Meeting Summary

Agricultural Best Management Practices Technical Workgroup
Tuesday, December 8, 2009, 1:30 p.m.
Arizona Department of Environmental Quality
Conference Room 145
1110 W. Washington St., Phoenix, Arizona 85007

Discussion Points:

1) **Welcome, Introductions & Review of Agenda**
Co-chair Earl Petznick Jr. opened the meeting shortly after 1:30 p.m. and asked for a review of the action items from the November 24, 2009, Technical Workgroup meeting.

2) **Discussion of Outstanding Action Items**
In Nancy Wrona's absence, Corky Martinkovic, ADEQ Air Quality Division Planning Unit Supervisor, reviewed the five action items: (1) the rule comparison table is being reviewed by Sona Chilingaryan, EPA, and will prepare a single page table summary for the Workgroup prior to the December 18, 2009, meeting; (2) there was insufficient time to meet and discuss the control efficiencies provided by the Workgroup in comparison to those provided by California (see discussion summary below); (3) Ms. Chilingaryan reported that she did not find any California county rules that were more stringent than those developed by the air quality districts and thinks that the rules cited at the prior meeting were related to wind speeds for pesticide application, she will inform the Workgroup if she finds other information; (4) the Arizona Department of Agriculture distributed threshold numbers and Clean Water Act comparison for review by the Workgroup (see discussion summary below); and (5) ADEQ distributed a responsiveness summary for the comments received at the time for any proposed BMPs.

Summary of discussion on Action Item #2. Ms. Martinkovic suggested that a summary of the BMPs recommended to date for each category, sorted by high-medium-low impacts would help the Workgroup make final recommendations to the Committee. The Workgroup, however, wanted to maintain the control efficiencies currently listed with each suggested BMP. The workgroup decided to proceed along current lines and perhaps re-visit the idea later. Technical assessments, along with economic factors, for each BMP will be part of the rulemaking process and State Implementation Plan (SIP) technical support documentation.

Summary of discussion on Action Item #4. The Arizona Department of Agriculture provided a handout with threshold numbers for the number of animals. Mr. Aja stated that perhaps it would be better to determine who would be included in the program by whether or not they were licensed operations rather than by size or threshold numbers. The group discussed that this might also be a way to enforce the program if noncompliance would result in action against a license. The Department of Agriculture will review the licensing of all farming operations; Mr. Shuler will assist in the research.

Mr. Petznick asked if there were any changes to the meeting summary of November 24th. Mr. Lavis, Arizona Cotton Growers, presented a resolution to amend the summary based on a correction provided by Ms. Cheryl Goar, Arizona Nursery Association (see attached resolution read into the record, moved, seconded and, approved; meeting summary will be amended to reflect the correction).

3) **Discussion of Comments Received on Proposed BMPs**

Dena Konopka, Maricopa County Air Quality Division, commented that the proposed BMPs did not address opacity and added if the BMPs were to not be less stringent that their Rule 310.01 – considered most stringent measures (MSMs) in the 5 Percent Plan – then the new statutory requirement to match the SIP would not be met (i.e., relying on San Joaquin's will not be sufficient as not all are considered MSM). Ms. Konopka also commented that many of the BMPs were incomplete in reference and detail. Mr. Petznick stated that things change constantly and some of the BMPs will be new or specific to activities in Arizona and that analysis regarding their effectiveness will be developed by the process were are now involved in. Jo Crumbaker, Maricopa County Air Quality Division, asked how the program will address farmers that continually refuse to reduce particulate matter emissions, which is one of their primary concerns. Bas Aja, Arizona Cattlemen's Association, said if the program makes assumptions regarding effectiveness, then there is a problem; but it is premature to say the BMPs do not meet Rule 310.01 without a measurement of overall effectiveness. Mr. Aja added that mandatory BMPs and reporting may be added and all BMPs must be considered together; but EPA will be the final arbiter. Pinal County comments focused on making sure the BMPs were quantifiable and tangible versus just a check in the box. Ira Domsky, ADEQ Air Quality Deputy Director, said that many of the comments received to date will be answered by the analysis required for both the rulemaking and the SIP and omission of BMPs addressing ammonia and VOCs may be premature due to the potential affect of the revised 8-hour ozone standard. Maricopa County countered that BMPs addressing these two pollutants, while contributors to secondary PM_{10}, do little to reduce PM_{10} emissions directly; however, did concede that if reduction of PM_{10} emissions are co-benefit of a BMP addressing ammonia or VOCs, then they should be included or at least further analyzed for the impact to reducing particulate matter emissions.

Mr. Petznick asked for further discussion of the comments received on the proposed dairy BMPs. Most of the comments and responses to comments received focused on feedlots but some pertained to dairies as well. The dairy group did respond in writing to comments received and presented a revised BMP list.

4) **Discussion and Possible Action on Proposed BMPs for Beef Feedlot and Dairy Operations**

The feedlot BMPs focused on practices addressing watering/sprinkling, feed variations, aprons, seasonal diagonal fencing, shade, and manure harvesting. Cost issues were also discussed. Maricopa County stated the concern that BMPs with lower control efficiencies could be used together that would not add up to a more efficient BMPs, which could constitute SIP relaxation. Mr. Petznick said that perhaps a mandatory BMP, such as sprinkling, could be considered to avoid the issue of SIP relaxation. Mike Billotte wanted to know if Maricopa County had a problem with the ten percent efficiency numbers when there was no current data to assign a different number and no additional information could be found. ADEQ stated those BMPs would be analyzed during rule and SIP development. The dairy representatives also stated that wetting could not be a mandatory BMP for dairies because of health and safety issues. The group agreed that additional comments on the BMPs should be received before December 15th so they can be reviewed and discussed at the December 18th meeting.

5) **Discussion and Possible Action on Proposed BMPs for Dairy Operations**

Mr. Petznick asked there was further discussion on the BMPs at this time. The remaining categories (poultry, swine, and cropland) will be discussed at the meeting on December 18th. Robert Shuler, Shuler Government Affairs LLC, indicated the revised poultry BMPs were distributed but did not believe any revisions to the swine BMPs were available. Mr. Petznick asked for additional comments or questions. Rick Lavis made a comment on the record concerning those in the farming community who would put the Agricultural BMP Program at risk by engaging in actions that defeat the purpose of the program – to maintain clean air and lower the emissions of particulate matter. Mr. Lavis asked that the issue be brought before the Committee at their next meeting and stated that is a matter taken very seriously by those involved with the AgBMP Program. The comment was put forth as a motion, moved, seconded and approved.

6) **Action Items**

1. Robert Shuler and the Arizona Department of Agriculture will research the licensing regulations for all agricultural operations.
2. Additional comments on BMPs for all agricultural sectors, including consideration of any mandatory BMPs as well as reporting requirements, will be submitted via email to the Co-Chairs before December 15, 2009.
3. Rule comparison table, EPA to provide a one-page summary.

7) **Adjournment**

Mr. Petznick adjourned the meeting at 3:15 p.m.

For additional information contact Lisa Tomczak, (602) 771-4450 or tomczak.lisa@azdeq.gov; or Corky Martinkovic, 602-771-2372 or dam@azdeq.gov.

United Dairymen of Arizona
Response to Maricopa County Air Quality Department Comments on the Dairy Best Management Practices Draft
December 8, 2009

The following is United Dairymen of Arizona's response to Maricopa County's comments on the "Draft Dairy Best Management Practices to Reduce PM_{10} Emissions.

General Comments:

1. All of the emission factors and control efficiencies represented in the draft BMP's were derived from documents we reviewed in the San Joaquin Valley Air Pollution Control District (SJVAPCD), the California Air Resources Board (CARB) and the Western Region Air Partnership (WRAP). These documents contain hundreds of pages in a variety of sections and locations. Therefore we refrain from providing citations for each page and location as these were derived from their websites, printed versions of their rules and other printed materials. If the technical committee or Maricopa County desires specific citations we suggest the committee conduct a review of each individual BMP to determine if: 1) The BMP is valid or questionable; 2) Is the emission factor reasonable or not; and 3) If there are questions regarding the origin use of the BMP on other Jurisdictions.

2. Sentence clarification added to draft document.

3. See comment #1.

4. We agree that "equivalent" requirements are necessary in order to not backslide from the existing SIP. We specifically supported the inclusion of statutory language in SB1225 requiring no backsliding in the development of BMP's. Therefore, we are suggesting the combination of an expanded BMP program (more measures than provided in SVJAPCD) which reduces significant amounts of potential and real emissions; potentially "designated" (or required) individual BMP's (such as a requirement to remove manure from the corrals a minimum of three times a year) ; potential to add an annual reporting requirements; all coupled with the state, federally and judicially recognized components of the SVJAPCD program will create an "equivalent" if not enhanced emission reduction program which will meet the necessary SIP requirements. We will provide the mathematical evidence to demonstrate how the implementation of this type of BMP program will exceed all levels of suppression or reduction in emissions envisioned by the current SIP development process. We will demonstrate how the emissions inventory; potential control measures; and 5% reduction targets will be met through this comprehensive BMP Program.

5. Page 9 of the Emission Reduction Calculations Methodology for Dairy & Feed Lots CMPS. By adding the emission factors listed on this page and using the emission factor for Open Corral dairies (there are no free-stall dairies in the non-attainment area) the emission factor will total 5.22 lbs/hd/yr.

6. Comment noted.

7. The Emission Reduction Calculations Methodology for Dairies & Feed Lots CMPS document, page 4, section C.

Comments on Unpaved Access Connections BMPs

8. If the unpaved access connection is privately owned by the dairy or part of a contractual lease the dairy has committed to; then any of the control measures may be applied to the roadway. If the road does not belong to the dairy operation (for example, a county road) then the responsibility of PM_{10} mitigation belongs to the legal owner.

9. SJVAPCD's program lists these control measures separately with corresponding control efficiencies. Many dairies have more than 50 employees, along with daily activities of hauling milk and feed. The limiting of trips per day alone would be unrealistic.

10. There is no difference in the emission of PM_{10} particulate matter from vehicle travel on unpaved access connection or unpaved roads and equipment areas.

11. BMPs have been added.

12. The BMP narrative has been revised.

13. We agree that "equivalent" requirements are necessary in order to not backslide from the existing SIP. We specifically supported the inclusion of statutory language in SB1225 requiring no backsliding in the development of BMP's. Therefore, we are suggesting the combination of an expanded BMP program (more measures than provided in SVJAPCD) which reduces significant amounts of potential and real emissions; potentially "designated" (or required) individual BMP's (such as a requirement to remove manure from the corrals a minimum of three times a year) ; potential to add an annual reporting requirements; all coupled with the state, federally and judicially recognized components of the SVJAPCD program will create an "equivalent" if not enhanced emission reduction program which will meet the necessary SIP requirements. We will provide the mathematical evidence to demonstrate how the implementation of this type of BMP program will exceed all levels of suppression or reduction in emissions envisioned by the current SIP development process. We will demonstrate how the emissions inventory; potential control measures; and 5% reduction targets will be met through this comprehensive BMP Program.

14. This has been added to the narrative on track-out.

Comments on Unpaved Road or Feed Lane BMPs

15. See comment #9

16. This category of unpaved roads and feed lanes has been interpreted to be the roads within the confines of the dairy operation. These roads would not access public roads.

17. BMP has been modified.

18. BMP's have been modified.

19. BMP has been modified

20. The definition of categories of activity for PM_{10} mitigation are subtly different for Maricopa County Rule 310 and SJVAPCD. Maricopa County Rule 310 has a categories for unpaved access connections and unpaved roads; where SJVAPCD has only unpaved roads. In order to best reconcile these differences and utilize SJVAPCD's defined emission factors this interpretation of unpaved access connections was made.

Comments on Animal Feeding, Waste Handling and Transportation BMP's

21. Animal feeding was added to this category because it and waste handling are the handling of bulk materials. They both require activities that transport large amounts of bulk material. Bulk feed in addition requires various strategies to protect it from wind and the elements.

22. The BMP and narrative has been modified.

23. The wind speed of 25 mph is the standard for the cessation or change of activity in the SJVAPCD program, the South Coast Air Pollution Control District program, and the Arizona BMP program for crops.

24. The control measures SJVAPCD referenced in "Bulk Material Control", page 3, section a. in the "Emission Reduction Calculation Methodology for Dairies and Feedlots CMP" relates to the "Feed EF" factor, listed on page 9, of .123lbs/hd-yr. The 4.6lb/hd-yr relates to the emission of an open corral dairy.

Comments on Arena, Corral and Pen BMPs

25. On page 9, in the "Emission Reduction Calculation Methodology for Dairies and Feedlots CMP" the emission factor for a freestall dairies is 1.845lbs/hd-yr; the

emission factor for an open corral dairy is 4.6lbs/hd-yr. This is a difference of 60%. There are no freestall dairies in the non-attainment area, they are all open corral. Thus if a dairymen were to build a freestall dairy the emission factor for the design would be 60% less then the prevailing dairy designs.

26. The three areas that affect stocking density on dairies: shades, cooling, and fence line area are distinctly different methods of increasing stocking density. Each one of these procedures will increase the congregation of the animals and thusly manure moisture levels. Different dairy operations should be able to choose the procedure or procedures that work the best for their operation. There is not data available on the specifics of stocking densities. There are BMP's listed in the SJVAPCD program that do not have scientific data to support the practice; these sound practices were assigned control efficiencies of 10% until such time that data could be generated.

27. On page 1, section a. in the "Emission Reduction Calculation Methodology for Dairies and Feedlots CMP" at the bottom of the first paragraph "This control method is not recommended on areas used by lactating cow". This is for sanitary reasons. Dr Auvermann was referring to feedlot operations.

28. Frequent scraping and manure removal are two distinctly different activities. Scraping activities pull fresh manure out from under the shades and out into the open corral areas; where the wet manure is commingled with the dry manure. This activity also grooms the manure to a consistent depth. Dairies would perform scraping activities on a minimum of 1 per week.

    Manure removal usually involves large front end loaders that scrape up the manure pack and load large trucks for transportation to land application sites. We will modify this BMP to state; manure will be removed a minimum of 3 times a year.

    Dr Auvermann specified 1 to 3 inches; the practicality of maintaining large corral areas with constant animal use and movement to a manure pack depth of one precise inch is not realistic. There is a point where the manure pack can become to thin exposing bare soil which the compacted manure would normally protect from PM_{10} emissions. The scraping equipment used in the corrals is not precise laser guided leveling tools. After scraping procedures some areas may be at a 1 inch depth other areas could be more or less. Dr. Auvermann's recommendation to keep the dry lose manure on top of the compacted layer at a minimum depth is a valid point in reducing PM_{10} emissions however the reality of achieving some exact depth of manure over a large corral surface is beyond the capabilities of the equipment used for this procedure. If a depth of lose manure needs to be identified it must take into account these physical parameters.

29. This refers to procedures that maintain the manure pack at an optimal depth. The flushing and vacuuming of manure is a process of removing the manure from the pens which reduces the amount of manure and related PM_{10} emissions.

30. Scraping and harrowing pens regularly helps to maintain the optimal depth of the manure pack. This is the concept Dr. Auvermann was describing to reduce the PM_{10} emissions from animal movement.

31. See comment #28.

32. In order to maintain the manure pack at a minimum depth during the frequent scraping activities there needs to be a place to store the excess manure. The piling of manure in the areas of the least animal activity (these would be the areas that the animals would not walk through to get to the milking barn three times a day, six trips) decreases the area of the exposed manure to wind erosion. There are BMP's listed in the SJVAPCD program that do not have scientific data to support the practice; these sound practices were assigned 10% control efficiencies until such time that data could be generated.

33. Dairy cows are generally milked three times a day; this means 6 times a day cows move from between the corrals and the milking barn. A standard operating procedure of not running cows would decrease PM_{10} emissions. There are BMP's listed in the SJVAPCD program that do not have scientific data to support the practice; these sound practices were assigned 10% control efficiencies until such time that data could be generated.

34. BMP's have been modified.

35. We agree that "equivalent" requirements are necessary in order to not backslide from the existing SIP. We specifically supported the inclusion of statutory language in SB1225 requiring no backsliding in the development of BMP's. Therefore, we are suggesting the combination of an expanded BMP program (more measures than provided in SVJAPCD) which reduces significant amounts of potential and real emissions; potentially "designated" (or required) individual BMP's (such as a requirement to remove manure from the corrals a minimum of three times a year) ; potential to add an annual reporting requirements; all coupled with the state, federally and judicially recognized components of the SVJAPCD program will create an "equivalent" if not enhanced emission reduction program which will meet the necessary SIP requirements. We will provide the mathematical evidence to demonstrate how the implementation of this type of BMP program will exceed all levels of suppression or reduction in emissions envisioned by the current SIP development process. We will demonstrate how the emissions inventory; potential control measures; and 5% reduction targets will be met through this comprehensive BMP Program.

36. This BMP will be added to the category "Corrals, Pens, and Areanas".

Arizona Cattle Feeders' Association
Response to Maricopa County Air Quality Department Comments on Arizona Beef Feedlot Draft Best Management Practices (BMP's)
December 7, 2009

The following contains the response of the Arizona Cattle Feeders' Association to comments regarding the draft BMP's for Beef Feedlots provided by the Maricopa County Air Quality Division.

General Comments

Comment #1: Please provide references (with page numbers) for the emission factors and control efficiencies in the document.

Response: *All of the emission factors and control efficiencies represented in the draft BMP's were derived from documents we reviewed in the San Joaquin Valley Air Pollution Control District (SJVAPCD), the California Air Resources Board (CARB) and the Western Region Air Partnership (WRAP). These documents contain hundreds of pages in a variety of sections and locations. Therefore, we refrain from providing citations for each page and location as these were derived from their websites, printed versions of their rules and other printed materials. If the technical committee or Maricopa County desires specific citations we suggest the committee conduct a review of each individual BMP to determine if: 1) The BMP is valid or questionable; 2) Is the emission factor reasonable or not; and 3) If there are questions regarding the origin use of the BMP in other jurisdictions.*

Comment #2: Please add a column to the table noting the source of the BMP….

Response: **Please note response above as the review suggested would require us to "note the source."*

Comment #3: Maricopa County Rule 310.01 (Fugitive Dust from Non-Traditional Sources of Fugitive Dust), Section 302.8 (Livestock Activities) contains the following visible emission requirements. Equivalent requirements will be necessary for livestock activities in the Agricultural BMP rule to prevent SIP relaxation and backsliding.
-20% opacity limit for unpaved access connections, unpaved feed lane access areas, corrals, pens and arenas (Section 302.8(a)(1) and (2)), and
-Limit on visible emissions beyond the property line (Section 302.8(a)(3)).

Response: *We agree that "equivalent" requirements are necessary in order to not backslide from the existing SIP. We specifically supported the inclusion of statutory language in SB1225 requiring no backsliding in the development of BMP's. Therefore, we are suggesting the combination of an expanded BMP program (more measures than provided in SVJAPCD) which reduces significant amounts of potential and real emissions; potentially "designated" (or*

required) individual BMP's (such as a requirement to use water on pen surfaces); potential to add an annual reporting requirement; all coupled with the state, federally and judicially recognized components of the SVJAPCD program will create an "equivalent" if not enhanced emission reduction program which will meet the necessary SIP requirements. We will provide the mathematical evidence to demonstrate how the implementation of this type of BMP Program will exceed all levels of suppression or reduction in emissions envisioned by the current SIP development process. We will demonstrate how the emissions inventory; potential control measures; and 5% reduction targets will be met through this comprehensive BMP Program.

Comment #4: What is the basis of the "animal feeding" BMP's (Feed High Moisture Feeds, Feed Higher Moisture Feed to increase moisture in Pens, and Add Molasses or tallow to Feed)? These are not contained in the SJVAPCD Conservation Management Practices (CMP) program nor are they contained in Imperial County's Beef Feedlot Mitigation Measures. What is the basis for the 10% control efficiency? Do these measures reduce PM_{10}, NH_3, or VOC? If these are NH_3 or VOC measures, how effective are they in reducing PM_{10} in Arizona which is dominated by course fraction PM_{10}. These BMP's should be removed from the list unless data supporting their effectiveness at controlling or reducing PM_{10} emissions can be provided.

Response: *We agree and are happy that Maricopa County acknowledges that most PM_{10} from these producers is "course fraction" PM_{10}. There are volumes of evidence that the health effects from "course fraction" PM_{10} are immensely less than "fine" or "smooth" particle PM_{10}. The biological response of the bovine animal is to excrete 90% of the moisture it consumes. Enhancing the intake of moisture through higher moisture feeds causes an increase in the excretion of moisture from the animal and therefore creates a wetter surface on which it travels. Dr. Auvermann provided some "excretion response" data regarding the feeding of higher moisture feeds. The "higher moisture" feed BMP is a PM10 measure and it provides for a dual role in emission reduction. First, it provides for the increase in excreted moisture from the animal and it provides for significant suppression during the bulk handling and mixing of feeds. The higher moisture in the feed causes an increased reduction in the potential to emit during mixing and feeding. Maricopa County Air Quality Inspectors themselves have suggested to producers that they add moisture to the feed mixing process in order to reduce emissions. We do not agree with removing a BMP which clearly will enhance mitigation of emissions.*

Comments on Arena, Corral and Pen BMPs

Comment #5: What is the basis of the "Concrete Apron (at least 8 ft) in Pen Approaching Feed Bunks" and the "Concrete Aprons (at least 4ft) in Pen Approaching Water Troughs" BMPs? These are not contained in the SJVAPCD CMP program nor are they contained in Imperial County's Beef Feedlot Mitigation Measures. Similar measures are listed in SJVAPCD's "Dairy Potential BACT Requirements and Mitigation Measures" (see "Pave feedlane at least 8 feet on the corral side of the fence"); however, these measures are listed as VOC and NH_3 measures. Do these measures reduce course fraction PM_{10}? These BMP's should be removed from the list unless data supporting their effectiveness at controlling or reducing PM_{10} emissions can be provided.

Response: *Maricopa County's own rule provides for the paving of roads, open areas, lots, etc. as a PM_{10} mitigation measure. Why wouldn't they also provide for the "partial paving" (application of concrete around bunks and troughs in pens) as a mitigation measure in pens? These two BMP's will reduce the amount of exposed dirt/manure mix surface in pen areas thereby reducing the overall exposed manure surface in a pen. In addition, the application of concrete in these areas provides for an enhanced level of moisture in the areas adjacent to the concrete (animals will excrete moisture while feeding and drinking in these areas and the moisture will then be concentrated in the organic surface of the exposed pen nearest to the concrete thereby enhancing and building the moisture content reducing the potential for emissions). We disagree with the removal of these BMP's.*

Comment #6: The following BMP's relate to increasing stocking density and should be combined into one BMP: "Increase stocking density in corrals to increase manure moisture." Additionally, this BMP needs to specify either the percent shade coverage required or the targeted stocking density and a targeted moisture control of 20 %. Dr. Auvermann mentioned that there are shade and stocking density requirements that need to be met for effective control.

Response: *These two BMP's have value individually or combined and they might be utilized separately. For instance a producer might not want to enhance their stocking density but they might choose to provide shade which has emission reduction benefits from the concentration of animals in an area (under the shade) where they concentrate the value of moisture excreted. The same is achieved by increasing stocking densities except that the enhanced moisture value is spread over more of the pen surface. In short, providing shade provides emission reduction from the pen surface nearest the shade and the increased stocking density provides emission reduction value across more of the pen surface. They should be maintained for application either combined or individually.*

Comment #7: In regard to the "Add moisture to pen surface via water sprinkling (3 to 6 gallons per head/per day – selective of moisture and weather conditions) BMP. First, this BMP should be revised to "Sprinkle or Sprinkling of Open Corral" similar to SJVAPCD's CMP. Second, this BMP needs to specify a target moisture control of 20% and a target watering to a depth of 1/10 to ¼ inch per day (in accordance with Dr. Auvermann recommendations) or an "overall moisture factor between 20% and 40% in the top three inches" similar to Imperial County Air Pollution Control District's Rule 420 rather than a "gallons per head/per day" target. Lastly, what is the basis for the 85% control efficiency for this measure? Dr. Auvermann's presentation showed a 30-55% reduction and SJVAPCD assumed a minimal control effectiveness[1].

Response: *The comment mixes up components of various air quality regimes (SVJAPCD and Imperial County). These programs are all designed to provide a series of measures which combined together provide the needed level of suppression. Attempting to take a piece from one and a piece from another does not necessarily represent an achievable level of reductions or are not compatible in real "on the ground" scenarios. Dr. Auvermann's presentation on the "pen surface" moisture level was a "laboratory level" study – not a field study. Furthermore, his reference to 1/10 to ¼ inch was a reference to the level of moisture applied – not the depth of the moisture in the pen surface. Dr. Auvermann's research regarding the 20% to 40% number was demonstrated in a line graph which did demonstrate the 20% to 40% numbers mentioned in the*

comment. He even mentioned these numbers can easily be skewed or changed based on real on the ground conditions (relative humidity, mixing zones, etc.). However, Dr. Auvermann also cited that moisture levels above 30% were going to increase and exacerbate other nuisance factors including odors, flies, etc. SVJAPCD does not reference a "moisture level" number. Imperial County does in their program; however, they also have an exemption or an "out" if the producer provides a plan and reasoning for having a lower number. Since this program is designed after SVJAPCD we should follow their program which does not cite a percentage moisture number. The recent implementation of our dust suppression study at feedlots in Arizona demonstrates an 85% reduction in emissions if you add 3 to 6 gallons per head/per day to the pen surface. Note that this is for the "pen surface" not all areas of production (roads and other surfaces). If the other areas were calculated in conjunction with the pen surface you will garner the 30% to 55% number referenced by Dr. Auvermann. If the parties wanted to establish a "soft target" for a moisture level (across some percentage of the pen surface) with the hard target of 3-6 gallons per head/per day – we believe we could possibly marry the two if properly combined.

Comment #8: In regard to the "Frequent manure removal (every 6 months) leaving an uneven corral surface of compacted manure on top soil" BMP, the frequency of manure removal does not meet optimum frequency based on Dr. Auvermann's recommendation of between 3 and 6 times per year. In addition to specifying optimum scraping and manure removal frequency, the ideal depth needs to be specified as well. SVJAPCD's description of "Frequent Scraping and/or Manure Removal" states "Keeping the dusty manure depth less than one inch above the ground, and therefore keeping the corral surface thin and well compacted reduces PM emissions.

Response: *This comment's reference to Dr. Auvermann's "optimum" level of scrapings was based on "laboratory testing" and was singularly referencing the pen surface – not including the additional emissions from tractor movement and manure loading and unloading. If we look at the pen surface in isolation – 3 – 6 may be optimum. However, when you include the balance of the process (scraping, tractor movement, loading and unloading) this does not reference an optimum level. Also, the 3-6 gallons per head/per day number we suggest is based on 2 -3 manure harvests per year. Our study demonstrates that 3-6 gallons provides enough suppression in levels of loose manure up to 3 inches.*

Comment #9: What is the basis for the "Pile manure between cleaning" BMP? This is not contained in the SVJAPCD CMP program nor is it contained in Imperial County's Beef Feedlot Mitigation Measures. This BMP should be removed from the list unless data supporting its effectiveness at controlling or reducing PM10 emissions can be provided.

Response: *In earlier comments Maricopa County suggested extremely stringent levels of "loose manure." Then in this comment they suggest a measure which will reduce the level of loose manure across the pen surface be removed. We are confused as to what does Maricopa County want to achieve? Reduced emissions with a BMP Program broad enough to provide a toolbox with many reduction measures or one which the prosecution of violations is more important than actual direct emission reductions?*

Comment #10: What is the basis of the "Feed higher moisture feed (Wet Distiller Grain Solubles) to increase moisture in pens" BMP? These are not contained in the SVJAPCD CMP Program nor are they contained in Imperial County's Beef Feedlot Mitigation Measures. What is the source of the 10% control efficiency? This BMP should be removed from the list unless data supporting its effectiveness at controlling or reducing PM10 emissions can be provided.

Response: *As we stated in our response to Comment #4, 90% of the moisture consumed by the animal is excreted to the pen surface. Does it not make sense then that if an animal is increasing its level of moisture intake via "wetter" feeds - that the animal will excrete more moisture to the pen surface? We recommend that this BMP be maintained unless data can be provided that it will not enhance the suppression of emissions. Can we all agree that if it rains more we will have less dust? Then can we agree that if the cattle "rain" more we will have less dust?*

Comment #11: In regard to the "Control cattle during movements (So they do not run)" BMP, Dr. Auvermann stated in his presentation that "animal behavior changes" are hard to implement and not always effective. Because this BMP is not contained in any other EPA approved CMP program (i.e. SJVAPCD or Imperial County) and Dr. Auvermann stated this type of control is not always effective, this BMP should be removed from the list.

Response: *Dr. Auvermann also admitted that they had done little research on this issue. He said it was his opinion that yes – it could reduce emissions – but that he was uncertain how to quantify it. After reviewing this BMP the technical committee does not think it will provide emission reductions than we would not have any problem removing it as a BMP.*

Comment #12: In regard to the "Plant tree windbreak" BMP, this needs to specify "install within 50 feet to 100 feet of corrals, pens, and arenas" similar to Maricopa County Rule 310.01 Section 302.8(b)(3)(b).

Response: *If the technical committee finds it necessary to stipulate a "distance" for installation of a windbreak, we will entertain establishing a distance similar to the recommendation by Maricopa County.*

Response to Comment #13: ***Note: This is a redundant statement. Please see our response to Comment #3.*

Response to Comment #14: *We support adding this to the BMP's.*

Response to Comment #15: *Please see our responses to Comment #4 and #10.*

Response to Comment #16: *We approve of removing the "last BMP in the "Unpaved Access Connections" BMP Category and including language to represent the four control measures. However, we disagree with Maricopa County's assertion that the exact language from Rule 310 is required to be incorporated into this BMP Program or it is considered "backsliding." The difference is our interpretation includes an "equivalent to" measurement which provides for a calculation determining if the combined implementation of BMP's provide for reductions or*

controls "equal to" current regulatory programs. For instance, a mandatory BMP of water sprinkling in addition to one selected BMP from each category will exceed the singular nature of the 20% opacity standard.

Response to Comment #17: *Once again, we reiterate our statement regarding SIP relaxation should be concluded by an overall review of the BMP plan and reduction of subsequent emissions, not by reviewing a singular measure in isolation of the totality of the BMP Program. In addition, this BMP Program is designed to apply in currently designated non-attainment areas and future designated areas. The current designation for Maricopa County is "serious" which requires Best Available Control Measures (BACM) and future designated areas may only require Reasonably Achievable Control Measures (RACM). Therefore, we propose that for BACM, the BMP Program requires mandatory selection of the "water sprinkling" BMP (possibly in addition to the "Quadra" handling BMP reference in this Comment) and an additional BMP from each category. The application of a RACM BMP Program would require a variation on the BACM plan.*

Response to Comment #18: *We disagree. The requirement referenced by Maricopa County is designed for a "private" or non-commercial operation. We can reduce current or future emissions with adoption of portions of these requirements (limited public access, etc) however to limit overall trips to 20 per day is not a realistic application. We believe a BMP program designed to include a dust suppression component of "water sprinkling" on these types of roads will garner more reductions than a "vehicle trip count."*

Response to Comment #19: For BACM requirements we support a "trackout" provision.

Response to Comment #20: *We did not design these BMP's to allow producers to violate other state and federal laws. Therefore, we support putting a statement in the BMP Program to state, "a producer cannot take credit for air quality improvement and emission reductions by utilizing efforts which violate other federal laws."*

Response to Comment #21: *We question whether adding a "depth specification" will cause producers to eliminate the selection of applying gravel, rock or grindings for a dust suppression measure. If a producer were to be willing to apply 2 inches of gravel it would have an effect of reducing emissions. Does the County wish to reduce the incentive to apply other materials to suppress emissions to the extent that a producer may only take credit if they meet the 4 inch specification? We support further discussion to defining the BMP to meet proper specifications as long as the specifications to not have a perverse effect of eliminating the use of any level of "other materials" in providing for a reduction in emissions. Maybe we could utilize a sliding scale of emission reduction factors allowing for greater credit when the 4 inch target is met and some other smaller factor for less depth.*

Response to Comment #22: *We support amending the BMP to include the "other than water" element.*

Response to Comment #23: *Does the County really want to eliminate the application of individual measures which are proven to reduce emissions just because they are not all*

combined into one category? It is our view that the application of measures to reduce emissions is a positive thing whether or not they are combined with others. For Beef Feedlots 80% of the emissions are derived from animal movement within the pens. If we need to have a discussion about refining the BMP Program in the "Unpaved Access Connections" we can, however, we believe an overall review of the BMP Program and the level of reductions calculable for the overall program is more important than a single or measure or one which seeks to require a combination of measures in a single category which represents less than 15% of our emissions.

Response to Comment #24: ***Please see our response to Comment #21***

Response to Comment #25: *We support refining this BMP to meet trackout requirements.*

Response to Comment #26: *This BMP Program does not encompass all of the livestock activities regulated by Maricopa County. The County will still have jurisdiction over the balance of livestock activities outside of dairy, beef feedlot, swine and poultry. Therefore, the county's application of a single 20% opacity or "visible emissions" beyond the property line remains intact for a large portion of livestock activities not included in this BMP Program. Therefore, we believe an overall review of the calculable emission reductions from this BMP Program is the only determining factor in whether "backsliding" has occurred. We support such a measured review to determine if the components of the BMP program are lacking and allow for backsliding. It is our view we can design and implement a BMP Program where such backsliding is not a concern.*

Response to Comment #27: *We support amending the BMP provisions to provide better clarity on the "trackout" provision.*

Comments & Responses – December 7, 2009

MCAQD Comments on Draft Dairy and Beef Feedlot Best Management Practices to Reduce PM_{10} Emissions

General Comments

Comment: Provide references and page numbers for emission factors and control efficiencies shown in the document. Revise 2nd sentence on page 1, paragraph 2, to state that the legislation defined "regulated area" to include "any other PM_{10} particulate nonattainment area established in this state on or after June 1, 2009." Add a column on page to identifying source of the BMP or "not in use elsewhere."

Response: The Notice of Final Rulemaking (NFRM) will include this information.

Comment: To prevent SIP relaxation and backsliding, add MCAQD Rule 310.01 and 302.8(a)(1), (2) and (3) requirements for livestock activities for opacity and visible emissions beyond the property line.

Response: Language clarifying that existing control measures approved in the SIP continue in full force and effect will be included in either the NFRM or the SIP.

Comment: Remove any BMP from the list if data supporting its effectiveness at controlling or reducing PM_{10} emissions cannot be provided. Eliminate BMPs that address only VOC and NH_3 emissions. Consult San Joaquin Valley Air Pollution Control District document "Dairy Potential BACT Requirements and Mitigation Measures" that lists dairy measures by activity and pollutant.

Response: EPA has announced its intent to promulgate a revised National Ambient Air Quality Standard for 8-hour ozone in August 2010, which could result in a nonattainment designation for more of Pinal County than is currently experiencing ozone violations. In addition, the Cowtown monitor exceeds the $PM_{2.5}$ NAAQS. Since VOC emissions are precursors of both ozone and $PM_{2.5}$, and ammonia is also a significant $PM_{2.5}$ precursor, Agricultural Best Management Practices that address ozone and $PM_{2.5}$ precursors may be appropriate. Further, they will likely be viewed by EPA as necessary for control of PM unless it can be demonstrated that secondary particulate matter is not a significant component of $PM_{2.5}$ for the areas covered by the new BMPs.

Comment: Any BMP with a requirement to "install" should also require "maintain."

Response: Practically enforceable requirements will be included in the NFRM.

Unpaved Access Connections

Comment: Explain how "unpaved private road connection with a paved public road" is consistent with MCAQD Rule 310.01, which does not distinguish between public and private road connections, and is not backsliding. Explain impact of this proposed definition on leased state land or leased public land. Visible emission limits at the property line of livestock activities should be added to prevent SIP relaxation.

Response: The NFRM will be consistent with the approved SIP

Comment: The three BMPs on pages 2-3 are for unpaved roads and not controls for trackout from unpaved access connections: Install signage that prohibits vehicular speeds in excess of 15 mph; Install speed control devices (e.g., speed bumps); Restrict access to thru traffic by posting signs or installing gates.

Response: Agreed.

Comment: The discussion on Dairy page 3, paragraph 2, concerning San Joaquin methodology for calculating emission reductions from speed limits is inappropriate for unpaved access connections and should be removed.

Response: Applicability of this methodology will be explained or methodology will be changed in the SIP revision.

Comment: Add two control options proposed for MCAQD Rule 310.01, Section 302(b)(1) for unpaved access connections: Apply and maintain pavement, gravel (maintained to a depth of four inches), or asphaltic roadbase, apply and maintain dust suppressants other than water.

Response: These options will be added.

Comment: Language concerning trackout control devices should be revised to limit discretion related to "other" devices.

Response: Language will be added to require "with equivalent control efficiency."

Comment: Add requirements for cleanup if trackout exceeds 25 linear feet and at end of day to be consistent with MCAQD Rule 310.01.

Response: Language clarifying that existing control measures approved in the SIP continue in full force and effect will be included in either the NFRM or the SIP.

Unpaved Roads or Feed Lanes

Comment: Combine speed limit BMPs and restricted access into a single BMP; require maintenance of the selected control measure(s); and do not relax the SIP.

Response: Speed limits should remain separate from access restrictions to provide the flexibility necessary to perform required agricultural activities. Language clarifying that existing control measures approved in the SIP continue in full force and effect will be included in either the NFRM or the SIP.

Comment: Include MCAQD's proposed rule requirement for water application and a trackout device to prevent SIP relaxation.

Response: This requirement is not in the approved SIP.

Comment: Specify that "Used oil" is not allowed for dust control on roads, and specify allowable types of oil to prevent adverse impacts on water quality.

Response: EPA's list of allowable water suppressants will be referenced or included.

Comment: Gravel, rock and grindings requirements are less stringent than MCAQD Rule 310.01, Section 302.8(b)(1)(b), especially regarding "to a depth of four inches." The requirement should be "apply and maintain."

Response: The NFRM will be consistent with the approved SIP.

Comment: Explain the discrepancy between unpaved roads emissions factors shown on pages 2 and 4 of Dairy and the higher San Joaquin emission factor.

Response: The SIP revision will explain the emission factor.

Animal Feeding, Waste Handling and Transporting

Comment: "Animal Feeding" on pages 2 and 7 of Dairy should not be combined with Waste Handling and Transporting. Please explain the derivation of the 5.215 lb PM_{10}/head-year in the last row of the Dairy table on page 2. Explain the origin for feed content BMPs, which are not in the California CMPs, the basis for Dairy 10% control efficiency for PM_{10} and the basis for control efficiency for Beef Feedlots. Explain the discrepancy between the San Joaquin emission factors for corral/manure handling and overall management feeding and the emission factor shown on Dairy page 2.

Response: This BMP will be explained in the SIP revision.

Comment: Manure hauling truck requirements should be revised to add a limit on vehicle trips to be consistent with all 4 requirements in MCAQD Rule 310.01, Section 302.8(b)(2) and prevent SIP relaxation. Wind speed of 25 mph is too high for cessation of loading dry manure into trucks unless these are met.

Response: The NFRM will be consistent with the approved SIP.

Arena, Corral and Pens

Comment: Explain the source of the 60% control efficiency compared to San Joaquin's statement that no data is available for control efficiency factor and its assumption of 10% control efficiency.

Response: The SIP revision will explain the control efficiency factor.

Comment: Three BMPs related to increased stocking density should be combined into one BMP; specify stocking density; and specify percent shade cover.

Response: Practically enforceable requirements will be included in the NFRM.

Comment: Change "add moisture" to "sprinkle or sprinkling;" require 20%-40% soil moisture target and a daily watering depth requirement; delete "during hot weather" and require year-round soil moisture standard. Explain the basis of 85% control efficiency.

Response: Practically enforceable requirements will be included in the NFRM, and the basis of control efficiency will be explained in the NFRM or SIP revision.

Comment: Manure harvesting/pen scraping should be one BMP with frequency of 3 to 6 times a year and a specified depth requirement, not every 6 months. Specify control efficiency for PM_{10}.

Response: Practically enforceable requirements will be included in the NFRM.

Comment: Combine requirement to use drag equipment, instead of push equipment, with frequent manure removal similar to San Joaquin's weekly scraping requirement.

Response: Agreed if necessary to determine control efficiency.

Comment: Explain basis of "pile manure between cleaning" and 10% control efficiency for PM_{10} or remove from list if not effective.

Response: Explanation will be included in the SIP revision.

Comment: Remove "do not let cattle run" from list; it is not in any EPA approved CMP program and unlikely to be effective.

Response: Practically enforceable requirements will be included in the NFRM.

Comment: Windbreak BMPs should add distance requirement of within 50-100 feet of corrals, pens and arenas.

Response: Practically enforceable requirements will be included in the NFRM.

Comment: Add a 20% opacity limit and no visible emissions beyond the property line for corrals, pens and arenas to prevent SIP relaxation.

Response: Language clarifying that control measures approved in the SIP continue in full force and effect will be included.

Comment: Add a BMP to allow application of a fibrous layer in working areas as a control measure for corrals, pens and arenas; it is in MCAQD Rule 310.01, Section 302.8(B)3) and is a San Joaquin Valley CMP.

Response: Agreed.

Comment: Explain the basis of Beef Feedlot Concrete Apron BMPs, which are not in California Beef Feedlot CMPs (although similar measures are in San Joaquin's Dairy CMPs). Remove unless they control PM_{10}.

Response: An explanation of BMPs, and their effectiveness for controlling PM will be addressed in the NPRM and the SIP. EPA has announced its intent to promulgate a revised National Ambient Air Quality Standard for 8-hour ozone in August 2010, which could result in a nonattainment designation for more of Pinal County than is currently experiencing ozone violations. In addition, the Cowtown monitor exceeds the $PM_{2.5}$ NAAQS. Since VOC emissions are precursors of both ozone and $PM_{2.5}$, and ammonia is also a significant $PM_{2.5}$ precursor, Agricultural Best Management Practices that address ozone and $PM_{2.5}$ precursors may be appropriate. Further, they will likely be viewed by EPA as necessary for control of PM unless it can be demonstrated that secondary particulate matter is not a significant component of $PM_{2.5}$ for the areas covered by the new BMPs.

<u>Pinal County Comments on Beef Feedlot Best Management Practices to Reduce PM_{10} Emissions</u>

Comment: Control of late afternoon PM_{10} emissions is critical because elevated hourly PM_{10} concentrations at the Cowtown monitor correspond to cattle movement at that time of day even in 2009, and feedlot emissions dominate at this monitor

according to the speciation study. Reductions sufficient to demonstrate attainment in the SIP revision and maintain it at the monitors will be required.

Response: Agreed.

Comment: Adequate watering of feed pens should be mandatory baseline measure for all feedlots, not a menu option.

Response: A combination of mandatory and menu BMPs is under consideration.

Comment: Proposed control efficiencies should be supported by data or analysis.

Response: Every beef feedlot operator covered by the AgBMP Program should be required to report on the implemented measures for transparency, accountability and equity with other PM_{10} source categories. Quantification will be necessary to model an attainment demonstration for the SIP revision.

Animal Thresholds

	Small CAFO*	County Fair**	State Fair**	SanJoaquin Rule
Cattle or cow/calf pairs	less than 300	180	100	190
Mature dairy cattle	less than 200			500
Swine (over 55 lbs)	less than 750			
Swine (under 55 lbs)	less than 3,000	450	80	
Laying Hens	less than 25,000	100	300	

*based on EPA Clean Water Act

**the average number of animals on any given day at the Maricopa County and Arizona State Fairs

Regulatory Definitions of Large CAFOs, Medium CAFO, and Small CAFOs

A **Large CAFO** confines at least the number of animals described in the table below.

A **Medium CAFO** falls within the size range in the table below and either:

- has a manmade ditch or pipe that carries manure or wastewater to surface water; **or**
- the animals come into contact with surface water that passes through the area where they're confined.

If an operation is found to be a significant contributor of pollutants, the permitting authority may designate a medium-sized facility as a CAFO.

A **Small CAFO** confines fewer than the number of animals listed in the table **and** has been designated as a CAFO by the permitting authority as a significant contributor of pollutants.

Animal Sector	**Size Thresholds (number of animals)**		
	Large CAFOs	**Medium CAFOs[1]**	**Small CAFOs[2]**
cattle or cow/calf pairs	1,000 or more	300 - 999	less than 300
mature dairy cattle	700 or more	200 - 699	less than 200
veal calves	1,000 or more	300 - 999	less than 300
swine (weighing over 55 pounds)	2,500 or more	750 - 2,499	less than 750
swine (weighing less than 55 pounds)	10,000 or more	3,000 - 9,999	less than 3,000
horses	500 or more	150 - 499	less than 150
sheep or lambs	10,000 or more	3,000 - 9,999	less than 3,000
turkeys	55,000 or more	16,500 - 54,999	less than 16,500
laying hens or broilers (liquid manure handling systems)	30,000 or more	9,000 - 29,999	less than 9,000
chickens other than laying hens (other than a liquid manure handling systems)	125,000 or more	37,500 - 124,999	less than 37,500
laying hens (other than a liquid manure handling systems)	82,000 or more	25,000 - 81,999	less than 25,000
ducks (other than a liquid manure handling systems)	30,000 or more	10,000 - 29,999	less than 10,000
ducks (liquid manure handling systems)	5,000 or more	1,500 - 4,999	less than 1,500

[1]Must also meet one of two "method of discharge" criteria to be defined as a CAFO or may be designated.
[2] Never a CAFO by regulatory definition, but may be designated as a CAFO on a case-by-case basis.

Draft 12/08/09

Dairy Best Management Practices to Reduce PM_{10} Emissions

The Phoenix metropolitan area has not met the federal Clean Air Act standards for PM_{10} emissions since the Act was revised in 1990. There are different levels of nonattainment based on the extent to which the Environmental Protection Agency's (EPA) National Ambient Air Quality Standards are exceeded. Under current law, any farmer who farms more than ten contiguous acres of land located within the Maricopa County PM_{10} nonattainment area and the portion of Maricopa County in Area A is required to implement PM_{10} regulations. The regulations are incorporated into the EPA-approved Statewide Implementation Plan (SIP). The SIP establishes measures that will be used to reduce emissions and attain acceptable air quality standards in general.

Recently passed legislation requires the Agricultural Best Management Practices Committee to adopt PM_{10} control rules by June 30, 2010, for animal agriculture that will apply to regulated areas in Maricopa County. The legislation defined "Regulated area" to include "any other PM_{10} particulate non-attainment area established in this state on or after June 1, 2009.The Committee consists of fifteen members from various sectors of the agricultural community, including dairy. The members are appointed by the Governor and are responsible for adopting an agricultural general permit. An agricultural general permit outlines Best Management Practices (BMPs) for regulated agricultural activities in order to reduce PM_{10} emissions. PM_{10} emissions refer to particulate matter with an aerodynamic equivalent diameter of less than ten micrometers, and are regulated for public health reasons. The Committee adopts by rule a list of BMPs that can vary according to regional or geographical conditions or management practices. The Committee is required to adopt BMPs for animal agriculture, and requires dairy, beef cattle, poultry and swine operations to follow those BMPs if they are located in an area regulated as a PM_{10} nonattainment area. Currently, the Maricopa PM_{10} particulate nonattainment area and that portion of Area A located in Maricopa County are regulated areas.

An *agricultural general permit* is defined as BMPs that reduce PM_{10} emissions. Included in the definition of an agricultural general permit are BMP's that reduce PM_{10} emissions from the activities of a dairy, beef cattle feedlot, poultry facility, or swine facility, including practices relating to:

a) unpaved access connections.

b) unpaved roads or feed lanes.

c) animal waste handling and transporting.

d) arenas, corrals and pens.

Producers will be required to select at least one BMP per category; with the total of all of control measures meeting the percentage of emission reduction the State Implementation Plan requires.

The following lists of control measures can be used to control PM_{10} emissions for each of the following categories. Each category lists an emission factor in lb/head/year that can be reduced by the individual BMP's control efficiency factor.

Emission #/hd/yr	Dairy PM_{10} Best Management Practices (BMP's)	Control Efficiency
.369	**Unpaved Access Connections**	
	Install signage that prohibits vehicular speeds in excess of 15 miles per hour.	42%
	Install speed control devices (e.g., speed bumps).	81%
	Restrict access to thru traffic by posting signs or installing gates.	10%
	At all unpaved access connections in use; a track-out device will be installed and maintained	10%
	Apply and maintain pavement, or asphaltic roadbase.	98%
	Apply and maintain gravel .	46%
	Apply and maintain dust suppressants other than water.	80%
	Application of water	70%
.123	**Unpaved Roads or Feed Lanes**	
	Install engine speed governors on vehicles used exclusively at dairy. Control to 15mph	42%
	Install signage that prohibits vehicular speeds in excess of 15 miles per hour.	42%
	Install speed control devices (e.g., speed bumps).	81%
	Restrict access to thru traffic by posting signs or installing gates.	10%
	Water roads.	70%
	Oil roads with approved (State, Federal) products.	76%
	Apply and maintain gravel, rock, and grindings on roads.	46%
	Pave (asphalic roadbase) high traffic areas.	98%
	Apply and maintain dust suppressants other than water.	80%
	Use appropriate vehicles (electric carts, small utility vehicles) instead of trucks.	20%
	Pave or cement feed lanes	49%
.123	**Animal Feeding, Waste Handling and Transporting**	
	Feed high moisture feeds (e.g., green-chop, silage).	10%
	Add water to ration mix to achieve a 20% minimum moisture level.	10%
	Add molasses or tallow to ration mix at a minimum of 1%.	10%
	Store commodities in bins, tanks, or commodity barns.	10%
	Cover all silage piles (except feeding face).	10%
	Store silage in bunkers.	10%
	Cover manure hauling trucks prior to exiting dairy & implement proper material hauling procedures.	10%
	Do not load manure trucks with dry manure when wind exceeds 25 mph.	10%
4.6	**Arenas, Corrals and Pens**	
	Use free-stall housing with concrete lanes/feeding areas to allow frequent manure removal.	60%
	Provide shade in corral to increase stocking density.	10%
	Cement cattle walkways to milk barn.	25%
	Flush, scrape, or vacuum lanes daily.	10%
	Provide cooling in corral to increase stocking density.	10%
	Add moisture to manure through coolers or fence line spraying during hot dry weather.	10%
	Frequent manure removal (every 4 months) with equipment that leaves an even corral surface of compacted manure on top of the soil.	10%
	Scrape and harrow pens on at least on a weekly basis.	10%
	Use drag equipment instead of push equipment to maintain pens.	10%
	Pile manure between cleanings.	10%
	Increase stocking density in corral to increase manure moisture.	10%
	Feed green-chop to increase wetness of manure in corral.	10%
	Keep calves in barns or hutches (under two months of age).	10%
	Do not run cattle.	10%
	Apply a fibrous layer in working/dusty areas.	10%
	Plant tree windbreak within 50 to 100 feet of arenas, corrals and pens.	30%
	Stack hay to create windbreak within 50 to 100 feet of arenas, corrals, and pens.	30%
5.215	Select at least one BMP per category; with the total of all of control measures meeting the percentage of emission reduction the State Implementation Plan requires.	

Unpaved Access Connections

An unpaved access connection is defined as any unpaved private road connection with a paved public road. The goal involves minimizing any and all material that adheres to and agglomerates on all vehicles and equipment from unpaved roads and falls onto a paved public road or the paved shoulder of a paved public road.

Unpaved Access Connections(any unpaved private road connection with a paved public road). .369 lb/head/year Emission Factor	**Control Efficiency**
Install signage that prohibits vehicular speeds in excess of 15 miles per hour.	42%
Install speed control devices (e.g., speed bumps).	81%
Restrict access to thru traffic by posting signs or installing gates.	10%
At all unpaved access connections in use; a track-out device will be installed and maintained	10%
Apply and maintain pavement, or asphaltic roadbase.	98%
Apply and maintain gravel.	46%
Apply and maintain dust suppressants other than water.	80%
Water roads.	70%

The practice of installing speed limit signs, speed bumps, or maintaining the road in such a manner that inhibits vehicular speed in excess of 15 miles per hour reduces PM_{10} from getting on to the paved public road from unpaved access connections. PM_{10} becomes entrained when vehicles pass over the unpaved road or area surface and can also be suspended by natural winds. PM_{10} emissions are a function of speed, meaning reducing speed reduces PM_{10} emissions. There is a linear relationship between speed and emissions; therefore, reducing speed to 15 mph will result in proportional emission reductions. A study performed by UC Davis in Fresno County examined speed reduction and found that reducing speed from 25 mph to 10 mph achieved 58% ± 3 control effectiveness and 42% ± 35 control effectiveness from 25 mph to 15 mph. For example, because the emissions from unpaved roads are directly proportional to vehicle speed, if the speed is reduced to 12.5 mph, the effectiveness of the control is more than doubled from 36% to 87%.

Restricting access means to limit public access to private roads and areas. That can be achieved by installing a line with a no-trespassing sign, by placing any other type of physical restriction across the road to discourage the use of it, or by signage that limits public access and thru traffic. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, restricting access will discourage the unnecessary use of the unpaved road and reduces emissions. With this concept, it is reasonable to assume that none to very minimal PM_{10} emissions would result from the mechanical disturbance of soil by the tires and vehicle on those unpaved roads and areas during non-agricultural activity.

Track-out control measures installed between the paved roads and unpaved vehicle/equipment traffic areas assist in reducing PM_{10} when vehicle pass over the unpaved road or area surface and onto traffic areas. This can be accomplished by maintaining sufficient length of paved/graveled interior roads to allow mud and dirt to drop off vehicles before exiting the site; or use of a grizzly to dislodge debris from tires and undercarriage of vehicles leaving site. The track out device must be a suitable trackout control device that controls and prevents trackout and/or removes particulate matter from tires and the exterior surfaces of motor vehicles that traverse the site.

If trackout occurs, the owner and/or operator shall repair and/or replace the control measure(s) and shall clean up immediately such trackout from areas accessible to the public including curbs, gutters, and sidewalks when trackout extends a cumulative distance of 25 linear feet or more and at the end of the day for all other trackout.

Water can be used as a control measure on unpaved roads and unpaved vehicle/equipment traffic areas to reduce PM_{10} emissions. The emissions on these roads and areas result from the mechanical disturbance of soil by the tires and vehicle. Water increases soil particle mass by binding to them and also adds surface tension forces. Even after water evaporation, the properties of the cohesion of water and particles remains due to the formation of aggregates and surface crusts.
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Paving unpaved roads, feed lanes, and high traffic unpaved vehicle/equipment traffic areas can be used to reduce PM_{10} emissions when vehicles pass over the unpaved road or area surface. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, they can be reduced by changing the surface of the road. Paving changes the soil surface by providing a permanent protection from the tires and eliminates the amount of PM_{10} emissions being suspended in the air.

Gravel or other aggregate material can be used as a control measure on unpaved roads and unpaved vehicle/equipment traffic areas to reduce PM_{10} emissions when vehicle pass over the unpaved road or area surface. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, they can be reduced by changing the surface of the road. Gravel provides a protection similar to a chemical stabilization. It adds a layer that separates the soil surface from the tires and reduces the amount of PM_{10} emissions being suspended in the air. A layer of gravel must be placed at an appropriate depth to minimize emissions.

Applying nontoxic chemical or organic PM_{10} suppressants as a control measure on unpaved roads and unpaved vehicle/equipment traffic areas reduces PM_{10} emissions when vehicle pass over the unpaved road or area surface. These control measures must not be prohibited for use by any applicable regulation and also must meet any specification required by any federal, state, or local water agency. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, they can be reduced by changing the surface of the road either with wet suppression or chemical stabilization. Wet suppression keeps the road surface wet to control emissions. Chemical stabilization tries to change the physical characteristics of the surface. For example, road oil forms a coat over PM_{10} forming a hard crust and also improves the cohesive resistance of road material. It usually can be applied once every two to three months and re-applied several times per year to maintain its efficiency. Other types of dust suppressant have high water content to dilution ratios that allows the water to evaporate once applied to the soil and the non-water solution bonds the fine soil particles making them into larger particles; thus making those particles less susceptible to being entrained. Others draw moisture from the environment that acts to keep road surfaces moist, thus holding PM_{10} emissions down. Several studies were performed to evaluate the control effectiveness of PM_{10} suppressants. Two of them were performed in the San Joaquin Valley; one in Fresno County by UC Davis, and the other in Merced County by the Desert Research Institute. These two studies provide the best available data to date. Here's an explanation of the PM_{10} suppressant properties as described by the Desert Research Institute:

- **Salts:** these are hygroscopic compounds such as magnesium chloride or calcium chloride. They absorb water when the relative humidity exceeds about 50%. Water improves the adherence of the soil particles to each other. Salts are often depleted by precipitation and runoff owing to their high solubility.
- **Resin or petroleum emulsion:** these are non-water-soluble organic compounds that are emulsified or suspended in water. When these emulsions are sprayed onto soil, they stick the soil

particles together, and eventually harden to form a solid mass. There are several emulsion products based on tree resin, petroleum, or asphalt compounds.

- **Polymers:** these act as adhesives which may be more effective than ordinary resins because their molecular structure is a long chain which in theory may be able to stick to more particles, or bridge larger particle-to-particle gaps.
- **Surfactants**: these reduce water surface tension, allowing available moisture to more effectively wet the particles and aggregates in the surface layer.
- **Bitumens:** these include materials such as asphalt or road oil that effectively pave the surface.
- **Adhesives:** these include lignin sulfonate, a syrupy wood product which creates a sticky but water-soluble layer.
- **Solid materials:** these include a petroleum industry by-product made by mixing recycled materials with earth materials.

Unpaved Roads or Feed Lanes

When a vehicle travels on an unpaved surface, such as an unpaved road or unpaved parking lot, the force of the wheels on the road surface causes pulverization of surface material. PM_{10} are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. The quantity of PM_{10} emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on source parameters that characterize the condition of a particular road and the associated vehicle traffic.

Control measures for unpaved roads and feed lanes include application of chemical dust suppressants, paving the surface or placing a layer of gravel over the unpaved surface, speed reduction, access restriction, and utilizing appropriate vehicles.

Unpaved Roads or Feed Lanes **.123 lb/head/year Emission Factor**	**Control Efficiency**
Install engine speed governors on vehicles used exclusively at dairy. Control to 15mph.	42%
Install signage that prohibits vehicular speeds in excess of 15 miles per hour.	42%
Install speed control devices (e.g., speed bumps).	81%
Restrict access to thru traffic by posting signs or install gates.	10%
Water roads.	70%
Oil roads with approved (State, Federal) products.	76%
Apply and maintain gravel, rock, and grindings on roads.	46%
Pave (asphalic roadbase) high traffic areas.	98%
Apply and maintain dust suppressants other than water	80%
Use appropriate vehicles (electric carts, small utility vehicles) instead of trucks.	20%
Pave or cement feed lanes.	49%

The practice of installing speed governors on dairy vehicles, speed limit signs, speed bumps, or maintaining the road in such a manner that inhibits vehicular speed in excess of 15 miles per hour reduces PM_{10} emissions. PM_{10} emissions become entrained when vehicles pass over the unpaved road or area surface and can also be suspended by natural winds. PM_{10} emissions are a function of speed, meaning reducing speed reduces PM_{10} emissions. There is a linear relationship between speed and emissions; therefore, reducing speed to 15 mph will result in proportional emission reductions. A study performed by UC Davis in Fresno County examined speed reduction and found that reducing speed from 25 mph to 10 mph achieved 58% ± 3 control effectiveness and 42% ± 35 control effectiveness from 25 mph to 15 mph. For example, because the emissions from unpaved roads are directly proportional to vehicle speed, if the speed is reduced to 12.5 mph, the effectiveness of the control is more than doubled from 36% to 87%.

Restricting access means to limit public access to private roads and areas. That can be achieved by installing a line with a no-trespassing sign, by placing any other type of physical restriction across the road to discourage the use of it, or by signage that limits public access and thru traffic. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, restricting access will discourage the unnecessary use of the unpaved road and reduces emissions. With this concept, it is reasonable to assume that none to very minimal PM_{10} emissions would result from the mechanical disturbance of soil by the tires and vehicle on those unpaved roads and areas during non-agricultural activity.

Water can be used as a control measure on unpaved roads and unpaved vehicle/equipment traffic areas to reduce PM_{10} emissions. The emissions on these roads and areas result from the mechanical disturbance of soil by the tires and vehicle. Water increases soil particle mass by binding to them and also adds surface tension forces. Even after water evaporation, the properties of the cohesion of water and particles remains due to the formation of aggregates and surface crusts.

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Paving unpaved roads, feed lanes, and high traffic unpaved vehicle/equipment traffic areas can be used to reduce PM_{10} emissions when vehicles pass over the unpaved road or area surface. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, they can be reduced by changing the surface of the road. Paving changes the soil surface by providing a permanent protection from the tires and eliminates the amount of PM_{10} emissions being suspended in the air.

Gravel or other aggregate material can be used as a control measure on unpaved roads and unpaved vehicle/equipment traffic areas to reduce PM_{10} emissions when vehicle pass over the unpaved road or area surface. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, they can be reduced by changing the surface of the road. Gravel provides a protection similar to a chemical stabilization. It adds a layer that separates the soil surface from the tires and reduces the amount of PM_{10} emissions being suspended in the air. A layer of gravel must be placed at an appropriate depth to minimize emissions.

Applying nontoxic chemical or organic PM_{10} suppressants as a control measure on unpaved roads and unpaved vehicle/equipment traffic areas reduces PM_{10} emissions when vehicle pass over the unpaved road or area surface. These control measures must not be prohibited for use by any applicable regulation and also must meet any specification required by any federal, state, or local water agency. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, they can be reduced by changing the surface of the road either with wet suppression or chemical stabilization. Wet suppression keeps the road surface wet to control emissions. Chemical stabilization tries to change the physical characteristics of the surface. For example, road oil forms a coat over PM_{10} forming a hard crust and also improves the cohesive resistance of road material. It usually can be applied once every two to three months and re-applied several times per year to maintain its efficiency. Other types of dust suppressant have high water content to dilution ratios that allows the water to evaporate once applied to the soil and the non-water solution bonds the fine soil particles making them into larger particles; thus making those particles less susceptible to being entrained. Others draw moisture from the environment that acts to keep road surfaces moist, thus holding PM_{10} emissions down. Several studies were performed to evaluate the control effectiveness of PM_{10} suppressants. Two of them were performed in the San Joaquin Valley; one in Fresno County by UC Davis, and the other in Merced County by the Desert Research Institute. These two studies provide the best available data to date. Here's an explanation of the PM_{10} suppressant properties as described by the Desert Research Institute:

- **Salts:** these are hygroscopic compounds such as magnesium chloride or calcium chloride. They absorb water when the relative humidity exceeds about 50%. Water improves the adherence of the soil particles to each other. Salts are often depleted by precipitation and runoff owing to their high solubility.
- **Resin or petroleum emulsion:** these are non-water-soluble organic compounds that are emulsified or suspended in water. When these emulsions are sprayed onto soil, they stick the soil particles together, and eventually harden to form a solid mass. There are several emulsion products based on tree resin, petroleum, or asphalt compounds.
- **Polymers:** these act as adhesives which may be more effective than ordinary resins because their molecular structure is a long chain which in theory may be able to stick to more particles, or bridge larger particle-to-particle gaps.

- **Surfactants**: these reduce water surface tension, allowing available moisture to more effectively wet the particles and aggregates in the surface layer.
- **Bitumens:** these include materials such as asphalt or road oil that effectively pave the surface.
- **Adhesives:** these include lignin sulfonate, a syrupy wood product which creates a sticky but water-soluble layer.
- **Solid materials:** these include a petroleum industry by-product made by mixing recycled materials with earth materials.

Using appropriate vehicles (electric carts, small utility vehicles) instead of trucks to perform routine tasks or trips on the dairy will reduce PM_{10} emissions. These vehicles weigh significantly less than a truck and cause less soil disturbance.

Animal Feeding, Waste Handling and Transporting

The daily activities on dairies of feeding animals and removing manure require the handling and transportation of large amounts of bulk materials. These activities contribute to PM_{10} emissions on dairies. A number of procedures have been identified to reduce these emissions when storing and handling bulk materials.

PM_{10} emissions in animal feeding operations originate from feed, bedding material, and manure, and can depend on several factors such as stocking density, and feeding methods. Emissions result from the disturbance of dry and loose surface caused by animal movement and mechanical disturbances by the tires and vehicle.

Animal Feeding, Waste Handling and Transporting **.123 lb/head/year Emission Factor**	**Control Efficiency**
Feed high moisture feeds (e.g., green-chop, silage).	10%
Add water to ration mix to achieve a 20% minimum moisture level.	10%
Add molasses or tallow to ration mix at minimum of 1%.	10%
Store commodities in bins, tanks or commodity barns.	10%
Cover all silage piles (except feeding face).	10%
Store silage in bunkers.	10%
Cover manure hauling trucks prior to exiting dairy and implement the proper material hauling procedures.	10%
Do not load manure trucks with dry manure when wind exceeds 25 miles per hour	10%

Feeding operations include the procurement and storage of large quantities of different feed ingredients. These various ration components are mixed together then transported to the feed lanes and dispensed to the animals multiple times a day. The PM_{10} emissions from feed storage areas due to wind erosion can be reduced by the use of bunkers, coverings, bins, tanks, and commodity barns. High moisture feeds and the addition of water, oils and molasses to feed rations reduce PM_{10} emissions by binding these small particles to the larger ones in the ration.

Manure management activities require that periodically large amounts of dry manure are removed from the animal pens and transported to sites where they are applied for fertilizer in agricultural crops. When manure hauling trucks are in transit from the dairy to the land application sites covering the truck loads of dry manure reduces PM_{10} emissions. Limiting manure loading operations to days where the wind is blowing less than 25 mph will also reduce PM_{10} emissions.

Bulk material hauling off-site and crossing and/or accessing an area accessible to the public:

1. Load all vehicles used to haul bulk material, including animal waste, such that the freeboard is not less than three inches:
2. Prevent spillage of loss of bulk material, including animal waste, from holes or other openings in the cargo compartment's floor, sides, and/or tailgate(s);
3. Cover cargo compartment with a tarp or other suitable closure; and
4. Install, maintain, and use a suitable trackout control device that controls and prevents track-out and/or removes particulate matter from tires and the exterior surfaces of motor vehicles that traverse the site.

Arenas, Corrals and Pens

The control of PM_{10} emissions in areas where animals are housed can be broken down into a number of different mitigation strategies. Physical design characteristics of dairies can have a significant impact on reducing PM_{10} emissions. Another area where PM_{10} emissions can be minimized are management procedures that not only optimize operations for the efficient production of milk but also take into account each procedures impact on PM_{10} emission reductions.

Arenas, Corrals and Pens **4.6 lb/head/year Emission Factor**	**Control Efficiency**
Use free-stall housing with concrete lanes/feeding areas to allow frequent manure removal.	60%
Provide shade in corrals to increase stocking density.	10%
Cement cattle walkways to milk barn.	25%
Flush, scrape, or vacuum lanes daily.	10%
Provide cooling in corrals to increase stock density.	10%
Add moisture to manure through coolers or fence line spraying during hot dry weather.	10%
Frequent manure removal (every 4 months) with equipment that leaves an even corral surface of compacted manure on top soil.	10%
Scrape and harrow pens on at least a weekly basis.	10%
Use drag equipment instead of push equipment to maintain pens.	10%
Pile manure between cleaning.	10%
Increase stocking density in corrals to increase manure moisture.	10%
Feed green-chop to increase wetness of manure in corrals.	10%
Keep calves in barns or hutches (under two months of age).	10%
Do not run cattle.	10%
Plant tree windbreak within 50 to 100 feet of arenas, corrals and pens.	30%
Stack hay to create windbreak within 50 to 100 feet of arenas, corrals, and pens.	30%
Fibrous layer in working/dusty areas.	10%

The designs of dairies are characterized as either open corral or free-stall. In open corral dairies, animals are confined in large, open air, fenced corrals on a surface of compacted manure. Free-stall dairy designs house the animals under roofed structures, on concrete floors where there is a minimum of contact with compacted manure. The disturbance of the corral surfaces, by animal movement, is a source of emissions. Other features that are incorporated into both of these designs that can reduce emissions are:

- Concrete walkways from the animal housing to the milk barn, which eliminate animal contact with compacted manure surfaces.
- Flush systems that remove manure from the concrete feed apron on daily basis, reducing the overall manure build up in corrals. This removal of manure on a daily basis assists in maintaining a 1” to 3” manure pack in the corrals.
- Evaporative cooling systems under corral shades, which increase animal stocking densities and add moisture to the manure pack.

The use of free-stall housing results in a reduction in the amount of generated dust. For this area of the facility, emissions would otherwise result from the disturbance of dry and loose corral surface caused by animal movement. Having a concrete floor eliminates having a dry, loose surface, thus reducing PM_{10} emissions. It also allows for manure deposition to be cleaned through a flushing system. The manure

would already be in a high moisture state at that stage. The practice may also be practical for reducing PM_{10} emissions of dry cows and heifers.

The practice of providing shaded areas in open corrals involves providing shades for the animals to loaf in. For this area of the facility, emissions result from the disturbance of the dry and loose surface caused by animals. By providing shades, it allows the animals to stay in shaded areas together, thus increasing stocking density under the shades, which in turn, increases the moisture content of the surface, and thereby reduces PM_{10} emissions.

The practice of frequent scraping/harrowing and/or manure removal in the corrals prevents the build-up of dry loose manure which can be conveyed airborne by the animals hoof action. The management objective for open corral surfaces is to maintain a firm hard, well drained surface consisting of a 1-3" layer of well compacted manure and soil over the mineral subsoil, minimizing the depth of uncompacted manure on the corral surface. Moreover, the piling of manure in low traffic areas not only reduces the surface area of manure exposed to wind erosion but also reduces the redistribution of un-compacted manure by animal activity. An even corral manure pack surface can be achieved with a piece of equipment that allows operators to leave it leveled evenly with compacted manure on top of soil. It is physically more difficult to ensure that a pushed scraper blade (e.g.: front loader) leaves an even, smooth surface than a pulled blade (e.g.: box scraper). Pull-type equipment stabilizes soil surface by avoiding floor depressions for PM_{10} accumulation and accumulation of dry soil/manure.

Stocking densities in corrals can be increased to increase the moisture level in the manure pack. Feeding strategies that increase the moisture level in manure can also be used to reduce PM_{10} emissions in corrals. Housing calves in barns or hutches (two months of age or less) reduces PM_{10} emissions by removing these animals from the manure pack of the corrals.

Operation procedures that strictly forbid herding tactics that make animals run will reduce PM_{10} emission. With dairy animals being moved from the corrals to the milking parlor multiple times per day this procedure can have a significant affect.

Planting trees or stacking hay bales to form a windbreak establishes a boundary that disrupts the erosive flow of wind over unpaved roads and areas. This wind barrier reduces the PM_{10} emissions typically stirred up in the process due to winds. The effectiveness of a barrier depends on the height, density, orientation, and length. For instance, it was found that a wind barrier reduces wind speeds up to 30 times their height downwind and that the sheltered area is defined as ten times the height on the leeward side and two times the height on the windward side of the barrier. The maximum benefit of using this practice is when the barriers are as perpendicular as possible to the prevailing wind direction. Examples of barrier are continuous board fences, trees, shrubs, conifers, burlap fences, crate walls, bales of hay, etc. A basic requirement is to have a continuous row of barriers. The longer it is the better the protection it provides.

The practice "Fibrous Layer in Working Areas" or "Fibrous Layer in Dusty Areas" means to add fibrous or damp material to these areas. Emissions result from the disturbance of the dry and loose surface caused by animal movement. This practice prevents fugitive dust disturbance and entrainment by retaining moisture longer. This practice is more applicable to areas that heifers occupy. For example, it can be achieved by adding wood chips, dry separated manure solids, or other materials to sorting alleys and high traffic areas to hold moisture and keep down dust disturbance. Another example is to put damp manure solids right off the separator into the heifer pens on a daily basis and working it with a harrow. This keeps the more fibrous materials at the surface and the finer below, enabling the fibrous layer to trap the finer particles.

Draft 12.07.09
Poultry Best Management Practices to Reduce PM_{10} Emissions

The Phoenix metropolitan area has not met the federal Clean Air Act standards for PM_{10} emissions since the Act was revised in 1990. There are different levels of nonattainment based on the extent to which the Environmental Protection Agency's (EPA) National Ambient Air Quality Standards are exceeded. Under current law, any farmer who farms more than ten contiguous acres of land located within the Maricopa County PM_{10} nonattainment area and the portion of Maricopa County in Area A is required to implement PM_{10} regulations. The regulations are incorporated into the EPA-approved Statewide Implementation Plan (SIP). The SIP establishes measures that will be used to reduce emissions and attain acceptable air quality standards in general.

Recently passed legislation (SB 1225) requires the Agricultural Best Management Practices Committee to adopt PM_{10} control rules by June 30, 2010, for animal agriculture that will apply to regulated areas in Maricopa County. Retroactive to June 1, 2009, it also stipulates that rules adopted that regulate animal agriculture and commercial farming in future PM_{10} nonattainment areas be adopted through the Committee BMP process. The Committee consists of fifteen members from various sectors of the agricultural community, including poultry. The members are appointed by the Governor and are responsible for adopting an agricultural general permit. An agricultural general permit outlines Best Management Practices (BMP's) for regulated agricultural activities in order to reduce PM_{10} emissions. PM_{10} emissions refer to particulate matter with an aerodynamic equivalent diameter of less than ten micrometers, and are regulated for public health reasons. The Committee adopts by rule a list of BMP's that can vary according to regional or geographical conditions or management practices. The Committee is required to adopt BMP's for animal agriculture, and requires dairy, beef cattle, poultry and swine operations to follow those BMP's if they are located in an area regulated as a PM_{10} nonattainment area. Currently, the Maricopa PM_{10} particulate nonattainment area and that portion of Area A located in Maricopa County are regulated areas.

An *agricultural general permit* is defined as BMP's that reduce PM_{10} emissions. Included in the definition of an agricultural general permit are BMP's that reduce PM_{10} emissions from the activities of a dairy, beef cattle feedlot, poultry facility, or swine facility, including practices relating to:

a) unpaved access connections.

b) unpaved roads or feed lanes.

c) animal waste handling and transporting.

d) arenas, corrals and pens.

Pursuant to SB 1225 producers are required to select two BMP's from each of the four categories.

For poultry facilities with 25,000 egg laying hens or more the following lists of control measures can be used to control PM_{10} emissions for each of the following categories. Each category lists an emission factor in lb/head/year that can be reduced by the individual BMP's control efficiency factor.

Emissions	**Poultry Operations PM10 Best Management Practices (For poultry facilities with 25,000 egg laying hens or more)**	Control Efficiency %
2lbs/Vehicle Miles Traveled	**Unpaved Access Connections (any unpaved private road connection with a paved public road)**	
	Install signage that prohibits vehicular speeds in excess of 15 miles per hour.	42
	Install speed control devices (e.g., speed bumps, closed gates).	81
	Restrict access to thru traffic by posting signs or installing gates.	10
	At all exits; install gravel pad, pavement or other track-out control device between all unpaved road connection and paved public road.	10
	Unpaved Roads/Equipment Areas	
	Install signage that prohibits vehicular speeds in excess of 15 mph	42
	Restrict access to thru traffic by posting signs or installing gates	10
	Sprinkle water	70
	Use gravel, rock, or grindings	46
.0213lbs/Hd/Yr	**Animal Feeding, Waste Handling and Transportation**	
	Remove spilled feed from the facility at least once every 14 days	10
	Store feed in an enclosed weatherproof storage structure	10
	Add oil and/or water to the feed rations to minimize PM_{10} during feed handling and consumption	10
	Distribute feed within the houses in an enclosed feed distribution system	10
	Use a flexible discharge spout on the end of the feed truck transfer auger for feed deliveries to the site	10
	Minimize drop distance from feed distribution system into feeders (i.e. extension line off of feed distribution system into feeder)	10
	Enclose transfer point(s) from the feed storage structure to the in-house feed distribution system	10
	Wash floors and walls between animal groups to remove PM_{10} and manure accumulations	10
	Clean aisles between cage rows at least twice every 14 days to prevent dried manure, spilled feed, and debris accumulation	10
	Stack separated solids to minimize surface area exposure	10
	Maintain moisture in solids	10
	Housing	
	Clean/wash fans, louvers, and soffit inlets between animal groups to remove PM_{10} accumulation	10
	No bedding is used in the production facility	10
	Control vegetation on building exteriors to prevent PM_{10} accumulation	10
	Add moisture through coolers in housing on dry hot days	10
	Poultry housed in fully enclosed ventilated buildings	10*

Emissions and Control Efficiency figures are based on the Conservation Services Report Program Report for 2005 dated January 19, 2006 to the San Joaquin Valley Air Pollution Control District.

Prepared by Patia Siong, Senior Air Quality Specialist and Samir Sheikh, Permit Services Manager. Reviewed by David Warner, Director of Permit Services and Seyed Sadredin, Deputy APCO. Report is found at: http://www.valleyair.org/farmpermits/updates/cmp_program_report_for_2005.pdf

Where Control efficiency figures are unknown, a level of 10 is assumed per the approach adopted in the Conservation Services Report Program Report for 2005 dated January 19, 2006 to the San Joaquin Valley Air Pollution Control District cited in the previous paragraph. Pursuant to communications with Sheraz Gill, Supervising Air Quality Engineer, San Joaquin Valley Air Pollution Control district on December 2, 2009, the hen PM_{10} emission factor that the San Joaquin Valley Air Pollution Control District is currently using is 0.0213 lbs/hd-yr. This is based on the study *"Particulate Matter and Ammonia Emission Factors for tunnel-Ventilated broiler houses in the Southern US", R.E. Lacey, J.S. Redwine, C.B Parnell, Jr*.

This document will need to be reevaluated when additional emissions and control efficiency data is available for poultry.

*We have conservatively assumed a control efficiency of 10 for the BMP "Poultry housed in fully enclosed ventilated buildings" based on the assumptions used in the San Joaquin Valley. However, it is certain that the most efficient control factor for PM10 in poultry production is in fact such housing.

Unpaved Access Connections

An unpaved access connection is defined as any unpaved private road connection with a paved public road. The goal involves minimizing any and all material that adheres to and agglomerates on all vehicles and equipment from unpaved roads and falls onto a paved public road or the paved shoulder of a paved public road.

Unpaved Access Connections(any unpaved private road connection with a paved public road	Control Efficiency
Install signage that prohibits vehicular speeds in excess of 15 miles per hour.	42%
Install speed control devices (e.g., speed bumps, closed gates).	81%
Restrict access to thru traffic by posting signs or installing gates.	10%
At all exits; install gravel pad, pavement or other track-out control device between all unpaved road connection and paved public road.	10%

The practice of installing speed limit signs, speed bumps, or maintaining the road in such a manner that inhibits vehicular speed in excess of 15 miles per hour reduces PM_{10} from getting on to the paved public road from unpaved access connections. PM_{10} becomes entrained when vehicles pass over the unpaved road or area surface and can also be suspended by natural winds. PM_{10} emissions are a function of speed, meaning reducing speed reduces PM_{10} emissions. There is a linear relationship between speed and emissions; therefore, reducing speed to 15 mph will result in proportional emission reductions.

Restricting access means to limit public access to private roads and areas. That can be achieved by installing a line with a no-trespassing sign, by placing any other type of physical restriction across the

road to discourage the use of it, or by signage that limits public access and thru traffic. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, restricting access will discourage the unnecessary use of the unpaved road and reduces emissions. With this concept, it is reasonable to assume that none to very minimal PM_{10} emissions would result from the mechanical disturbance of soil by the tires and vehicle on those unpaved roads and areas during non-agricultural activity.

Track-out control measures installed between the paved roads and unpaved vehicle/equipment traffic areas assist in reducing PM_{10} when vehicle pass over the unpaved road or area surface and onto traffic areas. This can be accomplished by maintaining sufficient length of paved/graveled interior roads to allow mud and dirt to drop off vehicles before exiting the site; or use of other methods to dislodge debris from tires and undercarriage of vehicles leaving site.

Unpaved Roads/Equipment Areas

When a vehicle travels on an unpaved surface, such as an unpaved road or unpaved equipment area, the force of the wheels on the road surface causes pulverization of surface material. PM_{10} are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. The quantity of PM_{10} emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on source parameters that characterize the condition of a particular road and the associated vehicle traffic.

Control measures for unpaved roads and equipment areas include application of chemical dust suppressants, paving the surface or placing a layer of gravel over the unpaved surface, speed reduction, access restriction, and utilizing appropriate vehicles.

Unpaved Roads/Equipment Areas	Control Efficiency
Install signage that prohibits vehicular speeds in excess of 15 miles per hour.	42%
Restrict access to thru traffic by posting signs or install gates.	10%
Sprinkle water	70%
Use gravel, rock, or grindings	46%

The practice of installing speed limit signs in such a manner that inhibits vehicular speed in excess of 15 miles per hour reduces PM_{10} emissions. PM_{10} emissions become entrained when vehicles pass over the unpaved road or area surface and can also be suspended by natural winds. PM_{10} emissions are a function of speed, meaning reducing speed reduces PM_{10} emissions. There is a linear relationship between speed and emissions; therefore, reducing speed to 15 mph will result in proportional emission reductions.

Restricting access means limiting public access to private roads and equipment areas. That can be achieved by installing a line with a no-trespassing sign, by placing any other type of physical restriction across the road to discourage the use of it, or by signage that limits public access and thru traffic. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle,

restricting access will discourage the unnecessary use of the unpaved road and reduces emissions. With this concept, it is reasonable to assume that none to very minimal PM_{10} emissions would result from the mechanical disturbance of soil by the tires and vehicle on those unpaved roads and areas during non-agricultural activity.

Water can be used as a control measure on unpaved roads and unpaved equipment areas to reduce PM_{10} emissions. The emissions on these roads and areas result from the mechanical disturbance of soil by the tires and vehicle. Water increases soil particle mass by binding to them and also adds surface tension forces. Even after water evaporation, the properties of the cohesion of water and particles remains due to the formation of aggregates and surface crusts.

Gravel or other aggregate material can be used as a control measure on unpaved roads and unpaved equipment areas to reduce PM_{10} emissions when vehicles pass over the unpaved road or area surface. Because PM_{10} emissions result from the mechanical disturbance of soil by the tires and vehicle, they can be reduced by changing the surface of the road. Gravel provides a protection similar to a chemical stabilization. It adds a layer that separates the soil surface from the tires and reduces the amount of PM_{10} emissions being suspended in the air. A layer of gravel must be placed at an appropriate depth to minimize emissions.

Animal Feeding, Waste Handling and Transporting

PM_{10} emissions in animal feeding operations originate from feed, bedding material, and manure, and can depend on several factors. Emissions result from the disturbance of dry and loose surface materials caused by animal movement and mechanical disturbances by vehicles.

Animal Feeding, Waste Handling and Transporting	Control Efficiency
Remove spilled feed from the facility at least once every 14 days	10%
Store feed in an enclosed weatherproof storage structure	10%
Add oil and/or water to the feed rations to minimize PM_{10} during feed handling and consumption	10%
Distribute feed within the houses in an enclosed feed distribution system	10%
Use a flexible discharge spout on the end of the feed truck transfer auger for feed deliveries to the site	10%
Minimize drop distance from feed distribution system into feeders (i.e. extension line off of feed distribution system into feeder)	10%
Enclose transfer point(s) from the feed storage structure to the in-house feed distribution system	10%
Wash floors and walls between animal groups to remove PM_{10} and manure accumulations	10%
Clean aisles between cage rows at least twice every 14 days to prevent dried manure, spilled feed, and debris accumulation	10%
Stack separated solids to minimize surface area exposure	10%
Maintain moisture in solids	10%

Poultry feed is delivered to the housing unit site premixed. No raw material storage or feed mixing occurs on-site. Poultry feed is bulk stored outside of the housing units. Bulk feed deliveries occur on an as-needed basis. From the bulk feed storage area, feed is transferred into the housing units as necessary. Once inside of the housing units, the feed is distributed into feeders.

Fugitive particulate matter (PM_{10}) emissions in animal feeding operations can originate from feed and feed transfer. Emissions due to wind can be reduced by minimizing wind contact through use of a flexible discharge spout on the end of the feed truck transfer auger for bulk feed deliveries to the housing units and storing bulk feed inside of weatherproof storage structures. Addition of water and/or oils to feed rations can reduce PM_{10} emissions by binding the small particles to the larger ones in the ration. Emissions can be further reduced through enclosing transfer point(s) from the bulk feed storage structure to the in-house feed distribution system, distribution of feed within the houses in an enclosed feed distribution system, and minimizing drop distance from the feed distribution system into feeders. All of these practices will reduce emissions by reducing introduction of PM_{10} into the air during feed disturbance by minimizing air contact during feed conveyance. Removing spilled feed from the facility at least once every 14 days will minimize the PM_{10} emissions from air movement across feed spills.

When disturbed by animals or employees, dried manure, dust, and spilled feed can contribute to PM_{10} emissions. Washing cage rows, floors, and walls between animal groups will prevent dust and manure accumulation. Cleaning aisles between cage rows at least twice every 14 days will prevent dried manure, spilled feed, and debris accumulation.

Fugitive PM_{10} emissions can originate from the solids and manure stacks. PM_{10} emission can be reduced by stacking separated solids to minimize surface area exposure, minimizing wind exposure. Maintaining moisture in the solids can also reduce PM_{10} emissions by binding the small particles to the larger particles.

Housing

The control of PM_{10} emissions in areas where animals are housed can be broken down into different mitigation strategies. Physical design characteristics of houses can have a significant impact on reducing PM_{10} emissions. Another area where PM_{10} emissions can be minimized is management procedures that not only optimize operations for efficient production but also take into account each procedures impact on PM_{10} emission reductions.

*We have conservatively assumed a control efficiency of 10 for the BMP "Poultry housed in fully enclosed ventilated buildings" based on the assumptions used in the San Joaquin Valley. However, it is certain that the most efficient control factor for PM10 in poultry production is in fact such housing.

Housing	Control Efficiency
Clean/wash fans, louvers, and soffit inlets between animal groups to remove PM_{10} accumulation	10

No bedding is used in the production facility	10
Control vegetation on building exteriors to prevent PM_{10} accumulation	10
Add moisture through coolers in housing on dry hot days	10
Poultry housed in fully enclosed ventilated buildings	10*

Poultry are produced inside of temperature regulated housing units with mechanical ventilation for comfort. The disturbance of housing unit surfaces, by air movement and animal/employee movement, is a source of PM_{10} emissions. PM_{10} emissions can be reduced through dust mitigation inside and around the housing units.

Mechanical ventilation fans accumulate dust on the fan blades and louvers as they operate; cleaning/washing fan blades and louvers between animal groups reduces PM_{10} that can break free into the air from the fans and louvers. Vegetation around the housing units can increase PM_{10} emissions by trapping dust then dispensing into the atmosphere as air moves across it. Controlling vegetation on building exteriors will prevent dust accumulation.

The disturbance of dried solids build-up results in PM_{10} emissions. Perforated flooring allows effluent from the animals to fall below the floor, minimizing solids build-up within the enclosure. The use of bedding results in PM_{10} emissions due to the disturbance and break down of bedding material as well as disturbance of solids accumulation within the bedding material. PM_{10} emissions from bedding material and solids accumulation are prevented by not using bedding material.

The addition of moisture through in-house coolers on hot days reduces PM_{10} emissions by increasing the moisture level in the air and on surfaces, reducing PM_{10}emissions caused by air movement and animal/employee disturbance. Addition of moisture will also help prevent any solids accumulation from drying out and becoming airborne as PM_{10} during disturbance.

United Dairymen of Arizona
Response to Maricopa County Air Quality Department
Comments on the Dairy Best Management Practices Draft
December 7, 2009

The following is United Dairymen of Arizona's response to Maricopa County's comments on the "Draft Dairy Best Management Practices to Reduce PM_{10} Emissions.

General Comments:

1. All of the emission factors and control efficiencies represented in the draft BMP's were derived from documents we reviewed in the San Joaquin Valley Air Pollution Control District (SJVAPCD), the California Air Resources Board (CARB) and the Western Region Air Partnership (WRAP). These documents contain hundreds of pages in a variety of sections and locations. Therefore we refrain from providing citations for each page and location as these were derived from their websites, printed versions of their rules and other printed materials. If the technical committee or Maricopa County desires specific citations we suggest the committee conduct a review of each individual BMP to determine if: 1) The BMP is valid or questionable; 2) Is the emission factor reasonable or not; and 3) If there are questions regarding the origin use of the BMP on other Jurisdictions.

2. Sentence clarification added to draft document.

3. See comment #1.

4. We agree that "equivalent" requirements are necessary in order to not backslide from the existing SIP. We specifically supported the inclusion of statutory language in SB1225 requiring no backsliding in the development of BMP's. Therefore, we are suggesting the combination of an expanded BMP program (more measures than provided in SVJAPCD) which reduces significant amounts of potential and real emissions; potentially "designated" (or required) individual BMP's (such as a requirement to remove manure from the corrals a minimum of three times a year) ; potential to add an annual reporting requirements; all coupled with the state, federally and judicially recognized components of the SVJAPCD program will create an "equivalent" if not enhanced emission reduction program which will meet the necessary SIP requirements. We will provide the mathematical evidence to demonstrate how the implementation of this type of BMP program will exceed all levels of suppression or reduction in emissions envisioned by the current SIP development process. We will demonstrate how the emissions inventory; potential control measures; and 5% reduction targets will be met through this comprehensive BMP Program.

5. Page 9 of the Emission Reduction Calculations Methodology for Dairy & Feed Lots CMPS. By adding the emission factors listed on this page and using the emission factor for Open Corral dairies (there are no free-stall dairies in the non-attainment area) the emission factor will total 5.22 lbs/hd/yr.

6. Comment noted.

7. The Emission Reduction Calculations Methodology for Dairies & Feed Lots CMPS document, page 4, section C.

Comments on Unpaved Access Connections BMPs

8. If the unpaved access connection is privately owned by the dairy or part of a contractual lease the dairy has committed to; then any of the control measures may be applied to the roadway. If the road does not belong to the dairy operation (for example, a county road) then the responsibility of PM_{10} mitigation belongs to the legal owner.

9. SJVAPCD's program lists these control measures separately with corresponding control efficiencies. Many dairies have more than 50 employees, along with daily activities of hauling milk and feed. The limiting of trips per day alone would be unrealistic.

10. There is no difference in the emission of PM_{10} particulate matter from vehicle travel on unpaved access connection or unpaved roads and equipment areas.

11. BMPs have been added.

12. The BMP narrative has been revised.

13. We agree that "equivalent" requirements are necessary in order to not backslide from the existing SIP. We specifically supported the inclusion of statutory language in SB1225 requiring no backsliding in the development of BMP's. Therefore, we are suggesting the combination of an expanded BMP program (more measures than provided in SVJAPCD) which reduces significant amounts of potential and real emissions; potentially "designated" (or required) individual BMP's (such as a requirement to remove manure from the corrals a minimum of three times a year) ; potential to add an annual reporting requirements; all coupled with the state, federally and judicially recognized components of the SVJAPCD program will create an "equivalent" if not enhanced emission reduction program which will meet the necessary SIP requirements. We will provide the mathematical evidence to demonstrate how the implementation of this type of BMP program will exceed all levels of suppression or reduction in emissions envisioned by the current SIP development process. We will demonstrate how the emissions inventory; potential control measures; and 5% reduction targets will be met through this comprehensive BMP Program.

14. This has been added to the narrative on track-out.

Comments on Unpaved Road or Feed Lane BMPs

15. See comment #9

16. This category of unpaved roads and feed lanes has been interpreted to be the roads within the confines of the dairy operation. These roads would not access public roads.

17. BMP has been modified.

18. BMP's have been modified.

19. BMP has been modified

20. The definition of categories of activity for PM_{10} mitigation are subtly different for Maricopa County Rule 310 and SJVAPCD. Maricopa County Rule 310 has a categories for unpaved access connections and unpaved roads; where SJVAPCD has only unpaved roads. In order to best reconcile these differences and utilize SJVAPCD's defined emission factors this interpretation of unpaved access connections was made.

Comments on Animal Feeding, Waste Handling and Transportation BMP's

21. Animal feeding was added to this category because it and waste handling are the handling of bulk materials. They both require activities that transport large amounts of bulk material. Bulk feed in addition requires various strategies to protect it from wind and the elements.

22. The BMP and narrative has been modified.

23. The wind speed of 25 mph is the standard for the cessation or change of activity in the SJVAPCD program, the South Coast Air Pollution Control District program, and the Arizona BMP program for crops.

24. The control measures SJVAPCD referenced in "Bulk Material Control", page 3, section a. in the "Emission Reduction Calculation Methodology for Dairies and Feedlots CMP" relates to the "Feed EF" factor, listed on page 9, of .123lbs/hd-yr. The 4.6lb/hd-yr relates to the emission of an open corral dairy.

Comments on Arena, Corral and Pen BMPs

25. On page 9, in the "Emission Reduction Calculation Methodology for Dairies and Feedlots CMP" the emission factor for a freestall dairies is 1.845lbs/hd-yr; the

emission factor for an open corral dairy is 4.6lbs/hd-yr. This is a difference of 60%. There are no freestall dairies in the non-attainment area, they are all open corral. Thus if a dairymen were to build a freestall dairy the emission factor for the design would be 60% less then the prevailing dairy designs.

26. The three areas that affect stocking density on dairies: shades, cooling, and fence line area are distinctly different methods of increasing stocking density. Each one of these procedures will increase the congregation of the animals and thusly manure moisture levels. Different dairy operations should be able to choose the procedure or procedures that work the best for their operation. There is not data available on the specifics of stocking densities. There are BMP's listed in the SJVAPCD program that do not have scientific data to support the practice; these sound practices were assigned control efficiencies of 10% until such time that data could be generated.

27. On page 1, section a. in the "Emission Reduction Calculation Methodology for Dairies and Feedlots CMP" at the bottom of the first paragraph "This control method is not recommended on areas used by lactating cow". This is for sanitary reasons. Dr Auvermann was referring to feedlot operations.

28. Frequent scraping and manure removal are two distinctly different activities. Scraping activities pull fresh manure out from under the shades and out into the open corral areas; where the wet manure is commingled with the dry manure. This activity also grooms the manure to a consistent depth. Dairies would perform scraping activities on a minimum of 1 per week.

    Manure removal usually involves large front end loaders that scrape up the manure pack and load large trucks for transportation to land application sites. We will modify this BMP to state; manure will be removed a minimum of 3 times a year.

    Dr Auvermann specified 1 to 3 inches; the practicality of maintaining large corral areas with constant animal use and movement to a manure pack depth of one precise inch is not realistic. There is a point where the manure pack can become to thin exposing the animals hoofs to rocks, which can cause hoof problems and lame animals. These animals have spend their entire lives on a soft manure pack surface and are not acclimated to rocky surface like the cattle you see in the Arizona desert. They are also much larger animals.

29. This refers to procedures that maintain the manure pack at an optimal depth. The flushing and vacuuming of manure is a process of removing the manure from the pens which reduces the amount of manure and related PM_{10} emissions.

30. Scraping and harrowing pens regularly helps to maintain the optimal depth of the manure pack. This is the concept Dr. Auvermann was describing to reduce the PM_{10} emissions from animal movement.

31. See comment #28.

32. In order to maintain the manure pack at a minimum depth during the frequent scraping activities there needs to be a place to store the excess manure. The piling of manure in the areas of the least animal activity (these would be the areas that the animals would not walk through to get to the milking barn three times a day, six trips) decreases the area of the exposed manure to wind erosion. There are BMP's listed in the SJVAPCD program that do not have scientific data to support the practice; these sound practices were assigned 10% control efficiencies until such time that data could be generated.

33. Dairy cows are generally milked three times a day; this means 6 times a day cows move from between the corrals and the milking barn. A standard operating procedure of not running cows would decrease PM_{10} emissions. There are BMP's listed in the SJVAPCD program that do not have scientific data to support the practice; these sound practices were assigned 10% control efficiencies until such time that data could be generated.

34. BMP's have been modified.

35. We agree that "equivalent" requirements are necessary in order to not backslide from the existing SIP. We specifically supported the inclusion of statutory language in SB1225 requiring no backsliding in the development of BMP's. Therefore, we are suggesting the combination of an expanded BMP program (more measures than provided in SVJAPCD) which reduces significant amounts of potential and real emissions; potentially "designated" (or required) individual BMP's (such as a requirement to remove manure from the corrals a minimum of three times a year) ; potential to add an annual reporting requirements; all coupled with the state, federally and judicially recognized components of the SVJAPCD program will create an "equivalent" if not enhanced emission reduction program which will meet the necessary SIP requirements. We will provide the mathematical evidence to demonstrate how the implementation of this type of BMP program will exceed all levels of suppression or reduction in emissions envisioned by the current SIP development process. We will demonstrate how the emissions inventory; potential control measures; and 5% reduction targets will be met through this comprehensive BMP Program.

36. This BMP will be added to the category "Corrals, Pens, and Areanas".