

Technical Support Document
for
EPA's Notice of Proposed Rulemaking

on revisions to the
California State Implementation Plan

as submitted by the California Air Resources Board
for the San Joaquin Valley Unified Air Pollution Control District

EPA's Analysis of
San Joaquin Valley Unified Air Pollution Control District's
Rule 4570, Confined Animal Facilities

United States Environmental Protection Agency, Region IX
Air Division

August 2011

A. Rule Adoption and Submittal Chronology

- June 15, 2006: The San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) Governing Board adopts Rule 4570, Confined Animal Facilities (CAF).
- June 18, 2009: SJVUAPCD re-adopts Rule 4570.
- January 14, 2010: EPA finalizes a limited approval/limited disapproval of the June 18, 2009 version of Rule 4570 (75 FR 2079).
- October 21, 2010: SJVUAPCD Governing Board adopts amendments to Rule 4570.
- April 5, 2011: The California Air Resources Board (CARB) submits the October 21, 2010 version of Rule 4570 to EPA (on behalf of SJVUAPCD) as a revision to the California State Implementation Plan (SIP).
- May 6, 2011: EPA finds the April 2011 submittal of Rule 4570 complete.

B. Rule Summary

Rule 4570 is designed to decrease volatile organic compound (VOC) emissions from dairies, beef feedlots, poultry houses, and other confined animal facilities. Most of the rule requirements apply only to large operations above size thresholds described in table 2 (e.g., 400,000 chickens). These operations must obtain an SJVUAPCD permit describing the control measures the facility chooses to implement from menus of control measure options listed in Section 5. Sections 6–8 describe additional requirements concerning permitting, recordkeeping, testing and monitoring.

C. Evaluation Criteria – EPA is using the following criteria to evaluate Rule 4570.

1. Enforceability - The Bluebook (reference #3) and the Little Bluebook (reference #4) were used to help evaluate compliance with the federal Clean Air Act (CAA) Section 110(a)(2)(A) requirement for enforceability.
2. Anti-Backsliding – We have evaluated this SIP revision to determine whether it would interfere with any applicable requirement concerning attainment and reasonable further progress (RFP) or any other applicable requirement of the Act (CAA §110(l)) or modify, in a nonattainment area, any SIP-approved control requirement in effect before November 15, 1990 (CAA §193).
3. RACT – CAA Section 182(b)(2) directs extreme nonattainment areas like SJVUAPCD to adopt and submit SIP provisions implementing Reasonably Available Control Technology (RACT) for all stationary sources of VOC that emit more than 10 tons per year of VOC. RACT is “the lowest emission limitation that a particular source (can meet using) control technology that is reasonably available, considering technological and economic feasibility.”(44 FR 53762,

September 17, 1979). In addition, CAA Section 172(c)(1) requires nonattainment areas to implement all reasonably available control measures, including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology (RACT/RACM), as expeditiously as practicable.

SJVUAPCD must implement RACT/RACM for CAFs that are major sources of ozone precursors. In this proposal, we are only evaluating RACT. Additional control measures for CAFs may be required pursuant to CAA §172(c)(1) if both: (1) additional measures are reasonably available; and (2) these additional reasonably available measures will advance attainment in the area when considered collectively with other reasonable measures. In a separate rulemaking, EPA will take action on the State's RACM demonstrations for the 8-hour ozone NAAQS based on an evaluation of the control measures submitted as a whole and their overall potential to advance the applicable attainment date in the San Joaquin Valley. See 40 CFR 51.912(d) and 51.1010.

D. EPA Evaluation – EPA staff assessment of the rule according to the criteria is summarized below.

1. **Enforceability** - In general, Rule 4570 requirements are sufficiently clear, and contain adequate monitoring, recordkeeping and other provisions to determine compliance with the rule.
2. **Anti-Backsliding** – The District has lowered the applicability threshold of the rule for dairies and poultry facilities, added new requirements for mitigation of silage emissions, and removed numerous compliance options that are not effective at reducing VOC emissions. These changes are described in additional detail in the RACT discussion below. We propose to determine that our approval of the submittal complies with CAA §110(l), because the proposed SIP revision does not interfere with the on-going process for ensuring that requirements for RFP and attainment of the NAAQS are met, and the submitted SIP revision is at least as stringent as the rule previously approved into the SIP. We also propose to determine that our approval of the submittal complies with CAA §193 because the submitted SIP revision is at least as stringent as the rule previously approved into the SIP and would insure equivalent or greater emission reductions of VOC.
3. **RACT** – Because of the limited history of studying and regulating VOC emissions from CAFs, RACT is not clearly defined for these operations. Research efforts to better understand VOC emissions from CAFs are on-going, and we commend SJVUAPCD for their continuous efforts to monitor and lead research efforts so as to better understand emissions and potential controls for these facilities. As discussed further below, we propose to determine that Rule 4570 complies with RACT. Rule 4570 contains both Class One mitigation measures which generally consist of less expensive management practices and Class Two mitigation measures which consist of more expensive management practices or require add-on controls.

Class One Mitigation Measures

As part of the 2010 amendments to Rule 4570, the District further analyzed all Class One mitigation measures and significantly strengthened menu options. The District reviewed the most recently available science, and adjusted compliance options to ensure the efficacy of controls. For example, the District adjusted the timeframe for feeding total mixed rations in the dairy feed menu from 48 hours to 2 hours to reflect recent information that shows that feed emissions occur within the first 12-24 hours after the feed is put into the feed lane (see Final Staff Report, pg. 20). The District also further analyzed the applicability of various measures, and removed compliance options that were already standard industry practice or were not applicable for the types of facilities that were targeted by specific menus. For example, the District removed ‘installing floats or other devices in water troughs to prevent spills’ from dairy and feedlot menus because they concluded that the measure was standard industry practice (see Final Staff Report, pg. 29 and 43), and the District removed ‘cleaning under poultry cages every 14 days’ from the broiler/duck/turkey housing menu because animals in these facilities are not caged (see Final Staff Report, pg. 66). Moreover, the District examined all optional measures, and where it was economically and technically feasible, specified mandatory measures. The District also justified why it was necessary for certain measures to remain optional. For example, the 2009 dairy corral menu allowed sources to select 6 measures from a menu of 13 options without specifying any mandatory measures. The 2010 dairy corral menu requires sources to select 7 measures from a menu of 10 options, and specifies 6 mandatory measures that must be selected. Sources are allowed to select one additional measure from three other options. The District explains that this flexibility is necessary because of the variability among dairies and high costs of the optional management practices (see Final Staff Report, pg. 32).

The District’s careful analysis ensures that sources are implementing all Class One measures that are reasonably available. As additional information becomes available about the efficacy and costs of controls, what is reasonably available may change over time.

Dairy Class One Mitigation Measures

The District has lowered the applicability threshold for dairies from 1000 to 500 head to further reduce emissions. This threshold ensures that all dairies that emit 10 tons of emissions per year are covered by the rule. Both large (1000 head) and medium (500 head) dairy CAFs must implement measures to mitigate emissions from feed, silage, the milking parlor, freestall barns, corrals, and liquid manure. Large dairy CAFs must also implement measures for solid manure/separated solids.

EPA’s 2010 action on Rule 4570 deferred a decision on RACT for dairy and feedlot operations because we expected significant new information to be available in the near future that would help clarify RACT for these facilities. EPA continues to assess information gathered through the National Air Emission Monitoring Study (NAEMS), a \$14.8 million industry funded analysis of CAF emissions at 25 sites nationwide that EPA is overseeing. Concurrent with adoption of the 2010 version of Rule 4570, SJVUAPCD adopted revised emission factors for dairies that

incorporate findings from the most recently available science. The new emission factors indicate the importance of fermented feed (at silage piles and in total mixed rations) as a VOC source. The District estimates that all VOC sources at dairies excluding feed emit a combined 15.8 lbs/hd-yr, and estimates that open face of silage piles and total mixed rations emit about 18.3 lbs/hd-yr (see 2010 Staff Report Appendix H).

The 2010 version of Rule 4570 includes additional mitigation measures for silage that require dairies to either use a sealed feed storage system or to select at least four practices to create and manage silage piles in a manner that minimizes VOC emissions. Because they were not effective at reducing VOC emissions or were not applicable, the District removed two measures from the dairy feed menu, four mitigation measures from the freestall barns menu, three measures from the corrals menu, one measure from the solid manure handling menu, one measure from the liquid manure menu, and two measures from the land application menu (see 2010 Staff Report, pg. 19 - 39). Overall, dairies are required to implement 22 of 35 mitigation measures.

Other Cattle Class One Mitigation Measures

The applicability threshold for other cattle facilities that include heifer and calve ranches is 7,500 head. The District is currently revising the emission factors for other cattle. These emission factors have more uncertainty associated with them because they are extrapolations from the District's current VOC emission factors for mature milk cows. Whereas several iterations of research efforts have been completed, reviewed, and refined to determine emissions from mature milk cows, such an extensive effort has not yet been undertaken to measure VOC emissions from support stock because they have much lower VOC emissions. The composition of the diet fed to cattle is an important factor that affects emissions, and support stock have lower emissions because they are fed a ration that has a higher percentage of relatively inert organic matter, such as lignin and cellulose, while mature dairy cows are fed a much higher amount of fermentable carbohydrates and silage (see August 19, 2011 email from Ramon Norman, SJVUAPCD). The District estimates that four other cattle facilities that emit more than 10 tons of emissions per year are not subject to Rule 4570 (see August 8, 2011 email from Samir Sheikh, SJVUAPCD, and attachment). Each of these facilities have cattle ranging from 3,700 to 5,800 head, and the District estimates that they emit a combined amount of .2 tons per day. This is less than 0.2% of the 112.4 tons per day of baseline VOC emissions attributed to CAFs in SJV (see 2010 Staff Report, Appendix B).

Other cattle facilities raise animals for dairy and feedlot operations, and the compliance requirements for other cattle are similar to the requirements for dairy and feedlot operations. Because they were not effective at reducing emissions or were not applicable, the District has removed four measures from the other cattle feed menu and three measures from the housing menu, has separated the table for housing into one that covers freestall barns and another that covers corrals, and has made changes to the manure and land application menus that are similar to the changes that were made for the dairy manure and land application menus. Overall, other cattle are required to select 16 of 29 mitigation measures.

Feedlot Class One Mitigation Measures

Rule 4570 applies to feedlots with 3,500 head. The District is revising the emission factor for feedlots, and currently estimates that beef cattle emit around 4 lbs/hd-yr (see August 5, 2011 email communication from Ramon Norman, SJVUAPCD). The applicability threshold for feedlots ensures that facilities that emit 10 tons of emissions per year are covered by the rule.

Feedlots that store and feed animals from silage piles are required to implement the same silage requirements as dairies. Because they were not effective at reducing VOC emissions or were not applicable, the District has removed four measures from the feedlot feed menu, four measures from the housing menu, and two measures from the land application menu (see 2010 Staff Report, pg. 39-46). Overall, feedlots are required to implement 13 of 22 mitigation measures.

Poultry Class One Mitigation Measures

EPA's 2010 limited disapproval of Rule 4570 discusses how the applicability threshold of 650,000 head for chicken facilities does not cover all major sources (see June 2009 EPA Technical Support Document pg. 3 and 9). The District adequately addressed this deficiency in the 2010 version of Rule 4570 by changing the applicability threshold for poultry facilities from 650,000 head to 400,000 head.

The 2009 version of Rule 4570 has one menu generally for poultry facilities. The 2010 rule has two menus more specifically tailored to layer facilities (Table 4.5) and broiler, duck or turkey facilities (Table 4.6). Moreover, the District has retired five mitigation measures from the 2006 rule that are not effective at reducing emissions from poultry feed, has retired seven measures that are not effective at reducing emissions from poultry housing, and has retired two measures from the solid manure menu because they were not applicable to poultry facilities in the Valley or would not reduce emissions (see 2010 Staff Report, pg. 59 - 67). Overall, layer facilities are required to implement 5 of 7 mitigation measures, and broiler, duck, and turkey facilities are required to implement 7 of 9 mitigation measures.

We also note in our 2010 action that the poultry housing menu in the 2009 version of the rule has four options requiring maintenance every 14 days (removing caked waste, cleaning under cages, adjusting drinkers, and repairing pipe leaks), and state that if these measures are cost effective for all major sources, it may be appropriate to generally require them. Conversely, we say that if the District determines that these measures are significantly less effective than other generally available measures, it may be appropriate to exclude them from the menus. In order to more specifically tailor mitigation measures to facility type, the District divided the poultry menu into a menu for layer facilities and another for broiler/duck/turkey facilities in the 2010 version of the rule. The SJVUAPCD removed three of the four options requiring maintenance every 14 days from the layer menu. The District retired the option to adjust drinkers every 14 days since birds at layer facilities are all grown in size and do not warrant a change in drinker configuration. The District retired the option to clean under poultry cages every 14 days since manure is cleaned once or twice a year when all the birds are removed from the housing and it would be cost prohibitive to remove manure on a biweekly basis. The District also retired the option to remove

caked animal waste every 14 days since they do not believe that caked manure that is dry has emission potential. The District strengthened the measure for inspecting and repairing pipes from 14 days to daily, and made it one of two measures required in the layer housing menu. These changes to the layer menu are explained on pg. 60-61 of the Final Staff Report. For broiler/duck/turkey facilities, the District retained the measure to inspect and adjust drinkers, but strengthened it from adjusting drinkers once every 14 days to 7 days. Broiler, duck, and turkey CAFs generally raise animals from chicks until they reach market weight. Since the size of the birds changes significantly in that period, drinkers need to be continuously adjusted to ensure that water is not spilled as the birds attempt to drink. Spilled water would mix with litter and manure on the floor, which may create conditions that could lead to microbial decomposition and VOC emissions. The District retired the measure to clean under poultry cages from the broiler/duck/turkey menu since animals are not caged in these facilities and also retired removing caked animal waste from the broiler/duck/turkey menu because they did not believe that caked waste was emissive. Like in the layer menu, the District included the measure to inspect and repair pipes and drinkers daily in the broiler/duck/turkey menu and made it a required measure.

Swine Class One Mitigation Measures

Rule 4570 applies to swine facilities with 3,000 head. This threshold ensures that all swine facilities that emit 10 tons of emissions per year are covered by the rule.

Because these measures do not reduce emissions or are not applicable, the District has retired ten measures from the swine feed mitigation menu, six measures from the housing menu, two measures from the liquid manure handling menu, and three measures from the solid manure menu. Overall, swine facilities are required to implement 7 of 9 mitigation measures.

Class Two Mitigation Measures

The District conducted additional analysis of the feasibility of Class Two mitigation measures (see Final Staff Report, Appendix E). In this analysis, the District uses logic that is similar to EPA's Air Pollution Cost Manual. Capital costs are converted to annual costs using the capital cost recovery factor. Annualized capital costs are added to the annual operating costs to get a total annual cost for controls. Cost effectiveness is then determined by dividing costs by the amount of emissions that would be reduced by controls.

As a result of finding that Class Two measures were not economically or technically feasible, SJVUAPCD retired Class Two mitigation measures that were compliance options in the 2010 version of the rule. Below we discuss the District's analysis for Class Two Mitigation measures for the three largest sources of dairy emissions, and Class Two Mitigation measures for poultry and swine.

Dairy Class Two Mitigation Measures

While the District considers Class Two mitigation measures for other emission points at dairies, the largest individual source of VOC emissions at dairies are total mixed rations with about 11.8 lb/hd-yr (see 2010 Staff Report Appendix H).

Total mixed rations are fed to cows in freestall barns. In addition to emissions from feed (including silage piles as well as total mixed rations), there are also enteric emissions from cows and emissions from manure in stalls and lanes in the freestall barns. The District notes potential animal health issues that may make enclosing freestall barns infeasible, and was not able to identify any freestall barns in San Joaquin Valley that were enclosed. Nonetheless, the District considered the economic feasibility of enclosing freestall barns and venting the exhaust to a biofilter. The District reviewed six different sources of information for the costs of enclosing and venting freestall barns to biofilters. To determine the capital and operating costs associated with biofilters, the District reviewed eleven sources in the literature. The District also directly contacted seven vendors that supply biofilters to request cost information, and received four responses which they incorporated into their analysis. The District considered the potential for reduced biofilter costs for facilities with larger flow rates, but determined there was not any additional cost reduction benefit related to economy of scale because the cost information they received indicated that facilities with larger flow rates may need multiple individual units to treat flows. The District's calculations indicate that it would cost \$205,098 - \$4,233,206/ton of VOC reduced to enclose and vent freestall barns to a biofilter (see Final Staff Report, Appendix E, pg. 6-19). This cost range is beyond what would be economically feasible for RACT.

Swine and Poultry Class Two Mitigation Measures

Using the same capital and operating costs for a biofilter, and required airflow rates that are specific to swine, the District estimated that annual VOC emission reductions for swine housing vented to a biofilter are \$219,180 - \$2,159,335/ton of VOC reduced for a facility with 3,000 finishing head (see Final Staff Report, Appendix E, pg. 19-21).

Similarly, using airflow rates specific to poultry houses, the District estimated that the costs of venting VOC emissions to a biofilter at poultry facilities with 32,000 broilers would be \$1,534,257 – 15,115,345/ton reduced and that the costs of venting VOC emissions to a biofilter at a facility with 5,000 turkeys would be \$2,454,812 – 24,184,553/ton reduced (see Final Staff Report, Appendix E, pg. 22-24).

The cost estimates for add-on controls at swine and poultry facilities are beyond what would be economically feasible for RACT.

Conclusion for Whether Rule 4570 Meets RACT

The District's analysis of Class One and Class Two mitigation measures ensures that the rule meets CAA requirements for RACT, and ensures that controls that are economically and technically feasible are required.

E. Additional Recommendations for Next Rule Revision

As noted above, SJVUAPCD believes that four other cattle facilities which are exempted by Rule 4570 emit above 10 tons/year of VOC. SJVUAPCD should lower the other cattle threshold in Section 4 or further consider how RACT is imposed for these sources. EPA is not identifying

this as a RACT deficiency at this time for reasons including the following:

- Rule 4570 imposes RACT for over 900 sources.¹ The other cattle threshold exempts only 4 facilities which emit a combined amount of 0.2 tons per day. This is less than 1% of the sources and the baseline VOC emissions attributed to CAFs in SJV. By analogy, national policy generally allows SIP rules up to 5% less stringent than presumptive RACT in CTGs (see Bluebook, pg. 2-2).
- The existing threshold effectively limits the size and therefore emissions of exempt other cattle facilities. That is, these four facilities can not significantly grow without triggering rule requirements.
- SJVUAPCD adopted three versions of Rule 4570 in the last five years, after highly resource-intensive internal and public processes. Nonetheless, this issue was not previously identified. While SJVUAPCD should address it the next time Rule 4570 is reevaluated, we do not believe it is a good use of public and private resources to compel the District to reopen this rule immediately for this one relatively small issue.
- There is added uncertainty associated with emission estimates for these four facilities since emission factors for other cattle are based on extrapolations from data for mature dairy cows.

F. EPA Action

The submitted revisions to Rule 4570 strengthen the SIP, and address the deficiencies we called out in our 2010 action. The rule satisfies CAA Section 182(b)(2) for RACT. EPA staff recommends approval of Rule 4570 pursuant to CAA §110(k)(3) and §301(a).

G. References

1. SJVUAPCD Rule 4570, Confined Animal Facilities, adopted October 21, 2010.
2. “Final Staff Report for Revised Proposed Amendments to Rule 4570 - Confined Animal Facilities,” SJVUAPCD, October 21, 2010, and its Appendices
3. “Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations,” (Bluebook) EPA OAQPS, May 25, 1988.
4. “Guidance Document for Correcting Common VOC & Other Rule Deficiencies,” (Little Bluebook), EPA Region 9, August 21, 2001.
5. Portions of the proposed post-1987 ozone and carbon monoxide policy that concern RACT, 52 FR 45044, November 24, 1987.

¹ This number only includes the number of dairies with over 500 head that are subject to Rule 4570. See 2010 Staff Report, Appendix D, pg. D-21.

6. “State Implementation Plans, General Preamble for the Implementation of Title I of the Clean Air Amendments of 1990,” 57 FR 13498, April 16, 1992.
7. “Preamble, Final Rule to Implement the 8-hour Ozone National Ambient Air Quality Standard” 70 FR 71612, November 29, 2005.
8. “Reasonably Available Control Technology (RACT) Demonstration for Ozone State Implementation Plans (SIP),” SJVUAPCD, April 16, 2009.
9. Letter from William T. Hartnett to Regional Air Division Directors, “RACT Qs & As – Reasonable Available Control Technology (RACT): Questions and Answers,” EPA, May 18, 2006.
10. EPA Air Pollution Control Cost Manual, Sixth Edition, EPA Office of Air Quality Planning and Standards, January 2002.