

## Data and Modelling Breakout Group

Chair: Paul Hamey; Rapporteur: Pat Havens

Participants: Mulugeta Admasu Delele, Arnaud Boivin, Jane Bonds, Clare Butler Ellis, Mark Egsmose, Zhenglei Gao, Jerome Goulet Fortin, Henk Jan Holterman, Anthony Lozano, Neil Mackay, David Nuyttens

### **Overall objective:**

- Completion of database compilation efforts and utility
  - Roadmap for development of regulatory modelling options
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### **Breakout Session 1**

#### **Questions posed:**

- Presentation/discussion of “trial template”, reporting standards and experiences with assembly of data
  - Are we capturing sufficient information to support more effective modelling?
  - Consideration of JB and EFSA tender experiences; recommendations for improvement
- Issues arising with statistical interpretation
  - Statistical assessment shows complex multi-variable relationships...
    - How to most effectively sub-divide the dataset to reduce variability
      - Machinery factors: Boom width, boom height, tractor speed? What is generic/protective?
      - Environmental factors: Wind speed, temperature – wide practical variability
      - Agricultural factors: Crop height / type
      - Trial factors: Collector type? Is further experimental work warranted?
    - Can mechanistic modelling assist?
    - Can we develop robust validation datasets?

#### **Discussion:**

- Trial template refined to ensure detailed recording of critical parameters to support interpretation and modelling (attached for presentation to field study breakout group)
- How to most effectively sub-divide the dataset to understand variability w.r.t. an empirical representation?
- To support effective statistical analysis strategy clear questions need to be formulated.

#### **Action:**

Can statistical interpretation of database identify the most critical sensitive parameters (statistical influence tree nodes)?

- Machinery factors: Boom width, boom height, tractor speed?
- Environmental factors: Wind speed, temperature
- Agricultural factors: Crop height / type
  
- Consider conducting comparison at a single distance (e.g., 5m vs 10 m) – do different factors have different effects at different distance?
- Do measurable parameters account for the majority of the variability?
- Unidentified/uncharacterised factors will account for remaining variability – can this be quantified and are they significant?
- Is further experimental work warranted?

### **Notes and observations;**

There is not a clear consensus on what constitutes a “standard” nozzle. Reference standards for nozzle testing and field work exist in different countries but these in fact vary (see presentation by Jane Bonds). This needs to be borne in mind when considering development of a “regulatory” drift curve versus reference curves for demonstration of “drift reduction”.

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### **Breakout Session 2**

#### **Questions posed:**

- What should be the specifications for a regulatory model?
- Performance may decline under more extreme conditions – if performance constraints could be identified can models be proposed for regulatory use within carefully defined bounds?
- How to define “acceptable” performance?

#### **Discussion:**

- What should be the specifications for a regulatory model?
  1. Active supported
  2. Public availability
  3. Documentation supporting use
    - a. Input parameterization guidance
  4. Documentation on mechanistic principles and underpinning process representation
  5. Availability of user-friendly GUI
  6. Published basis for validation
- If model will have a regulatory role, it must be actively supported and mechanisms for improvement must be resourced.
- A continuity plan is therefore needed to allow for role in regulatory assessment.

#### **Action**

Advance further discussions with Commission, EFSA and ECPA on practical and effective support framework to support regulatory role

- Future scope – potential to provide more nuanced exposure representation of exposure to other ‘receptors’ as longer-term objective – immediate focus upon 2-D deposition drift.
- Where could models fit in regulatory process?
  - Most effective role within a tiered framework
  - Can be used to support development of “regulatory scenarios” with representation in “lookup tables” as 1st tier
    - Scenarios could allow for some differentiation based upon crop and/or zonal
    - Sensitivity analysis can assist determining how much differentiation is warranted at Tier 1 and how to do this

**Actions:**

- Design and develop sensitivity analysis exercise with SSAU and IDEFICS models
- What are the most sensitive modelled parameters?
- How to most effectively carry forward when considering a regulatory drift representation?
  - “Typical/representative” vs “precautionary”?
- Is zonal differentiation of representation warranted?
- How does sensitivity of response compare with parallel efforts with field trial statistics?

- Higher tiers:
  - Mechanistic modelling scenarios as refinement upon meta-modelled “lookup tables”
  - More specific scenarios to be developed and confirmed
    - Develop “bundles” of representative usage practices – how to standardize and develop consensus?
    - Principle: Scenario should be developed in as complete a form as possible that would not require very specific application knowledge (e.g. pressure tied to representative scenario nozzle)
    - Adaptable to country-level specification if needed
  - Would allow for incorporation and direct representation of mitigation options:
    - Can be adapted to specific country needs/policies
    - Flexibility to explore options and support more effective discussion and demonstration of risk mitigation options
    - Particular value is envisaged to support consideration of compounded mitigation
    - Particular value is seen in discussions with national regulatory risk managers and could be used as tool to influence evolution of national policies on mitigations
    - Future role to support landscape-level risk assessment (and risk mapping?)
- Validation:
  - What level of ‘validation’ is required ? (and what does ‘validation’ actually mean?)

- What envelope of inputs is required for which the model gives acceptable performance
- i.e. 'how close' is considered 'validated' ?
  - Breakout session recommend that observed variation of trial data (looking at distributions) should provide guiding benchmark for acceptability of representation
  - Goal to get predictions 'within' with envelope of the conditions represented in the experimental data
  - Starting point for analysis could be EFSA-screened/accepted datasets, mapped back to raw data in DRAW db?

**Actions:**

- Enter discussions with EFSA to help identify screened and accepted trials from recent research tender
- Undertake variability characterisation assessment to develop potential benchmarks as validation criteria

**Breakout Session 3**

**Questions posed:**

- Developing a regulatory role for modelling requires parallel efforts with identifying reference standard(s) as a basis for scenarios...
- How to best proceed and balance the need for regulatory protectiveness, application realism and good practice?

**Discussion:**

Sources of information identified by breakout group to support defining a "representative worst-case" or "realistic worst-case" include:

Surveys:

- UK CPA application practice survey
- EFSA application practice survey
- Efforts within BROWSE

**Action:**

- Continue efforts to gather information to develop a basis for showing what combinations of application settings may be "typical" and what are "excessive" or unrealistic
- Carry forward further discussions with FERA to make best use of EFSA application practice database and address potential recording errors
- Pass information back to statistician to support analysis

Guidelines/regulations:

- National good agricultural practice recommendations
- Benchmark against existing national reference standards developed to support testing

**Actions**

- Continue efforts to obtain national “good agricultural practice” / “code of practice” recommendations (currently available for NL, DE, FR, in development for IT – widen to other countries)

## Development of a “realistic best case”

- Recommendation to not only develop “realistic worst-case” basis for drift representation but also develop an accepted “realistic best case” basis for drift to support Annex 1 safe use demonstration.
- Passing “realistic best case” assessment can then efficiently allow for more customised discussions on risk management to be conducted at zonal level more effectively reflecting national policy preferences and options.

**Actions**

- Interrogate application practice surveys to identify potential candidate basis for “realistic best case”
- Quantify on the basis of similar representation in EFSA drift database and as represented in SETAC DRAW database

## Scenario conservatism

- How do risk managers want to express conservatism in the risk assessment framework?
  - Is it in the scenario itself (“precautionary” scenario)
  - Is it via a safety factor and/or acceptance criteria (“typical” scenario)

**Action**

- Engage with Commission and national risk managers to gauge preference for handling and carry forward into scenario development and design efforts

- How to quantify protectiveness and address complexity surrounding parameter sensitivity?
  - To place in context within the range of application practices (within realistic practices)
  - DoE (Design of Experiment) matrix for key parameters, in combination with expert judgement
  - Carry forward to characterise modelled drift response to help characterise/quantify conservatism of representation under broad range of application conditions

**Actions:**

- Develop DoE matrix identifying range of realistic combinations of usage to support model response assessment
- Conduct modelling to develop response matrix
- Overlay with framework for quantifying application practice combination frequency from application practice surveys
- Use to develop proposals for “realistic worst-case” drift representations

## Mitigation and Management Breakout Group

Chair: Giovanna Azimonti; Rapporteur: Anne Alix

Participants: Elena Alonso Prados, Tom Bals, Paolo Balsari, Pat Chueca, Mike Coulson, Glenda Garcia-Santos, Christian Kuester, Dale Mason, Karin Nienstedt, Eskil Nilsson, Steve Norman, Tim Pepper, Petra Pucelik-Guenther, Manfred Roettele

### **Overall objective:**

- How to best reinforce and expand options with the SETAC MAgPIE drift mitigation toolbox
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### **Breakout Session 1**

#### **Questions posed:**

- Questionnaire overview
  - What are the key issues with demonstration of performance?
  - What are the key issues with representation in risk assessments – specific or generic?
  - What are the key concerns with take-up and implementation
  - What are the key issues with regulatory acceptance
- Where are most pressing actions warranted?
- What are recommendations for action?
- What homework should be considered between WS2 and WS3?

#### **Discussion:**

##### Issues with demonstration of performance

- Availability of performance data
- SETAC DRAW website under construction that should summarise Institutional testing of performance for classification purposes
- There is a need to ensure that the website helps both regulatory and farmer stakeholders to quickly reach the information they need
- Consideration of how to address issues with language for material hosted on website; eg offer translations in a few key languages
- Include discussion of examples of cross-referencing such as Swedish “Helper” linkage with JKI tunnel systems and acceptance by other MS
  - acceptance of “Helper” in Finland for drift management,
  - FR, NL accept UK data already,
- Recognition that communication is critical and harmonization will be needed to spread broader take-up and acceptance beyond national boundaries
- There is a need for more education on the RMM inventoried in MAgPIE (DRAW website should provide a basis for providing more detail on measures and how they operate)

**Action:**

- To ensure the following is well-captured in the website;
  - RMM profiles
  - Links back to institutional testing holdings
  - Summaries of how each institute summarises data for most effective use by regulatory and farmer stakeholders
  - Include examples of cross-referencing or mutual recognition schemes such as Swedish “Helper” etc.

**Issues with representation in exposure assessments**

- Agreement on a single figure on efficacy for an individual acknowledged as potentially difficult to achieve with parallel testing schemes - however classification taking into consideration a range of risk reduction is achievable.
- Some work towards continued efforts with harmonization of drift reduction measurement should be encouraged
- Some effort should be presented in proceedings to summarise options for how we may move from the result of a study to a value to use in a regulatory risk assessment
- Risk assessors should identify what critical aspects of drift reduction character should be taken into consideration to achieve this (e.g. a curve of risk reduction?)
- Information will ensure that the appropriate data is reported on the website.

Post-workshop Editorial Note: This level of detail would not be held in the SETAC DRAW website but may be available in the institutional testing websites depending upon testing strategy – those relying on field testing may have this information – those relying on wind tunnel tests will not. It is also noted that data submitted in support of a claim for low drift status is likely to be commercial and confidential: a testing laboratory would not be free to release this data.

**Action:**

- Set up of discussions with a group of risk assessors and risk managers to define their needs.
- Parallel discussions should take place with experts who carry out measurements to consider practicality to achieve options
- Summary to be presented for the next workshop

**Ability to quantitatively represent in exposure assessment**

- Wind tunnel: Are there options to support “read across” between existing testing schemes?

Post-workshop Editorial Note: Schemes are not readily inter-convertible but some “one way” conversion of “more detailed/demanding schemes” to less detailed/demanding schemes might be possible.

**Action:**

- Summarise existing schemes and investigate potential for convertability and highlight where constraints lie
- Some methods for representation and models are available - however the way they are employed may need to take into account policy choices on drift reduction class framework
- It is acknowledged that some variation in national practices (acceptance of application techniques) and approaches to measure effectiveness may be justified and would be difficult to harmonize at this stage
- Is reference back to ISO essential or mandatory? What is critical is to be able to trace how measurement was done to see if it is applicable to the situation for which it is consulted

**Post-workshop Editorial Note: ISO methods allow for some tolerance in testing that means national standard may be individually compliant but not consistent in terms of detail of testing. Some national testing is outside of an ISO framework.**

- Is the current framework of a “% reduction” practical? There are known issues of comparability to testing references that different from country to country.
- However, to inform the risk assessment and farmers on the need to reduce the drift we NEED a number to use for this purpose and in order to make practical recommendations.
- It is important to provide data that help regulators making their choice; reference to a list of risk mitigation measures. It is noted that these may be measured differently between countries. Ex of CRD method in the past
- To move forward, we need to accept the set of data we have at some point and make the best of them. The database WILL evolve with time and improve, and we will benefit of this with time

**Action:**

- Further consideration of classes of drift/risk reduction as practical options to help resolve the issue with variability in specific %age drift reduction.
- Comparison of outcome of testing schemes for given nozzles may be helpful to consider options or highlight constraints

- How to best address net impact of combined RMM (e.g. buffer zone + SDRN): we need a method to calculate the cumulative effectiveness.
- Experience with various schemes should be summarised and discussed:
  - Italian example
  - German system
  - Focus L&M
  - Others?

**Action:**

- Group of risk assessors and risk managers to discuss how to combine several RMMs into one recommendation in a risk assessment, for the next workshop

### **Issues with practicality for farmers**

- How can we better encourage the use of SDRN? (and overcome issues relative to the perception of a low efficacy to pest. May be a component to add to the Website?)
  - Communication at a more local level can be important as well as per crop system due to common practices
  - Proceedings to acknowledge and support need for more interaction and training for farmers based on existing precedents such as TOPPS.
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### **Breakout Session 2**

#### **Questions posed:**

- With regards website design;
- Conduct review of structure and content
  - Is presentation sufficiently clear?
  - Does it meet stakeholder needs?
  - What other sources of information should be added?
- What are the maintenance and continuity recommendations for drift management/mitigation website?
- Can we assemble a wish list for improvement as homework between WS2 and WS3?

#### **Discussion:**

#### **Website framework**

- The website aims at gathering info for European countries, to favour the visibility for countries within a zone and between zones. Hence we need to identify what to include on the site and what should be accessible via a link in order to manager updates
- The website should allow to check on the differences and commonalities between the zones
- Target audience: regulators, industry, academics, involved in the use and development of drift reducing measures, and ideally farmers
- Include links to national websites, to avoid duplication, provide visibility and updated info
- Links may lead to info in different languages, so further work will be needed to help summarizing, translating the information to help with communication
- Information should be organised to match the different audiences (risk managers, risk assessors etc) needs (even if this involves some duplication of the info included)
- Recommendation as regards expected content should be collected for workshop 3.
- Can we provide a link to the website in development, to this working group?
- As a start, it was mentioned that new drift curves may be needed, related to the different zones with discussions on equivalences to the EU drift set.
- It is suggested that EFSA takes note of this and of the scale at which harmonization can be observed/done, as well as on the diversity of RMM available in MSs

**Action:**

- Website working group to be assembled

**Drift data**

- Discussion on the curves: Consideration of extent of equivalence is key in order to determine risk mitigation and distances at which the risk is acceptable with a SDRN.
- Can we identify/test/select nozzles that allow to match the curves that display a satisfying drift reduction?
- It is noted that there is a large amount of data available that could be looked at for this purpose
- Future involvement of nozzle manufacturers is welcomed

**Action:**

- Working group to consider drift curve handling with active involvement research community to provide technical advice and guidance is needed

**Farmers**

- To maximise use for farmer stakeholders we need to consider translations into national languages.
- Feedback from farming unions should be included

**Labelling:**

- One additional homework for BO3 would be to work on the technical implications of recommending SDRN on a label (i.e. work on a specific SPe3 that would include a reference to the use of these nozzles)

**Overall actions:**

- Need working group to discuss drift curves and regulatory needs to take RMM into account in the risk assessment
    - This group would also discuss how to combine several RMMs into one recommendation in a risk assessment, for the next workshop
    - Need somebody to discuss labelling
    - Explore classes of risk reduction as an option to solve the issue of the single value. It would be useful to also compare references to facilitate the comparison
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### Breakout Session 3

#### Development of action plan

<b>Task</b>	<b>Who (not limited to...)</b>
<p>Work on the drift curves to investigate potential for harmonization and establish correspondences between national systems:</p> <ul style="list-style-type: none"><li>- Access the data sets (original curves)</li><li>- Define regulatory needs to take SDRN into account in the risk assessment</li><li>- Work out drift curves per nozzle type</li><li>- Interpret one nozzle classification system vs one another and translate the outcome in a national system</li><li>- Define classes of risk reduction</li></ul>	Mike Coulson (ecotox) Giovanna Azimonti (reg) Patricia Chueca (research) Elena Alonso Prados (reg) Glenda Garcia-Santos (res) Steve Norman (ecotox)
<p>How to use combination of RMM in risk assessment and/or decision making</p> <ul style="list-style-type: none"><li>- Examine existing national systems involving additional RMM (e.g. buffer zones/strips, shields, nozzles, adjuvants etc together)</li><li>- Look for examples in the MAGPIE proceedings</li><li>- Explore possibilities to elaborate the ways to take combinations into account</li><li>- Look how we can get mutual recognition of a RMM</li><li>- Provide recommendations on how to interpret data on the effectiveness of these measures</li><li>- Provide recommendation on the way to combine data (additive, multiplicative calculation)</li><li>- Highlight the need to encourage innovation in RMM and recognize the constraints in their development</li><li>- Propose revised SP phrases to account for updates in RMM</li></ul>	Giovanna Azimonti (reg) Tom Bals (ind) Manfred Roettele (topps) Anne Alix (ind) Dale Mason Petra Pucelik-Guenther
<p>Wind tunnel: a new ISO group is starting to among others identify correspondences between wind tunnel systems (JP Douzals lead)</p>	JP Douzals
<p>How do we expand RMM for bush and tree crops</p>	To be discussed at the next workshop (lead Tom Bals and Paolo Balsari)
<p>Prepare input for the website</p>	Christian Kuester

## Field Trials Protocol Breakout Group

Chair: Paul Miler; Secretary: Andrew Chapple

Participants: Grzegorz Doruchowski, Jean-Paul Douzals, Emilio Gil, Peter K Jensen, Rainer Keicher, Paul Miller, Jan van de Zande, Tom Wolf, Paolo Marucco, Andreas Herbst, Andrew Chapple, Reinhard Friessleben, Christina Pickl

### Overall objective:

- Revise existing draft protocol based on what we now know!
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### Breakout Session 1 (Rapporteur: Andreas Herbst)

#### Questions posed:

- Overall site: is our definition appropriate?
  - *e.g.*, Crop included (with a definition)? Reference area & collection area: bare ground v. grass / turf: thermal effects (large and small scale) under all conditions, particularly S. Europe? Site size and location – slope and upwind fetch.
- Does the protocol characterise the site in sufficient detail?
  - *e.g.*, Modelling requirements, EcoTox RA requirements.
- Does the protocol deal with the conditions of application sufficient detail?
  - *e.g.*, Anemometry – how detailed? T° difference (for stability class) necessary? S. Europe conditions

#### Discussion:

- AHerbst, RFriessleben, and TWolf briefly described their experience with the draft trial protocol.
  - **AH:** commented that JKI had measured boom height *in situ*, but that the resulting measurements are more difficult over a crop than bare ground. *In situ* boom height is therefore not a direct assessment relative to the drift itself but is indicative of what is happening in a field at the time of the trial. It would be “nice to have”...
  - Adding a crop causes issues: reduces the number of spray days!
  - Analytics: when using unfamiliar sampler types (in this case, the Technoifil material), perhaps the analytics should have gone to a specialist institute.
  - **RF:** growth stages difficult to meet as a requirement. Bare ground can be a problem if a farmer is used to supply the land for the trial.
  - Should there be a limit on the minimum swath width?
  - Should we be using a surfactant or not? RF showed trial data where this clearly makes a difference.
  - Wake effects: are they different between the various types of sprayers (mounted, towed, self-propelled)? Can this be addressed easily with CFD modelling?
  - **TW:** looked at the variability in the trial data from all three sites, and at photolysis effects, which were quite large in the Canadian trial. Batch to batch

tracer variability was discussed, and this is something that needs to be addressed in the protocol.

- Very clearly, there are differences between the samplers. TW showed some of ZGao's analysis. Creped filter paper tends to capture more than Techofil (strips or squares) which capture more than petri-dishes. However, the ratios derived from the field trial data are not sufficiently robust to justify normalisation of the DRAW database.
- Other issues raised: thermal effects over bare soil? To assess this properly, we would need an air T° gradient. This needs investigation (and an accurate °T).
- Characterisation of thermal v. mechanical dispersion effects – comparing crop v. sampling area.
- Airborne sampling was discussed: this would be a further, differing strategy for measurement of drift, but how do we do it? HVAs? Wires?

**Action:**

- PM ACC to discuss actions with a view to revising the existing draft protocol!
- ACC to follow up CFD modelling as a means of working out how important wake effects are.

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**Breakout Session 2 (Rapporteur: Reinhard Friessleben)**

**Questions posed:**

- How to sample drift? Recommendations...?
  - *e.g.* sampler performance characteristics [Brief summary (10 min) from Zhenglei Gao: database and 2016 Trial data calibration?]
  - *e.g.*, practical considerations relating to sampling systems in the field and for analysis
  - *e.g.*, Wind tunnel resolution? Link to modelling? Protocol for W/Tunnel work? Where [FR, DE, UK, or all three]?
- Photolysis in-situ
  - *e.g.* How should this be included in the protocol?

**Discussion:**

The discussion was deliberately side-lined to cover the inclusion / exclusion criteria, as laid down by EFSA for the Uni. Hertfordshire data collection. The principal points raised were:

- How to describe the co-ordinates of the field layout? AH recommended, to general agreement, a zero line of the last drilled row, and all distances and positions (*e.g.*, samplers, met-tower) laid down as x–y co-ordinates on a matrix.
- Much discussion on “what is a trial”. In effect, a trial is a set of replicates (as per ISO 22886). Each description of drift derived from a matrix of collectors (minimum 2 sets) is a replicate. The word “line” caused quite some confusion: a line of samplers downwind? Or parallel to the field?
- A much better machinery description is required.
- “Time taken from spraying to collection of last sampler” is an incl./excl. requirement that needs to be derived for the database.

- Tracer: there should be a demonstration ahead of the trial that the tracer is stable under the conditions of the trial; otherwise photolysis should be checked *in situ*. Again, the protocol needs an Appendix with some guidance (*c.f.*, TW's approach).

**Action**

Two sub-groups required: one to look at how the trials are analysed statistically; the second (TW, AH, JvZ, RF, PM, ACC?) to look at 'new' protocol + photolysis requirements.

**Breakout Session 3 (Tom Wolf)**

**Questions posed:**

- Revisit protocol...the details?
  - *e.g.*, Nozzle choice? Surfactant choice?
  - *e.g.*, Collectors? Should there be a 'reference' standard?
  - *e.g.*, Boom height?
  - *e.g.*, Tracking details of, *e.g.*, tracer?
- The 'analytical' question?
  - *e.g.*, What guidance should be included in the protocol?
- Is the protocol now "Fit for Purpose"?

**Discussion:**

Major discussion point was the 'reference' sampler. PM stressed that this is not the 'standard' sampler, but rather a reference sampler to be able to bridge between different trial sites (*i.e.*, a means of controlling for variability). Generally agreed that for reasons of practicability, this should be a petri-dish with a low lip.

- Reference line of (reference) petri-dishes: 2 lines of three points or 1 line of 6 points? [Z. Gao can answer this based on the 2016 data...]
- PM recommended that we investigate the differences between the samplers in a wind tunnel; this could be confirmed using the NL single track field sprayer; a further confirmation would be to use P Balsari's drift track assessment system (as demonstrated at the workshop).
- Some discussion on defining LOQ and LOD: what is this? Obviously, it is related to the variability of the measurements at the max. distance downwind as well as the area of the collector. (Suggestion: ZGao to see if there is data in the DRAW database to help sort out guidance as to what constitute and LOQ / LOD.)
- The analytical technique(s) required were discussed. It was decided that the protocol needs an Appendix outlining the minimum requirements for an effective analytical technique, and that the protocol should no limit the user to a particular tracer. Important to include tank calibration curves to recover reliable values above the LOD.
- P Hamey pointed out that photolysis and its assessment is a requirement for many studies as part of regulatory acceptance.
- Tank samples should be taken from the nozzle.

**Action:**

- ZGao to determine appropriate layout of 6 reference samplers.

- ACC and PM to plan wind tunnel and other work to look at sampler differences under controlled conditions.
- Z Gao to look at variability with distance down wind and to derive some rules for what is an LOQ / LOD
- PM and ACC to sort out an analytical description for the trial protocol appendices.
- PM / ACC to re-draft the protocol based on B/Out Group discussions (to be done by mid-March), circulate to all members of B/Out Group 1 for comment, and by 1<sup>st</sup> week April, Have finalised protocol.