



**Dirt Hugger<sup>®</sup>**

**ORGANIC COMPOST CO. - OR / WA**

# Dirt Hugger + Air Quality Permitting

1. Background and History
2. Air Permitting Experience
3. Take Aways, Reflections +  
Tips

2010



Dirt Hugger.

2010







2010 - 2014

BLACK GOLD MINE



**The New Location**  
*in Dallesport, WA*



Dirt Hugger.



# 2015: Dirt Hugger 2.0



Dirt Hugger.

2016



Dirt Hugger.





Leachate Pond

Sediment Trap

Yard Debris

Tipping Area 2

Ground Yard Debris

Stage One  
Aeration Pad

Tipping Area One

Fresh Water Pond

Stage Two  
Compost Curing

Screener

Retail Area



111 E Rockland Rd, Dallesport, WA, 98617

Screener

Retail Area

Stage Two  
Compost Curing

Leachate Pond

Sediment Trap

Yard Debris  
Tipping Area 2

Ground Yard Debris

Stage One  
Aeration Pad  
Tipping Area 1

Fresh Water Pond



# Permitting Experience

- Permits Required
  - ✓ SEPA – 100K TPY
  - ✓ Land Use Variance
  - ✓ Conditional Use Permit
  - ✓ Solid Waste – 100k TPY
  - ~~✓ Water Quality~~
  - ✓ Air Quality 100k TPY



<b>Dirt Hugger Air Quality Permitting Timeline</b>			
<b>Date</b>	<b>Event</b>	<b>Costs</b>	<b>Payee</b>
10/17/2016	AQ permit modificaton received by Ecology	\$875	
6/26/2017	Follow up- Ecology suggests not processing the 50k TPY permit so that a 100k TPY permit may be submitted		
9/12/2018	2nd Air Quality Permit Application Received	\$625	CRO AQ
1/29/2019	AERSCREEN modeling is requested	\$1,500	Claude Williams PE
2/5/2019	AERMOD modeling is requested	\$5,000	Ramboll
3/19/2019	Tier 2 review is required by AQ.	\$1,000	DOE
5/9/2019	Draft NOC approval order delivered (review costs to date DOE)	\$11,027	CRO AQ
5/31/2019	AERMOD modeling is complete	\$22,212	Ramboll
6/13/2019	ORIA assistance. Internal review by DOE		
9/17/2019	Final Permit Issued (DOE AQ 232 hours)	\$22,665	CRO AQ
<b>Budgeted Costs</b>		<b>\$875</b>	<b>CRO AQ</b>
<b>Actual Costs</b>	<b>(DH 330 hours on permit)</b>	<b>\$48,877</b>	





# Sticking Points

1. VOC – EFs (80% of time on this)
  1. SJVACD 2010 vs CARB 2015 & Maricopa 2018
  2. Public Records Requests
  3. Composting Experts (John Cleary, ECS, GMT)
2. On Site Testing
3. Capping Material
4. BMP vs BACT
5. Engines – non-road vs stationary

**Table A-3: SJVAPCD VOC Windrow Greenwaste Emissions Testing Data**

Site	Sampling Age of Material	Season Samples Taken	EF (lb-VOC/wet ton)
CIWMB (Modesto)	Over the Active + Curing Phase (days not sampled were interpolated)	Fall	0.85*
Site X		Spring	6.30
NorCal Jepson Prairie (Vacaville)		Summer	5.65
Northern Recycling (Zamora)		Spring	10.03
<b>Average</b>			<b>5.71</b>

\*1.54 was identified in the green waste report after a recalculation to better represent other sites; however, 0.85 was the actual value reported from this test site and will be used in the EF determination.

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# Public Records Request

Facility Name	VOC (lbs/ton)	Volume	Units	Tons	Feedstock	Stockpile EF	VOC (lbs/ton)	NH3 (lbs/ton)
Stemilt	1.626	30000	CY	7,143	I,II, III	0	1.626	N/A
Kittitas	2.85	n/a		6,000	I, II	0	2.85	
Chelan Co Compost	0.64	1000		1,500	i, II, sludge	0	0.64	
Entiat	1.78	n/a		7,000	biosolids	0	1.78	1.43
Average	1.72						1.72	
Lbs/ Year @ 100k TPY							172,346	
DH @ 100k TPY							86.17	
Order of manitude higher DOE recommended vs CRO.							3.31	



**From:** Tim O'Neill  
**Sent:** Monday, July 23, 2018 11:21 AM  
**To:** Vicente, Ryan (ECY) <[rvic461@ECY.WA.GOV](mailto:rvic461@ECY.WA.GOV)>  
**Subject:** RE: Emission factor documents

Hello Ryan,

I got permission this a.m. from one of the site owners to send you the study. Please find it here attached. The study was conducted on aerated static piles with a 6"-12" bio-layer that were composting a very rich mix (40%FW + 60% GW) over a pipe-on-grade aeration floor (which we supplied) that could provide a semi-uniform air flow. Nonetheless the overall VOC emissions from the active composting process was measured at 1.6 lb VOC/wet ton and from the curing phase at 0.4 lb VOC/wet ton. A more uniform and highly aerated agitated composting process, such as the one at Dirt Hugger, will convert more of the bio-available carbon into CO<sub>2</sub>, and less into VOCs. The result will be lower life-cycle VOC emissions.

If/when I get permission from the other facility operator I will forward that study as well.

Let me know if you'd like to discuss this further.

Best regards,

Tim O'Neill  
President  
**Engineered Compost Systems**  
O: 206.634.2625





**US** Composting  
Council®

## **USCC Position Paper: VOC Emissions from Composting**

**The types and volumes of VOCs emitted from properly operated commercial composting facilities are naturally occurring (biogenic) and do not pose significant risk to the formation of ground level ozone**

There is currently no evidence that, where they have been implemented, costly emission reduction requirements for composting operations have resulted in any improvement towards attaining Clean Air Act goals. Composting is in fact recognized by the EPA as an environmentally beneficial process, stating that the “composting process has been shown to absorb odors and treat



Dirt Hugger.



### Feedstock Throughput

Category	Annual (tpy)
Existing	25,000
Increase	37,633
Proposed	62,633

### Total VOC Potential to Emit (PTE)

Period	Uncontrolled	Controlled	Units
Existing (compost)	71.4	-	tpy
Engines	1,718	1,718	tpy
Proposed	226.4	99.99	tpy

### Composting VOC PTE (annual)

Period	Uncontrolled	Controlled	Units
Stockpile <sup>1</sup>	45.83	11.46	tpy
Active Phase	125.17	2.50	tpy
Biofilter	0.00	30.67	tpy
Curing Phase	53.65	53.65	tpy

<sup>1</sup> Stockpile exists: 153 days/yr

### Utilized Emission Factors

Pollutant	Value	Units
NH <sub>3</sub> - stockpile	0.0968	lb / wet ton / day
NH <sub>3</sub> - windrow	1.01	lb / wet ton
VOC - stockpile	0.269	lb / wet ton / day
VOC - windrow	5.71	lb / wet ton

### Negative Aeration Capture Efficiency

Pollutant <sup>1</sup>	Value	Units
any	98%	-

<sup>1</sup> Assumed

### Control/Destruction Efficiencies

Pollutant	Value	Units
NH <sub>3</sub>	21.8%	lb / ton throughput
VOC	75%	lb / ton throughput

### Maximum Onsite Capacity

Category	Peak Onsite <sup>1</sup> (tons)
Stockpile	2,231

<sup>1</sup> Compost density: 0.5 ton/yd<sup>3</sup>

### Total NH<sub>3</sub> PTE

Period	Uncontrolled	Controlled	Units
Existing	25,250	-	lb/yr
Proposed	96,288	79,665	lb/yr

### Composting NH<sub>3</sub> PTE (annual)

Period	Uncontrolled	Controlled	Units
Stockpile	33,028	25,845	lb/yr
Active Phase	44,281	886	lb/yr
Biofilter	0	33,957	lb/yr
Curing Phase	18,978	18,978	lb/yr

### Emissions Distribution

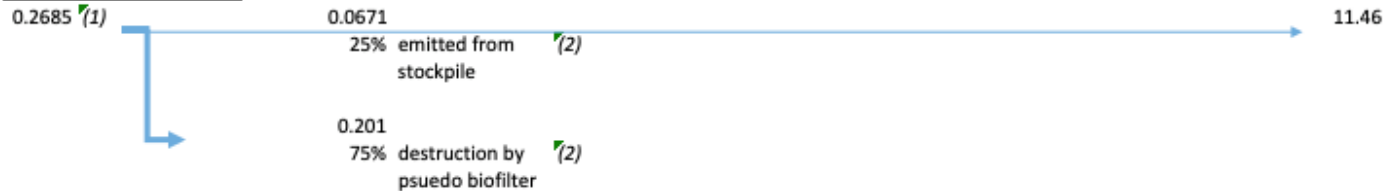
Phase	Emissions (%)	Duration
Active (primary)	70%	Initial 14 days
Curing (secondary)	30%	Remaining time



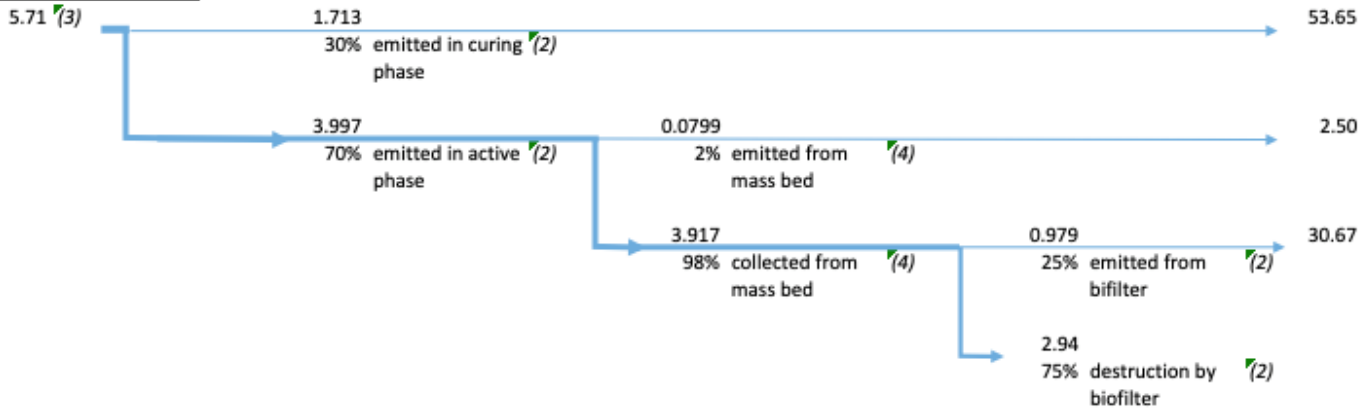
## VOC Emissions Breakdown

2,231 ton stockpile  
 153 days per year (stockpiling)  
 62,633 tons per year composted

### Stockpile (lb/wet-ton/day)



### Composting (lb/wet-ton)



### Stationary Engines (tons)



**Total** 99.99 tpy

### Sources

1. Average of derived emission factors from information presented in: "Air Emissions Source Test- Emissions Evaluation of Complete Compost Cycle VOC and Ammonia Emissions" at Jepson Prairie Organics Compost Facility, Vacaville, CA, issued 5/2006; and "Northern Recycling Zamora Compost Facility Baseline Air Emissions Assessment | Air Emissions Source Test, Revision 2" at Northern Recycling, near Zamora, CA, issued 5/2009.
2. Emissions Testing of VOCs from Greenwaste Composting at the Modesto Compost Facility in the San Joaquin Valley, issued 10/2007.
3. San Joaquin Valley Air Pollution Control District's "Compost VOC Emission Factors" report, issued 9/2010.
4. Conversation with Claude Williams on 2/5/2019.
5. Email from Annie Klinke on 6/12/2019.



# Sticking Points

## ~~1. VOC EF's~~

## 2. On Site Testing

1. No, Yes, But...
2. 25.3 vs TO12 vs Other...?

## 3. Capping Material

1. Screened Finished Compost (\$\$\$, fuel, labor)
2. Unscreened Finished Compost (\$150k less)
3. Overs (20% capacity)

## 4. BMP vs BACT

1. Feedstocks & Operations
2. Building

## 5. Engines – non-road vs stationary

1. 6,901 gallons (74%) vs 2,476 gallons (26%)
2. \$22k in modeling
3. Loss of ability to experiment/innovate





2018





April 2019





May 2019





June 2019





Oct 2019



Dirt Hugger.

<b>Dirt Hugger Marginal Costs for Expansion Under New Permit</b>	
<b>Item</b>	<b>Cost</b>
<b>Marginal Capital Costs of Negative Aeration (vs. existing + air)</b>	
<i>North Pad</i>	
Above Grade Manifolds & Biofilter Piping	\$84,000
Biofilter pad paving	\$23,100
Blower Increase for Negative	\$27,500
<i>Retro Fit South Pad</i>	
Above Grade Manifolds & Biofilter Piping	\$114,500
Biofilter pad paving	\$10,800
Labor for Install	\$26,125
Negative Aeration Engineering + Increased Permit Costs	\$46,378
<i>Total CapEx</i>	\$332,403
<i>Total Expansion Project CapEx</i>	\$1,517,919
Permit Increases in CapEx Costs	22%
<b>Operational Costs (per year)</b>	
Increased Power Consumption (negative is 3x more than +)	\$24,960
Biofilter Construction/Maintenance (2-3 yr cycle)	\$9,800
Biofilter footprint lease (\$150/mo)	\$1,800
Total OpEx	\$36,560
<i>Debt Finance (4.69%)</i>	\$8,228
<b>Calculations</b>	
Increase in permitted capacity (40K TPY to 62.7K TPY)	22,700
CapEx Cost/Ton/5 Yr	\$2.93
OpEx Cost/Ton	\$2.0
<b>Marginal Cost/Ton for Expanded Capacity</b>	<b>\$4.90</b>







# Reflections, Take Aways + Tips

- Same Goals
- More Front-End Alignment. Bring in Experts Earlier
- Flow Chart for Permitting? Based on scale?
- Reduced Cost Testing Protocol
- Standard WA EF's? At what cost?



# We Are the Change

An aerial photograph of a large agricultural field with a red tractor in the upper right quadrant. The field is divided into rows of crops, and the tractor is moving through one of the rows. The overall scene is a lush green landscape with some brown patches of soil or dry vegetation.

- Process Transparency
- Consistency Across State – Good Data!
- Macro vs Micro View
  - Ozone precursors/ Non-attainment
  - Biogenic
  - Opportunity Costs





## IMPACTS

- Over 50,000 yards of product sold
- Over 160,000 tons composted
- 15 full time jobs created
  - (4 per 10k TPY vs. 1)
- 17,899 tons CO2 Reduction/Year
  - 2 million gallons gas
  - 93 rail cars of coal
  - 7 million propane bbq's
  - 3200 cars