

SJVAPCD Best Available Control Technology (BACT) Guideline 5.7.1*

Last Update: June 22, 2022

Poultry Broiler House

| Pollutant | Achieved in Practice or contained in SIP | Technologically Feasible | Alternate Basic Equipment |
|----------------------------|--|--|---------------------------|
| VOC | <ol style="list-style-type: none"> 1. a) Enclosed housing with mechanical ventilation and computerized control of environmental conditions using sensors, or b) Use of acidifying litter amendments; AND 2. Comply with applicable District Rule 4570 Feed and Housing Mitigation Measures; AND 3. Houses completely cleaned out at least twice per year; AND 4. All mortality removed from houses at least once per day | <ol style="list-style-type: none"> 1. 98% Overall Capture and Control (Thermal/Catalytic Incineration with a Concentrator) 2. 95% Overall Capture and Control (Carbon Adsorption) 3. 80% Overall Capture and Control (Biofiltration) 4. 70% Overall Capture and Control (Wet Scrubber) | |
| Ammonia (NH ₃) | <ol style="list-style-type: none"> 1. a) Enclosed housing with mechanical ventilation and computerized control of environmental conditions using sensors, or b) Use of acidifying litter amendments; AND 2. Comply with applicable District Rule 4570 Feed and Housing Mitigation Measures; AND 3. Houses completely cleaned out at least twice per year; AND 4. All mortality removed from houses at least once per day | <ol style="list-style-type: none"> 1. 80% Overall Capture and Control (Biofiltration or Wet Scrubber) | |
| PM ₁₀ | <p>Use of the following broiler house design and management practices:</p> <ol style="list-style-type: none"> 1. Weatherproof housing structure, AND 2. Minimum disturbance of manure/litter, AND 3. Covered manure/litter piles | <ol style="list-style-type: none"> 1. 99% Overall Capture and Control (Cyclones followed by Electrostatic Precipitator or Baghouse) 2. 95% Overall Capture and Control: (Cyclones Followed by Wet Scrubber) 3. 60% Overall Capture and Control (High Efficiency Cyclones) | |

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

Proactive Best Available Control Technology (BACT) Determination

District BACT Guideline 5.7.1

Broiler House

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I. Introduction

The objective of this project is to proactively update BACT Guideline 5.7.1, which currently covers VOC and NH₃ emissions from broiler houses. Additionally, PM₁₀ requirements will be added to this guideline. This guideline was last updated on February 1, 2006.

The current update will incorporate any applicable and more stringent emission control standards that have been achieved in practice or determined to be technologically feasible since the last update. Any corrections and/or changes needed to ensure consistency with the District's BACT policy and other District practices will also be made.

The discussions in this update will be limited to the following topics:

- Source of emissions
- Current BACT requirements
- Top-down BACT analysis for all pollutants
- Recommendations

II. Source of Emissions

The principal pollutants emitted from poultry broiler houses are Volatile Organic Compounds (VOC), ammonia (NH₃), and particulate matter (PM₁₀). All of the emissions are generated within an enclosed structure equipped with a ventilation system. Factors that affect emissions from broiler houses include the moisture content of the litter, the pH, the ventilation rate, the temperature, and the amount of manure and length of the time the manure is present in the broiler house.

Manure as excreted by the birds has a high water content, most of which evaporates, which generates ammonia emissions as the manure dries out. Ideally, litter in the broiler houses should contain no more than 20-25% moisture.¹ High moisture content in the litter will lead to the development of anaerobic conditions and the production of hydrogen sulfide and other reduced sulfur compounds. High moisture content in the litter will also lead to greater production of VOCs and methane and will facilitate the further conversion of organic nitrogen to ammonia. Additionally, the greater the moisture content the more favorable the environment for microbes responsible for emissions of ammonia and VOC, which increases the likelihood that these compounds will be emitted. Moisture inside the broiler houses is controlled by adequate ventilation and regular maintenance of waterers to ensure that there are no leaks.

¹ Patterson, P. H. (2001) Lesson 11: Using Dietary and Management Strategies to Reduce the Nutrient Excretion of Poultry. Lesson 11 in Livestock and Poultry Environmental Stewardship Curriculum. Midwest Plan Service. Iowa State University, Ames, IA. Available at: http://articles.extension.org/mediawiki/files/e/ea/LES_11.pdf

The ventilation rate affects the amount of VOCs, ammonia, and particulate matter carried out of the broiler house. During the growth of the flock, continuous airflow removes ammonia and other gases and reduces the moisture content of freshly excreted manure.

The potential for gaseous emissions, such as VOCs and ammonia, increases with greater manure accumulation and storage time in the houses.² “Litter” is used as bedding for the birds, and is typically a mixture of rice hulls, straw, and/or sawdust, but it can also contain manure that is excreted from the birds. The amount of manure and length of the time the manure is present in the broiler house is determined by the number of flocks that are raised on the litter before a complete cleanout. Fresh litter will have negligible emissions, while litter that has been reused for several flocks may have higher emissions because of the accumulation of manure.

VOC emissions will vary with temperature because the rate of VOC formation, rate of reduction to methane, and rate of volatilization all vary with temperature.³

Ammonia volatilization is the result of the microbial decomposition of nitrogen compounds in poultry litter. The primary nitrogen compound in poultry litter is uric acid, but other nitrogen compounds also occur in the form of undigested organic nitrogen in poultry feces. Whenever uric acid comes in contact with the enzyme urease, which is excreted in animal feces, the uric acid will hydrolyze rapidly to form ammonia, which will be emitted soon after formation. The formation of ammonia will continue more slowly (over a period of months or years) with the microbial breakdown of organic nitrogen in the litter. The rate of ammonia volatilization is influenced by a number of factors including the concentrations of nitrogen compounds in the litter, temperature, air velocity, surface area, and moisture.

PM₁₀ emissions primarily result from wind disturbing the poultry litter in the poultry house. The use of a weatherproof housing can reduce this source of PM₁₀ emissions. Additionally, any other disturbance to the poultry litter/manure within the housing can result in PM₁₀ emissions. Finally, PM₁₀ emissions from poultry litter/manure piles can be minimized by covering the piles, or equivalent.

² US EPA (August 15, 2001) Emissions From Animal Feeding Operations, Draft Report, Section 2.3 – Factors Affecting Emissions. EPA Contract No. 68–D6–0011. (Research Triangle Park, NC: US EPA, Office of Air Quality Planning and Standards, Emissions Standards Division)
<https://www3.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf>

³ US EPA (August 15, 2001) Emissions From Animal Feeding Operations, Draft Report. EPA Contract No. 68–D6–0011. (Research Triangle Park, NC: US EPA, Office of Air Quality Planning and Standards, Emissions Standards Division), pg. 2-10

III. Current BACT Requirements

The current requirements of SJVAPCD BACT Guideline 5.7.1 are as summarized in the following table. Because the poultry houses are enclosed structures with ventilation systems, it is assumed that 100% of the emissions from the houses are captured.

| Pollutant | Achieved in Practice or contained in SIP | Technologically Feasible | Alternate Basic Equipment |
|-----------------|---|--|---------------------------|
| VOC | <p>19% Control -</p> <ol style="list-style-type: none"> 1. Completely enclosed mechanically ventilated broiler housing with evaporative cooling pads, mixing fans, and a computer control system using thermostats, sensors, and timers to control environmental conditions; all birds fed in accordance with NRC or other District-approved guidelines; houses completely cleaned out at least twice per year; and all mortality removed from houses twice per day <p>OR</p> <ol style="list-style-type: none"> 2. Acidifying litter amendments; all birds fed in accordance with NRC or other District-approved guidelines; and all mortality removed from houses twice per day | <ol style="list-style-type: none"> 1. 98% Control (Capture and Thermal Incineration) 2. 95% Control (Capture and Catalytic Incineration) 3. 95% Control (Capture and Carbon Adsorption) 4. 80% Control (Capture and Biofiltration) | |
| NH ₃ | <p>55% Control -</p> <ol style="list-style-type: none"> 1. Completely enclosed mechanically ventilated broiler housing with evaporative cooling pads, mixing fans, and a computer control system using thermostats, sensors, and timers to control environmental conditions; all birds fed in accordance with NRC or other District-approved guidelines; houses completely cleaned out at least twice per year; and all mortality removed from houses twice per day <p>OR</p> <ol style="list-style-type: none"> 2. Acidifying litter amendments; all birds fed in accordance with NRC or other District-approved guidelines; and all mortality removed from houses twice per day | <p>80% Control (Capture and Biofiltration)</p> | |

IV. Top-Down BACT Analysis

BACT Analysis for VOC and NH₃ Emissions

As explained earlier, Volatile Organic Compounds (VOC) and ammonia (NH₃) emissions are expected from a poultry broiler house. Since the formation and control of these pollutants are similar, VOC and NH₃ emissions will be addressed simultaneously in this analysis. The analysis of PM₁₀ emissions will be addressed separately.

Step 1 - Identify All Possible Control Technologies

The following BACT clearinghouse references were reviewed to identify any control technologies that could be considered more stringent than the current District BACT requirements for poultry broiler houses:

- EPA RACT/BACT/LAER clearinghouse
- California Air Resources Board (CARB) BACT clearinghouse
- South Coast AQMD (SCAQMD) BACT clearinghouse
- Bay Area AQMD (BAAQMD) BACT clearinghouse
- Sacramento Metro AQMD (SMAQMD) BACT clearinghouse
- San Diego County APCD (SDCAPCD) BACT clearinghouse
- San Joaquin Valley APCD (SJVAPCD) BACT clearinghouse

In addition, the following rules and regulations were reviewed to identify any emission limits that could be considered more stringent than the current District BACT requirements for poultry broiler houses:

- SCAQMD Rule 223 – Emission Reduction Permits for Large Confined Animal Facilities (adopted 6/2/2006)
- SCAQMD Rule 1127 – Emission Reductions from Livestock Waste (adopted 8/6/2004)
- BAAQMD Regulation 2, Rule 10 – Large Confined Animal Facilities (adopted 7/19/2006)
- SMAQMD Rule 496 - Large Confined Animal Facilities (adopted 8/24/2006)
- SJVAPCD Rule 4570 – Confined Animal Facilities (last amended 10/21/2010)
- Imperial County APCD (ICAPCD) Rule 217 - Large Confined Animal Facilities (LCAF) Permits Required (revised 2/09/2016)
- Butte County AQMD (BCAQMD) Rule 450 - Large Confined Animal Facilities (adopted December 21, 2006)

Survey of BACT Guidelines:

The EPA RACT/BACT/LAER clearinghouse does not include general guidelines, only determinations made by individual agencies. No determinations for broiler houses were found in the EPA RACT/BACT/LAER clearinghouse.

No BACT determinations for poultry broiler houses were found in the CARB BACT clearinghouse, SCAQMD BACT clearinghouse, BAAQMD BACT clearinghouse, SMAQMD BACT clearinghouse, or SDCAPCD BACT Clearinghouse.

Survey of Applicable Rules and Regulations:

SJVAPCD Rule 4570

The purpose of SJVAPCD Rule 4570 - Confined Animal Facilities is to limit emissions of VOC from Confined Animal Facilities. In addition to limiting VOC emissions, SJVAPCD Rule 4570 also includes measures that limit ammonia (NH₃) emissions from these operations. SJVAPCD Rule 4570 requires the different types of Large Confined Animal Facilities to implement mitigation measures and select from limited options to reduce emissions from different areas and processes at the facility. As stated above, the mitigation measures included in the original version (Phase I) of SJVAPCD Rule 4570 served as a model that other California air districts used to develop rules for Large Confined Animal Facilities.

SJVAPCD Rule 4570 was last amended on October 21, 2010. The amendments were to incorporate the results of more recent scientific studies, strengthen requirements, decrease any redundancy and ambiguity, and remove measures that were not applicable or had not been shown to reduce emissions. Examples of mitigation measures that were removed for broiler operations include removal of caked manure/litter at least once every 14 days and feeding or disposing of feed within 48 hours of grinding and mixing feed. It was determined that removal of caked manure/litter at least once every 14 days was not practical. Special machines are used to remove caked manure/litter from broiler operations; however, these machines cannot be used while birds are in the houses, so removal of caked manure is only performed between flocks (approximately 40-60 days for broilers). It was determined that feeding or disposing of rations within 48 hours of grinding and mixing feed was not applicable to poultry operations and would not reduce emissions. Poultry feed primarily consists of dry grain that has been ground and mixed offsite and shipped to the poultry operation. Because of the low moisture content of poultry feed it remains stable for long periods of time and is not expected to contribute significantly to gaseous emissions while being fed to the birds.

The current SJVAPCD Rule 4570 requirements for broiler operations are shown in the tables below.

| | |
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| SJVAPCD Rule 4570, Phase II – Broiler, Duck, or Turkey Mitigation Measures | |
| A. Feed Mitigation Measures | |
| Owners/operators of a broiler, duck, or turkey CAF shall implement at least one (1) of the following feed mitigation measures: | |
| 1. | a. Feed according to NRC guidelines; or b. Feed animals probiotics designed to improve digestion according to manufacturer recommendations; or c. Feed animals an amino acid supplemented diet to meet their nutrient requirements; or d. Feed animals feed additives such as amylase, xylanase, and protease, designed to maximize digestive efficiency according to manufacturer recommendations. |
| 2. | Implement an alternative mitigation measure(s), not listed above. |

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| SJVAPCD Rule 4570, Phase II – Broiler, Duck, or Turkey Mitigation Measures | |
| B. Housing Mitigation Measures | |
| Owners/operators of a broiler or duck CAF shall implement at least four (4) of the following housing mitigation measures: | |
| Owners/operators of a turkey CAF shall implement at least five (5) of the following housing mitigation measures: | |
| 1. | Use a dry housing cleaning method at all times, except when a wet cleaning method is required for animal health or biosecurity issues, pursuant to Section 5.4. |
| 2. | Use drinkers that do not drip continuously. |
| 3. | Inspect drinkers at least once every seven (7) days and adjust the height, volume, and location of drinkers if necessary. |
| 4. | Inspect water pipes and drinkers and repair leaks daily. |
| 5. | If the facility houses turkeys in pens, install mounds or berms up gradient to prevent the runoff of storm water into pens. |
| 6. | Implement an alternative mitigation measure(s), not listed above. |

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| SJVAPCD Rule 4570, Phase II – Broiler, Duck, or Turkey Mitigation Measures | |
| C. Solid Manure/Separated Solids Mitigation Measures: | |
| Owners/operators of a broiler, duck, or turkey CAF that handles or stores solid litter/manure or separated solids outside the animal housing shall implement at least one (1) of the following mitigation measures: | |
| 1. | Within seventy-two (72) hours of removal from housing, either: a. Remove all litter/manure from the facility; or b. Cover litter/manure outside the housing with a weatherproof covering from October through May, except for times when wind events remove the covering, not to exceed twenty-four (24) hours per event. |
| 2. | Implement an alternative mitigation measure(s), not listed above. |

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| SJVAPCD Rule 4570, Phase II – Broiler, Duck, or Turkey Mitigation Measures | |
| D. Liquid Manure Mitigation Measures: | |
| Owners/operators of a broiler, duck, or turkey CAF that handles manure in a liquid form shall implement at least one (1) of the following mitigation measures: | |
| 1. | Use a phototropic lagoon. |
| 2. | Use an anaerobic treatment lagoon designed in accordance with NRCS Guideline No. 359. |
| 3. | Maintain lagoon pH between 6.5 and 7.5. |
| 4. | Implement an alternative mitigation measure(s), not listed above. |

For the purposes of updating SJVAPCD BACT Guideline 5.7.1, the requirements shown above for solid waste and liquid waste outside of the houses are not applicable and will not be considered.

California Health & Safety Code Section 40724.6⁴ required each California air district that was designated as a federal nonattainment area for ozone as of January 1, 2004 to adopt and implement a rule or regulation that required Large Confined Animal Facilities, as defined by the California Air Resources Board (ARB), to obtain a permit from the district to reduce, to the extent feasible, emissions of air contaminants from the facility. As the largest agriculture area in California, the SJVAPCD took the lead in developing the initial mitigation measures for Confined Animal Facilities. Other California air districts that adopted rules with specific requirements for Confined Animal Facilities generally adopted rules with identical or nearly identical mitigation measures as contained in the original version of SJVAPCD Rule 4570.

SCAQMD Rule 223

SCAQMD Rule 223 – Emission Reduction Permits for Large Confined Animal Facilities establishes the permitting requirements for agricultural sources in the SCAQMD subject to permit as a result of California Health & Safety Code Section 40724.6 as effective January 1, 2004.

SCAQMD Rule 223 requires the different types of Large Confined Animal Facilities to select from menus of options to reduce emissions from different areas and processes at the facility (e.g., feed, housing, solid manure, liquid manure, etc.). A review of SCAQMD Rule 223 requirements applicable to broiler houses did not reveal any control options more stringent than those required by the latest version of District Rule 4570.

⁴ Text of California Senate Bill No. 700 (2003, SB 700, Florez) Air quality: emissions: stationary sources: agricultural operations available at: <https://ww3.arb.ca.gov/ag/sb700/sb700.pdf>

SCAQMD Rule 1127

The purpose of SCAQMD Rule 1127 – Emission Reductions from Livestock is to reduce ammonia, VOC, and PM₁₀ emissions from livestock waste. SCAQMD Rule 1127 applies to dairy farms and related operations such as heifer and calf farms and the manure produced on them. Because the requirements of SCAQMD Rule 1127 only apply to cattle operations, not poultry operations, it will not be considered for the proposed update of SJVAPCD BACT Guideline 5.7.1

BAAQMD Regulation 2, Rule 10

BAAQMD Regulation 2, Rule 10 – Large Confined Animal Facilities states that the purpose of the rule is to reduce emissions of air contaminants from large confined animal facilities through control measures established during permit review. However, the rule does not contain specific emission mitigation measures for Confined Animal Facilities.

SMAQMD Rule 496

The purpose of SMAQMD Rule 496 - Large Confined Animal Facilities is to limit VOC emissions from large confined animal facilities. SMAQMD Rule 496 requires the different types of Large Confined Animal Facilities to select from menus of options to reduce emissions from different areas and processes at the facility (e.g., feed, housing, solid manure, liquid manure, etc.). A review of SMAQMD Rule 496 requirements applicable to broiler houses did not reveal any control options more stringent than those required by the latest version of District Rule 4570.

ICAPCD - Rule 217

ICAPCD Rule 217 - Large Confined Animal Facilities (LCAF) Permits Required states that the purpose of the rule is to limit emissions of Volatile Organic Compounds (VOC) and ammonia (NH₃) from Large Confined Animal Facilities (LCAF). The rule requires Large Confined Animal Facilities to obtain an air permit and requires the different types of Large Confined Animal Facilities to select from menus of options to reduce emissions from different areas and processes at the facility. Imperial County APCD Rule 217 was last revised February 9, 2016. A review of ICAPCD – Rule 217 requirements applicable to broiler houses did not reveal any control options more stringent than those required by the latest version of District Rule 4570.

BCAQMD Rule 450

BCAQMD Rule 450 - Large Confined Animal Facilities states that the rule establishes the permitting requirements for agricultural sources subject to permit as a result of amendments to California Health and Safety Code Section 40724 that became effective January 1, 2004 and that a written Authority to Construct and Permit to Operate shall be required for all Large Confined Animal Facilities. However, the rule does not contain specific emission mitigation measures for Confined Animal Facilities.

Rule Discussion Conclusion:

SJVAPCD Rule 4570, Phase I requirements were used as model for other California air Districts to develop their rules for Large Confined Animal Facilities. SJVAPCD Rule 4570, Phase II requirements incorporated even more effective measures based on more recent scientific studies and removed measures that were not applicable or had not been shown to reduce emissions. Therefore, the requirements of SJVAPCD Rule 4570, Phase II will primarily be considered for purpose of updating BACT Guideline 5.7.1, as they are the most stringent of all the air district rules reviewed as part of this proactive BACT analysis.

Control Options Identified

The following control options were identified for VOC emissions. As mentioned above, the poultry houses are enclosed structures with ventilation systems, so it is assumed that 100% of the VOC emissions from the houses are captured.

| VOC Control Options | |
|----------------------------|---|
| Option #1 | 98% Overall Capture and Control (Thermal or Catalytic Incineration with a Concentrator) |
| Option #2 | 95% Overall Capture and Control (Carbon Adsorption) |
| Option #3 | 80% Overall Capture and Control (Biofiltration) |
| Option #4 | 70% Overall Capture and Control (Wet Scrubber) ⁵ |
| Option #5 | <ol style="list-style-type: none"> 1. a) Enclosed housing with mechanical ventilation and computerized control of environmental conditions using sensors; or b) use of acidifying litter amendments; AND 2. Comply with applicable District Rule 4570 Feed and Housing Mitigation Measures; AND 3. Houses completely cleaned out at least twice per year, AND 4. All mortality removed from houses at least once per day.⁶ |

⁵ The Iowa State University Extension and Outreach, Air Management Practices Assessment Tool (<https://www.extension.iastate.edu/ampat/>) also includes wet scrubbers as a potential option to control VOC's and NH₃ from animal housing. The Iowa State University Extension and Outreach, Air Management Practices Assessment Tool lists control efficiency ranges for wet scrubbers of 50% to 90% for VOC. It will be assumed that a typical wet scrubber used at a poultry facility will be in the middle of this range (70% control for VOC).

⁶ When District BACT Guideline 5.7.1 was established under District Project C-1051505, the removal of mortality twice per day was a management practice proposed by the facility. However, review of the BACT determination for District Project C-1051505 indicates that the frequency of removal of mortality from the broiler houses was not a factor when establishing the overall VOC and NH₃ control efficiencies for the practices that were established as BACT. The frequency at which mortality is removed from broiler houses may vary at different facilities. In addition, California state regulations also do not require mortality to be removed at a frequency greater than once per day. Because no additional emissions benefit can be quantified for removal of mortality from broiler houses twice per day rather than once per day and no regulations have been identified that require removal of mortality from broiler houses more than once per day, it is recommended that District BACT Guideline 5.7.1 be updated to require removal of mortality from the broiler houses at least once per day; this would make District BACT Guideline 5.7.1 consistent with other District BACT guidelines for poultry housing (District BACT Guidelines 5.7.2 and 5.7.3).

The following control options were identified for NH₃ emissions. Similar to the VOC discussion above, the poultry houses are enclosed structures with ventilation systems, so it is assumed that 100% of the NH₃ emissions from the houses are captured.

| NH₃ Control Options | |
|---------------------------------------|---|
| Option #1 | 80% Overall Capture and Control (Biofiltration) |
| Option #2 | 80% Overall Capture and Control (Wet Scrubber) ⁷ |
| Option #3 | <ol style="list-style-type: none"> 1. a) Enclosed housing with mechanical ventilation and computerized control of environmental conditions using sensors; or b) use of acidifying litter amendments; AND 2. Comply with applicable District Rule 4570 Feed and Housing Mitigation Measures; AND 3. Houses completely cleaned out at least twice per year, AND 4. All mortality removed from houses at least once per day.⁸ |

Step 2 - Eliminate Technologically Infeasible Options

None of the above control options is technologically infeasible.

⁷ The Iowa State University Extension and Outreach, Air Management Practices Assessment Tool (<https://www.extension.iastate.edu/ampat/>) also includes wet scrubbers as a potential option to control VOC's and NH₃ from animal housing. The Iowa State University Extension and Outreach, Air Management Practices Assessment Tool lists control efficiency ranges for wet scrubbers of 70% to 90% for NH₃. It will be assumed that a typical wet scrubber used at a poultry facility will be in the middle of this range (80% control for NH₃).

⁸ When District BACT Guideline 5.7.1 was established under District Project C-1051505, the removal of mortality twice per day was a management practice proposed by the facility. However, review of the BACT determination for District Project C-1051505 indicates that the frequency of removal of mortality from the broiler houses was not a factor when establishing the overall VOC and NH₃ control efficiencies for the practices that were established as BACT. The frequency at which mortality is removed from broiler houses may vary at different facilities. In addition, California state regulations also do not require mortality to be removed at a frequency greater than once per day. Because no additional emissions benefit can be quantified for removal of mortality from broiler houses twice per day rather than once per day and no regulations have been identified that require removal of mortality from broiler houses more than once per day, it is recommended that District BACT Guideline 5.7.1 be updated to require removal of mortality from the broiler houses at least once per day; this would make District BACT Guideline 5.7.1 consistent with other District BACT guidelines for poultry housing (District BACT Guidelines 5.7.2 and 5.7.3).

Step 3 - Rank Remaining Control Technologies by Control effectiveness

| VOC Control Options | | |
|----------------------------|---|--------------------------|
| 1 | 98% Overall Capture and Control (Thermal/Catalytic Incineration with a Concentrator) | Technologically Feasible |
| 2 | 95% Overall Capture and Control (Carbon Adsorption) | Technologically Feasible |
| 3 | 80% Overall Capture and Control (Biofiltration) | Technologically Feasible |
| 4 | 70% Overall Capture and Control (Wet Scrubber) | Technologically Feasible |
| 5 | <ol style="list-style-type: none"> 1. a) Enclosed housing with mechanical ventilation and computerized control of environmental conditions using sensors; or b) use of acidifying litter amendments; AND 2. Comply with applicable District Rule 4570 Feed and Housing Mitigation Measures; AND 3. Houses completely cleaned out at least twice per year, AND 4. All mortality removed from houses at least once per day. | Achieved in Practice |

| NH₃ Control Options | | |
|---------------------------------------|---|--------------------------|
| 1 | 80% Overall Capture and Control (Biofiltration) | Technologically Feasible |
| 2 | 80% Overall Capture and Control (Wet Scrubber) | Technologically Feasible |
| 3 | <ol style="list-style-type: none"> 1. a) Enclosed housing with mechanical ventilation and computerized control of environmental conditions using sensors; or b) use of acidifying litter amendments; AND 2. Comply with applicable District Rule 4570 Feed and Housing Mitigation Measures; AND 3. Houses completely cleaned out at least twice per year, AND 4. All mortality removed from houses at least once per day. | Achieved in Practice |

Step 4 - Cost Effectiveness Analysis

Since this is a proactive BACT determination that is not part of a specific permitting action, cost effectiveness analysis is not application.

Step 5 - Select BACT

Since this is a proactive BACT determination that is not part of a specific permitting action, selecting BACT is not applicable.

BACT Analysis for PM₁₀ Emissions

Step 1 - Identify All Possible Control Technologies

The following BACT clearinghouse references were reviewed to identify any control technologies that could be considered more stringent than the current District BACT requirements for poultry broiler houses:

- EPA RACT/BACT/LAER clearinghouse
- California Air Resources Board (CARB) BACT clearinghouse
- South Coast AQMD (SCAQMD) BACT clearinghouse
- Bay Area AQMD (BAAQMD) BACT clearinghouse
- Sacramento Metro AQMD (SMAQMD) BACT clearinghouse
- San Diego County APCD (SDCAPCD) BACT clearinghouse
- San Joaquin Valley APCD (SJVAPCD) BACT clearinghouse

In addition, the following rules and regulations were reviewed to identify any emission limits that could be considered more stringent than the current District BACT requirements for poultry broiler houses:

- SCAQMD Rule 223 – Emission Reduction Permits for Large Confined Animal Facilities (adopted 6/2/2006)
- SCAQMD Rule 1127 – Emission Reductions from Livestock Waste (adopted 8/6/2004)
- BAAQMD Regulation 2, Rule 10 – Large Confined Animal Facilities (adopted 7/19/2006)
- SMAQMD Rule 496 - Large Confined Animal Facilities (adopted 8/24/2006)
- SJVAPCD Rule 4570 – Confined Animal Facilities (last amended 10/21/2010)
- Imperial County APCD (ICAPCD) Rule 217 - Large Confined Animal Facilities (LCAF) Permits Required (revised 2/09/2016)
- Butte County AQMD (BCAQMD) Rule 450 - Large Confined Animal Facilities (adopted December 21, 2006)

Survey of BACT Guidelines:

The EPA RACT/BACT/LAER clearinghouse does not include general guidelines, only determinations made by individual agencies. No determinations for broiler houses were found in the EPA RACT/BACT/LAER clearinghouse.

No BACT determinations for poultry broiler houses were found in the CARB BACT clearinghouse, SCAQMD BACT clearinghouse, BAAQMD BACT clearinghouse, SMAQMD BACT clearinghouse, or SDCAPCD BACT Clearinghouse.

The District's current BACT Guideline 5.7.1 for poultry broiler houses does not include PM₁₀ requirements; however, BACT Guidelines 5.7.2 (Poultry Layer Houses) and 5.7.3 (Turkey Houses) include PM₁₀ requirements. In terms of the mechanisms for generating PM₁₀ emissions, these types of operations are nearly identical to poultry broiler houses.

BACT Guideline 5.7.2 requires the following for PM₁₀ emissions

| | <u>Achieved in Practice</u> | <u>Technologically Feasible</u> |
|------------------|--|---|
| PM ₁₀ | 50% control - completely enclosed mechanically ventilated layer housing with evaporative cooling pads, mixing fans, and a computer control system; and belt manure aeration/drying and removal system with manure removal at least twice per week. | 1) 99% control - Electrostatic Precipitator 2) 99% control - Baghouse 3) 95% control - Wet Scrubber 4) 60% control - High Efficiency Cyclones |

BACT Guideline 5.7.3 requires the following for PM₁₀ emissions:

| | <u>Achieved in Practice</u> | <u>Technologically Feasible</u> |
|------------------|--|--|
| PM ₁₀ | 5% Control - House design and management practices including (a) weatherproof housing structure, (b) minimum disturbance of manure/litter, and (c) covering manure/litter stockpiles | 1. 98% Control (Capture and Cyclones followed by Electrostatic Precipitator) 2. 95% Control (Capture and Cyclones followed by Baghouse) 3. 80% Control (Capture and Cyclones followed by Wet Scrubber) 4. 50% Control (Capture and Cyclones) |

Survey of Applicable Rules and Regulations:

SCAQMD Rule 223, SCAQMD Rule 1127, BAAQMD Regulation 2, Rule 10, SMAQMD Rule 496, SJVAPCD Rule 4570, Imperial County APCD Rule 217, and Butte County AQMD Rule 450 only address VOC emissions from CAFO's. No regulations were found that address PM₁₀ emissions from poultry broiler houses.

Options Identified

The following control options were identified for PM₁₀ emissions:

| PM₁₀ Control Options | |
|--|---|
| Option #1 | 99% Overall Capture and Control (Cyclones followed by Electrostatic Precipitator) |
| Option #2 | 99% Overall Capture and Control (Cyclones followed by Baghouse) |
| Option #3 | 95% Overall Capture and Control (Cyclones followed by Wet Scrubber) |
| Option #4 | 60% Overall Capture and Control (High Efficiency Cyclones) |
| Option #5 | Use of the following broiler house design and management practices: <ol style="list-style-type: none"> 1. Weatherproof housing structure, AND 2. Minimum disturbance of manure/litter, AND 3. Covered manure/litter piles |
| Option #6 | 50% control - completely enclosed mechanically ventilated layer housing with evaporative cooling pads, mixing fans, and a computer control system; and belt manure aeration/drying and removal system with manure removal at least twice per week. |

Step 2 - Eliminate Technologically Infeasible Options

The use of a belt manure aeration/drying and removal system is only feasible for a layer hen house where birds are housed in cages. This option is not feasible for a broiler house because the birds are not housed in cages; rather, the birds can freely roam throughout the enclosure. Therefore, option #6 above will be removed from consideration.

Step 3 - Rank Remaining Control Technologies by Control effectiveness

| PM₁₀ Control Options | | |
|--|---|--------------------------|
| 1 | 99% Overall Capture and Control (Cyclones followed by Electrostatic Precipitator or Baghouse) | Technologically Feasible |
| 3 | 95% Overall Capture and Control (Cyclones followed by Wet Scrubber) | Technologically Feasible |
| 4 | 60% Overall Capture and Control (High Efficiency Cyclones) | Technologically Feasible |
| 5 | Use of the following broiler house design and management practices: <ol style="list-style-type: none"> 1. Weatherproof housing structure, AND 2. Minimum disturbance of manure/litter, AND 3. Covered manure/litter piles | Achieved in Practice |

Step 4 - Cost Effectiveness Analysis

Since this is a proactive BACT determination that is not part of a specific permitting action, cost effectiveness analysis is not application.

Step 5 - Select BACT

Since this is a proactive BACT determination that is not part of a specific permitting action, selecting BACT is not applicable.

V. Recommendations

Based on the above analysis, BACT Guideline 5.7.1 should be updated as outlined in the Draft Updated BACT Guideline shown in Appendix A of this document.

Appendices

A: Draft Updated BACT Guideline 5.7.1

B: Current BACT Guideline 5.7.1

Appendix A
Draft Updated BACT Guideline 5.7.1

SJVAPCD Best Available Control Technology (BACT) Guideline 5.7.1*

Last Update: June 22, 2022

Poultry Broiler House

| Pollutant | Achieved in Practice or contained in SIP | Technologically Feasible | Alternate Basic Equipment |
|----------------------------|--|--|---------------------------|
| VOC | <ol style="list-style-type: none"> 1. a) Enclosed housing with mechanical ventilation and computerized control of environmental conditions using sensors, or b) Use of acidifying litter amendments; AND 2. Comply with applicable District Rule 4570 Feed and Housing Mitigation Measures; AND 3. Houses completely cleaned out at least twice per year; AND 4. All mortality removed from houses at least once per day | <ol style="list-style-type: none"> 1. 98% Overall Capture and Control (Thermal/Catalytic Incineration with a Concentrator) 2. 95% Overall Capture and Control (Carbon Adsorption) 3. 80% Overall Capture and Control (Biofiltration) 4. 70% Overall Capture and Control (Wet Scrubber) | |
| Ammonia (NH ₃) | <ol style="list-style-type: none"> 1. a) Enclosed housing with mechanical ventilation and computerized control of environmental conditions using sensors, or b) Use of acidifying litter amendments; AND 2. Comply with applicable District Rule 4570 Feed and Housing Mitigation Measures; AND 3. Houses completely cleaned out at least twice per year; AND 4. All mortality removed from houses at least once per day | <ol style="list-style-type: none"> 1. 80% Overall Capture and Control (Biofiltration or Wet Scrubber) | |
| PM ₁₀ | <p>Use of the following broiler house design and management practices:</p> <ol style="list-style-type: none"> 1. Weatherproof housing structure, AND 2. Minimum disturbance of manure/litter, AND 3. Covered manure/litter piles | <ol style="list-style-type: none"> 1. 99% Overall Capture and Control (Cyclones followed by Electrostatic Precipitator or Baghouse) 2. 95% Overall Capture and Control: (Cyclones Followed by Wet Scrubber) 3. 60% Overall Capture and Control (High Efficiency Cyclones) | |

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

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Appendix B
Current BACT Guideline 5.7.1

SJVAPCD Best Available Control Technology (BACT) Guideline 5.7.1*
Last Update: 2/01/2006

Broiler House

| Pollutant | Achieved in Practice or contained in SIP | Technologically Feasible | Alternate Basic Equipment |
|----------------------------|---|--|---------------------------|
| VOC | <p>19% Control -</p> <ol style="list-style-type: none"> 1. Completely enclosed mechanically ventilated broiler housing with evaporative cooling pads, mixing fans, and a computer control system using thermostats, sensors, and timers to control environmental conditions; all birds fed in accordance with NRC or other District-approved guidelines; houses completely cleaned out at least twice per year; and all mortality removed from houses twice per day <p>OR</p> <ol style="list-style-type: none"> 2. Acidifying litter amendments; all birds fed in accordance with NRC or other District-approved guidelines; and all mortality removed from houses twice per day | <ol style="list-style-type: none"> 1. 98% Control (Capture and Thermal Incineration) 2. 95% Control (Capture and Catalytic Incineration) 3. 95% Control (Capture and Carbon Adsorption) 4. 80% Control (Capture and Biofiltration) | |
| Ammonia (NH ₃) | <p>55% Control -</p> <ol style="list-style-type: none"> 1. Completely enclosed mechanically ventilated broiler housing with evaporative cooling pads, mixing fans, and a computer control system using thermostats, sensors, and timers to control environmental conditions; all birds fed in accordance with NRC or other District-approved guidelines; houses completely cleaned out at least twice per year; and all mortality removed from houses twice per day <p>OR</p> <ol style="list-style-type: none"> 2. Acidifying litter amendments; all birds fed in accordance with NRC or other District-approved guidelines; and all mortality removed from houses twice per day | <p>80% Control (Capture and Biofiltration)</p> | |

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

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