
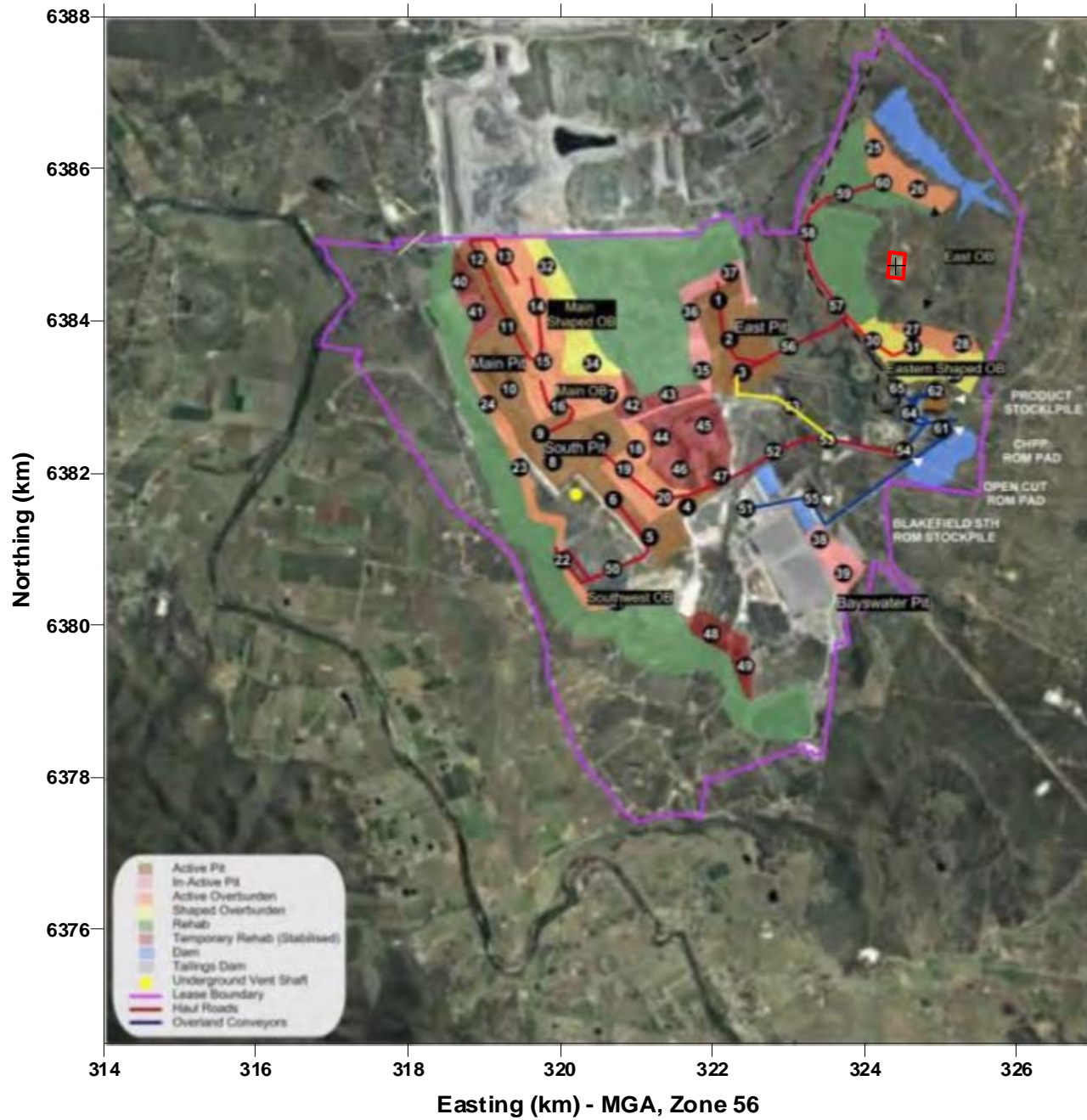## (Approved Methods)

Year 4 Scenario

Simulated Year 3 Scenario

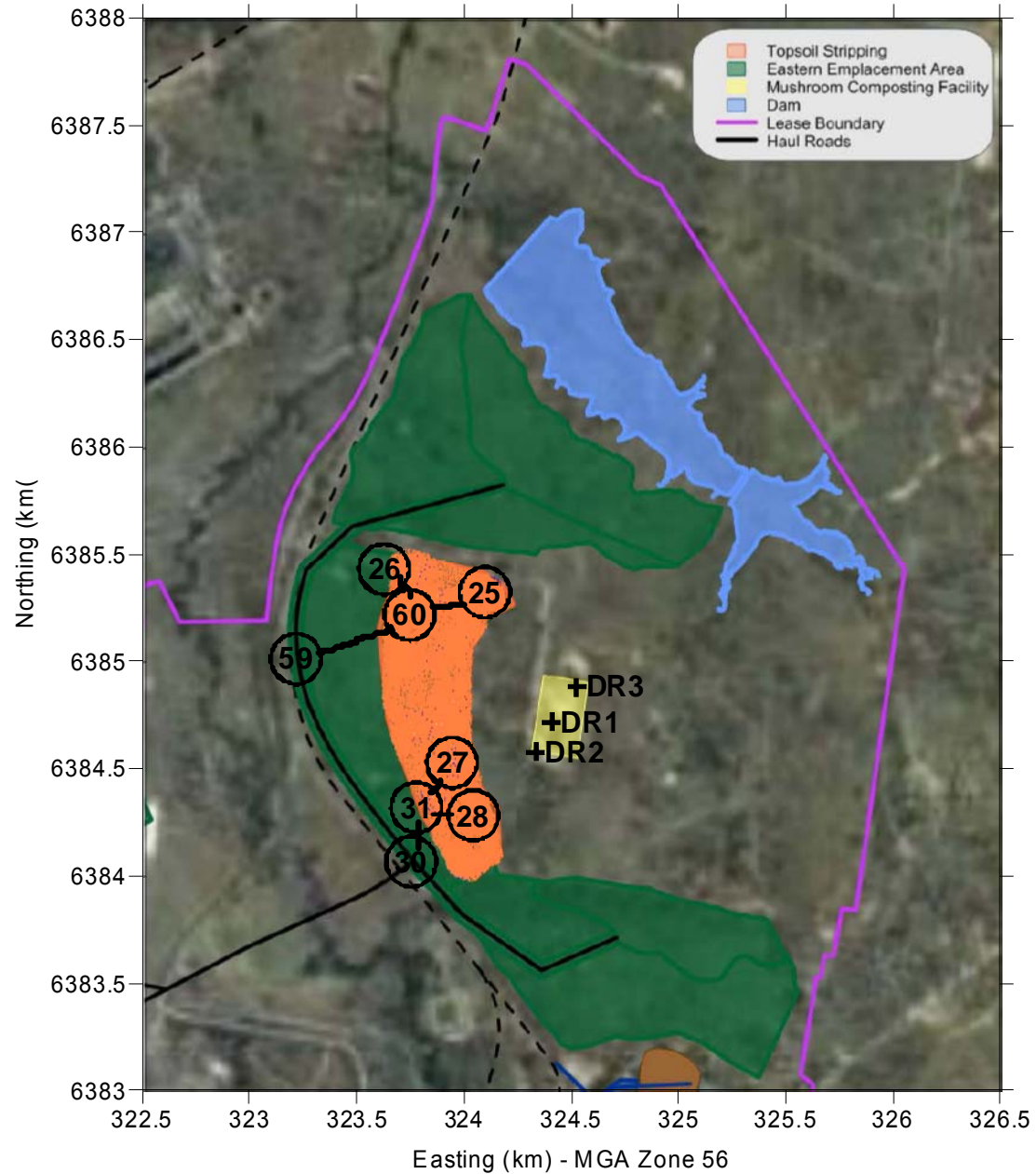**CASE 1** – Base Case – Sources & Inputs as per Appendix G

CASE 2 – Case 1 with all EEA sources off when Mushroom Facility not operating

CASE 3 – Case 1 with all EEA sources off when Mushroom Facility operating, with double emissions for remaining hours

Year 4 Scenario – Source Locations

Simulated Year 3 Scenario – Repositioned EEA Source Locations

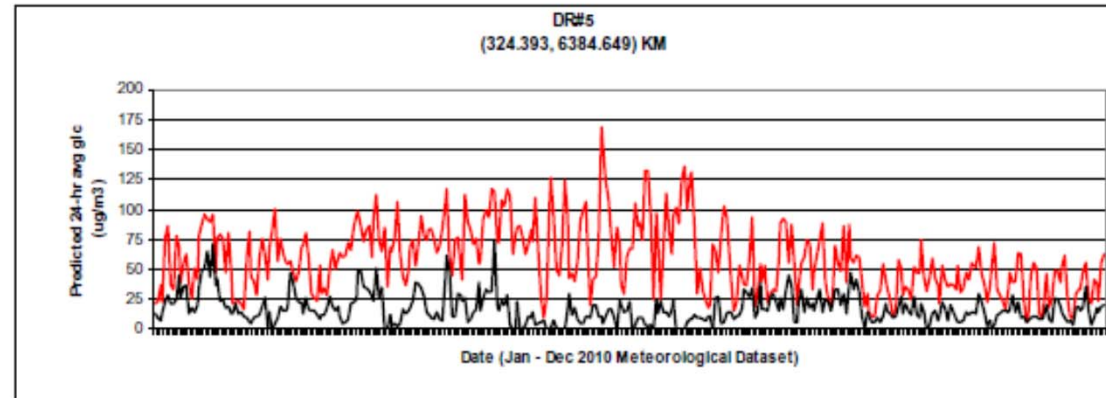**Discrete Receptor Locations - Mushroom Facility Impacts**

CASE 1 – Base Case – Sources & Inputs as in Appendix G

Year 4 Scenario – No topsoil stripping
Time Series: 24-hour average PM_{10} – Level 2 Assessment -with BACKGROUND (adjusted TEOM MTIE monitoring data –black)
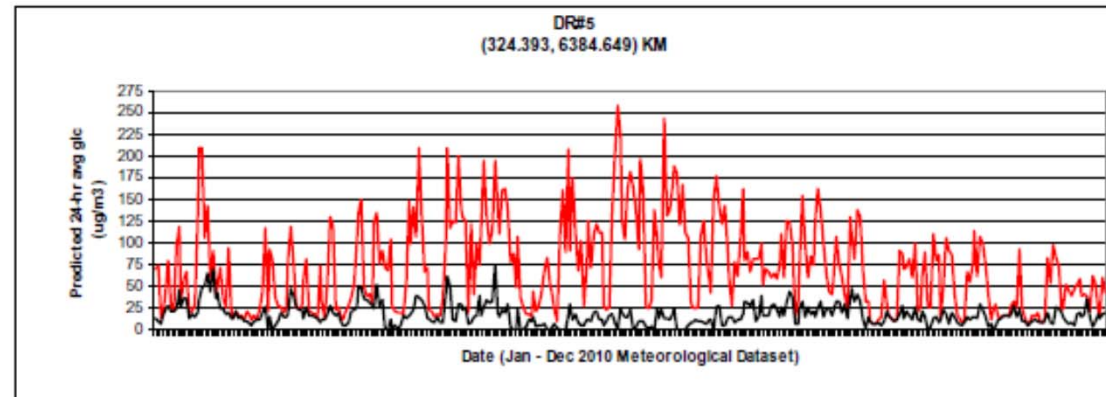Maximum of 169.7 ug/m³, with 50 ug/m³ criterion exceeded on 213 days

DR#5
(324.393, 6384.649) KM

Year 3 Scenario – No topsoil stripping
Time Series: 24-hour average PM_{10} – Level 2 Assessment -with BACKGROUND (adjusted TEOM MTIE monitoring data –black)
Maximum of 258.0 ug/m³, with 50 ug/m³ criterion exceeded on 211 days
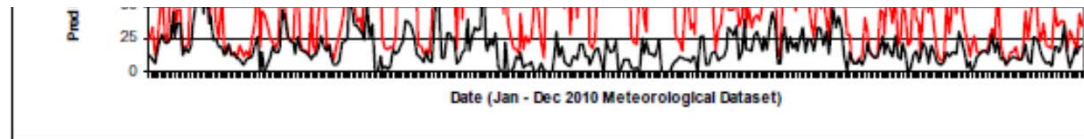

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(324.393, 6384.649) KM

CASE 2 – Case 1 with all EEA sources switched off during Mushroom Facility non-operating hours

Year 4 Scenario – No topsoil stripping
Time Series: 24-hour average PM$_{10}$ – Level 2 Assessment -with BACKGROUND (adjusted TEOM MTIE monitoring data –black)

Switching off EEA sources during adverse meteorological conditions (when MF not operating) leads to:

- Significant reduction in magnitude & frequency of non-compliance, but

- Still unacceptable level & frequency of non-compliance, even w/o accounting for any compensating EEA activities at other times.

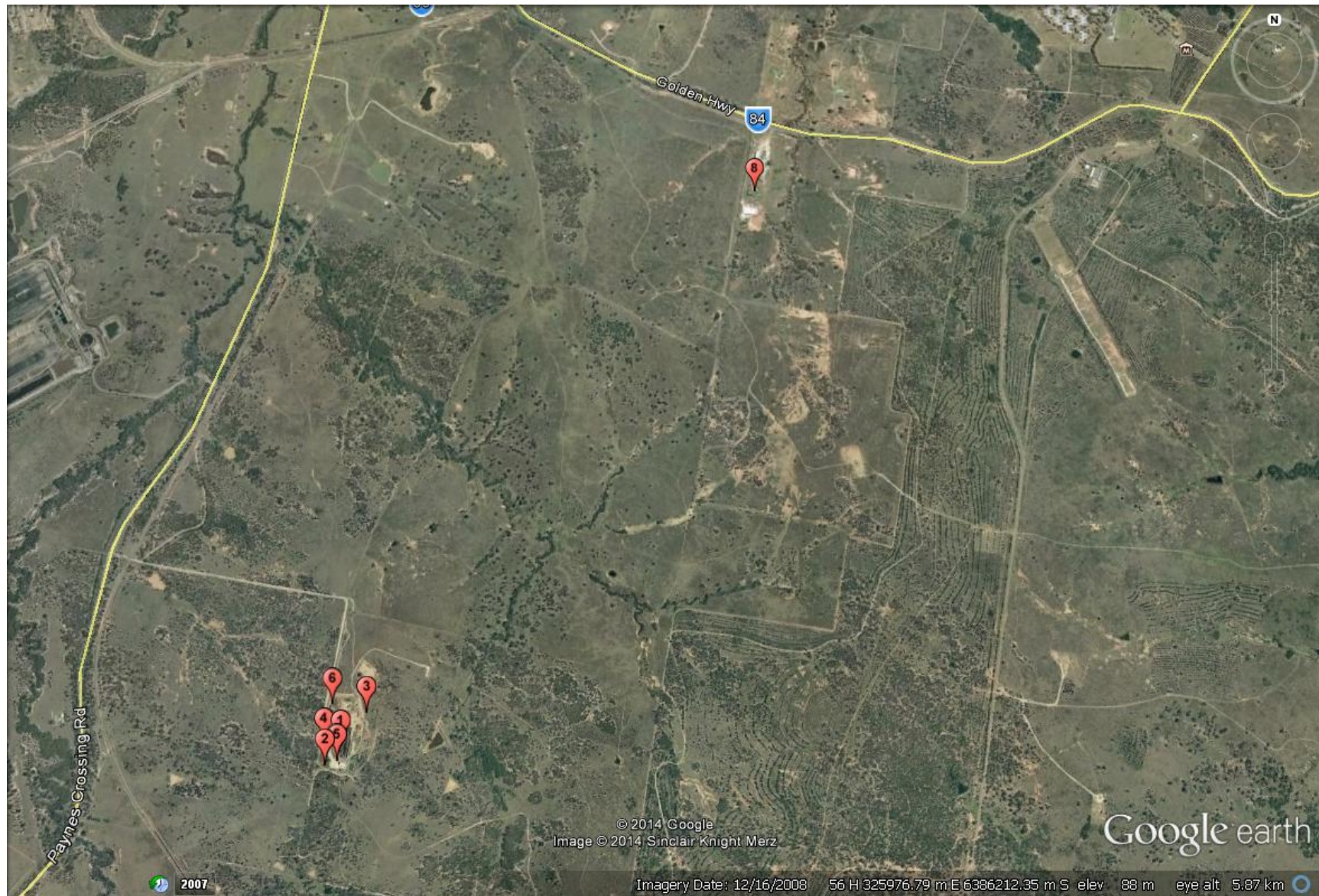Date (Jan - Dec 2010 Meteorological Dataset)

Switching off EEA sources when MF operating, with compensation of double emissions during other times leads to:

- **Significant increase in magnitude & frequency of non-compliance**

- **Potential increase in impacts, and possible non-compliance at other residential locations (see next slide)**

Date (Jan - Dec 2010 Meteorological Dataset)

Addition Discrete Receptor Location - DR#8

CASE 3 – Additional Discrete Receptor DR#8

Year 4 Scenario – No topsoil stripping
Time Series: 24-hour average PM_{10} – Level 2 Assessment -with BACKGROUND (adjusted TEOM MTIE monitoring data –black)
Maximum of 98.3 ug/m³, with 50 ug/m³ criterion exceeded on 12 days

Switching off EEA sources when MF operating, with compensation of double emissions during other times leads to:

- **Doubling the frequency of non-compliance at Residence No 8**

- **Other residential locations??**

Date (Jan - Dec 2010 Meteorological Dataset)

Potential Impact Experienced by Mushroom Compost Worker 24-hour PM_{10}

**Ambient criterion – 50 ug/m³**

(Approved Methods)

Case 1 with all BCM sources off when Mushroom Facility not operating

POTENTIAL IMPACT EXPERIENCED BY MUSHROOM COMPOST WORKER
(Case 1 with all mine sources switched off when Mushroom Facility not operating)

Year 4 Scenario – No topsoil stripping
Time Series: 24-hour average PM_{10} – Level 2 Assessment -with BACKGROUND (adjusted TEOM MTIE monitoring data –black)
Maximum of 82.2 ug/m³, with 50 ug/m³ criterion exceeded on 16 days

DR#5
(324.393, 6384.649) KM
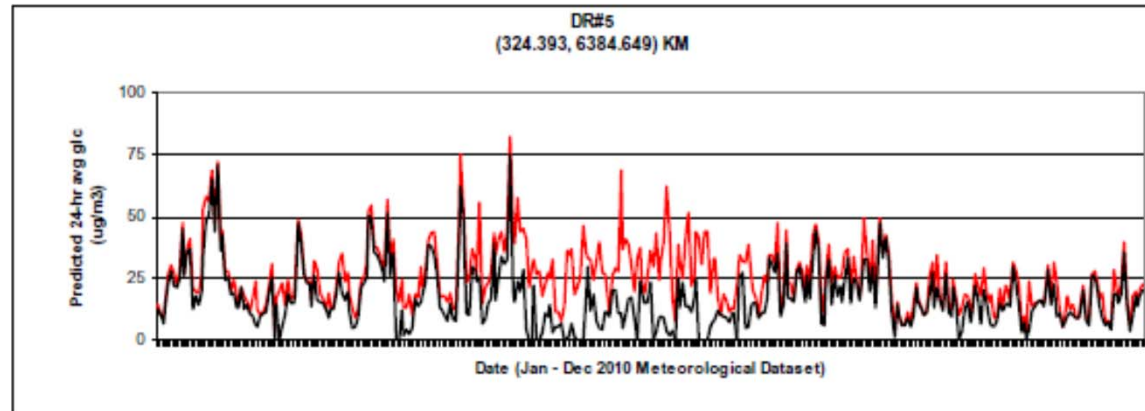
Simulated Year 3 Scenario – No topsoil stripping
Time Series: 24-hour average PM_{10} – Level 2 Assessment -with BACKGROUND (adjusted TEOM MTIE monitoring data –black)
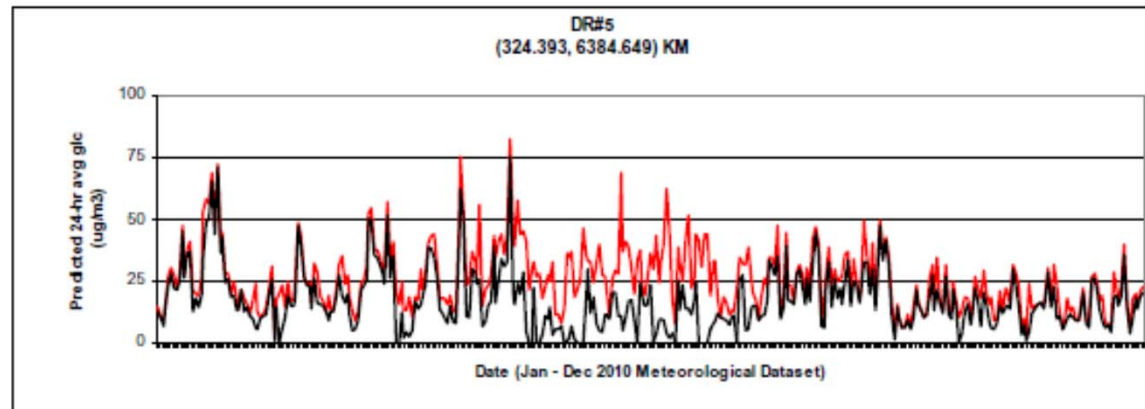Maximum of 118.1 ug/m³, with 50 ug/m³ criterion exceeded on 49 days

DR#5
(324.393, 6384.649) KM

Concluding Remarks

- **The additional results presented are only indicative, but clearly demonstrate that:**

  - **Further work needed to demonstrate the feasibility, or otherwise, of the proposed 'Additional Mitigation' measures (see Recommendation)**

- **Implementation of a management strategy whereby impacts at MF are acceptable may be feasible, but has not been demonstrated by the results and information presented to date – see list of deficiencies identified by Todoroski review and list of 'model uncertainties'.**

Recommendation

That the additional advice from Todoroski Air Sciences include analysis of air impact assessment modelling for emission scenarios that:

– Focus on, and are representative of, the likely impacts on the MF, including a scenario that is representative of 'worst-case' impacts

– Use best-available emission factors/precautionary principle

– Use meteorological inputs based on corrected meteorology

– Demonstrate the feasibility, or otherwise, of the 'Additional Mitigation' measures proposed by BCM to:

– o   Ensure that all air quality criteria for particulates as contained in the Approved Methods (not just the 24-hour average criterion of 50 µg/m^3 for PM_{10}) will be satisfied at the Mushroom composting facility.

– o   Not result in adverse impacts at other locations.