Written Comments on Proposed Air Permit Modification

Hickman's Egg Ranch, Arlington Facility Air Permit No. 040136
32425 W. Salome Highway, Arlington, Maricopa County, Arizona

The following written comments were prepared by Kathy J. Martin, PE (OK#18254) at the request of local citizens and submitted to the Maricopa County Air Quality Department in response to public notice for public comment on the proposed permit modification.

1. Propane-fueled rotary dryer specifications.

The one page information sheet from Vulcan Systems attached to the permit application does not specify a particular model of rotary dryer. According to their website, Vulcan Systems manufacturers several models of rotary dryers that differ in diameter, length, and throughput (tons per hour).[1] The equipment list in the proposed permit claims the rotary dryer and baghouse were installed July 2015, thus the exact model is known. It is important to identify the exact piece(s) of equipment that are going to be regulated under this permit modification so that the public and the agency understand the intended use, maximum throughput, and justification for the emission factors used.

2. Rotary dryers produce steam and dust during operation.

The application for permit modification date stamped received July 20, 2015 does not acknowledge the steam and dust generated during the drying of poultry manure in the rotary dryer. Online videos of similar types of rotary dryers show both steam exhaust (from the removal of moisture in the poultry manure) and dust exhaust from the on-loading of poultry manure into the equipment and off-loading of dried manure after treatment.[2][3]

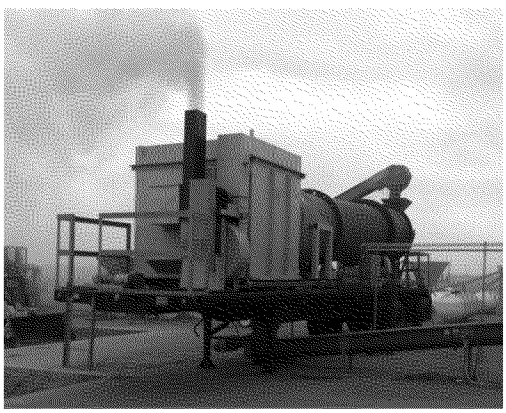

Figure 1 – Image from Vulcan website poultry manure system using rotary dryer. http://getavulcan.com/chicken-manure-dryer/

[1] See website: http://getavulcan.com/equipment/drying-systems/components/rotary-dryers/
[2] *See* video at: https://www.youtube.com/watch?v=sKSfYwgMx_Q
[3] *See* advertisement: http://getavulcan.com/chicken-manure-dryer/

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3. Baghouse efficiency and manufacturer's specifications.

The permit application does not state how much poultry manure will be processed using the rotary dryer nor does it make any attempt to identify and quantify the air pollution generated from the process. On page 2 of 4 of the permit application, the applicant claims a control efficiency of 99.5% for the baghouse but does not provide information such as manufacturer's model and specifications. No mention is made on acceptable pressure drop across the baghouse filter materials. The permit application does not describe the quantity of emissions expected to be controlled by the baghouse.

4. Limit of propane burned per 12 consecutive month period.

Condition 21 states:

> "The Permittee shall burn no more than 341,120 gallons of propane in the rotary dryer per twelve consecutive month period."

The Technical Support Document states on page 3 of 7:

> "Conditions 21-22 regulate the manure dryer and were included to keep the facility from exceeding any applicable threshold, such as BACT."

In the Emissions Calculations table provided on page 5 of the permit application, the propane tank is described as capable of holding 15,000 lbs or 63,600 gallons of propane. The information in the table states that the 15 MMBtu/hr dryer can operate for 388 hours per tank of propane.

Using the permit limit of 341,120 gallons, the capacity of the propane tank, and the hours of use per tank, the following can be calculated:

> (341,120 gallons/12 cons mo)/63,600 gal/tank = 5.4 tanks of propane/12 cons mo
> 5.4 tanks/12 cons mo x 388 hours of operation/tank = 2,081 hrs of op/12 cons mo

The permit application claims a limit of 2,080 hours of operation assuming a 5 day work week, 8 hours per day, and 52 weeks per year. The potential to emit assuming 24 hrs per day and 7 days per week would be based on 8,760 hours per 12 cons mo or four times the permitted operating time (8,760/2,080 = 4.2).

What is not explained is whether 2,081 hours of operation is sufficient to dry the poultry manure generated at both the Arlington and Tonopah egg laying facilities. The permit application fails to explain how this limited time is sufficient to process the combined poultry manure. The missing information includes the throughput (tons per hour) of the rotary dryer and the total tons of poultry manure intended to be processed through the dryer in any twelve consecutive month period (12 cons mo).

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For example, if the rotary dryer throughput was 20 tons per hour and is limited to 2,081 hours then the facility could only process 41,620 tons per 12 cons mo.[4]

Table 6 of Midwest Plan Services MWPS-18 Waste Characteristics includes a design factor of 0.15 lbs manure per bird per day for layers. The Arlington facility has 8 million layers and 4 million pullets. The Tonopah facility has 4.3 million layers and a maximum capacity planned at 10-12 million layers.[5] The tons of manure produced by 16.3 million layers can be calculated as follows:

> 16.3 million layers x 0.15 lbs/hd/day x 365 days/yr = 892,425,000 lbs
> or 446,212 tons of manure
>
> 219,000 tons/41,620 tons = 10.7 times more manure generated than can be treated with one rotary dryer.

Using the limiting factors of the proposed permit, the single rotary dryer can only treat nine percent (9%) of the poultry manure generated by 16.3 million layers in any twelve consecutive month period.

5. Relying upon Agricultural Best Management Practices.

On page 2 of 7 of the Technical Support Document, Item C includes this statement:

> "Rotary Dryer Baghouse (1) Controls particulate emissions from the rotary dryer. It is regulated under agricultural BMPs rather than the Control Officer."

There are no AgBMPs that specifically address the use of baghouses, rotary dryers, or any type of poultry manure drying for that matter. In fact, the AgBMPs suggest increasing the moisture of stored manure as a control for particulate emissions. The July 24, 2015 Notice of Final Exempt Rulemaking related to AgBMPs does not list rotary dryers, baghouses, or manure drying systems under R18-2-611.01(D) for commercial poultry facilities as follows:[6]

> (D)(2) Animal waste (and Feed) Handling and Transporting:
> (a) Remove spilled feed,
> (b) Store feed,
> (c) Add oil and/or moisture to the feed,
> (d) Use enclosed feed distribution system,
> (e) Use flexible discharge spout,

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[4] *See*: http://www.wwrequip.com/equipment/erkd020pics.htm

[5] *See*: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/nra/rca/?cid=nrcs143_014154 "Chickens three months and older" were assumed to be layers knowing the group could be either layers or breeders. There does appear to be some difference between layer and breeder manure, possibly due to the roosters housed with the breeder hens. The difference did not appear to be significant enough to divide "chickens three months and older" into two categories. "Broiler and other meat type chickens" were assumed to be broilers.

[6] *See* http://apps.azsos.gov/public_services/register/2015/30/13_final_exempt.pdf

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(f) Minimize drop distance,
(g) Enclose transfer points,
(h) Clean floors and walls in a commercial poultry facility,
(i) Clean aisles between cage rows,
(j) Stack separated manure solids, or
(k) Maintain moisture in manure solids.

On page 2 of 7 of the Technical Support Document, Item C also includes:

> "Corn Grinder (1) The grinder is self-contained to reduce particulate emissions. It is regulated by ADEQ under agricultural BMPs rather than the Control Officer."
> "Feed Mixer (1) The feed mixer is self-contained to reduce particulate emissions. It is regulated by ADEQ under agricultural BMPs rather than the Control Officer."

As shown in the list of (D)(2) AgBMPs, it is clear that the BMPs were not written envisioning the application to a large-scale feed manufacturing facility but rather focuses on the distribution of the feed within the animal feeding operation itself.

The reliance upon AgBMPs to limit particulate emissions from the rotary dryer and the feed mill processes appears to be a poorly considered hand-off of responsibility. In this case, the Control Officer has abdicated responsibility for emission controls to a system (AgBMPs) that has no readily identifiable method of identifying, quantifying, or controlling those emissions, including particulates and volatile organic compounds.

6. Emission factors used in calculating emissions for new backup generators.

The manufacturer's specification for QSL9-67 NR3 is available online, including exhaust emission information. The Compliance Statement says the horsepower rating for the Cummins QSL9-G7 NR3 is 464 hp, which is less than the 600 hp trigger to use Table 3.4-1 emission factors.[7] In the table on page 5 of 7 of the Technical Support Document, the horsepower ratings for the 19 new diesel engines shows that only one of the engines is rated higher than 600 hp (G-1 at 755 hp and designated Tier 2).

7. Emission factors used in calculating emissions for "old" backup generators.

The emissions estimates for the old backup generators (G-2, G-4, G-5, G-6, G-7, and G-9) were made using AP-42 Table 3.3-1 for CO, NOx, PM10, PM, and VOC. The emission factor for SOx was based on Table 3.4-1.

The EPA emission factor for SOx in AP-42 Table 3.3-1 is 2.05×10^{-3} or 0.00205 lbs/hp-hr, but the draft permit worksheet shows 0.0001 lbs/hp-hr for both the new diesel and old diesel engines. That value comes from Table 3.4-1 which is the emission factor for

[7] *See* 2015 EPA Tier 3 Exhaust Emission Compliance Statement https://powersuite.cummins.com/PS5/PS5Content/SiteContent/en/Binary_Asset/pdf/Commercial/Datasheets/Emissions/epa-1101.pdf

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SOx for diesel engines with greater than 600 hp. All of the old backup generators are rated for 380 hp, which is far below the trigger to use Table 3.4-1.

The Technical Support Document does not explain the use of the equation from Table 3.4-1 to determine SOx based on percent sulfur in the diesel fuel. Nor does it explain why the emissions estimate for the existing backup generators was made using AP-42 Tables rather than actual emissions measured during usage.[8]

Table 3.3-1. EMISSION FACTORS FOR UNCONTROLLED GASOLINE AND DIESEL INDUSTRIAL ENGINES[a]

Pollutant	Gasoline Fuel (SCC 2-02-003-01, 2-03-003-01)		Diesel Fuel (SCC 2-02-001-02, 2-03-001-01)		EMISSION FACTOR RATING
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	
NO_x	0.011	1.63	0.031	4.41	D
CO	6.96 E-03[d]	0.99[d]	6.68 E-03	0.95	D
SO_x	5.91 E-04	0.084	2.05 E-03	0.29	D
PM-10[b]	7.21 E-04	0.10	2.20 E-03	0.31	D
CO_2[c]	1.08	154	1.15	164	B
Aldehydes	4.85 E-04	0.07	4.63 E-04	0.07	D
TOC	0.015	2.10	2.47 E-03	0.35	
Exhaust	6.61 E-04	0.09	0.00	0.00	D
Evaporative	4.85 E-03	0.69	4.41 E-05	0.01	E
Crankcase	1.08 E-03	0.15	0.00	0.00	E
Refueling					E

[a] References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TOC = total organic compounds.

[b] PM-10 = particulate matter ≤10 m aerodynamic diameter. All particulate is assumed to be ≤ 1 m in size.

[c] Assumes 99% conversion of carbon in fuel to CO with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

[d] Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

[8] *See* AP-42 Chapter 3 at: http://www3.epa.gov/ttn/chief/ap42/ch03/index.html

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8. BACT for NOx emission reduction.

On page 3 of 7 of the proposed permit, the NOx emissions for the backup generators and the rotary dryer are shown to add up to 24.5 tons per year, just shy of the BACT trigger of 25 tons per year. The Technical Support Document states:

> "Except as noted, CO, NOx and PM10 emission factors are set at the appropriate emission standards for non-road diesel engines specified in 40 CFR 89.112."

40 CFR 89.112 includes the following requirements:

> "(a) Exhaust emission from nonroad engines to which this subpart is applicable shall not exceed the applicable exhaust emission standards contained in Table 1, as follows: [Table 1- Emission Standards (g/kW-hr)].
> (b) Exhaust emissions of oxides of nitrogen, carbon monoxide, hydrocarbon, and nonmethane hydrocarbon are measured using the procedures set forth in subpart E of this part.
> (c) Exhaust emissions of particulate matter is measured using the California Regulations for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines. This procedure is incorporated by reference. See §89.6."

At no point does 40 CFR 89.112 allow or otherwise condone the substitution of the emission *standard* as a replacement for determining the *actual emissions* from the diesel engine. The Technical Support Document assumes the diesel engines will not exceed the emission standard by merely saying so – rather than requiring monitoring and recordkeeping of the *actual emissions* to assure compliance with the *standard*.

This becomes most worrisome when considering MCAQD determined NOx emissions to be just slightly less than the amount that would trigger BACT (using an assumed emission value of 4 g/kw-hr) when the Cummins exhaust emission data sheet for QSL9-G7 NR3 diesel engine has NOx emission of up to 5.25 g/hp-hr (7.0 g/kw-hr) when the engine is on full stand-by.[9]

> Where: 5.25 g/hp-hr x 1.341 hp/kw = 7.0 g/kw-hr

9. Section Z-M existing air pollution emissions disclosure.

This permit application serves two purposes: to increase the number of backup generators and to identify the new use of a rotary dryer in the manure handling process. On page 3 of 4 of the permit application, the applicant did not provide information regarding the existing emissions as described on the form:

> "Provide a summary of the actual air emissions on an annual basis for the following three columns:

[9] *See*: https://www.cumminspower.com/www/Commercial/Datasheets/Emissions/eds-1056.pdf

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(i) Emissions to be released from only the equipment and affected processes described on this notification.
(ii) the entire site prior to the modifications of the equipment and processes described in (i) above.
(iii) The entire site including the emissions identified in (i) above. Normally, this column will be the sum of (i) and (ii)."

The emissions for the entire site prior to the backup generator modification should have included the emissions from the existing six (6) diesel powered stationary engines (backup generators). Instead, the application claims zero emissions from the existing backup generators.

It is understood that the existing emissions related to the rotary dryer would be zero because it is the first rotary dryer to be installed in the manure handling area of the facility and that the emissions from current manure handling processes are purportedly regulated under Agricultural Best Management Practices (AgBMPs). However, the AgBMPs do not address rotary dryer emissions specifically and thus cannot be relied upon to control particulate emissions during the operation of the rotary dryer.

On page 6 of the permit application, Item 9 states:

> "It is noted that MCAQD views the rotary dryer as part of the facility's waste management operations for purposes of manure drying, of which, such operations are regulated by the Arizona Department of Environmental Quality (ADEQ). The associated baghouse (and its fines) for the rotary dryer will be regulated by the ADEQ through Agricultural Best Management Practices (BMPs). The ADEQ will establish BMPs for the baghouse outside of this permit."

Arizona Statute A.R.S. §49-457 (Agricultural Best Management Practices Committee) describes the rule-making process as follows[10]:

> H. The committee shall adopt, by rule, an agricultural general permit specifying best management practices, including record keeping and reporting requirements, for regulated agricultural activities to reduce PM-10 particulate emissions. A person who is subject to an agricultural general permit pursuant to this section is not subject to a permit issued pursuant to section 49-426 except as provided in subsection K of this section. The committee shall adopt by rule a list of best management practices, at least one of which shall be used in areas designated as moderate nonattainment for PM-10 particulate matter and at least two of which shall be used in areas designated as serious nonattainment for PM-10 particulate matter, to demonstrate compliance with applicable provisions of the general permit. Best management practices may vary within the regulated area, according to regional or geographical conditions or cropping patterns.

[10] See: http://www.azleg.gov/ars/49/00457.htm

First, it must be understood that the air pollution generated during the drying of manure is not limited to "fines" but can include other air pollutants, such as ammonia, volatile organic compounds, pathogens, sulfide compounds, and malodors. These pollutants, especially volatile gases, are generated during the transfer of the manure from storage to the rotary dryer and while the rotary dryer is in operation where moisture and thus volatile gases are driven off of the manure solids by sustained high temperatures.

Secondly, the AgBMPs are part of the ADEQ rule making and if the ADEQ "established" BMPs for the rotary dryer baghouse, there would be a rule-making procedure to follow. The casual statement that ADEQ would resolve the baghouse emissions does not explain the complexity of the actual process.[11]

10. LPG Combustion Emissions Calculator.

The permit application includes three pages titled "Liquefied Petroleum Gas (LPG) Combustion Emissions Calculator – Revision D 2/1/2010 – Output Screen." The form does not include the name of the facility, the facility ID number, the facility location, or the name of the person that prepared the spreadsheet. The form itself has the logo for North Carolina Department of the Environment and Natural Resources (NCDENR) and can be found on the NCDENR website as an interactive spreadsheet.[12] There is no explanation for why this particular form/spreadsheet was used and the purpose for including the spreadsheet outputs in an Arizona air permit application.

11. Number of backup generators and when they were installed.

The Technical Support Document permit history indicates the first generators (number unknown) were included in the 2004 new permit application. Since that time, the Hickman Egg Ranch, Inc. has submitted minor permit modifications to include more emergency generators in 2011 (number unknown), 2013 (3 additional generators), and 2014 (3 additional generators). The permit history dated 7/20/2015 includes the statement:

> "The Permittee also requested the equipment list to be updated with a replacement emergency generator."

The Technical Support Document includes a page titled "Emission Worksheet for New Diesel Engines" and includes manufacturer's NOx and VOC specifications for Cummins QSL9-G7 NR3 engine. The page includes a table with nineteen (19) engines listed with unique identification numbers (G-1, G-10, G-11, G-12, G-13, G-14, G-15, G-16, G-17, G-18, G-19, G-20, G-21, G-22, G-23, G-24, G-25, G-39, FM1). The next page in the Technical Support Document is titled "Emission Worksheet for Old Diesel Engines" and includes six (6) engines with unique identification numbers (G-2, G-4, G-5, G-6, G-7, and G-9). It should be noted that there is not a G-3 or G-8 on either list.

[11] *See*: https://agriculture.az.gov/sites/default/files/Ag_Air_Quality_publication.pdf and https://www.azdeq.gov/environ/air/plan/download/webguide.pdf for description of AgBMP for PM10 process.
[12] *See* http://daq.state.nc.us/permits/spreadsheets/

The proposed permit includes an Equipment List with items 1 to 20, where item 1 is the rotary dryer with baghouse, item 2 is the aboveground gasoline storage tank, and the remaining 18 items are emergency diesel powered generators – some of which represent more than one generator of a particular horsepower rating – for a total of 25 emergency generators. The list of emergency generators includes dates, one described as "installed", others as "manufactured" and the remaining dates are without description. When comparing the dates from the proposed permit Equipment List to the Technical Support Document, one can surmise that the dates without description are the date of manufacture, which is important when applying emissions standards.

In order for the Equipment List to be consistent, the date of manufacture for FM-1 should be 2010. It would also be helpful to include the date of installation for all of the emergency generators rather than just one of them (ie., FM-1). It would be helpful to the general public if the Technical Support Document explained the difference between "old" and "new" generators as a dividing line of date of manufacture used to determine which emissions standards apply. Otherwise, it looks like this permit is allowing the facility to add 19 generators that just happened to be manufactured at various times.

The permit application does not include a facility map that shows where any or all of these generators are/will be located.

Figure 1 – Hickman Egg Ranch, Inc. Arlington facility in September 2003.

Figure 2 - Hickman Egg Ranch, Inc. Arlington facility in August 2006.

Figure 3 - Hickman Egg Ranch, Inc. Arlington facility in September 2010.

Figure 4 - Hickman Egg Ranch, Inc. Arlington facility in December 2014.

12. Permit Resolution regarding Notice of Violation for compost fire.

The permit modification includes Specific Condition 2 that refers to "mulching" and the requirement to get a burn permit as a reaction to the Notice of Violation for a "mulch" fire on March 7, 2014. The facility is not "mulching" but is composting poultry manure and dead chickens not only from the Arlington egg laying operation, but also the new Tonopah egg laying operation. The fire is/was not from a "burn event" but most likely from the overheating of manure/mortality compost causing spontaneous ignition.

It is not enough to prohibit open burning without a Burn Permit when the cause of the fire is due to the improper operation and maintenance of the manure and dead animal compost piles. The MCAQD must acknowledge that the compost burning is in violation of Rule 314, paragraph 305.1 that states:

> "Prohibited materials cannot be burned in open outdoor fires except as provided in Sections 303.2 and 303.4."

Neither Rule 303.2 nor 303.4 relates to the Hickman Egg Ranch. Rule 303.2 refers to 'fires prohibited during restricted-burn periods in Maricopa County' and the requirement to call the hotline. The only exemptions listed in the subparagraphs are for fire extinguisher training and disposal of dangerous materials conducted in compliance with

ADEQ's regulations. Rule 303.4 refers to 'testing of potentially explosive-containing products during restricted-burn periods'.

The definition of 'prohibited materials' in Rule 314 Section 211 includes "animal wastes and carcasses". Thus Hickman Egg Ranch should be prohibited from burning the compost material that contains both poultry manure and poultry carcasses. The idea that they should get a "burn permit" belies the purpose of regulating the proper handling and disposal of millions of cubic feet of poultry manure per year.

Arlington facility: 8 million egg layers and 4 million pullets
Tonopah facility: 4,300,800 egg layers

Using Midwest Plan Services MWPS-18 Waste Characteristics design factors for manure production, the combined manure can be estimated as follows:

12.3 million layers x 0.002 ft^3/hd/day x 365 days/yr = 8.98 million ft^3/yr
4 million pullets x 0.002 ft^3/hd/day x 365 days/yr = 2,920,000 ft^3/yr
Total: 11.9 million ft^3/yr

13. Potential for odors from manure handling and composting operations.

The Technical Support Document for the proposed permit states:

> "Conditions 3-5 were taken from Rule 320 and were included due to the potential for odors from manure handling and composting operations."

On page 1 of 9 of the proposed permit, section 3 regarding odor control states:

> "(3)(a) No person shall emit gaseous or odorous air contaminants from equipment, operations or premises under his control in such quantities or concentrations as to cause air pollution."
>
> "(3)(b) Material Containment Required: Materials including, but not limited to, solvents or other volatile compounds, paints, acids, alkalies, pesticides, fertilizer, and manure shall be processed, stored, used and transported in such a manner and by such means that they will not unreasonably evaporate, leak, escape or be otherwise discharged into the ambient air in such quantities or concentrations as to cause air pollutions smells, aromas or stenches commonly recognized as offensive, obnoxious or objectionable to a substantial part of a community. Where means are available to reduce effectively the contribution to air pollution from evaporation, leakage or discharge, the installation and use of such control methods, devices or equipment shall be mandatory."

The agency fails to address the distinctive odor of "stinky feet" or isovaleric acid and other malodors and dusts that currently emanate from the Hickman Egg Ranch, Inc. Arlington property. This foul odor travels beyond the boundary of the facility and invades the homes and properties in the nearby community.

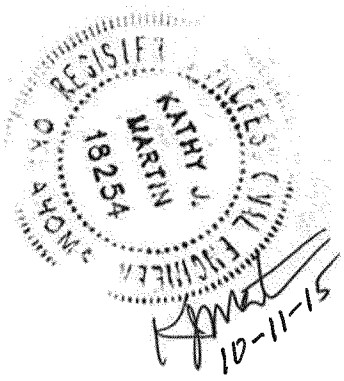
15. Removal of the animal feeding production operations requirements.

On page 2 of 4 of the permit application, the narrative description of the proposed modification includes the following statement:

> "Addition of Rotary Dryer with Baghouse for manure drying operation, and the installation of a 15,000 gallons propane tank. A request for the removal of the animal feeding production operations requirements from the Air Quality permit. The animal feeding operations are cover by the ADEQ BMP's."
>
> **Note:** The narrative does not include an emergency diesel engine generator.

The proposed permit does not include strikeout/underline to show what language was removed related to "animal feeding production operations requirements". The Technical Support Document does not identify applicable AgBMPs that would apply to any or all of the operations that were removed from the permit.

Kathy J. Martin, PE (OK#18254)

October 11, 2015
Date

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