

Appendix R

Meeting Agendas and Summary Notes

A G E N D A
Meeting 1

**Meeting of the Agricultural Waste Air Emissions Advisory
Group**

Agricultural Waste Best Management Practices

9:00 a.m. to 4:00 p.m.
Wednesday, April 7, 2010

GEF2 – Room G09
Madison, Wisconsin
(Electronic Map Attached*)

1. 9:00 a.m. Call to Order

Welcome: Al Shea, Air & Waste Division Administrator

Introduction: Al Shea
 - Introduction of Group Members
 - Review of Group Assignment
 - Review Ground Rules for the Group

2. 10:00 a.m. Meeting Logistics: Bart Sponseller
 - Expense Reimbursement
 - Meeting Dates and Times and Locations (**Bring Your Calendars**)

3. 11:00 a.m. Overview of Wisconsin Agricultural Industry
Bob Battaglia & Audra Hubbell - National Agricultural Statistics Service

4. 12:00 p.m. Lunch

5. 1:00 p.m. CIG Dairy & Livestock Odor and Air Emissions Project and 2010 Fence-line Study
Steve Struss - DATCP
David Grande - DNR

6. 2:00 p.m. US EPA National Air Emissions Monitoring Study Overview
Bill Schrock, US EPA Office of Air Quality Planning & Standards

7. 3:00 p.m. Discussion of Potential Rule Approaches – Andy Stewart
8. 3:30 p.m. Wrap-up
 - Review of Draft Agenda for the Next Meeting
 - Review of the Meeting Actions and Assignments
 - Logistics for the Next Meeting

Agricultural Waste NR 445 Advisory Group

<http://dnr.wi.gov/air/agWaste.html>

Meeting 1 – Draft Summary Notes

-- Send comments or corrections to david.panofsky@wisconsin.gov --

April 7, 2010, 9am to 4pm, G09, GEF2, Madison, WI

AGENDA: http://dnr.wi.gov/air/pdf/AgW_AgendaFirstMeeting_FINAL.pdf

ACTION ITEMS: 1) Before next meeting (May 11, 2010) bring producer survey questions (or send via email to Bart Sponseller directly) for Bob Battaglia for possible inclusion into the 4 page supplemental survey to routine USDA statistics; 2) As soon as presentations available, Bart will email that they are up on web; Bart will also include the brief survey about meeting improvements in this email 3) Bart will provide link to the Purdue NAEMS study as soon as available; and 4) draft summary notes to be sent to group and will be kept draft until Meeting 2, when group can review and finalize.

FUTURE MEETINGS: May 11 (no Mark Powell); June 8 (no Loren Asche); July 7 (no Steve Struss or Kenn Buelow); Aug 3 (all present); Sep 7 (no Bob Pofahl). During the June meeting, we will look at the rest of the calendar months in 2010.

ATTENDEES: All panel members present.

Loren Asche, Hans Breitenmoser, Kenn Buelow, Dennis Busch, Larry Jacobson, Amber Meyer Smith, Pat Murphy, Bob Pofahl, J. Mark Powell, James (Jamie) Saul, Bart Sponseller, Rob Thiboldeaux and Mike Wehler

http://dnr.wi.gov/air/pdf/AgW_AdvisoryGroupMembers-Abbreviated_FINAL.pdf

Additional advisory support from DNR and DATCP present: Al Shea (Air and Waste Division Administrator); John Melby, Jr. (Bureau of Air Management Director); Steve Struss (DATCP, Livestock Siting Engineer); Jeffrey Voltz (DNR Ag Sector Specialist); Josie Pradella (DNR Air Management Specialist); David Panofsky (DNR Air Management Engineer)

A dozen or so members of the audience throughout the day listening.

9:05 Bart Sponseller calls meeting to order.

Opening remarks and thank you to panel members from Al Shea.

Panel members present themselves and their connection to agriculture. Support staff and managers introduced.

Introductory remarks from Al Shea who described the charge of the advisory panel and some NR 445 rule background. The overall Ag Waste BMP project includes two phases, the first of which will be the charge of the group.

This first phase is to allow the panel to identify practices which minimize air emissions from agricultural waste and that work for Wisconsin agriculture. The group can use the watershed management BMP approach as a successful model. The efforts and end products of the advisory panel (BMP development) can then be inserted into a rule. The BMP evaluation task needs to be completed by end of calendar year 2010. The second phase (which is not the charge of the advisory panel) is to codify BMPs into administrative rules (the laws where details of regulations are put in place, at least in Wisconsin). The rule making process involves mandatory public review process and there is no fast tracking of the administrative rule process, in general.

Al Shea stressed the importance of the group's work in that it is up to them to determine what makes most sense to protect public health and is also feasible for farmers. Federal and State law contain obligations that air emissions be minimized, just like a factory. We spent decades on water quality and now we need to address air.

Background to where we are from Al Shea: Two emissions, ammonia (NH₃) and hydrogen sulfide (H₂S) under federal and state law require action. It is understood that it will be difficult to apply point source approaches to agricultural emissions. We need to ensure public health is protected from these two emissions. Lucky we now have science and sensibility. Two delays on the rule, last in 2007 DNR NRB asked for no more delays. Need to go forward with best job. What we do will not only be critical to survival but will provide for more sustainable agriculture in WI.

Mark Powell asks for a clarification about how and where ammonia and hydrogen sulfide are currently regulated under state law. Answer by Al Shea referencing NR 445, the Wisconsin air toxics rule.

Al Shea discusses his invite letter and the ground rules.

http://dnr.wi.gov/air/pdf/AgW_AlsLetterToPanel_FINAL.pdf

Larry Jacobson makes the point that he is more interested in the actual BMPs and what's in the rule than in the actual rule making process.

Pat Murphy asks if the panel is limited to these two pollutants. Bart Sponseller/Al Shea explain that based on Table E of NR 445, would only be NH₃ and H₂S for BMP discussion. Al Shea does agree that it would be advantageous to list co-benefits of BMPs.

John Melby thanks the group members for their participation. He also states that DNR as organizer of the advisory group comes with no preconceived notions regarding BMPs.

John Melby is impressed with the level of expertise represented by the advisory group and looks forward to the recommendations which will be coming out of its effort. John Melby reiterates that the rule will need to be understandable, usable and able to adapt to new technology.

Mark Powell asks if DNR (and the group) is interested in greenhouse gases (GHG). Pat Murphy mentions particulate matter (PM).

Al Shea states that yes, we are interested in climate change, but we should not be side tracked from our impending task, however should discuss how a BMP would affect GHG and other air emissions and potential unintended consequences on other environmental media. .

Ground rules discussed

http://dnr.wi.gov/air/pdf/AgW_Groundrules.pdf

Al Shea suggests that the panel may want to consider a site visit to a farm. Agenda will be sent at least a week ahead of time. Summary notes provided, reimbursements, too. The art of substantial agreement versus consensus. Group agrees to ground rules.

Bart Sponseller reminds panel members to bring their 3-ring binders back to each meeting. Web page described <http://dnr.wi.gov/air/agWaste.html> Panel members fill out meeting date matrix. Refer to Bart Sponseller with questions on reimbursements for travel to/from meetings.

break

9:45 - BOB BATTAGLIA, Director of National Agricultural Statistics Service for Wisconsin who prepares USDA statistics from Wisconsin in addition to projects for state and university data collection, also prepares the Census of Agriculture gave a presentation http://dnr.wi.gov/air/pdf/AgW_livestockprz2010_battaglia.pdf

Also gave handout from the 2007 Census of Agriculture, pages 161-185.

http://www.agcensus.usda.gov/Publications/2007/Full_Report/Census_by_State/Wisconsin/index.asp

Audra Hubbell livestock expert at National Agricultural Statistics Service for Wisconsin also in attendance.

Mark Powell makes the comment (after a slide showing the location and numbers of dairy operations) that a better indicator of manure production would be milk production statistics. Bob Battaglia states that these statistics are also produced on a county basis.

Josie Pradella asks about Wisconsin organic operation and Bob Battaglia states that there was a 2009 survey and that the University of Wisconsin also published on the topic.

http://www.nass.usda.gov/Statistics_by_State/Wisconsin/Publications/WI_Organic_Release.pdf

<http://www.cias.wisc.edu/wp-content/uploads/2010/02/org09final022310.pdf>

Bob Battaglia mentioned that the next producer survey will be out soon (June) and as usual will have a 4-page questionnaire (in addition to the standard USDA statistics) and advisory panel members may be able to use this opportunity to include some questions to ask producers in the upcoming survey.

Please send proposed questions to Bart Sponseller and he will compile for Bob Battaglia. Please prioritize them, too and prepare for the May meeting or sooner. Mark Powell asked Bob Battaglia to send an example of the 4-page questionnaire attached to USDA “standard” stats.

Mark Powell asked about statistics on production methods in Wisconsin because he notes that it is significant when we understand that different animal housing has direct impact on ammonia emissions (for example, stanchion vs. freestall housing which determines manure management – daily haul vs. liquid manure). David Panofsky asked Bob Battaglia if his group had provided EPA with Wisconsin specific manure management statistics (which imply production methods) because those statistics are used in EPA methodologies (Annex 3 of the 2009 U.S. Greenhouse Gas Inventory Report, page A-215 (or 115/208 in Adobe reader)). Bob Battaglia states that no, his group didn't provide statistics to EPA.

<http://www.epa.gov/climatechange/emissions/downloads09/Annex3.pdf>

Bob Battaglia also mentioned that on-farm energy generation (which will include anaerobic digesters) is in the May 2010 survey.

11:30 - STEVE STRUSS, DATCP livestock siting engineer gave a presentation
http://dnr.wi.gov/air/pdf/AgW_CIG-Presentation_100410_struss.pdf Livestock Air Monitoring and Odor Project

<http://datcp.state.wi.us/arm/agriculture/land-water/odor/index.jsp>

The final report is here:

<http://datcp.state.wi.us/arm/agriculture/land-water/odor/pdf/CIGFinalReport.pdf>

Break for lunch - 12 to 1pm

1:00 pm Vid Grande, DNR Air Management atmospheric chemist gave the ammonia and hydrogen sulfide portion of the study presentation http://dnr.wi.gov/air/pdf/AgW_CIG-BMP-Group_100407_grande.pdf.

Discussion

Size of lagoon didn't matter with respect to surface concentrations, but Bart Sponseller points out that flux (mass rate emissions) will change.

Mark Powell asked if we can pick a surrogate contaminant which if addressed will minimize other air emissions of concern. Bart Sponseller mentioned that David Panofsky is developing a BMP matrix and it will list other air parameters, in addition to ammonia and hydrogen sulfide. Vid Grande mentions the limitations of the study and that emissions from feed (among many others) was not the focus of the study. David Panofsky asked about the fate of the ammonia or hydrogen sulfide potentially trapped under an impermeable cover and that it makes sense to consider whole farm emissions to maximize effectiveness of BMPs. Bart Sponseller states that including BMPs for land application is not a regulatory end point but we can and should address land application within the BMP discussion

2pm BILL SCHROCK, US EPA presentation on the US UPA National Air Emissions Monitoring Study (NAEMS) http://dnr.wi.gov/air/pdf/AgW_WI-NAEMS-StudyBriefing_100407_schrock.pdf – (presentation given by phone)

Discussion

Panel member asked whether the May 1 report from Purdue (with the mountains of data) to EPA will be made available to the panel. YES. Bart Sponseller will be let known by Bill Schrock and Bart Sponseller will inform group when it is available. Some discussion within panel as to whether the report will be final by May 1, 2010. Rob Thiboldeaux asked if the open path monitoring was done one day per quarter. Bill Schrock said, no, a minimum of 21 days and the procedure was to take equipment out and within a week set up/test and then run and operate remotely and then 3 weeks later do QA, load equipment on trailer and then leave for next site. Bart Sponseller asked what operations would need to comply with after the 120-day post promulgation of EPA standards. Bill Schrock replied that applicable CERCLA/EPCRA reporting and CAA (title V permitting) 250 tons PM, VOCs, etc. Non participants have same requirements and they don't have "coverage " for past violations. Mike Wehler asked Bill Schrock when will producers need to be in compliance with federal laws and Bill Schrock stated now, for reporting requirements under EPCRA, if not signers of agreement. CAA requirements in place (Title V permitting) in California and Ohio.

Agreement in panel that the results of the final EPA study will have little bearing on the work of the advisory panel addressing BMPs. Larry Jacobson explained that the NAEMS goal was to get baseline – typical of what was happening. With the study there is a mountain of data. The actual measurement (and modeling) of

air flow is the hard part –getting a flux the hard part. Easier to measure cross-ventilated barns vs. naturally ventilated.

Mark Powell added that we should not be overly confident, as there are the litany of qualifiers and again, it is a national study to get us some baseline emissions (that is, without BMPs). The panel would do well to go after the source factors which produce ammonia in the first place – Less N in feed is a key example of a preventative BMP. Bart Sponseller explained that the BMP matrix to be developed with the panel can include this prioritization.

3pm – ANDY STEWART, Bureau of Air Management Permits and Stationary Source Modeling Section Chief (and former NR 445 rule developer) gave a presentation on NR 445 and some potential options for how the panel can proceed
http://dnr.wi.gov/air/pdf/AgW_NR445_BMP_100407_stewart.pdf

3:30 pm Bart Sponseller wraps up meeting. Mention of draft agenda for Meeting 2 and that Jay Harmon from Iowa will not be available. Meeting 3 will get into the “nuts and bolts” BMP discussion. Expect a survey from Josie Pradella on impressions of Meeting 1. Pat Murphy made the suggestion about having some producer groups to share their experience with the implementation of various BMPs. John Melby and others widely agreed that this would be good and Bart Sponseller will look into it if time permits for the panel.

4pm – Meeting adjourned

A G E N D A
Meeting 2

Meeting of the Agricultural Waste Advisory Group

Recommendations for Agricultural Waste Best Management Practices

9:00 a.m. to 4:00 p.m.
Tuesday, May 11, 2010

Wisconsin DNR - GEF2 – Room G09
Madison, Wisconsin

1. 9:00 a.m. Welcome & Review of Meeting 1 Summary Notes
2. 9:15 a.m. DATCP Odor Management Standard – Livestock Facility Siting Rule – DATCP - Steve Struss
3. 10:15 a.m. Neighboring State Process for Best Management Practices Development and Lessons Learned

Minnesota Pollution Control Agency – George Schwint
4. 11:45 a.m. Lunch
5. 12:45 p.m. Best Management Practice Technical Development

Iowa State University – Dr. Jay Harmon (web presentation)

University of Minnesota – Dr. Larry Jacobson
6. 2:45 p.m. Review & Prioritization of Possible NASS Survey Questions
7. 3:15 p.m. Wrap-up and Next Steps
* *Bring calendars to next meeting*

Agricultural Waste NR445 Advisory Group

Meeting 2 – Final Summary Notes of May 11, 2010

Attendees

Loren Asche • Hans Breitenmoser • Kenn Buelow • Dennis Busch • Larry Jacobson • Amber Meyer Smith • Pat Murphy • Bob Pofahl • James Saul • Bart Sponseller • Steve Struss • Rob Thiboldeaux • Mike Wehler (Mark Powell excused) • guest presenter George Schwint from Minnesota PCA • Jeffrey Voltz (WDNR) • David Panofsky (WDNR) • Josie Pradella (WDNR)

Handouts

- Updated Advisory Group Table
- May Meeting Agenda
- Draft 4/7/2010 meeting minutes
- Livestock Siting Odor Standard Background and Best Management Practices (BMPs) by Steve Struss - DATCP
- Ambient Air Quality & Feedlots by Mr. George Schwint - MPCA
- MN Air Emissions and Odor Management Plan by Mr. George Schwint - MPCA
- Air Quality and Livestock: An Iowa Perspective by Dr. Jay Harmon of Iowa State University
- Air Control Technologies for Animal Production Systems by Dr. Larry Jacobson – University of Minnesota

Agenda Item 1 – Welcome and Review (Bart Sponseller)

- In Meeting 1, we explored broader issues related to air quality, odor, and agricultural waste. In this meeting, we will zone in on the regional perspective i.e., what is going on in neighboring states and within Wisconsin: Iowa & Minnesota; ATCP 51, DATCP's livestock siting rule
- Next meeting: focus on looking at BMPs for Ag Waste for Wisconsin
- Introduction of newest member: Steve Struss, DATCP Livestock Siting Engineer
- Draft June agenda (forthcoming – Meeting 3 to be held in Room G09)
- Draft July agenda – field trip - fence-line swine study and gradient study at dairy operation with farm manager at UW Arlington Research Station
- Review of today's agenda
- Draft summary notes from April: questions or comments?
 - Comment by Steve Struss: add in John Melby's introductory comments and welcome
 - TO DO Items: followed through on all action items
 - Bart contacted US EPA regarding the NAEMS Study status. Purdue study link: There has been an official request for extension, so US EPA does not have anything in hand yet; July 2nd target for full report according to Larry Jacobson
 - GovDelivery technical issue has been fixed
 - We won't be accepting public comments at this meeting; public comments can be submitted through our web presence; conceivable that we may open up public comments during the latter part of a meeting in the fall, around October

- Depending on the technical nature of the BMP evaluations, we may need to break out into technical subgroups to accomplish the work

Agenda Item 2 - DATCP Odor Management Standard

STEVE STRUSS – Livestock Siting Odor Standard Background and BMPs

http://dnr.wi.gov/air/pdf/AgW_M2-12-LivestockSitingOdorStandard_Struss.pdf

History: Local pressure against siting facilities was overriding farmer interest. Conditional use permits for expansion were getting rejected for political pressure rather than for technical reason.

DATCP got involved and developed Rhode Committee; Rep. David Ward got involved to introduce AB868. Ag 235 signed into law mid 2004; created technical expert panel; 6 mo project (technical BMP group); May 2006 ATCP 51 signed into law.

There was a need for consistency across the state in balance with local enforcement. State siting standard must be adopted through local ordinance by individual counties or municipalities. Not all counties or municipalities have elected to adopt the siting rule.

Who does this affect? Only those people who are applying for a future expansion permit; within 2500 feet to occupied building of neighbor or if new operations over 500 Animal Units. Farmer locks in separation distance from nearest existing neighbor for odor; future development protection. Trying to encourage good planning on farmer's part. Includes nutrient management plan. Have to start construction for expansion within 2 yrs or permit becomes void. No deadline beyond expansion start.

Predictive standard – you don't know what your odor will be when you hit the full size of your permit. Based on installed (physical & management) practice. Allows some odor. Odors from structures only (distance, density of neighbors, installed practices & wind direction; any occupied building, not just individual residence). Does not consider odor from land spreading (a compromise to get rule passed).

There's a paper odor worksheet in the rule; must get over 500 odor score to pass. There is also an Excel spreadsheet version.

BMP development process involved a technical panel, comprehensive literature search; Univ. of Minnesota Offset model; also customized the Offset model for WI farms. Odor from Feedlots Setback Estimation Tool:

(<http://www.extension.umn.edu/distribution/livestocksystems/DI7680.html>). 21 practices in ATCP 51 rule.

How did credits get assigned to BMPs? Literature; data supplied by industry; comparison to similar practices; consultation with experts; field experience.

Legislative intent: all standards had to be protective of public health & safety, usable by local authorities, etc. Practicable & Workable; Cost-Effective (up to the farmer to decide)

Rule allows for a procedure for innovative practices – producer or manufacturer applies for credit (beyond list of 21 practices); ATCP has 90 days to assess control effectiveness; performance based and field observation; assign odor control credit to that practice. ATCP has received only one innovation application in four years. ISS system – wastewater treatment system; haven't issued credit yet.

There will be a technical rule update process this year – technical update process used to adapt to newer standards or issue a “fix”; not for policy changes; controversial so requires public hearing process.

Four year review of siting rule; had four listening sessions around the state. Verbal: 863 comments total; fairly split for and against. Written comments released 5/12.

Those against: Pre-emptive rule – does take away some local control. Odor standard is too easily passed. Enforcement at local level is problematic. Insufficient fees (\$1500/permit) for administration/ review of permit applications.

Will need to reduce the credit for digesters; redefine anaerobic digester practice (e.g. 17 day hydraulic/solids retention time currently – so go to a longer time period for to get full credit.)

Questions: Amber Myer-Smith asked if DACTP board is considering reopening livestock board? Yes, we're required to reconvene technical committee and consider whether the rule needs technical update or open it up for full revamping (public hearing etc); assumption is that they will probably go through public hearings.

Kenn Buelow Has this rule stopped litigation? In theory yes, it should. What we have had are appeals to livestock decision-making process. Loophole: local authority has to say we have a complete application, then decide whether to issue permit; they're dragging out that first step. Maybe give them 30 days to make completeness determination and then complete the process. Can the local authorities put in extra conditions? In court of appeals; briefed and argued; awaiting decision.

Mike Wehler asked what conclusions can we draw related to your presentation on odor for both ammonia and hydrogen sulfide issue we're looking at? There are a lot of different things that can factor in re: odors from hundreds of other compounds beyond ammonia. At a high level, hydrogen sulfide is not detectable. There's some correlation re: high odors and high ammonia; but often no correlation for hydrogen sulfide. Odors can be masked, but not emissions. Is the enforcement solely based on complaints or is there monitoring? Mostly complaint based with local authority going out to investigate; checking if practices are being maintained.

Are the model practices all additive re: odor generation? Yes; kind of a weighted average. Possible situation where you build something else and it works to bring the overall score down.

Mike Wehler asked: The issue of an offensive odor – terminology – how do we look at something and determine whether it's “offensive”? It's a subjective judgment call. Assumed any agricultural odor could be considered by a neighbor to be offensive. So then we're looking at

level of odor rather than characterizing it; “annoyance curves.” Larry Jacobson further explains the difficulty of enforcement of an odor standard based on hedonic tone (the pleasantness of an odor) versus the more defined measure of odor units through a nasal rangefinder with a chosen annoyance level.

Agenda Item 3 – Neighboring State Process

GEORGE SCHWINT - Neighboring States Process for BMPs and Lessons Learned

http://dnr.wi.gov/air/pdf/AgW_M2-I3-MinnLessons_Schwint.pdf

Minnesota State ambient air quality regulations (MAAQS) regulate hydrogen sulfide. Health risk values, from Minnesota Department of Health, are designed to prevent health effects even in sensitive populations; guidelines only.

Standards apply to all feedlots, regardless of size; measured at property line (unless general public has access to areas within the property line); air quality easement may be obtained from adjacent property owner in writing; easements are for no more than 5 yrs at a time; Exemption for manure cleanout and seven days after manure removal. Exemption maximum for feedlots over 300 animal units - max number of days is 21 per calendar year.

Compliance: Jerome meters and Continuous Air Monitors – Compliance monitoring performed April thru Oct season. State does the monitoring. State prioritizes sites for monitoring by odor complaints. First, they evaluate validity of complaint (meteorology); staff suggestions and direct investigations i.e., site visits. Livestock Odor Statute (Hydrogen Sulfide) requires MPCA to use portable meters and factor in citizen complaints. MPCA does initial monitoring for a season; follow-up monitoring, once a fix is installed, is typically paid for by facility. Enforcement: you created the problem; you tell us how you’re going to fix it. No specific BMPs are required by State.

Feedlot permitting and review: a permit is required for large CAFOs, new construction or sites required to fix pollution hazards.

Environmental Assessment Worksheets – for construction/expansion of 1,000 Animal Units (AUs); evaluate need for an environmental impact statement. Look at air dispersion modeling; large cost; this is a long, drawn-out process.

NPDES/SDS permits – require submission of air emissions plan; gets incorporated into permit. SDS portion of permit identifies measures to mitigate air emissions, if H₂S standard is exceeded. No BMPs required if H₂S standard is not exceeded. There is a list of BMPs on the EA worksheet although there are no particular control reductions (or points) assigned to these BMPs. Model: If an exceedance is documented, EAW requires analysis of air emissions with an air emission model by applicant (CALPUFF) for hydrogen sulfide (H₂S), ammonia, odor and particulates; include background concentration of 17 ppb H₂S. Predict emissions at property boundaries.

Question: What about the ammonia background concentration of 148 micrograms/m³ used in the model? Responses: By the time it gets to property line, it dissipates.

Question: How many worksheets have you seen? About 8 a year.

Cannot require air emission modeling at facility that has not had a hydrogen sulfide violation.

3 year extensive study of feedlots funded by MN legislature – 1998, completed in 2001. Economic and social factors. Finding: modeling was a good predictor of pollutant concentrations.

MN has no setbacks from residences, cities. Only from water features; all handled by county. Working with other groups: Univ. & MPCA; UMN created OFFSET model to assist counties with feedlot location issues. Producer groups involved: pork, Cattlemen's, Milk, etc.

Examples: swine farm with large anaerobic lagoon received numerous complaints. Documented exceedances with monitoring. Permeable geotextile cover installed. Cover failed because it sank to bottom of lagoon; a heavier impermeable cover then installed with ozonator; monitoring continued to show exceedances; large gas bubbles would migrate to edge and put them over the standard. Result: moratorium on open air basin swine basins. Entered into agreement with MPCA, took several other actions and no longer receive complaints about odor.

Excel Dairy example: litigious process. Moral of the story: have proper separation distance between open basins and residences.

Lessons learned: each feedlot is different, let feedlot play a role in deciding appropriate controls. Court process is unpredictable; would be helpful to have additional emergency powers for public health hazard declarations; separation distance is the easiest to control; things quickly get political.

Recommendations: develop a screening tool (OFFSET or some dispersion model). Proactive, not reactive; incorporate rules/requirements into permits; plans should be unambiguous. Work with universities; keep up to date with technologies and base decisions on sound science.

Question: How do you handle ammonia without a standard? Ammonia is looked at through modeling process through health risk lens.

Question: How do you deal with land spreading? We don't deal with it. Does the (agency?) deal with odor complaints? Usually acute land application; by the time we get up there it's all dispersed.

Question: You said that you don't love the idea of getting credit for BMPs – can you say more about that? A lot of the BMPs are management intensive, must be maintained. Hard to assign a blanket value to all of them.

Question: The levels of H₂S in Excel Dairy seem extremely high. What have you seen from other dairies? Were these high values monitored during the high value? Yes, April thru Oct.

includes ineffective aeration in lagoon; monitor sampling occurs in half hour increments.
Environmental context – colder up there earlier – limited monitoring ability.

Unenforceable standard – there's no standard for ammonia we [MPCA] can enforce; we can recommend a control practice. We negotiate with the facility and may require an Environmental Impact Statement (EIS).

In Wisconsin, we have an Environmental Analysis questionnaire – targeted toward water but have some air specific questions in there.

Question: Jamie Saul asked if there were any other separate clean air act violations. Yes, EPA issued a notice of violation for Excel Dairy. In our state [MN] the goal is to get feedlots covered under one super-permit.

Question: For H₂S, are you using the water quality permit for going after exceedances at non-monitored facilities? No problem enforcing permit once it's in there. NPDS/PDS rolled together; works really well.

Question: Can you make some comparisons of this high level facility (Excel) to others? We've never seen violations that high anywhere else.

Question: How many facilities have you had violations on that you've gotten to solutions and over how many years? Not logging violations very often. Four that I can think of, maybe 3%.

Question: Are there differences in other portions of the state with swine operations? Most going to biofilters as control. Swine can no longer do open basins. Dairy can still do open basins.

Question: Are you seeing any pressure wanting you to look at ammonia? No; everyone's concerned about odor and H₂S.

Question: For the odor emissions management plan, have you assigned reduction controls for these or do people come up with their own? They have to provide a list of odor sources, their potential, and a list of control strategies. Five dairy digesters in state; four covered basins. One uncovered, has had some odor complaints.

Question: In terms of process and the permitting, air staff never touches it? It all comes to staff that does everything in super permit; 1000 permits will all be coming due in August; have 60 days to get them issued.

Question: Kenn Buelow asked if this dispersion model also take into account ammonia reactivity? AirMod and CALPuff do some atmospheric analysis – for ammonia. It takes into consideration the weather and instabilities but not reactivity.

Question: Can models touch on any chemical reactivity and studies that show what happens to ammonia in the air? Ammonia is a precursor to ozone, fine particles, as well as haze.

Question: Any idea on the 24 hr fence-line number re: NR445? Can get data over lunch. George Schwint reviewed the monitoring data from Excel and sent Bart Sponseller a summary in an email on Wednesday, May 12. George found a maximum 24 hour concentration of 72 ppb at Excel dairy. He urged caution in using this value because the monitoring instrument maximum detection limit is 90 ppb (over a 30 minute period) and the monitor measured 90 ppb 31 times during the 24 hour monitoring period.

Agenda Item 4 – Best Management Practice Technical Development

DR. JAY HARMON – Air Quality and Livestock: An Iowa Perspective (web presentation)

PDF version: http://dnr.wi.gov/air/pdf/AgW_M2-I5-BMPsTechDev_Harmon.pdf

Web presentation: [http://brenton2.brenton.iastate.edu/bcrelay/AnS382/WI_DNR_Harmon_-_Web_\(800x600\)_-_20100505_03.15.01PM.html](http://brenton2.brenton.iastate.edu/bcrelay/AnS382/WI_DNR_Harmon_-_Web_(800x600)_-_20100505_03.15.01PM.html)

Odor is the biggest concern; state regulations govern siting (master matrix point system for permitting – air, water, soil); no current emission criteria for gases. Odor control technology needs to result in minimum 70% reduction of source odor, when needed. It does not mean 70% control 100% of the time. Gas control impacts: The receptor becomes the atmosphere rather than a neighbor, so overall reduction is the goal. There really isn't an "off" time. Look for overall reduction of emissions.

Emission sources: Building ventilation air; outside manure storage; land application.

Criteria that a producer would adopt: Effective, Economical, Practical, Limited management demands, Known limitations, not universally applied

Offers a suite of options to address air quality mitigation strategies for producers. Siting is number one. Model looks at receptors, can model "what if" scenarios with each person (neighbor) within field and time of exposure. Model limitations: don't account for terrain; should be coupled with education and common sense.

- Biofiltration: 60% odor reduction; up to 65% for ammonia (NH₃); up to 95% for H₂S. Limitations re: biofiltration: must be mechanically ventilated system; proper design; good moisture maintenance; large footprint.
- Vegetative Environmental Buffers: promotes mixing and uplift (dispersion situation); visual screen; difficult to quantify impact. Up to 15% odor reduction.
- Dietary manipulation: crude protein reduction, replace with crystalline amino acids; limit use of blood meal, fishmeal. Up to 30% reduction; easy to implement.
- Permeable covers: prevents wind blowing over surface; ammonia reduction 40-90%. Can use straw (which tends to sink into the lagoon); LECA rock; geotextiles.
- Impermeable covers: HDPE; 90% reduction; expensive.
- Manure Injection: odor/ammonia reduction approx. 90%

Second tier AQ mitigation techniques: barriers, biocurtain with ESP, V Scraper (separate manure and urine – solids scraped to separate area); high cost/availability, ultraviolet degradation, bioscrubber, topical applications (zeolite in poultry manure) – promising techniques.

Air quality tools: National Air Quality Site Assessment Tool (NAQSAT); and Iowa State's Air Mgmt Practices Assessment Tool (AMPAT)

naqsat.tamu.edu (species teams for each group to determine what things impact emissions)

Self assessment tool: get effectiveness results matrix

<http://www.extension.iastate.edu/airquality/practices/homepage.html>

Question: What would be the differences with EPA regions? There is no difference in federal rule. The difference is the working relationships between states and the respective region.

Importance of site: trying to go toward surface application to avoid nitrate filtration; roads; electrical service, finances, etc. That's why our group should come up with a suite of BMPs that will work for different farm situations.

Comments:

- MN has all their permitting under one roof; sounds like there's more communication between media program staff.
- Water folks in DNR are ahead of the Air program.
- BMPs cause a tradeoff between air and water. Look for where there is some overlap between the two – acknowledge where they come together. (e.g. manure injection is not the answer to everything – it reduces air emissions significantly but can cause groundwater problems).

Question: Can you fill us in a little bit more about AMPAT? AMPAT is a decision tool that looks at technologies; NAQSAT is an assessment tool.

Points are assigned in Iowa matrix system. Point-based; need to get certain amount of points to be able to site a facility – this is part of Iowa's process to get construction permit.

PDF and link will go on web.

Agenda Item 5 - Best Management Practice Technical Development

LARRY JACOBSON – Air Control Technologies for Animal Production Systems

http://dnr.wi.gov/air/pdf/AgW_M2-15-ControlTechnologiesTalk_Jacobson.pdf

Diet manipulation – Distiller's Grain (DDG) is a byproduct from making ethanol; has lots of nutrient value (including high protein content). Dairy is using DDGs a lot; pig and poultry are using it more. Lowers input costs for facilities.

Good housekeeping – you know it when you see/smell it.

Odor Management Plan – be proactive, identify your sources, and estimate what you would do.

Injection of liquid manure – most CAFOs do injections in MN; done by commercial applicators usually in the Fall. MN encourages injection for everything. Keep nutrients in soil and keep odor

down. Look at other opportunities – Denmark model of spreading on plants. Air & water balance. Kenn Buelow suggested that we remember manure can be many things.

Setback distance methods: zoning/land use guidelines; empirical formulas; dispersion models. Ontario minimum distance separation model: four factors (type of animal, # of livestock units, % increase in animals, type of manure system)

OFFSET – Odor from Feedlots Setback Estimation Tool estimates average odor impacts from a variety of animal facilities and manure storages. Has requirement in Environmental Assessment Worksheet for air dispersion modeling to assess hydrogen sulfide impacts. Costs around \$5,000.

MNSET – MN Setback Estimation Tool includes gases (hydrogen sulfide). Predicts odor, hydrogen sulfide, ammonia at property boundary. Could predict how many pounds per day was coming from a site. Downwind concentrations are a function of emission rate and weather.

Flux and dispersion: per animal, per animal unit, flux appears to be controlled by surface area (e.g, not how many animals but rather the footprint of the structure- with assumptions that animals occupy housing with known surface areas per housing type). Rates vary a lot from farm to farm. Mass per time per area based rather than per animal. Surface area phenomenon.

AERMOD dispersion model used to predict downwind concentrations from swine farms using over 5 yrs (hourly meteorological data). Modeled 26 different case farms with constant flux rate.

EAW vs. MNSET – EAW emission rate in model is half that of MNSET for hog finishing; 30% lower for dairy barn. Conclusion: if we used the same emission rates we get the same concentrations but literature indicates that MNSET has shorter distance. MNSET could incorporate GHG flux rates. MNSET has been shelved. Used literature values or empirical data that U of Minnesota measured as basis for flux factors. Estimation tool for producers; emission rates are the key.

Question: does it make any sense to use oil on a manure basin? The oil helps temporarily but then becomes rancid and that produces another odor. What about plastic balls? LECA rock – very porous and floats; creates a boundary layer, doesn't really decompose. Have to try to pump it and may not be good for pumps.

Question: What are the other states doing? In Midwest, odor is a real key issue; Minnesota's hydrogen sulfide standard is a surrogate for odor. Affects human health, esp. among people who are immune suppressed. Ammonia – acid rain, nutrient deposition and precursors to haze, ozone and fine particles. Some counties in MN are requiring biofilters on swine operations and there is a "ban" on open swine manure basins.

Question: What about North Carolina and their approach to odor models? It got political pretty fast with their hog operations. They didn't set an odor rule but tried to address what was coming from sites. They don't have a model per se but have done site specific assessments. There was a moratorium in NC at one point.

Bart: Dave Panofsky and Steve Struss are working on BMP matrix. Goal is to have a final draft matrix by end of May. Will get introduction memo and BMP matrix to the group one week prior to June meeting. We need a lot of info from you to fill in; what's missing, what you may be able to contribute. Think about formatting or something else that would help create an efficient and effective evaluation process.

Agenda Item 6 - NASS survey list

Mark Powell provided some suggested edits to questions 2 and 5 that would help better assess ammonia losses and related potential mitigating strategies for housing and manure storage. We will send what we have to Bob Battaglia and Audra Hubbell at NASS as promised.

Agenda Item 7 - Wrap-up and next steps

As we start making this pivot to more analysis of BMPs, what's the best way to organize them from an effectiveness standpoint.

The next meeting is about BMP evaluation; what are the other issues you think are important in terms of bringing in experts or some other information we should bring into our conversation re: ammonia and hydrogen sulfide? What information would you need to be comfortable with this process and recommendations?

Pretty broad definition of BMPs- includes different methods; what we mean (whether increasing setback is a BMP); mix of management and physical practice.

Everything is on the board; we need a process to decide whether it (BMP) stays or goes. Get to a set of broad recommendations from this group.

Question: If farms are under a threshold, do we need to have that discussion? Current NR445: ALL farms will have to evaluate their emissions by July 2011. Then demonstrate that they are under or over a threshold (Table A of rule); then can do modeling or applying BMPs outright to get below threshold. Dairy, swine, beef, poultry.

Comment: It makes a difference whether we're talking 20 cow dairy or 500 cow dairy.

Response: We can assume that we're focusing on medium to larger size operations.

Action Item: All – Please e-mail Bart about what went well, what didn't, what could be improved.

Next Meeting: Tuesday, June 8, 9 am – 4 pm, Room G09, Madison. *Bring calendars and 3-ring binders to next meeting.*

Summary prepared by Josie Pradella: josephine.pradella@wisconsin.gov

A G E N D A
Meeting 3

Meeting of the NR445 Agricultural Waste Advisory Panel

Recommendations for Agricultural Waste Best Management Practices

9:00 a.m. to 4:00 p.m.
Tuesday, June 8, 2010

WDNR – GEF 2 – Room G09
Madison, Wisconsin

1. 9:00 a.m. Welcome
2. 9:05 a.m. Schedule Meetings for October through December – Complete Scheduling Form (*have calendars ready*)
3. 9:15 a.m. Human Health & Environmental Impacts of Ammonia and Hydrogen Sulfide - Dr. Rob Thiboldeaux - DHS
4. 9:45 a.m. Introduction to Best Management Practice Matrix and Framework for BMP Evaluation Process
5. 10:00 a.m. Review of First Set of Best Management Practices
6. 12:00 p.m. Lunch
7. 1:00 p.m. Continue Review of Best Management Practices
8. 3:30 p.m. Wrap-up and Next Steps
 - July Meeting logistics
 - Transportation
 - Map & directions
 - Attire

Agricultural Waste NR 445 Advisory Group

Meeting 3 – Summary Notes, June 8, 2010

Attendees: Loren Asche, Kenn Buelow, Dennis Busch, Larry Jacobson, Amber Meyer Smith, Pat Murphy, Bob Pofahl, James Saul, Bart Sponseller, Steve Struss, Rob Thiboldeaux, Mark Powell, Mike Wehler, Jeffrey Voltz, David Panofsky, Josie Pradella (Excused absence: Hans Breitenmoser)

Handouts:

- Toxicity and exposures associated with air emissions from concentrated animal feedlot operations – Rob Thiboldeaux
- Best Management Practices to Mitigate Air Quality Impacts from Animal Agriculture, slides and text – David Panofsky
- Air Mitigation Measures and Effectiveness Summary Table
- Air Mitigation Measures and Effectiveness Expanded Table

Agenda Item 1

Bart Sponseller reviewed the agenda; group will go through ranking mechanism to evaluate BMPs and do mock exercise (two subgroups – dairy; swine & poultry); Subgroups will schedule phone calls to perform first round of ranking during the month of June.

Agenda Item 2

Remaining meetings scheduled for:

- Friday, Oct 15th in Room G09;
- Friday, Nov 5th in Room G09; and
- Tuesday, Dec 7th at the WI Energy Conservation Corporation office Training Room (corner of Whitney Way and Mineral Point Rd)

Agenda Item 3 Human Health & Environmental Impacts of Ammonia and Hydrogen Sulfide – Rob Thiboldeaux

Agricultural air pollutants we can focus on – hydrogen sulfide, ammonia.

Toxicity involvement with DATCP design criteria for safety at manure handling systems in confined spaces etc. There are many chemicals derived from agricultural waste, which comprise odors; only focused on two for the example provided.

Ammonia has a high vapor pressure and is alkaline, soluble in water, dissolving into biological tissues. Properties of ammonia make it good for dissolving nucleic, fatty and amino acids.

Occupational standards: 50 ppm and 300 ppm

Deamination = coming directly from animals; animal protein as energy source; ammonia is toxic to the blood. Urea readily hydrolyzes in the environment to release ammonia.

Environmental fate of ammonia: Plant growth is nitrogen-limited, so fixed ammonia preferentially gets cycled back into plant matter (ideally). A lot of ammonia ends up in

the atmosphere. Odor complaints reflect ammonia oxidized to nitrate, forming PM2.5 secondarily in the atmosphere. Nitrate and sulfate comprise a significant portion of fine particulates in the ambient air.

Kenn Buelow asked about seasonality. Bart explained that ammonium nitrate and ammonium sulfate formation, both components of atmospheric fine particulate matter, are driven by atmospheric temperature. Cooler temperatures (below ~ 45-50°F) tend to push the ammonia reaction toward the formation of ammonium nitrate. Warmer temperatures will push the formation toward more ammonium sulfate. That is why total fine particle matter is comprised more of ammonium nitrate in the winter and more of ammonium sulfate in the summer. Note that ammonium nitrate can still be formed during the warmer periods, just to a lesser degree and vice versa for ammonium sulfate.

Mike Wehler – re: the amount of ammonia produced – is it the same regardless of how many animals are in one area vs. dispersed? Rob- Don't know; it bears discussion.

Mark Powell – our milk production was the same but animal production increased by 50%, so we are getting more ammonia but less ammonia per unit of milk. Bart: we have performed required atmospheric modeling for ~30 eastern states; we found that the Midwest is a net exporter of ammonia to other states, contributing regionally to their air pollution problem – just like us with sulfur dioxide from power plants.

Mike Wehler – if you have a million head of animals, do you have the same amount of ammonia produced (does density affect emissions)? Larry Jacobson: Key thing is dispersion; assuming they're housed the same. The emissions don't come from the animal; they come from the manure; it makes a huge difference how it's handled. Better on per area basis and then identify production system.

Toxicity progression of ammonia: above 50-100ppm is irritating; 150 ppm can cause inflammation in the lungs; dysfunction. Workers that are chronically around farm type dust are seen to have a gradual decrease in lung function.

Ken B- any other sources of ammonia besides agriculture? (Dave P: Ammonia slip from utilities); Bart – a bit from mobile sources (gasoline combustion) but the majority from animals and fertilizers. Based on 2002 emission inventory estimates, approximately 84% of ammonia in Wisconsin is from agriculture.

Hydrogen sulfide: more complicated to understand. Mostly anaerobic systems; industrial activities involving processing – pulp mills, sugar, and landfills.

Mike Wehler – what is the primary source of the odor in towns with paper mills? Sulfuric acid to digest the wood fiber. May want more information on discharge in populated areas from paper industry (get info on levels, whether it's hydrogen sulfide, etc). Bart said we will do an emission inventory query for sulfur-containing compounds, specifically hydrogen sulfide.

H₂S lethal accidents – we usually don't know what the actual exposure was. It appears that water becomes super-saturated; when it's agitated it releases H₂S and creates a dangerous situation. By the time emergency and health experts reach the site, the H₂S has dispersed.

PM toxicities: chronic, acute – low concentrations, acute –high concentrations, acute – very high concentrations (slide on p 6 of handout)

Mike Wehler – What is the NR 445 H₂S limit? The H₂S threshold concentration is 336 µg/m³ is approximately 220.8 ppb at standard temperature and pressure.

Mechanics of H₂S toxicity: key concept is that H₂S affects us very much like cyanide. Nucleophiles; both chemicals will bind to any molecule in a cell; will bind to iron in a red blood cell, so they can't bind oxygen. Mitochondria and hemoglobin targets. Sulfide directly stimulates nerve centers leading to cardiac irregularities and respiratory shutdown (at high concentrations). There is no OSHA 8-hour threshold.

Reference concentration is a health-based guideline (not regulatory); somewhere between zero and a level at which you will be harmed. Biologically defensible yet low enough to avoid harm. Numbers are set at lowest observable effect. Uncertainty Factor of 300.

David Panofsky: how would you say MN H₂S standard compares to WI standard? Bart: WI standards have been revised and reviewed more recently; WI toxics rule went through 6-yr revision process. Mike Wehler: UF number is for rats and they're applying that to humans? Rob T: yes, biopsies conducted lead to establishing reference concentrations that would be applied to the public.

When looking at low concentrations and think about what the number should be, recent literature suggests that H₂S is found naturally (very low levels in the brain); modulates inflammation – so how much is OK? We most likely manufacture it ourselves.

Time of day and atmospheric conditions affect the odor plumes and nuisance element. Can get high concentrations in very narrow plumes from agricultural waste lagoons/pits.

Agenda Item 4 Introduction to Best Management Practice Matrix and Framework for BMP Evaluation Process – David Panofsky

Referred to synergies, other media.

Overview: Define Best Management Practices (BMPs), how they work, linkage between BMPs and production practices, background on ammonia and hydrogen sulfide, caveats, summary table, references, sub-group work.

Purpose of BMPs: prevent or control air emissions (NH₃ & H₂S) from animal agriculture operations. Production methods, animal types, technologies, waste management practices – anything that minimizes emissions; possible other mechanisms.

How they work: reduce/prevent generation of emissions; reduce emissions through capture and treatment; increase dilution and dispersion.

Other BMP efforts with other, or additional, air quality goals in mind: (slide on p 3)
ATCP 51 (in Wisconsin)

Volatile Organic Compounds (VOCs), esp. in San Joaquin Valley Air Pollution Control District (California) - specific rules, papers, dairy focus

NH₃ – (Idaho) dairy related

NH₃ – (Mid-Atlantic) dairy related

H₂S, Odor – (Minnesota)

NH₃, H₂S, Odor, PM – (Iowa)

Methanol (Oregon)

Particulate Matter – Yakima, WA

Livestock Poultry Environmental Learning Center

Successful BMPs:

- recognize that not one size fits all;
- recognize economic value of nitrogen;
- look at whole farm;
- practicable, workable, cost-effective.

Volatile loss discussions especially from the nitrogen side; integrated system. Most excess nitrogen transformed into ammonia. Ammonia is produced in aerobic and anaerobic conditions.

Research primarily based on: C.A Rotz, Journal of Animal Science 2004.82:E119-137
http://jas.fass.org/cgi/content/full/82/13_suppl/E119

Ammonia from animal ag in WI:

Dairy: N ~20% bodyweight (BW) excretion per year (Dairy comprises approx. 60% of ammonia emissions (2002 table)

Broilers: N ~ 40% BW/year

Turkeys: N ~ 30% BW/year

Beef: N ~ 11% BW/year

Layers: N ~ 30% BW/year

Swine: N ~ 20% BW/year

For larger Wisconsin operations we have more info re: production and manure management because of water quality permitting. For smaller operations, don't know as much.

Housing dairy (ammonia sources) (in order of lowest nitrogen losses to greatest)

Tie-stall: lowest nitrogen losses

Freestall

Bedded pack

Feedlots: highest losses

Poultry Housing (in order of lowest nitrogen losses to greatest)

Cage and belt – lower losses

Aviary

Deep litter

High Rise: highest losses

Swine Housing (in order of lowest nitrogen losses to greatest)

Slatted floor – lower losses

Free range

Deep litter systems – highest losses

Manure storage

Land application

H₂S from animal agriculture in Wisconsin (p 8 slides):

Decomposition of sulfur-containing organic matter (mostly manure)

Production methods/practices resulting in aerobic conditions:

Housing (in order of lowest hydrogen sulfide losses to greatest)

Dairy barns

Beef lots

Hog finishing barns – highest losses

BMP Caveats: Technical feasibility, economic feasibility, one pollutant may exacerbate another pollutant; what's good for water quality may not necessarily be good for air quality

Mike Wehler: I would say there's not agreement in the ag community that storing manure is good for water quality; an incident (e.g., an overflow) may impair water quality.

Dennis Busch: another tradeoff potentially (working as manure management educator): the newer hubs – reduction of water in the pit, the manure was very high in N; hard to meet high injection rate (can broadcast).

Larry Jacobson: If we come up with better technology we can inject manure with higher nitrogen levels. It's physically possible but not economical. Daily hauling is not good; storage gives you the opportunity to spread it when you want it; but there's a narrow window in an agronomic system.

BMP Tables: are in draft form, need your input, want to refine what we have/what we know; compilation of what I (Dave Panofsky) found (framework was ATCP 51). Mostly focused in on odor; defined; reference tool, lumped species all together.

Categories:

- Animal housing and feed
- Manure storage and treatment

- Open lots/corrals
- Pasture systems
- Land application

Expanded Table columns:

BMP, Ammonia, Hydrogen Sulfide, types of emissions, notes (total of 93 BMPs)

Summary table:

BMP, main mechanisms, pollutants (arrows: down indicates reduction – 20% for one arrow) - are estimations. A question mark indicates uncertainty or contradictory information appears in the literature. Broad brush approach; the advisory group has the opportunity to add references, correct citations, how we carefully define a given BMP.

Afternoon: will assign species for manure handling category and then will have an exercise to prioritize/rank BMPs in this category.

Bart Sponseller: these tables are a dynamic, a work in progress, meant to serve as utility for subgroups; give a general sense of whether BMP increases or decreases NH₃ or H₂S plus other pollutants. “Helping Table” worksheets.

Steve Struss: it makes sense to break it out by species; producers will use this.

Larry Jacobson: this is an excellent consolidation of all the info; pragmatic.

Kenn Buelow: there should be a column that talks about water quality and the impact (synergy tradeoffs mostly in the notes).

Bart: this summary table pulls from the expanded table and helps us focus in, prioritize a set of BMPs – focus today on manure handling BMPs. Ranking mechanism. Go through starting with manure treatment (items 38-69)

Species: B = bovine (ruminants), P – poultry (broilers, turkeys, layers, ducks), S = swine
Try to assign letter to populate manure storage category BMPs. 0 – 10 with zero being no or limited benefit; companion BMPs, other media considerations, notes/justifications for rankings.

Bart Sponseller: columns as guidance, not for going into final rule.

Larry Jacobson: if I do something in housing area that I can control but don't have something in manure storage, I lose all that?

David Panofsky: The group should define the BMPs so we're not going to see unintended consequences. Consider synergies and tradeoffs for other media. Acknowledge whether we see other benefits.

Bob Pofahl: boundaries on the ranking: practicality, feasibility, technology in place, or just “does it work regardless of whether it can be implemented or not?” If we have a couple cuts at this, first cut: has this been proven to work or not? Second cut: is it

practical? Is this a tactical decision a farmer needs to make or require an operational procedure, or does system need to be retrofitted?

David Panofsky: implementation – if it doesn't work with production levels that we have, I would score it low.

Mark Powell: do we need three sessions? Ranking, practicality, what resources are required to implement the practice?

Bart Sponseller: we're temporarily "hiding" those (cost, impacts on other parts of the environment, etc.) columns in the spreadsheet, so you will focus on just the air topics in the first round; you'll rank them (NH₃, H₂S, ease of implementation, disbenefits or co-benefits for air quality). We're not looking at cost or other environmental parts just yet (first cut); phase 2: focus on costs and companion parts and environmental media.

Larry Jacobson: purpose – let's not "x" (delete) things too quickly, consider the whole gamut. Ease of implementation I would put in the second round.

Steve Struss: it's site specific so what's a retrofit in one place may be a new installation for new farm.

Bob Pofahl: what needs to be retrofitted or considered in new systems?

David Panofsky: ease of operation and control reductions – a lot of that will be fleshed out with how we define our BMP.

Mike Wehler: to understand the process we're undertaking, is it that we're going through BMPs because an operation is above the limits for NH₃ or H₂S; we have options that would help farmer operation get below the limit in the statutes?

Bart Sponseller: Yes, we want to create that list of BMPs for the farmer – a farmer can look at the list and pick out what might work for his/her farm. We don't want to prescribe; rather, here are ones this advisory group put together and recommended based on the ranking criteria.

Mike Wehler: when we get into discussing costs and practicality, implementing a BMP for a small operation would cost a lot more than it might for a larger operation. If we're focusing on those that are near the threshold that gives us a better idea of how we deal with these other categories.

Bart Sponseller: you could put in a note, like a permeable cover for a small operation would not be feasible re: cost.

Jamie Saul: in thinking about the difference between the ease of implementation and the costs, if it's more expensive we might still be able to do it. Maybe we don't want to exclude costly things that are really effective.

Steve Struss: ATCP 51 required that all elements be cost effective. What does that mean? If they would have to go out of business, if they don't do it (implement a BMP) and can't meet the regulation? Then it's not too expensive and is cost effective.

Let's put them out there and if a farm decides it's going to work for them economically, it's on their list of available practices.

Bart Sponseller: we put \$\$ signs in there; not as a rank but relative indication of cost. Informative table would provide range of BMPs and associated costs. Water quality part: if you're trying to make whole farm decisions, these are other ramifications you may consider.

David Panofsky: we're trying to put as much comparative information together on a number of different production methods.

Rob Thiboldeaux: do you have in mind that certain BMPs will be dropped?

David Panofsky: I tried to come at it without preconceived notions; our process will make things rise to the surface for specific operations.

Mark Powell: within this ranking could we make some statements in terms of whether we know this BMP works in the field; what can they monitor that they're getting reduced ammonia emissions from their farm? Benchmarks. Make BMPs a little sexy for the farmer (e.g., if you're feeding dietary food protein at a certain level and it's a mix of _____ protein, keep track of milk, urea, nitrogen, what will help them keep track on the farm? Milk, Urea, Nitrogen (MUN); how will you know you've conserved nitrogen through the cycle? What things can they monitor? Proxy indicators for reduced ammonia losses. Indicators that relate to profitability. Will reduce your feed cost, reduce fertilizer nitrogen loss, etc. Frame BMPs this way.

David Panofsky: Pie chart for dairy – ammonia and fertilizer, you'll nail part of that pie chart and reduce fertilizer ammonia nitrogen loss. Reduction of ammonia up front and conserving nitrogen means you conserve the amount of fertilizer you need to bring in.

Mark Powell: do we need a column that asks: can we directly measure effectiveness or what are the proxies?

Larry Jacobson: if you don't manage it, it's not working. Good to have some easy way to try to make some key parameters that basically the regulatory agency would ultimately be responsible for.

David Panofsky: if one couldn't define a BMP and use a proxy, you might decide that this isn't what we want to recommend if the BMP can't be verified.

Bart Sponseller: one of the things we need from you (eventually) is a definition of that BMP that will get you to a known effectiveness range (20%, 20-40%, 75%, etc.); what

does the farmer need to know to be able to say I will get that % reduction or what will I, as the farmer, need to be able to measure/recordkeeping to I know I'm getting something demonstrable out the other end?

David Panofsky: define each BMP so that it's understandable, verifiable, existing rule language, to support performance information. Build on what producer knows re: proxy.

Bart Sponseller: some questions for the group: should we move the ease of implementation from the Round 1 ranking and deal with it in Round 2 when we deal with cost/environment parts?

Group consensus: Yes. Move the ease of implementation to Round 2 and add a column that has measurement of effectiveness, direct or indirect method that is somehow verifiable.

David Panofsky: Should we add a column re: what we actually know about it being used in WI or the Midwest? Also, should we ask whether the BMP is already standard operating procedure or used on one experimental farm in the country?

Bart Sponseller: Add a column for second Tier.

Jamie Saul: observations – conversation about direct or proxy measurement reminds me of structure in NR 445 – I think the BMPs ARE the proxy – they're essentially deemed to be in compliance. The measurement is backed up to what we're trying to accomplish. Include a confidence level – how sure are we; subject to human error; how we're going to assess how the BMPs relate to each other? Not just a rank but a single score that lets a producer relate that this one BMP gets me the same reduction as 3 or 4 BMPs.

Steve Struss: BMP may work with some practices and not others.

Bart Sponseller: The companion BMP column in Round 2 should cover that.

Dennis Busch: inter-relationship, e.g. diet manipulation – diet manipulation if less effective, then what else do you do?

Steve Struss: pick your range of operation of effectiveness based on confidence range to not have someone out there second-guessing.

Bart Sponseller: example – biofilters effectiveness range in literature is 9 to 90%. Your job will be to narrow that down and then define how we're going to get that.

David Panofsky: based on practice and what you've seen in the field; define in simple and understandable way.

Larry Jacobson: need BMP design criteria, then we're higher up on that scale.

Mike Wehler: the process of requiring a suite of BMPs – is because it's triggered by some type of measurement that says a farm is at or over the threshold. It's important to know if this is a one-time event. Is a suite of BMPs actually required? If you're now below that threshold, what does that mean?

Bart Sponseller: the way NR445 works, we're not discussing implementation in terms of this process,... in NR 445, if you're a facility, emissions are compared to a threshold to determine if it applies per pollutant. If you're over a threshold, then the next step is modeling the threshold at the fenceline (ambient air); you may have to figure out what control technology/BMPs would work.

Mike Wehler: What you're saying, is you have to know your emissions

David Panofsky: if you're below a threshold for ammonia, it'll be a pretty small operation.

Bart Sponseller: if we do a different rule, we can decide that there's a different trigger mechanism for applicability (re: certain level farm).

Steve Struss: you may have a certain level that you're producing but your topography gets factored into the model – at fenceline, then may have to add practices to get to that level.

Bart Sponseller: what we're trying to do here is get together a list of verifiable, workable BMPs for those farms that have to address emissions.

David Panofsky: Can we also identify what's beneficial for operations even possibly below the threshold?

Bart Sponseller: NR445 may never cross their view (of the smaller farms) but say this kind of BMP might make sense for my farm.

Mike Powell: let's not lose the opportunity to consider different size farms and BMPs that might serve them no matter how big/small they are. Large farms that may surpass the threshold, they hire feed nutritionists, etc. – then do capital-intensive items (e.g., cover a lagoon). Some things are scale neutral; others not.

Bart Sponseller: after lunch, we'll assign the animal species for each BMP, break into subgroups, and work through a few of these. Subgroups need to be as consistent as possible in terms of how they approach the BMP evaluation. We need a consistent product from all groups to bring back into a single, final table for recommendations.

Agenda Item 5 Review of First Set of BMPs

Group went through items 38-93 and assigned the species for each BMP i.e. Bovine, Swine, Poultry

Agenda Item 6 Lunch break

Agenda Item 7 Continue Review of BMPs

Group input into BMP table

Add Drinking Water BMP to Housing & Feed

Two Subgroups:

- Swine & Poultry: Larry Jacobson (group leader); Loren, Amber, Pat, Rob, Mike. Steve Struss & Bart Sponseller to go back and forth between the two subgroups
- Bovine: Mark Powell (group leader); Hans Breitenmoser, Kenn Buelow, Dennis Busch, Bob Pofahl, Jamie Saul.

We will schedule conference calls between full advisory group meetings; pin down dates today for conference calls; Bart will reserve Wislines; meetings must/will be public noticed; how long, when, etc. Notices are posted to DNR's public notice web page. Select two days between now and July 7th (Meeting 4 at UW Arlington Research Station).

Tasks: Review BMP table for manure storage; make edits, corrections, additions.
Rank NH₃, H₂S, co-benefits/disbenefits

Mark Powell: for dairy, H₂S is not an issue for manure storage.

Larry Jacobson: I wouldn't say that. Excel Dairy in MN. ppb issue vs. ppm.

Bart Sponseller: do we want to have a way to say "non-applicable"?

David Panofsky: liquid and slurry for dairy, maybe potentially? Loosely prioritize how we will focus our efforts.

Report out: dates, how the process went, and recommendations for modifying our approach?

How easy or difficult was it?

Prioritization/ranking table will get emailed to everybody; only Larry or Mark will modify the subgroup final table.

Swine & Poultry subgroup report:

0-10 was too many numbers; we used 0,3,6,9 because it's easier to come to consensus. Fairly effective for a first cut re: reductions in ammonia and H₂S. Got through to biocovers on the list. We found one case where we split out swine and poultry. Often going on gut feeling of the group.

Bovine subgroup report:

Agreed on process – wanted to make sure that everyone understood what the technology was; then added qualifiers to language for rankings, if needed; assumed the practice was in place. In regards to an anaerobic digester - 0 for ammonia, 1 for H₂S if scrubbed; give 6 for air quality co-benefits with GHG. Re: additives, we came up with new group: Insufficient Information (I.I.) is two steps – verdict is out or maybe we don't have the

information in the group. Combined 40 & 41, lumped into pit additives. Compost is in place and want to know what they could do to reduce emissions. Qualifiers: 4 if H₂S... Odor control.

Group leaders can make assignments in terms of tasks.

Bart Sponseller: are you comfortable as a group doing this type of BMP review/ranking on a call?

Group: agreed to 0,3,6,9 values. Get through round 1 prior to July meeting. Take July mtg time for doing reviewing the approach for Round 2 review as a group.

Back to Housing & Feedlots

Agenda Item 8 Wrap-up and Next Steps

Bart summarized the two subgroup tasks and will speak to the subgroup chairs about the details of setting up their calls through WisLine. Reminded the group to wear comfortable clothing suitable for a farm tour for July meeting.

A G E N D A
Meeting 4

Meeting of the NR445 Agricultural Waste Advisory Panel

Recommendations for Agricultural Waste Best Management Practices

9:00 a.m. to 4:00 p.m.
Wednesday, July 7, 2010

UW Arlington Research Station
N695 Hopkins Road
Arlington WI 53911

1. 9:00 a.m. Welcome
 - Review of Agenda
 - Draft Final Notes Approval
 - Logistics of the Day

2. 9:15 a.m. Tour of Farm
Air Monitoring Explanation - David Grande – WDNR
 - Gradient Study (dairy)
 - Fence-line Study (swine)UW Arlington Farms Information - Darwin Frye –
Research Station Superintendent

3. 12:00 p.m. Lunch

4. 1:00 p.m. Regulatory Dispersion Modeling Overview - John Roth – WDNR

5. 2:00 p.m. Subgroup reports on Round 1 Screening of BMPs
Dr. Mark Powell – Bovine Subgroup
Dr. Larry Jacobson – Swine & Poultry Subgroup
 - Round 1 Wrap-up and Round 1 Results Comparison

6. 2:45 p.m. Full group discussion of Round 2 Approach

7. 3:30 p.m. Wrap-up and Next Steps
 - Schedule subgroup conference calls for July
 - Next Meeting: Tuesday, August 3 in Room G09 GEF2

Agricultural Waste NR 445 Advisory Group

<http://dnr.wi.gov/air/agWaste.html>

Meeting 4 – Summary Notes

July 7, 2010, 9am to 4pm, UW Arlington Research Station, N695 Hopkins Road, Arlington WI 53911

AGENDA: http://dnr.wi.gov/air/pdf/AgW_M4-Agenda.pdf

ACTION ITEMS: 1) Round 2 spreadsheets will be sent to both subgroups; 2) Information on best management practices (BMPs) subgroups identified with “ii” for insufficient information as well as air quality co-benefits will be part of Round 1 completion and provided to subgroups 3) Round 1 will be completed by the subgroups and provided to full group; 4) draft summary notes to be provided prior to next meeting; 5) Subgroups hold conference calls prior to August 3 full group meeting and complete Rounds 1 and 2.

SCHEDULED SUBGROUP CONFERENCE CALLS: Bovine Subgroup conference call August 2, 2-4 pm; Swine & Poultry Subgroup Meetings July 22, 9-11 and July 23 10-12

FUTURE AG WASTE MEETINGS: August 3, 2010 in Room G09, GEF2 (tentative agenda items include Al Shea; round 3 framework; round 2 reports; Meeting 6 = September 7, 2010.)

ATTENDEES: All panel members present except Jamie Saul.

Loren Asche, Hans Breitenmoser, Kenn Buelow, Dennis Busch, Larry Jacobson, Amber Meyer Smith, Pat Murphy, Bob Pofahl, J. Mark Powell, Bart Sponseller, Steve Struss, Rob Thiboldeaux and Mike Wehler

http://dnr.wi.gov/air/pdf/AgW_AdvisoryGroupMembers-Abbreviated_FINAL.pdf

Additional advisory support from DNR present: Andrew Craig and Tom Bauman from DNR Watershed Management, Jeffrey Voltz (DNR Ag Sector Specialist) and David Panofsky (DNR Air Management Engineer)

One member of the public in the audience throughout the day listening.

HANDOUTS: Meeting 4 Agenda and draft Round 1 summary

9:03 Bart Sponseller calls meeting to order.

- Review of Agenda
- Draft Notes from Meeting 3 Approved
- Logistics of the Day

Darwin Frye, director of the UW Arlington Farms welcomes the group and explains that later in the morning he will give a tour of the farm including a stop with researchers working on long-term environmental agriculture studies which may be of interest to the group. Darwin Frye mentions that Mike Peters will take the group through the dairy barns.

9:25 – 9:50 Air Monitoring Project - David Grande – WDNR

Vid Grande discussed his current gradient study (dairy) and fence-line study (swine) for ammonia and hydrogen sulfide concentrations. Property line studies at one poultry farm and one dairy farm have already been completed. This month (July 2010) swine and dairy at UW Arlington. More dairies may be planned, depending on funding and agreement to participate by farms. Vid explained the difference between passive and active samplers. He let the group hold an example of one of the passive samplers and described how they function and told the group where they would see them out in the field during our farm tour later in the morning. Vid mentioned that are 36 passive samplers set up and associated with both dairy and swine operations at Arlington. Some of the passive samplers are not located at the property boundary, because the entire property is more than 3 miles east to west. Vid discussed the use of Jerome meters which are used to gain real-time hydrogen sulfide readings. There are also active samplers which collect air samples which are then sent to a laboratory for both ammonia and hydrogen sulfide analyses.

Steve Struss asked Vid about the availability and location of meteorological data and Vid described meteorological data collected at the study site, including wind speed, direction, humidity, solar radiation. Vid explained that the wind direction and speed is recorded every 15minutes and assists with the generation of a week-long wind rose. Also farm data such as number of animals present, feed rations and feed characteristics will be recorded during the monitoring period.

Mike Wehler asked how research being done at Arlington may affect monitoring results. Vid stated that he won't be able to differentiate the effects of various research projects on the air monitoring results and that the measurements will reflect an average of concentrations. Bart Sponseller says that with the monitoring study, the results will be qualified by noting UW Arlington is a research farm.

Vid described that a number of farms were evaluated for their ability to be monitored. Based on the study constraints, 22 farms were considered "monitorable" in the counties surrounding Dane County. Of these 8 or 10 positively responded to the request to be part of the study - no beef operations agreed and one poultry operation agreed. The only swine operation that agreed is the operation at UW Arlington. It is likely that 5 or 6 farms will be monitored. Again, depends on funding and the final number of farms that agree to participate.

Passive monitoring requires maintenance and are out in the field for approximately one week. This time period does not approach the theoretical loading limit for ammonia which is about 830 μg or about 3600 ppb ammonia.

10-11:30 Tour of UW Arlington Farms - Research Station Superintendent, Darwin Frye

Darwin Frye drove a tractor pulling a cart with mounted bleachers which held the group. First stop was one of Vid Grande's passive monitors located near the dairy barn and dairy manure basin. Other passive monitors were pointed out by Vid.

Bob Pohfal asked about background ammonia concentrations and Vid stated that there is good background data from the monitoring "super site" at Horicon, which demonstrates approximately an 8 ppb ammonia background concentration in the summer and a concentration around 1-2 ppb of ammonia in the winter.

Larry Jacobson asked if WDNR possessed any hydrogen sulfide background data. Vid stated no, and that background is very likely below the monitoring detection limit based on CIG study results which over the highest 10-12 hour period were 15 ppb. Vid stated that if there is no odor, it's very likely that the hydrogen sulfide concentrations in ambient air are below the Jerome meter's threshold (which is about 3 ppb hydrogen sulfide). Larry Jacobson stated that he is aware of a background concentration used in Minnesota of 19 ppb. Vid expressed his doubt as to the validity of the Minnesota value and stated it doesn't appear to be realistic based on monitoring done in Wisconsin.

Andrew Craig asked if the dairy pits (basins) at UW Arlington would be agitated and Darwin replied that yes that in spring, summer and fall manure from the pits is applied. In the summer, it will be when the wheat crop comes off.

Next stops were with UW Arlington Farms researchers Janet Hedtcke and Gary Oates. Both researchers provided handouts describing their respective projects. Janet talked about her agronomy research in differing crop production systems involving six types of "full-scale" cropping systems, including dairy forage-based cropping systems. Gary Oates, with the Great Lakes Bioenergy Research Center, provided two handouts and described his work on greenhouse gases and cropping systems including grain rotations and native grasses. Gary Oates also described the use of vented static chambers to measure GHGs (N_2O , CO_2 , CH_4) in his cropping trials.

The group viewed the sand separator/channel, basins and drove through two dairy barns, the second with Mike Peters the dairy manager at UW Arlington (and UW campus and Marshfield). Dairy cows are milked twice daily and this herd

(including dry cows) is used as research for cow lactation and basic cow physiology. The research station is specifically NOT for the research of farm housing or manure management technologies. The dairy barns are scraped every 2.5 hours in the summer and continuously in the winter. The scraped manure drops into a central channel which is flushed with recycled water at 2000 gallons per minute and flows at a 4.5% grade in a 24-inch culvert to the sand separator. The sand settler is at a 1% grade and is scraped to the side of the concrete sand channel basin and cured (allowed to dry) for six to eight weeks, before it goes back to the barns for bedding again. Mike Peters states that the sand system works well. There is a two-stage lagoon (basin) system.

11:30-12:00 p.m. Lunch

12:05 p.m. Regulatory Dispersion Modeling Overview - John Roth – WDNR –

http://dnr.wi.gov/air/pdf/AgW_M4-I4-FarmBMP_JohnRoth.pdf

John Roth explained that his use of the term “modeling” means atmospheric dispersion modeling. John Roth provides some caveats for using the currently accepted statistical model - AERMOD – for ammonia emissions from agricultural sources. Ag sources are not a “stack” source, nor are the emissions a “continuous” source. John Roth described his use of the Harper *et al* paper, provided to the Department by the Wisconsin Dairy Business Association, for his modeled assessment of ammonia ambient air concentrations at a “model” liquid manure dairy farm.

Kenn Buelow asks whether the model can account for ammonia reactivity. John Roth answered that the model is a dispersion model and does not account for reactivity.

A question was raised as to whether the freestall housing used in the example was open or cross ventilated and Mark Powell adds that temperature and relative humidity are more important in the transformation of urea nitrogen into ammonia than whether or not the freestall is open (naturally ventilated) or closed (mechanically cross ventilated)

Bart Sponseller asks how fast ammonia reacts. Mark Powell answers that the kinetics are well established.

Larry Jacobson mentions the fact that the method used by Harper *et al* is an indirect methodology i.e., the measurement method used by Harper *et al.*, does not directly measure atmospheric ammonia concentrations but uses a model to back calculate and estimate concentrations. This is different than the other common approach which uses monitoring technologies to directly measure ambient concentrations of ammonia at the source..

Rob Thiboldeaux raises the issue of ammonia's impacts on regional air quality i.e., the role ammonia plays as a pre-cursor pollutant to the formation of fine particles in the atmosphere.

Mike Wehler asks if there are other models out there. John Roth answers that AERMOD is the required US EPA regulatory model. AERMOD is used for all regulatory dispersion modeling performed by WDNR and states nationwide. John notes that the NR 445 ambient air quality standard for ammonia is a 24 hr daily standard

Mike Wehler asks whether there is a way to improve model accuracy and whether, for the case presented by John Roth, how many days and under what cases farms are above the ammonia standard.

Discussion of area sources (sand channels and manure storage basins/lagoons) versus volume sources (barns). Need to develop "model" farms for other animal species, too.

Mark Powell reminds of the importance of increased surface area of the barn transforming barn urine urea into ammonia and where this manure is transferred, this ammonia will be released when agitated and when temperature and other conditions maximize volatilization. Mark Powell also reminds the group of the difference in terms of dairy housing ammonia emissions - stanchion emissions are less than freestall, due to the limited surface area and other factors.

Kenn Buelow states that every dairy scrapes at least every 8 hrs and that perhaps a maximum manure basin size of 1500 x 300 feet might be a good size to model.

1:00 p.m. Subgroup reports on Round 1 Screening of BMPs - Mark Powell – Bovine Subgroup; Larry Jacobson – Swine & Poultry Subgroup; Bart Sponseller, summary of Round 1

Mark Powell reported results of the bovine subgroup, which held two conference call sessions lasting 1.5 hours each. Mark Powell described that each subgroup member completed the Round 1 evaluations and this helped move the subgroup discussion. Mark Powell stated that members were present and there was good participation. When the subgroup majority didn't have enough information to rank a given practice, the subgroup put an "ii" in the ranking box for "insufficient information," indicating the subgroup would like to get additional information before giving a rank. Mark Powell also reiterated that the Round 1 rankings were associated with only that practice in a given farm component and that ammonia reductions were relative to each practice, independent of one another. A score of just 0, 3, 6, or 9 was hard to use, but further evaluation rounds will help better differentiate. Also, with Round 1 practicality and costs were not considered.

Larry Jacobson spoke on behalf of the swine and poultry subgroup and reported a similar process to the bovine group, although subgroup members came to the conference call without filling in independently Round 1 rankings. The swine and poultry subgroup worked as a group with Jeffrey Voltz assisting with the calls. Considerable time was spent during the calls describing what the technology or practice was and this provided for good discussion. Larry Jacobson set the bar, which became the point of departure for discussion. Each subgroup member provided a ranking for Round 1. When there was controversy or misunderstanding, there was further discussion. Conference calls held lasted 2 hours and 1.5 hours. Larry Jacobson agreed that Round 1 evaluation was a good first rough cut. Some lumping (i.e., grouping of similar BMPs) still needed for a few BMPs, but this relates primarily to poultry BMPs. Mike Wehler expressed that the 0, 3, 6, and 9 ranking did help the subgroup gravitate to a particular number. Dennis Busch asked the group, when do we begin better describing or defining the BMPs.

Bart Sponseller discussed the draft Round 1 summary spreadsheet. He also noted that the full group may want to discuss the disparity between the subgroups for a number of similar BMPs. The disparities may be due to species specific response to a given BMP or just the subjective nature of subgroup evaluation. Bart Sponseller promised that David Panofsky would be following up on the “ii” as well as the specific air quality co-benefits.

1:30 – 2:15 Full group discussion of Round 2 Approach

Bart Sponseller presented a draft Round 2 evaluation which included a column for assessing whether a BMP is verifiable. Andrew Craig asked for whom are we defining verifiable. Bart Sponseller stated that verifiable means either a direct or indirect method of measurement to know whether emissions reductions have been achieved from a chosen BMP.

Amber Meyer-Smith asked how can we look at the bigger picture and a whole farm perspective comparing one practice versus another and how the chosen practice will work together as a system in reducing overall emissions.

Mark Powell suggested that Round 3 can look at how BMPs work in a system. That we need a baseline for standard farms and identify scale neutral practices. We need some agreement about what are standard practices (what defines baseline).

Bart Sponseller asks if we can also identify practices which are “standard” practices and define baseline for swine and poultry. Mike Wehler expresses concern over getting overly technical, because it needs to be understood at the farm level. It shouldn’t get more complicated than it has already become and also the science not well understood.

Mark Powell stated that in terms of ammonia reductions for dairies, there are three basic pieces of information required: 1) feed sheet with nitrogen data 2) Bulk tank, MUN (milk urea nitrogen); and 3) TAN (total ammonical nitrogen) samples from manure storage.

2:30 break out of sub groups to schedule Round 2 calls, complete Round 1

The full advisory group broke into their separate subgroups to schedule their July conference calls and discuss some Round 1 follow-up items.

3:00 p.m. Wrap-up and Next Steps

- Department will provide subgroup leaders with the Round 2 framework; “ii” (insufficient information); and the air quality co-benefits by July 19
- Subgroup conference calls scheduled
 - Bovine Aug 2, 2-4pm
 - Poultry Swine - July 22, 9-11 and July 23, 10-12
- Next Meeting: Tuesday, August 3 in Room G09 GEF2 Al Shea to present; framework for round 3; round 2 reports

3:30 Meeting adjourned

Prepared by David Panofsky

A G E N D A
Meeting 5

Meeting of the NR445 Agricultural Waste Advisory Panel

Recommendations for Agricultural Waste Best Management Practices

9:00 a.m. to 4:00 p.m.
Tuesday, August 3, 2010

WDNR – GEF 2 – Room G09
Madison, Wisconsin

1. 9:00 a.m. Welcome
2. 9:15 a.m. Subgroup Reports
Dr. Mark Powell – Bovine Subgroup
Dr. Larry Jacobson – Swine & Poultry Subgroup
3. 9:30 a.m. Subgroup Work on Round 2
4. 12:00 p.m. Lunch
5. 12:45 p.m. Continue Subgroup Work (*schedule subgroup conference calls*)
6. 3:30 p.m. Wrap-up
 - Meeting 6

Agricultural Waste NR 445 Advisory Group

<http://dnr.wi.gov/air/agWaste.html>

Meeting 5 – Summary Notes

August 3, 2010, 9am to 4pm, G09, GEF 2, Madison, WI

AGENDA: http://dnr.wi.gov/air/pdf/AgW_M5-Agenda.pdf

ACTION ITEMS: 1) Rounds 1 & 2 summary spreadsheets will be finalized for both subgroups and sent to subgroups; 2) Send ATCP 51 in electronic format to subgroups; 3) **September 7 full advisory group meeting cancelled**, contingent upon completion of subgroup work on BMP descriptions; 4) Bovine subgroup to hold face-to-face meeting August 26 at GEF2 in Room 728, Swine & Poultry will hold a conference call on August 30.

FUTURE AG WASTE MEETINGS: Friday, October 15, 2010 in Room G09, GEF2 (tentative agenda items include Al Shea; round 3 report-outs; Meeting 6 = October 15, 2010.)

ATTENDEES: All panel members present except Jamie Saul, Kenn Buelow

Loren Asche, Hans Breitenmoser, Dennis Busch, Larry Jacobson, Amber Meyer Smith, Pat Murphy, Bob Pofahl, Mark Powell, Bart Sponseller (DNR Chair), Steve Struss, Peter Taglia, Mike Wehler

Additional advisory support from DNR present: Andrew Craig and Tom Bauman from DNR Watershed Management for portions of the meeting, Jeffrey Voltz (DNR Ag Sector Specialist) and David Panofsky (DNR Air Management Engineer)

HANDOUTS: Meeting 5 Agenda, ATCP 51 odor BMP definitions, Elements of BMP

9:05 Bart Sponseller calls meeting to order. Bart explains that this meeting is to be used as a working meeting for the subgroups – Swine & Poultry to begin Round 3 BMP descriptions and Bovine subgroup to complete Round 2 and start Round 3. To assist the Bovine subgroup complete Round 2, Bart explains that the column pertaining to “verification” in the Round 2 screening process referred to whether actual reductions in ammonia and/or hydrogen sulfide have been realized and verified in the literature or elsewhere. Bart reminds the advisory group that the methods used to determine whether a given BMP is working and providing the farm the expected BMP benefits will be described during Round 3. Subgroups continue work on Rounds 2 & 3.

A G E N D A

Meeting 6

Meeting of the NR445 Agricultural Waste Advisory Panel

Recommendations for Agricultural Waste Best Management Practices

9:00 a.m. to 4:00 p.m.
Friday, October 15, 2010

WDNR – GEF 2 – Room G09
Madison, Wisconsin

1. 9:00 a.m. Welcome
2. 9:05 a.m. Subgroup Reports – Where are we now?
Dr. Mark Powell – Bovine Subgroup
Dr. Larry Jacobson – Swine & Poultry Subgroup
3. 9:30 a.m. Integration of Landspreading BMPs - Full Group Discussion
4. 10:00 a.m. Subgroup Work on Round 3
 - Complete unfinished BMPs
 - Integration of BMPs
5. 12:00 p.m. Lunch
6. 12:45 p.m. Continue Subgroup Work on Round 3 (*schedule subgroup conference calls, if necessary*)
7. 2:30 p.m. Review Draft of BMP Report Outline & BMP Category Concept –
Bart Sponseller & Dave Panofsky
8. 3:30 p.m. Wrap-up
 - The next two meetings
 - Address any remaining BMP details
 - Finalize BMP Recommendations
 - Review Draft BMP Advisory Group Report
 - Identifying Additional Issues for the Advisory Group to Consider
 - Meeting 7 – Friday, November 5 GEF 2 in Madison

**Sixth Meeting of the Agricultural Waste Best Management Practice Advisory Group
October 15, 2010**

Attendance:

Larry Jacobson, Pat Murphy, Loren Asche, Rob Thiboldeaux, Hans Breitenmoser, Steve Struss, Bob Pofahl, Mark Powell, David Panofsky, Josie Pradella, Bart Sponseller

Agenda Item 1: Welcome

Agenda Item 2: Subgroup Reports

Mark Powell and Larry Jacobson, leaders of the bovine and swine & poultry subgroups respectively, provided brief subgroup reports. They indicated that they believed progress was being made with the practices and the next step is for the Department to draft a report.

Mark Powell asked whether and how the Department is trying to coordinate its management practice development with ATCP, which is revising ATCP 51 currently. Bart Sponseller noted that Steve Struss from ATCP sits on the DNR's Advisory Group and Jeffrey Voltz of the DNR sits on the ATCP odor subcommittee. In addition, odor control practice specifications contained in ATCP 51 were included as part of the original list of practices and technologies evaluated by the DNR's Advisory Group for ammonia and hydrogen sulfide reductions and where possible and applicable, practices and their respective descriptions were used. Bart noted that not all odor control practices work for hydrogen sulfide or ammonia and conversely, not all air toxic control practices work for odors. In addition, Bart noted that DNR Air Management has engaged the Department's Water Division to assure that selected practices do not adversely impact ground water or surface waters as well as practices being in alignment with nutrient management plan requirements.

Agenda Item 3: Integration of Land Spreading BMPs

BMP Template

Per the subgroups' request, a consistent format for the practices was developed. Bart Sponseller discussed this consistent format by using the land application practices as an example.

Draft format includes these elements:

- Description
- Rationale
- Baseline (Established/Emerging/Demonstration)
- Farm Component:
 - Nutrition and/or Feed Management
 - Housing
 - Storage & Treatment

Open Lots/Corrals
Land application
Animal Type: Bovine/Swine/Poultry
Air Toxic Emission Reductions: Ammonia/Hydrogen Sulfide
Other air quality considerations
Engineering, O&M requirements
Confirmation components (incl. Record Keeping and Monitoring
Additional considerations, references

Land Application BMPs

Group exercise to review draft BMPs in the context of the BMP template form. Bart Sponseller updated language in real time using a laptop, based on committee feedback. The following were reviewed with the full advisory group: BMP form headers: Technique, Manure Type, Land Use, NH₃ Reduction from baseline (%) and H₂S Reduction from baseline (%). Definition included for each BMP.

Under the injection land application practice, Pat Murphy defined the major agricultural activities. David Panofsky noted that the land spreading practices consider techniques, implements and both solid and liquid manures from a variety of animal agriculture operations.

Hans Breitenmoser noted that injecting in the inter-row space doesn't make sense (e.g. beans); He said that most farmers inject at a slight angle to the crops rows in the field. He recommended removing the last sentence of "Land applied manure." The Advisory Group agreed and the sentence was removed.

Mark Powell asked whether baseline should be the first thing defined under land application i.e., the first text that would be read. David Panofsky suggested that it would also be helpful if the rationale is up front in the document. Mark recommended that another line be inserted in the land application table that would clearly identify baseline (zero reduction) Mark Powell also suggested ordering the practices from least to most effective in the table.

Bart Sponseller reminded the Advisory Group that the Department is including these landspreading practices but they provide additional options for the farmer (not a regulatory end point). A farmer may want to realize the benefits of one or more landspreading practices, if he/she wishes.

A member of the Group noted that there is no such thing as no-till with deep injection. A note was made to no-till language and to clarify the manure in headlands language i.e., "it's ok to have some manure lying around on headlands."

A member asked whether the landspreading practices should reference the 590 plan, in addition to ch. NR 243, Wis. Adm. Code. The 590 plan addresses permitted farm limitations.

A member of the Group said that the rate of manure application for various fields and conditions should be stated with the selected landspreading practice.

A member of the Group noted that most of the larger farms will have nutrient management plans; smaller farms may question the landspreading practices. It was also stated that everyone should be tracking nitrogen; should only get credit if they're following guidance or a standard. (e.g. NRCS Conservation Practice Standard 590)

A member of the group noted that NR243 defines injection at a depth of 4-12 inches, specified in 243.

Bart Sponseller noted that Air Management would like to align with water definitions, as well as ATCP 51, as much as possible.

David Panofsky noted that there are many definitions re: land application. He noted that the Group is getting more explicit with those definitions with respect to air quality benefits/practices re: incorporation and injection to retain nitrogen on the farm.

A question was asked about the difference between deep and shallow injection. The answer was shallow injection may use more shanks at a shallower depth.

A member of the group asked with deep, close slot injection, if someone doesn't achieve the minimum injection depth, is there a discount?

Mark Powell suggested that there should be uniformity among all management practice definitions. We should try to render definitions so that there is a uniform number of lines in each.

Shallow injection – move any general descriptor up, then go from specific to deep, specific to shallow.

Bart Sponseller reorganized the practices by technology. Descriptions will line up well with table.

Hans Breitenmoser said that for deep vs. shallow injection the definitions are splitting hairs. He noted that he didn't think we should delineate between shallow and deep injection and it should just be called injection.

- Banding

Hans also asked whether researchers have documented emissions decreases by using drop shoes or trailing shoes. He asked whether we should consider this a demonstration technology.

Bart Sponseller asked whether the Group would like to pull the land spreading BMP apart, have established (in use) vs. demonstration categories for land application.

Hans Breitenmoser said if there's enough research out there saying banding with drop shoes or trailing shoes works, then it should be an established practice.

Bart Sponseller suggested that we're focusing on Wisconsin, not Vermont (where some research in the US had been conducted). Do we feel comfortable considering these to be established?

The Group agreed that there is sufficient scientific literature to support reductions from banding using drop shoes or trailing shoes and that this should remain an established practice.

David Panofsky noted that there should be general description of practices that work.

Bart Sponseller asked whether Group would like to distinguish between deep and shallow injection. Should we consolidate the two and define the practice as injection is any injection deeper than 4 inches? He noted that currently the reductions for deep and shallow injection are different.

Mark Powell stated that if manure is injected and covered, the depth of injection doesn't matter for air quality, as long as the manure is covered.

David Panofsky noted that the bulk of the research delineates between deep and shallow. He suggested we could say injection is deeper than 4 inches.

The Group decided to combine deep and shallow injection into one practice with a minimum depth of 4 inches.

- Broadcast with Enhanced Infiltration

There was discussion about enhanced infiltration. A member of the Group noted that perforation is performed prior to broadcasting, or can be done using the same implement and performed simultaneously with the application.

Mark Powell said that he and his colleagues had just completed a 4-year study showing the aerator with broadcast manure reduced ammonia emissions by 40% and injection of manure reduced ammonia by 80% for liquid dairy manure on corn silage. Manure was applied in the spring, open ground. The study was done in south central Wisconsin.

The Group agreed that aeration is a landspreading practice to be included and that aeration should occur immediately before or after broadcast application of manure.

- Incorporation

It was noted that the difference between immediate and rapid incorporation must be clarified because there are different percent reductions for each practice. Immediate incorporation is described as manure being incorporated into the field within as little as 15 minutes. Rapid incorporation is within 12 hours.

A question was asked about the application of manure and the differences between hydrogen sulfide and ammonia. Someone noted that the volatility of hydrogen sulfide and ammonia is similar.

David Panofsky said that in the practice notes, we should state that hydrogen sulfide would likely follow similar reductions for land application techniques but research doesn't show reductions yet.

Solid manure:

Hans Breitenmoser asked whether it is necessary to mention the stanchion manure practice because we're dealing with larger producers.

It was also asked about the definition of manure. What is water, liquid manure, slurry, solid manure? Are they defined by nutrient value and how much nitrogen is in it? Mark Powell asked how we weight all these things.

David Panofsky said this could be apportioned by the nitrogen content and volume of the manure to be land applied and by how much nitrogen on a mass basis is being retained in the soil and not lost as ammonia.

It was noted that baseline is on the production component which is land spreading.

Mark Powell suggested that we're only talking about four components. Each BMP will have a baseline.

Bart Sponseller noted a weakness in the overall approach is the companion BMPs have not been identified. He noted that farmers may come up with combined practices that get more reductions when done in combination.

David Panofsky said we'll have to look at doing some thinking as a group – i.e., how do we make those connections between the farm components, across species and processes?

Mark Powell said there should be a difference between poultry manure and poultry litter.

David Panofsky asked whether the topic should be taken offline and work on the poultry issues with Loren Asche?

TASK: Loren will work on incorporating into table.

Hans Breitenmoser asked how we define bedded pack manure; there are other materials that are applied but are not really bedded pack, like straw bedding for calving areas.

Rationale

The rationale was discussed. Mark Powell noted that manure nutrient availability persists for years after application.

David Panofsky noted that for poultry, housing emissions are higher than land application emissions. He said he believes it would be OK to expand the land application practices rationale out to other species.

Baseline

It was noted that there is a need to apportion the application method to the total farm emissions. Mark Powell suggested that the report will explicitly explain what these numbers mean.

David Panofsky said this would be a relative index. We're not using emission factors.

It was asked whether the farm should receive one value for land application. A member of the Group noted that we shouldn't treat every farm exactly the same. i.e., land application should be based on acreage, number of animals, amount of manure applied and the practice used etc.

Bart Sponseller suggested that the practices could be apportioned based on the portion of total quantity handled in a given manner.

The Group discussed a variety of ways and factors to consider with specific land application practices and more broadly other practices and technologies.

It was suggested that we define BMP as beneficial management practices, not. best management practices because what may be best for one farm may not be best for another. The Group agreed.

HOMEWORK

Loren – poultry land application assignment

After the land application practices were discussed, the Group discussed other practices that affect both bovine and swine & poultry.

Animal Nutrition and Feed Management

- Lactating Dairy Cows

A question was asked whether methane should be noted in the description.

David Panofsky suggested that we place methane information in Other Air Quality Considerations. The Group agreed and methane was removed from the Rationale.

A question was asked whether MUN should be a sliding scale. Should it be less than 10 or less than 12?

It was recommended that the baseline be changed from a MUN of 12 to a MUN of 14 mg/dl. The Group agreed and this was changed.

David Panofsky asked whether there are large quantity producers who, with their contract, will not be looking at MUN.

Bart Sponseller noted that Kenn Buelow said in another meeting that all large farms will be getting MUN numbers.

Hans Breitenmoser said that in the first line, we should add: "excretion, the principal source of emission dairy farms." This change was made.

Bart Sponseller asked whether we need to have a separate section for large farm heifers. Do we want to do the sliding scale and do we have supportive data for emissions reductions? i.e., do we need to separate this practice out further?

Mark Powell noted that a meta-analysis of cows in Europe and US was performed and the target values for good management are 12 or below. For every unit reduction in MUN between 15 and 10 mg/dL, ammonia emission decreases by 5%. If emissions at MUN of 15 = 15 g/cow, and emissions at MUN of 10 = 10 g/cow, that makes for roughly a 30% reduction. Dividing this reduction by 5 units of MUN gives approximately 6% reduction for each 1 unit of MUN. We round down for both calculations to be a bit conservative. So for every 1% lower MUN value, Mark recommended providing a 5% decrease in emissions.

Bart Sponseller asked whether there should be two tiers for average MUN. For example, an average MUN of 10-12% reduction equals 10 points; below 10% MUN gets 20 points?

Mark Powell noted that we should change "baseline" to "conventional baseline practice" for all BMP forms.

Mark Powell stated that it's very well supported that a lower MUN results in lower manure nitrogen excretion.

- Beef, Heifers and Dry Cows (new category)

It was recommended that animal nutrition practice for beef, heifers and dry cows be separated from the lactating cows animal nutrition practice because diets are very different.

- Poultry & Swine:

When the animal nutrition practice for poultry and swine was reviewed, it was suggested that Mike Wehler be asked to review the particle size of feed for swine and the ammonia documentation for swine.

For poultry, Loren Asche noted that cysteine is naturally occurring in feed ingredients. Methionine can be synthetic.

Loren Asche suggested that the conventional baseline practice for poultry should be crude protein rather than amino acids. This change was made. It was noted that Mike Wehler should be asked to see whether he agrees that the same baseline apply to swine.

Larry Jacobson suggested that a hydrogen sulfide reduction of 30% may be high and suggested 20%?

It was decided to not review the composting practice at this time and have group members provide comments on that practice by email within the week.

Agenda Item 7: Report Outline

Bart Sponseller reviewed a draft outline for the report.

Beneficial Management Practices for Mitigating Hazardous Air Emissions from Animal Waste

Mark Powell recommended that we define BMP as beneficial management practice. Bart Sponseller asked whether there is a common definition in the literature for beneficial management practice.

It was recommended that there be an appendix that contains brief bios for committee members. The Group agreed and Bart asked that the bios be emailed to him by next Friday (October 22). The bio should be 2 paragraphs at most.

Mark Powell suggested that language be added to the executive summary that the Group went through a process of consulting best research, and developed ranking using professional judgment.

The Group agreed that the conventional baseline practice as consensus of what the industry looks like in Wisconsin at this time.

Mark Powell noted that we began with the global literature review but extracted those things that could apply to Wisconsin directly. Research conducted in Wisconsin was used as much as possible.

Mark Powell said that we need a clear description of how the scoring/percentages in Round 1 and Round 2 of the BMP evaluation work.

Mark Powell also noted that much of our recommendations focus on nitrogen (i.e., ammonia) as there is a limitation of available literature for hydrogen sulfide.

The Group noted that the goal is to deliver the report to Secretary by the end of December.

The Group agreed to add a signature page for all committee members to the beginning of the report.

Agenda Item 8: Meeting 7

A few of the Group members were not available on December 7. The Group decided to move the December meeting from 7th to Monday the 13th.

Agenda Item 7 again:

Bart Sponseller presented two slides to the Group saying that what he has heard during the meetings is that the practices should be delineated. He presented a concept suggested that practices could be designated as Established, Demonstration, or Emerging. He noted that the criteria for a Demonstration practice need to be developed.

Bart said that each practice may need a checkbox indicating whether a practice would work for existing or new operations, or both.

Bart Sponseller ended the meeting by asking Group members to review the species-specific homework assignments within the week and to email their comments to Dave Panofsky, Jeffrey Voltz and Bart.