



TECHNICAL MEMORANDUM

TO: RCH Group

FROM: Rick Moore, RGM Environmental

DATE: March 23, 2023

SUBJECT: Emission Factors for an Expansion of Compost Facility 2 at the Yolo County Central Landfill

Introduction

Northern Recycling is proposing to increase the maximum throughput for Compost Facility 2 (CF2), an aerated static pile compost facility located at the Yolo County Central Landfill (YCCL). CF2 began operating on July 1, 2022, with a permitted maximum throughput of 182,500 tons per year and a peak maximum daily amount of 1,000 tons per day. The proposal is to increase the annual maximum to 260,000 tons per year and a daily peak tonnage of 1,500 tons per day.

The intent of this technical memorandum is to determine the emission factors required for CF2 to expand as proposed and remain below the already permitted annual emission limits and to assess if those emission factors are appropriately conservative.

Default Emission Factors Used to Estimate CF2 Emissions for Air District Permitting

CF2 received an Authority to Construct (ATC) from the Yolo-Solano Air Quality Management District (YSAQMD) prior to beginning operations. The permitted emissions for Volatile Organic Compounds (VOCs) and ammonia (NH₃), as presented in the ATC Application, were based on emission factors being used by the San Joaquin Valley Air Pollution Control District (SJVAPCD) and are quite conservative. Those emission factors are:



Feedstock Storage:

- VOC emission factor = 0.20 lb. VOCs/ton/day
- NH3 emission factor = 0.02 lb. NH3/ton/day

Active Compost Emissions with Placement of a Biofilter Layer on Top of the Composting Material:

- Uncontrolled VOC emission factor = 5.14 lb. VOCs/feedstock ton
- Uncontrolled NH3 emission factor = 0.55 lb. NH3/feedstock ton
- Biofilter control efficiency for VOCs = 80%
- Biofilter control efficiency for NH3 = 53%
- Controlled VOC emission factor = 1.03 lb. VOCs/feedstock ton
- Controlled NH3 emission factor = 0.26 lb. NH3/feedstock ton

Note that the SJVAPCD revised their VOC emission factor in March 2022 to a lower value to correspond with the value adopted by the California Air Resources Board (CARB). The revised value is 3.22 lb. VOCs/feedstock ton during active composting, resulting in a controlled VOC emission factor of 0.64 lb. VOCs/feedstock ton, rather than 1.03.

Curing Emissions:

- VOC emission factor = 0.57 lb. VOCs/feedstock ton
- NH3 emission factor = 0.24 lb. NH3/feedstock ton

The revised VOC emission factor during curing (SJVAPCD, March 2022) is 0.36 lb. VOCs/feedstock ton.

The default emission factors used in the ATC Application resulted in facility-wide emission factors for the entire process of processing, composting and curing the organic material of 2.2 lb. VOCs/feedstock ton and 0.48 lb. NH3/feedstock ton. Applying the revised VOC emission factor results in a facility-wide emission factor for VOCs of 1.6 lb. VOCs/feedstock ton. These facility-wide emission factors are shown in Table 1 below.

Table 1. CF2 Permitted Facility-Wide Emission Factors

Description	CF2 Permitted	CF2 ¹ Updated
VOC emission factor (lb./ton)	2.2	1.6
NH3 emission factor (lb./ton)	0.48	0.48

1. Updated VOC emissions are based on the VOC emission factor adopted by the SJVAPCD in March 2022, which corresponds to the CARB-adopted emission factor (CARB 2015).

Source Test Results for CF2

Following the initiation of operations at CF2, Northern Recycling conducted source testing to demonstrate compliance with the YSAQMD permit. Results of the source testing are shown in Table 2.

Table 2. Results of CF2 Source Testing

Operational Phase	VOCs (lb./ton)	NH3 (lb./ton)
Active Composting	0.089	0.04
Curing	0.007	0.012
Finished Product Storage	0.009	0.03
Feedstock Storage	0.0012	0.00012
Facility-Wide Total	0.11	0.08

Source Test Results for the City of Napa Compost Facility

A sister company to Northern Recycling operates a compost facility for the City of Napa. The compost technology used is the same as the YCCL technology and was designed by the same vendor, Engineered Compost Systems (ECS). The Napa aerated static pile compost facility began operation in January 2020.

In 2017, Napa Recycling and Waste Services (NRWS, a sister company to Northern Recycling) conducted a source test on feedstock stockpiles using a Bay Area Air Quality Management District (BAAQMD) approved testing protocol. Results are:

Food Waste Stockpile: **VOCs:** 0.1 lb. VOCs/ton/day (half of the default of 0.2)
NH3: 0.00053 lb. NH3/ton/day (38 times lower than the default of 0.02)

Green waste stockpile: **VOCs:** 0.05 lb. VOCs/ton/day (one quarter of the default of 0.2)
NH3: 0.00043 lb. NH3/ton/day (46 times lower than the default of 0.02)

Following the commencement of operations, NRWS conducted four quarterly source tests on the composting and curing phases over the first four quarters of operation, as required by the BAAQMD. Results are shown in Table 3 below.

Table 3. Results of NRWS Aerated Static Pile Source Testing

Emission Type	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Average
VOC (lb./ton)	0.03	0.08	0.20	0.22	0.13
NH3 (lb./ton)	0.03	0.09	0.07	0.23	0.11

Using these values from the Napa source testing and applying the average emission factors from the four quarters of testing results in facility-wide emission factors of:

- $(0.1 \text{ lb. VOCs/ton/day})(3 \text{ days}) + 0.13 \text{ lb. VOC/ton} = 0.43 \text{ lb. VOCs/ton}$
- $(0.00053 \text{ lb. NH3/ton/day})(3 \text{ days}) + 0.11 \text{ lb. VOC/ton} = 0.11 \text{ lb. NH3/ton}$

The facility-wide per ton emission factors are shown in Table 4 for a side-by-side comparison.

Table 4. Default and Source Test-Derived Facility-wide Emission Factors

Description	CF2 Permitted	CF2 Updated ¹	CF2 Source Test ²	Napa Facility Source Test ³
VOC emission factor (lb./ton)	2.2	1.6	0.11	0.43
NH3 emission factor (lb./ton)	0.48	0.48	0.08	0.11

1. Updated VOC emissions are based on the VOC emission factor adopted by the SJVAPCD in March 2022, which corresponds to the CARB-adopted emission factor.
2. Results of source testing of CF2 using a YSAQMD-approved protocol.
3. Results of source testing of the City of Napa aerated static pile compost facility using a BAAQMD-approved protocol.

Maximum Allowable Emission Factor for CF2

Northern Recycling is proposing to increase the annual maximum CF2 tonnage to 260,000 tons per year. The maximum facility-wide emission factors to remain below the already permitted emissions are:

$$\text{Max VOC EF} = (182,500 \text{ tons per year} / 260,000 \text{ tons per year}) (2.2 \text{ lb./ton}) =$$

1.54 lb. VOCs/ton

$$\text{Max NH}_3 \text{ EF} = (182,500 \text{ tons per year} / 260,000 \text{ tons per year}) (0.48 \text{ lb./ton}) =$$

0.34 lb. VOCs/ton

A comparison of these maximum emission factors with those shown in Table 4 show that the maximum emission factors are conservative with respect to the source test results and not significantly lower than the emission factors shown in the CF2 Updated column.

Conclusion

The emission factors used to permit CF2 were very conservative relative to source-test-derived emission factors that have resulted from aerated static pile systems at Yolo County and the City of Napa. Applying reasonable and still conservative emission factors to the proposed 260,000 ton per year expanded CF2 facility results in no increase in the previously permitted level of VOC and NH3 emissions.