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April 10, 2017

Mary Nichols, Chair
California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Re: Comments on the Draft Environmental Analysis for the Proposed Strategy for Achieving California's 2030 Greenhouse Gas Target – Baseline Air Emissions from Covered Composting and Off-sets

Dear Ms. Nichols;

The California Compost Coalition (CCC) is a statewide organization representing operators of permitted facilities involved in the processing and composting of green and food waste materials throughout California. On behalf of these companies, we have already submitted comments on the December 2, 2016 Discussion Draft of the 2030 Target Scoping Plan Update and on the December 14, 2016 meeting on the Natural & Working Lands model. CCC supported SB 32 and SB 1383 and looks forward to the joint implementation of SB 1383 by CARB and CalRecycle in the regulatory process to divert 50% of all organics from landfill by 2020, and 75% of all organics by 2025.

CCC supports the overall vision and strategy set forth in the 2017 Climate Change Scoping Plan Update and the November 2016 draft of the Short-Lived Climate Pollutant Reduction Strategy, and appreciates that these plans have been linked. Both of these plans need to develop a sustained funding mechanism to develop the multi-billion dollar infrastructure to develop over 100 facilities and to foster the use of compost on our working lands, with a focus on irrigated croplands. Composting and anaerobic digestion form the cement that binds the Governor's Five Pillars together. Eliminating organics from the landfills will mitigate methane generation as a short-lived climate pollutant to implement SB 1383 (Pillar 4), and instead, creates biomethane power at anaerobic digestion facilities to generate more renewable energy to achieve the goals of SB 350 (Pillar 2). Biomethane energy will also produce carbon negative fuel for the CNG fleets that collect the organics and implements the Low Carbon Fuel Standard to reduce petroleum use by 50% (Pillar 1) and transition from heavy-duty diesel trucks. The diverted food waste and digestate can be composted to sequester carbon and be integral to healthy soils (Pillar 5). Organic power and compost use have been deemed among the most cost-effective greenhouse gas (GHG) reduction strategies and bond all Five Pillars together. The California Legislative Analyst's Office determined the cost of composting and anaerobic digestion to be at just $9/ton of GHG reduction while the overall average is $57/ton.

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The ***2017 Annual Report on the Cap and Trade Dollars at Work*** show that the 100% of the grant dollars administrated by CalRecycle to develop the compost and AD infrastructure will benefit the disadvantaged communities. This is achieved by reducing methane, reducing emissions, and transitioning from heavy-duty vehicles to CNG trucks using renewable natural gas and near-zero low NOx engines.

Our comments below are in addition to the comments we posted on February 6, 2017, and will focus on covered compost facilities' emissions and baseline conditions with detailed data to support our comments. Our comments request that additional environmental analysis be conducted by CARB staff as part of this environmental review.

Comments on Section 3 Air Quality – ii. SLCP Measures

> Operation of new green waste composting facilities could potentially increase VOC and PM emissions depending on the type of composting employed. These facilities could also cause other criteria pollutant emissions associated with the use of heavy equipment on-site (e.g., tractors, compost turners, and grinders) and from waste-haul truck traffic to and from the sites. Air quality impacts from the operation of digesters and associated equipment at composting facilities could potentially increase emissions. The quantity and type of emission increases would depend on the type of digester technology and the end use of the captured biogas and may include CO, PM, SOx, VOC, and NOx. Although there would be emissions associated with these sources at anaerobic digestion and composting facilities, the operation would divert organics out of landfills. As a result, there would be less mobile source at activity at landfills. Operation of digestion facilities could also help offset other emission sources by generating electricity or producing biogas as a substitute for fossil vehicle fuels.

The Environmental Analysis needs to recognize baseline conditions for organic waste management practices such as landfilling when assessing the emissions from composting and anaerobic digestion facilities. Page 62 (copied above) states that compost facilities could potentially increase VOC and PM emissions, but does not discuss the baseline conditions of these materials being landfilled, with methane and other associated landfill operations emissions. Since the SLCP measures are diverting food waste and green waste from landfilling, these baseline conditions need to be recognized where the net benefit of both greenhouse gas reductions and criteria pollutants can be demonstrated when diverting green waste and food waste from landfills to composting and/or anaerobic digestion facilities.

The Short-Lived Climate Pollutant Plan adopted by CARB on March 24, 2017, presents a scenario on page 126 on the number and type of facilities needed to divert 50% of the organics from landfilling by 2020, and 75% by 2025. CARB assumes that there will need to be 53 compost facilities by 2020 and 74 composting facility by 2025, with a throughput of 100,000 tons per year each – which is a reasonable assumption to conduct and environmental analysis. Keep in mind that the compost industry has moved beyond the existing windrow technology in place today, and that all new facilities will be covered aerated static pile facilities (CASP) using the best available control technology within the respective air district, and those emission factors should be used.

<u>Baseline Landfill Emissions Conditions:</u>

To assess the air quality impacts, these new CASP emissions from 53 to 74 new facilities can be compared to the landfilling baseline. Using standard industry practices, we have calculated that avoided landfill emissions of VOCs are 1.9 times greater that the VOCs emitted from CASP compost facilities. The net benefit of diverting organics from the landfill to CASP compost facilities is almost 2 times greater

than baseline conditions. The comments in the section copied above needed to reflect that only CASP composting will be utilized for new compost facilities, and that VOCs will not increase above baseline, but instead will be cut in half. Plus, the compost industry is in the midst of electrifying their off-road heavy-duty grinders and trommels, and that there will also be a new reduction in those emissions contrary to the statement copied above.

Landfill gas contains VOCs and NH3, which are emitted with fugitive landfill gas. The USEPA LandGem model is used to estimate landfill gas emissions and provides output including amounts of methane, carbon dioxide and NMOCs. This was used to derive the ratio of NMOCs to methane generation, which is 0.026 mass NMOCs/mass of methane at a concentration of 2,420 ppmv (AP-42, Chapter 2.4). Additionally, the fraction of NMOCs that is considered VOCs is 85% of the total NMOCs for co-disposal sites that accept residential and commercial/industrial waste. Therefore, the VOC content of landfill gas is (0.85)(0.026) = 0.0221 times the mass of methane.

Fugitive methane emissions can be estimated using the avoided landfill emission factor of 0.39 MTCO2e/ton organic feedstock for food waste and 0.21 for green waste (CARB, 2015) and multiplying the result by 16/44 and adjusting to short tons. Applying these factors results in avoided methane generation the resulting in avoided VOC emissions can be calculated. Using standard industry practices and an average of the composting emission that the local air district are using, we have calculated that avoided landfill emissions of VOCs are 1.9 times greater that the VOCs emitted from CASP compost facilities.

<u>Compost Emissions Conditions Example in the SJVAPCD:</u>
Each local air district has their specific compost emissions factors. Default VOC & ammonia emission factors are generally conservative and here we present a case study in the SJVAPCD, where ECS and others that do compost emission testing say that the real emission factors are much lower. It is possible to accept an Authority to Construct based on default emission factors with the understanding that emission testing after construction will be conducted, and based on those results the permit could be modified to allow more throughput.

Default VOC emission factors in the SJVAPCD are:

- 5.71 lb/ton of feedstock during composting and curing (uncontrolled emission factor)
- 0.2 lb/ton/day for feedstock storage
- It is assumed that 90% of VOCs are generated during active composting and that a finished compost layer will reduce emissions by 80%

A lower compost emission factor that is probably achievable is 2.5 lb/ton (this is uncontrolled).

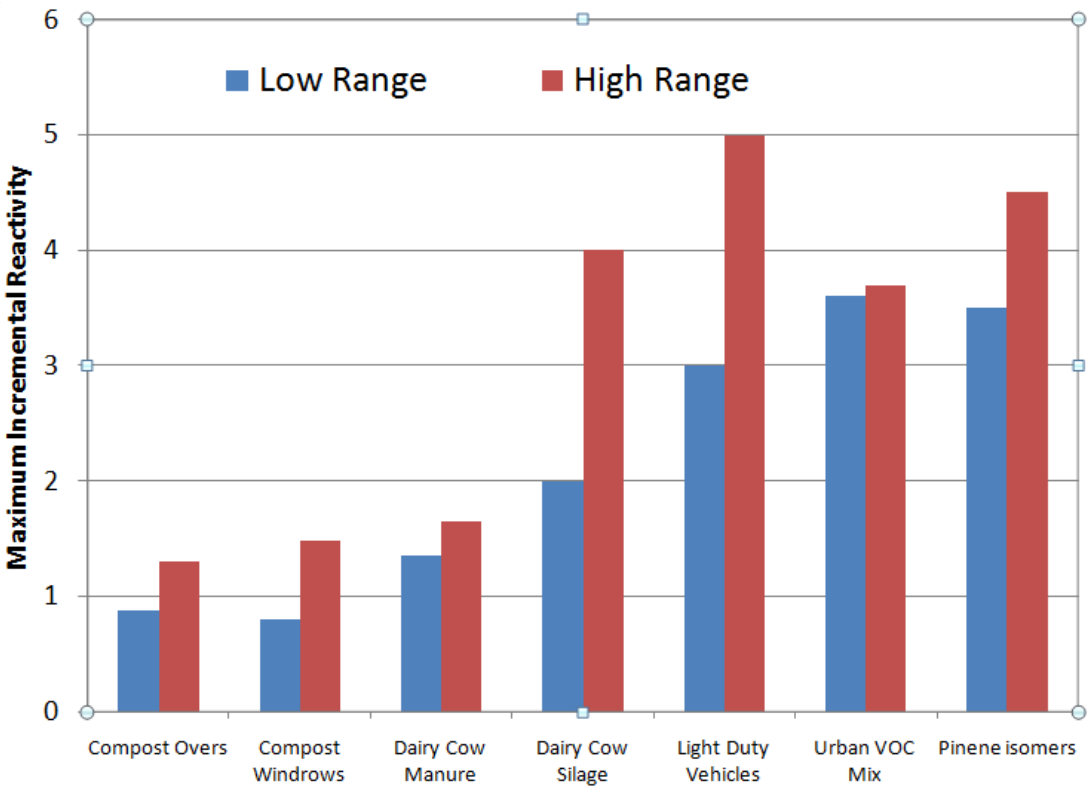
<u>VOCs from green waste composting has much lower ozone formation potential</u>
VOCs from green waste composting are a diverse mixture, but comprise 80 - 95 percent low reactivity alcohols. The ozone formation potential of the total composting VOC mix is considered low, and is similar to other agricultural sources. The following phrase is from a peer reviewed journal article (A. Kumar et al. / Atmospheric Environment 45 (2011) 1841 - 1848). *Overall, only around 10 % of the average VOC emissions were found to have medium to high potential for ozone formation.*

Full Citation: Volatile organic compound emissions from green waste composting:

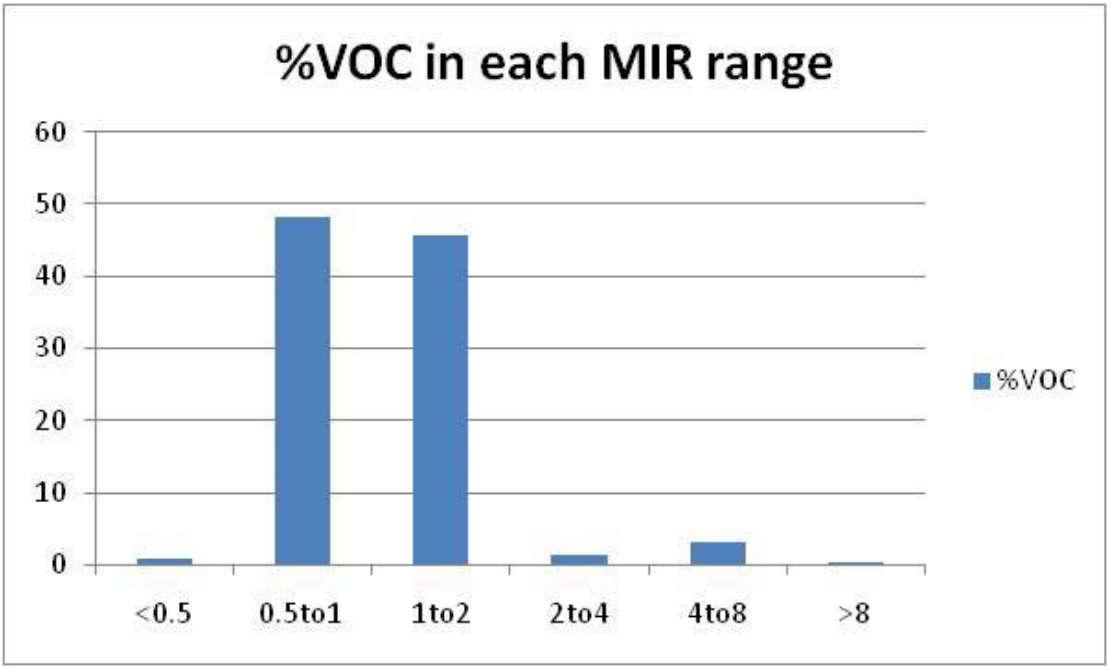
Characterization and ozone formation Anuj Kumar a,1, Christopher P. Alaimo a, Robert Horowitz b, Frank M. Mitloehner c, Michael J. Kleeman a, Peter G. Green a,* Atmospheric Environment 45 (2011) 1841 - 1848
The following is from a report prepared by Professor Peter Green at UC Davis under contract with CalRecycle (December, 2010)

VOCs from green waste composting are a diverse mixture, but comprise 80 - 95 percent low reactivity alcohols. The ozone formation potential of the total composting VOC mix is considered low, and is similar to other agricultural sources. The Maximum Incremental Reactivity (MIR) scale is the most common scale used to compare the ozone formation potential of various compounds. Any compound or mixture with an MIR of less than 2 is considered to have low reactivity. The average MIR of all samples taken in Modesto was .95. The average MIR of all samples taken in Tulare was 1.13. The MIR of a typical urban VOC mixture is about 3.6.

Because the composting business model is based on low profit margin, high volume, and efficient production, strict air quality requirements could force some operators out of business. Losing organics processing facilities would undermine 20 years of work by CalRecycle and its predecessor agency to increase diversion of organic materials away from landfills and into more productive uses. Such a development would deprive farmers of affordable sources of compost, an important product for building soil health and ensuring food security. Compost is fundamental to organic crop production, and organic production is growing in terms of both acreage and total dollar value.



Average Maximum Incremental Reactivity (MIR) of various VOC sources.



Average contribution of VOC into the ozone formation according to their reactivity.
(Urban VOC average is 3.6 to 3.7, depending on latest model revisions.)

Full citation:
An Investigation of the Potential for Ground-Level Ozone Formation Resulting from Compost Facility Emissions - December 2010, CalRecycle
Produced Under Contract By: Peter G. Green University of California, Davis School of Civil & Environmental Engineering

Comments on Section 3 Air Quality – ii. SLCP Measures

> Because the implementation details of many of the methane measures identified in the SLCP Strategy depend substantially on the design of future incentive and regulatory programs, and upon local permitting decisions, long-term air quality impacts at this point are difficult to categorize with certainty. As described above, there are methods available to implement the identified measures that may have beneficial impacts on long-term air quality through the replacement of more-polluting emissions sources and fuels. Indeed, as a statutory matter, per SB 605, SB 1383, and AB 32, along with existing Health and Safety Code mandates for criteria pollutant planning, ARB will ultimately need to develop approaches to addressing these issues that ensure that air quality goals are achieved. However, for the conservative purposes of this programmatic analysis, ARB has also disclosed implementation choices that could substantially affect air quality.

CARB should prepare a Program EIR just for CASP Compost to unravel the mysteries and complexities expressed in the statement above. CARB will ultimately need to develop approaches, as each air district now has their own specific methodology, which are uncoordinated and stifling to the development of the CASP compost industry where 53 new facilities need to be developed by 2020, and 74 new facilities need to be developed by 2025. Instead, facilities may choose to quit composting due to complex and

expensive air permitting costs that do not recognize baseline conditions, and may revert to the baseline conditions of landfilling, which emit up to 1.9 times more VOCS than CASP composting.

Local Air Permitting:

Some local air districts are treating new covered aerated static pile (CASP) compost facilities, using the best available control technologies as a new source, as inferred in the statement above, where the cost of permitting and offsets can stop the development of the facility. This Environmental Analysis needs to recognize the net benefit of both greenhouse gas reductions and criteria pollutants can be demonstrated when diverting green waste and food waste from landfills to composting and/or anaerobic digestion facilities. The off-set costs for the typical 100,000 CASP compost TPY facility in each of the major air district are noted below based upon their emission factors and average cost per off-set.

BAAQMD

$7,060 average off-set

100,000 TPY

$473,161 costs

Feedstock TPY	VOCs TPY	$ Offsets
12,950	10.00	0
15,000	11.57	11,084
20,000	15.42	38,265
25,000	19.27	65,446
30,000	23.12	92,627
35,000	26.97	119,808
40,000	30.82	146,989
45,000	34.67	174,170
50,000	38.52	201,351
55,000	42.37	228,532
60,000	46.22	255,713
65,000	50.07	282,894
70,000	53.92	310,075
75,000	57.77	337,256
80,000	61.62	364,437
85,000	65.47	391,618
90,000	69.32	418,799
95,000	73.17	445,980
100,000	77.02	473,161

SCAQMD

$22,246 average off-set

100,000 TPY

$1,396,826

Feedstock TPY	VOCs TPY	$ Offsets
6,000	4.00	0
10,000	6.67	59,397
15,000	10.01	133,698
20,000	13.35	208,000
25,000	16.69	282,302
30,000	20.03	356,603
35,000	23.37	430,905
40,000	26.71	505,207
45,000	30.05	579,508
50,000	33.39	653,810
55,000	36.73	728,112
60,000	40.07	802,413
65,000	43.41	876,715
70,000	46.75	951,017
75,000	50.09	1,025,318
80,000	53.43	1,099,620
85,000	56.77	1,173,921
90,000	60.11	1,248,223
95,000	63.45	1,322,525
100,000	66.79	1,396,826

SJVAPCD

$4,750 average off-set

100,000 TPY

$318,345

Feedstock TPY	VOCs TPY	$ Offsets
12,950	10.00	0
15,000	11.57	7,458
20,000	15.42	25,745
25,000	19.27	44,033
30,000	23.12	62,320
35,000	26.97	80,608
40,000	30.82	98,895
45,000	34.67	117,183
50,000	38.52	135,470
55,000	42.37	153,758
60,000	46.22	172,045
65,000	50.07	190,333
70,000	53.92	208,620
75,000	57.77	226,908
80,000	61.62	245,195
85,000	65.47	263,483
90,000	69.32	281,770
95,000	73.17	300,058
100,000	77.02	318,345

BAAQMD	$475,000	in off-set costs per 100,000 TPY CASP compost facility
SCAQMD	$1,400,000	in off-set costs per 100,000 TPY CASP compost facility
SJVAPCD	$320,000	in off-set costs per 100,000 TPY CASP compost facility

A geographic siting of 53 new CASP composting facilities by 2020 in these 3 districts could costs about $40 million in off-sets.

A geographic siting of 74 new CASP composting facilities by 2025 in these 3 districts could costs about $54 million in off-sets.

To assess the air quality impacts, these new CASP emissions from 53 to 74 new facilities can be compared to the landfilling baseline and not be considered a new source, that could cost up to $54 million in off-set costs while reducing VOCs by almost half from baseline conditions.

We appreciate the recognition of the beneficial impacts on long-term air quality mentioned in the statement above, but the analysis then notes there could be choices which substantially affect air quality. This Environmental Analysis needs to recognize the net reduction, with a macro analysis, that both greenhouse gas and criteria pollutants reductions can be demonstrated when diverting green waste and food waste from landfills to composting and/or anaerobic digestion facilities. With respect to criteria pollutants, the covered aerated static pile compost systems have been shown to reduce VOC emissions by over 80% with the use of biofilters, which should be compared to the baseline landfill system.

CCC supports the overall vision and strategy set forth in The 2017 Climate Change Scoping Plan Update and the November 2016 draft of the Short-Lived Climate Pollutant Reduction Strategy and appreciates that these plans have been linked. CCC respectfully requests that CARB further evaluate our recommendations to fully close the loop on recycling and composting with waste diversion to compost use in the one of the most recognized cost-effective GHG reduction measures available:

Should you have any questions, please contact me at (916) 739-1200.

Sincerely,

Evan W.R. Edgar
Regulatory Affairs Engineer

cc: Scott Smithline, Director, CalRecycle