Ardagh Metal Packaging

Air Permitting and Compliance

* *How to conduct a facility-wide PTE Emissions Inventory*
* *Emission Calculation Strategies*

July 20, 2023

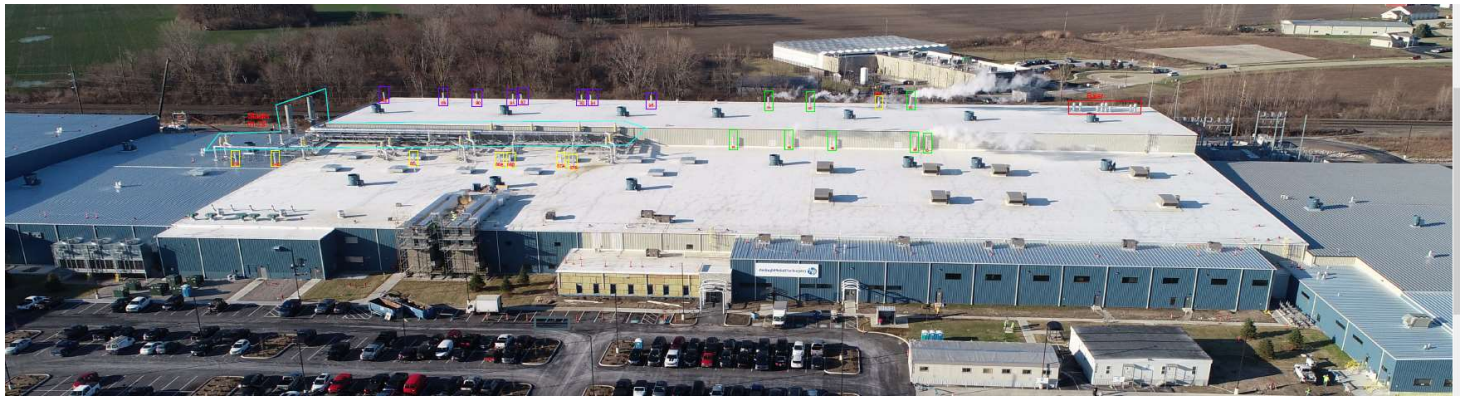
Who & How to conduct an emissions inventory

Who: Under state and federal regs, it is the business owner's responsibility to obtain an air pollution permit for **all** air contaminant sources.

How do I know if I have an air contaminant source?

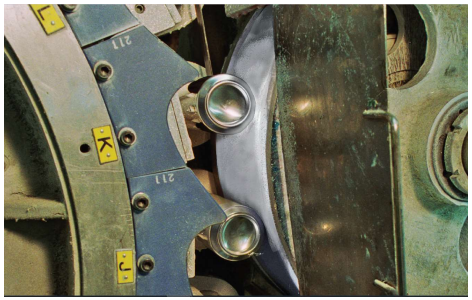
Ohio EPA recommends 4 rules of thumb:

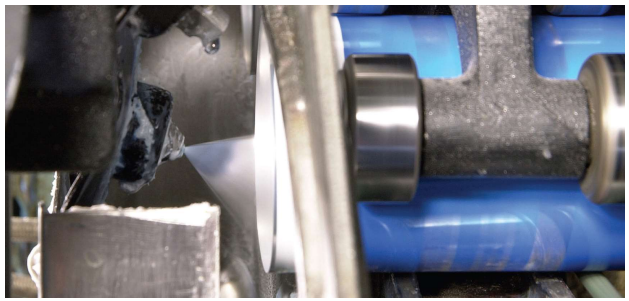
1. Equipment that has a stack, dust collector, or vent.



Who & How to conduct an emissions inventory

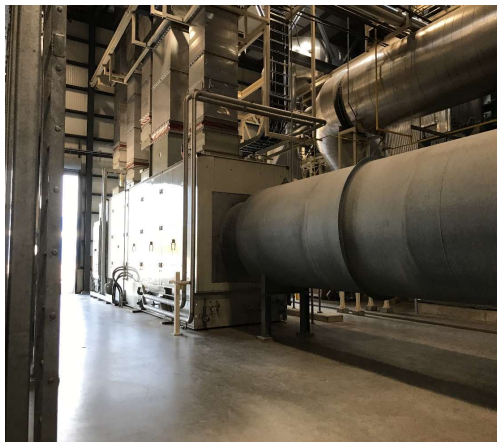
2. A process that uses paints, solvents, adhesives, or inks.





Who & How to conduct an emissions inventory

3. A process that burns a fuel (e.g., oil, natural gas, or coal)



Who & How to conduct an emissions inventory

4. A process that produces visible dust, odors, or smoke.

How to conduct an emissions inventory

Now you have you have an air contaminant source inventory – *What Next?*

1. *Gather data from each emission source and determine if they contain any of the 6 "Criteria Pollutants" on the National Ambient Air Quality Standards (NAAQS)*

    - *SDS; VOC sheets; gas usage; current air permits issued to the facility; performance test results (stack tests, raw materials,etc.); capture and control efficiency of pollution control equipment (RTO, baghouse, etc.); vendor literature describing the process*

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How to conduct an emissions inventory

2. Identify legally enforceable limitations

3. Identify the emission calculation methods you will use.

EXAMPLE: PTE Calculations Using MASS BALANCE

Small Business, Inc. has maintenance booth with a single spray gun. The gun capacity is 5 gallons per hour. The coating contains 65 percent VOC by weight and its density is 11.2 lbs/gal.

- *VOC content = (11.2 lbs coating/gal) x (0.65 lbs VOC/lb coating) = 7.28lbs VOC/gal coating*
- *Maximum operating hours/yr = 8,760*

Annual Potential Emission of VOCs

(5 gal coating/hr) x (7.28 lbs VOC/gal of coating) = 36.4 lbs of VOC/hr
(36.4 lbs VOC/hr) x (8,760 hrs/yr) = 318,864 lbs of VOC/yr
(318,864 lbs VOC/yr) x (1 ton/2,000 lbs) = ***159.4 tons of VOC/yr***

EXAMPLE: PTE Calculations Using EMISSION FACTORS

Small Business, Inc. has a natural gas-fired boiler rated at 10 million Btu per hour. The NOx Emission Factor from Table 1.4-1 in Chapter 1.4 of AP-42 (see figure 2-3 above) is 100 pounds of NOx emitted per million scf of natural gas burned. In addition to NOx emissions the company would also use emission factors to calculate CO, SO_2, PM, and VOC emissions.

- *1 scf of natural gas = 1,020 Btu*
- *Maximum operating hours/yr = 8,760*

Annual Potential Emission of NOx:

(10,000,000 Btu/hr) x (1 scf of fuel/1,020 Btu) = 9,803.9 scf of natural gas/hr
(9,803.9 scf natural gas/hr) x (8,760 hrs/yr) = 85,882,352.9 scf of natural gas/yr
(85,882,352.9 scf/yr) x (100 lbs of NOx/1,000,000 scf of fuel) = 8,588.2 lbs of NOx/yr
(8,588.2 lbs of NOx/yr) x (1 ton/2,000 lbs) = ***4.3 tons of NOx/yr***

EXAMPLE: PTE Calculations Using PERFORMANCE TEST DATA

Data from a stack test at **Small Business, Inc.** indicates that the actual air flow rate of the exhaust fan on the unpermitted metal parts grinder is 29,000 scf per minute. The emission source is subject to Rule 331, which limits PM emissions to 0.10 pounds of PM per 1,000 pounds of exhaust gas.

- *1 scf air = 0.075 pounds.*
- *Maximum operating hours/yr = 8,760*

Annual Potential Emissions of PM

(29,000 scf of air/min) x (60 min/hr) x (0.075 lbs of air/1 scf of air) = 130,500 lbs of air/hr
(130,500 lbs of air/hr) x (0.10 lbs of PM/1,000 lbs of air) = 13.05 lbs of PM/hr
(13.05 lbs PM/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **57.0 tons PM/yr**

How to conduct an emissions inventory

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4. Determine if any of the air contaminant sources are De minimis, permanent exemptions or permit-by-rule provision.

   What is De minimis? *See OAC rule 3745-15-05*

   Emission sources that meet two conditions:
   1. Emit less than 10#/day of any air contaminant
   2. < 1 ton/ year (2,000 pounds) of any hazardous air pollutant or combination of hazardous air pollutants

How to conduct an emissions inventory

What may fall under Permanent Exemptions?

See OAC rule 3745-31-03(B)(1)

These are sources that have minimal emissions or meet certain size criteria.

What is Permit-by-rule provision?

See OAC rule 3745-31-30

This applies to certain types of low-emitting sources.

How to conduct an emissions inventory

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Determine best way to collect and display your emissions calculations

- Before you begin calculating the emissions – design what you want on a simple piece of paper.
  - You want something that is brief, easy to follow by all technical levels and adaptable to business changes and needs.
    - Know you audience: accounting, business managers, EPA associates, air program manager.
    - Design something that can be completed easily in your absence
    - Design something that can be updated easily
    - Know your business inputs and needs

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CAN LINES (K004-K008)

Control Efficiencies

Coating/Oven Capture Efficiency	80% by weight	*Uncaptured VOC are assumed to be captured by general building ventilation and emitted throug*
Ink Capture Efficiency	80% by weight	*Uncaptured VOC are assumed to be captured by general building ventilation and emitted throug*
Destruction Efficiency	99% by weight	

Can Surface Areas

Surface Area For Standard 12 Oz. Cans	44.02 in^2
Surface Area For 16 Oz. Cans	55.25 in^2
Surface Area For 19.2 Oz. Cans	65.15 in^2
Surface Area For 12.1 Oz. Sleek Cans	47.22 in^2

Monthly Production (While RTO is Operating)

Production Type	Monthly Production While RTO is Operating (cans/mont							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Lines 1 & 2 Production (12 Oz. Standard) K004(L1) K005(L2)	98,965,101	96,819,766	92,157,212	59,527,309	56,378,548	0	0	0
Lines 1 & 2 Production (16 Oz.) K004(L1) K005(L2)	0	0	0	0	0	0	0	0
Line 3 Production (16 Oz.) K006(L3)	0	0	0	0	0	0	0	0
Line 3 Production (19.2 Oz.) K006(L3)	0	0	8,435,076	22,382,282	28,817,120	0	0	0
Lines 4 & 5 Production (12.1 Oz. Sleek) K007(L4) K008(L5)	70,621,954	103,094,464	126,095,200	130,102,720	99,540,320	0	0	0

Monthly Production (During RTO Downtime)

Production Type	Monthly Production During RTO Downtime (cans/montl							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Lines 1 & 2 Production (12 Oz. Standard) K004(L1) K005(L2)	0	0	134,575		0	0	0	0
Lines 1 & 2 Production (16 Oz.) K004(L1) K005(L2)	0	0	0	0	0	0	0	0
Line 3 Production (16 Oz.) K006(L3)	0	0	0	0	0	0	0	0
Line 3 Production (19.2 Oz.) K006(L3)	0	0	32,667	0	0	0	0	0
Lines 4 & 5 Production (12.1 Oz. Sleek) K007(L4) K008(L5)	938,590	0	107,820	0	0	0	0	0

Inside Spray (Volume)

Description	Monthly Material Use (gal/month)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
AKZONOBEL 640C2135 / IS	25,110	28,800	28,767	32,863	0	0	0	0

Inputs ---> | FER Input | Material Properties | Summaries ---> | FER Summary | Rolling 12-Month ...

INSIDE SPRAY

Description	Type of Coating	Material Properties							Diethylene Glycol Monoethyl Ether (DGME)	Diethylene Glycol Butyl Ether (DGBE)	Diethylene Glycol Monohexyl Ether (DGHE)
		VOC Content Less Water (lb/gal)	VOC Content (lb/gal solids)	Coating Density (lb/gal)	Solids Content (wt %)	Solids Content (vol %)	Solvent Content (wt %)	Water Content (wt%)			
AKZONOBEL 640C2135 / IS	Inside Spray	1.48	6.8	8.45	20.3%	17.2%	13.8%	65.5%	-	-	-
PPG 2012823 BPANI / IS	Inside Spray	3.5	6.9	8.4	21.0%	17.7%	14.6%	64.4%	-	-	-
SHERWIN WILLIAMS V7XQ18AA GEN 2.1 / IS	Inside Spray	3.2	5.8	8.44	21.1%	18.1%	12.4%	66.5%	-	-	-
SHERWIN WILLIAMS V7XQ11AA BPANI - GEN 2 / IS	Inside Spray	3.3	6.1	8.43	21.1%	18.0%	13.0%	65.9%	0.2%	-	-

TITLE V OPERATING PERMIT RECORDKEEPING REQUIREMENTS

Year	Month	Monthly VOC Emissions (ton/month)									Rolling, 12-Month Emissions (Avg. ton/month)		
		K001	K002	K003	K004	K005	K006	K007	K008	P801	End Modules	Can Lines	Clean-up Solvent
2022	Jan	0.35	-	-	-	-	-	-	-	-			
	Feb	0.56	-	-	-	-	-	-	-	-			
	Mar	0.43	0.35	-	-	-	-	-	-	-			
	Apr	0.46	0.79	-	-	-	-	-	-	-			
	May	0.61	1.02	-	0.10	0.10	-	-	-	0.18			
	Jun	0.98	1.52	-	0.84	0.84	-	-	-	0.18			
	Jul	0.68	1.35	-	3.04	3.04	-	-	-	0.59			
	Aug	0.71	2.05	-	5.09	5.09	-	-	-	0.85			
	Sep	1.03	1.65	-	0.16	0.16	-	5.6E-03	5.6E-03	1.26			
	Oct	1.48	2.24	-	4.16	4.16	-	0.82	0.82	0.90			
	Nov	1.11	1.73	-	0.97	0.97	-	1.07	1.07	1.98			
	Dec	1.06	2.01	-	1.29	1.29	-	0.66	0.06	1.56			
	Jan	1.16	2.10	-	1.71	1.73	-	1.82	0.97	0.18	2.26	3.50	0.64
	Feb	0.99	1.99	-	1.62	1.62	-	1.82	1.82	1.33	2.46	4.08	0.75
	Mar	1.13	2.12	-	1.74	1.74	0.49	2.49	2.49	1.83	2.66	4.82	0.90
	Apr	1.03	2.01	-	1.19	1.01	1.23	2.57	2.57	0.54	2.81	5.54	0.95
	May	1.71	2.83	-	-	-	-	-	-	-	3.06	5.52	0.93
	Jun	-	-	-	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	-	2.85	#DIV/0!	0.92

= greater than 80% of permit limit
= Permit limit exceedance

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				N-Butyl Acetate	123-86-4	25.00%	N	2	
Video Jet Ink	VideoJet	0.25	6.68	Methanol	67-56-1	30.00%	Y	1	1
Make-up Fluid	16-23450			2-Butanone (MEK)	78-93-3	70.00%	N	1	
Formaldehyde:	145.070486 MMcans w/ IC & OV x 6.0 lbs formaldehyde/MMcans = 870.422916 lbs formaldehyde produced								870
	79.329159 MMcans w/ BC x 0.6 lbs formaldehyde/MMcan = 47.5974954 lbs formaldehyde produced								48
							Total lbs	29,277	1,213
Hours Operated	840						Total ton	14.64	0.61

Capa Production		Ave. (/min)	Permit (/min)	Status
Line 1:	42,273,909	839	1,600	OK
Line 2:	28,671,975	569	1,600	OK
Line 3:	43,609,418	865	1,600	OK
Line 4:	30,515,184	605	1,400	OK
Total:	145,070,486			
Basecoated Cans:	79,329,159			
Overspray PE (lb/hr)		0.12	1.72	OK

HAPs	TONS/MO
Glycol Ethers	0.05
Xylene	0.08
Ethyl Benzene	0.02
Formaldehyde	0.46
Methanol	0.00
TOTAL	0.61

1) Unit Description:	Plant Gas									Emissions	Permit	Status
2) Burner Size:	10	MMbtu/hr	Emission Calculations for Natural Gas Consumption									
3) Gas Usage	19.76	MMscf	Emission factors based on AP-42 Table 1.4-1 (rev. 3/98)							(lb/hr)	(lb/hr)	
4) Control:	None											
CO:	19.760	MMscf	X	84.0	lb/MMscf	/	840.0	hours	=	1.98	13.02	OK
NOx:	19.760	MMscf	X	100.0	lb/MMscf	/	840.0	hours	=	2.35	15.5	OK
PM:	19.760	MMscf	X	7.60	lb/MMscf	/	840.0	hours	=	0.18	1.18	OK
VOC:	19.760	MMscf	X	5.50	lb/MMscf	/	840.0	hours	=	0.13	0.85	OK

Compare the rolling 12-month monthly average VOC emissions to the permit limits.
Calculated value is more than half of the allowable limit
Calculated value exceeds the allowable limit

Material Generic Description	Sofidel Material Identification	Supplier Name	Supplier Material Identification	Material VOC Content (wt. %)	VOC Emissions Per Month (short tons) 2019 May	June	July	August	September	October	November	December	VOC Emissions Per Month (short tons) 2020 January	February	March	April	May	June	July
Rolling 12-month Monthly Average VOC Emissions PER PULP & PAPER MACHINE (short tons): = 12-month sum of VOC emissions / 12 months per year					2.23	2.29	2.31	2.35	2.40	2.44	2.33	2.16	2.05	1.88	1.75	1.36	0.99	0.89	0.82
Total VOC Monthly VOC Emissions PER PULP & PAPER MACHINE (short tons): = Sum of VOC emissions per month					4.40	1.18	0.89	0.41	0.67	1.36	0.01	1.06	1.70	2.65	1.60	0.41	0.00	0.00	0.00
Pulp Additive	803078	Solenis	Presstige FB8527	85.00%	2.99	0.79	0.44	0.20	0.51	1.20	-	0.80	1.20	2.39	1.20	-	-	-	-
Pulp Additive	803076	Solenis	PerForm PA8254F	25.00%	0.06	0.06	0.20	-	-	-	-	0.06	0.11	0.10	-	0.22	-	-	-
Pulp Additive	803203	Solenis	Prosoft TQ250	15.40%	0.35	0.25	0.14	0.12	0.04	0.14	-	0.09	0.30	0.07	-	0.19	-	-	-
Pulp Additive	803197 & 803097	Solenis	Rezosol 8207NA	0.27%	0.13	0.08	0.11	0.08	0.11	0.01	-	0.02	0.08	0.02	-	-	-	-	-
Pulp Additive	803157	Solenis	Rezosol CS3250	0.08%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pulp Additive	803160	Solenis	Solenis DPC710	0.30%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pulp Additive	803217	Solenis	Hercobond 1194	0.01%	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	-	-	-	-
Pulp Additive	803256	Solenis	Perform PC8179	25.77%	0.87	-	-	-	-	-	-	0.09	-	0.06	0.40	-	-	-	-
CoGen Additive	-	Solenis	AmeROyal 710	0.30%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
CoGen Additive	-	Solenis	Advantage Plus 1465	0.60%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
CoGen Additive	-	Solenis	Amercor 1848	48.08%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Caution of what not to do:

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TAB INSTRUCTIONS	1	**CHANGE THE MONTH AND YEAR IN THE "VOC EMISSIONS MONTH" TAB AT THE TOP. IT WILL POPULATE THE OTHER TABS**
PROD MTD DATA CURRENT MONTH TAB	1	USE THE ZNOP REPORT WITH THE OPTIONS BELOW FOR THE "BACK END" AND DELETE ALL COLUMNS EXCEPT "PRODLINE", "SIZE", "Good(EA)" & "Scrap(EA)". INSERT A PIVOT TABLE AS SEEN HERE-
***** CRITICAL->	2	TRANSFER THE PIVOT TABLE DATA TO THE "SAP PRODUCTION" TAB AND SUMMARIZE AS NOTED. CHECK THE "ALLOCATION BY LINE" TAB TO ENSURE THE VALUES LINKED CORRECTLY, REPLACE IF NE
ARMS DATA-CURRENT MONTH TAB	1	COPY THE ARMS REPORT FOR THE CURRENT YEAR INTO THE MONTHLY FOLDER
***** CRITICAL->	2	DELETE ALL MONTHLY COLUMNS EXCEPT THE ONE YOU NEED
***** CRITICAL->	3	COPY THE VALUES FROM CELL A1 TO CELL D147 (BUT CHECK) IN THE MONTH COLUMN WHERE YOU NEED DATA AND PASTE "VALUES" ONLY TO CELL A1 IN THE TAB
	4	VALUES WILL POPULATE IN THE VOC, PM, CASS & CO2 DATA TABS
FORCED USAGE TAB	1	COPY THE "FORCED USAGE" REPORT FOR THE MONTH FROM Z:\PUBLIC\End of Month Direct Material Usage\2022 INTO THE CURRENT MONTHLY FOLDER
***** CRITICAL->	2	COPY THE VALUES FROM CELL A1 TO CELL O90 (BUT CHECK) AND PASTE "VALUES" ONLY TO CELL A1 IN THE "FORCED USAGE" TAB
	3	VALUES WILL POPULATE IN THE "VOC EMISSIONS MONTH" DATA TAB
GET RTO DOWNTIMES FROM OMS	1	RUN DOWNTIME REPORT FOR BOTH RTO'S IN OMS."HISTORICAL CLIENT", "DOWNTIME MACHINE LOG" PICK ALL SHIFTS, CREWS, FAULT STATES, DATES AND "OXIDIZER" UPDATE AND EXPORT
	2	DOWNLOAD "DOWNTIME" FILE. AND PUT IN CURRENT MONTH FOLDER.
***** CRITICAL->	3	PLACE THE HOURS EACH RTO WAS NOT RUNNING IN THE RTO DATA PORTION OF THE "VOC EMISSIONS MONTH" TAB
COPYING VALUES TO GENERATE REPORT		THE FOLLOWING BLUE TABS HAVE SELF-EXPLANATORY INSTRUCTIONS TO COPY & PASTE "VALUES" ONLY WITHIN THE TAB TO MAINTAIN ANNUAL DATA RECORDS
***** CRITICAL->	1	HAPS PER LINE
***** CRITICAL->	2	PM EMISSION ALUMINUM
***** CRITICAL->	3	PM EMISSIONS PROCESS
***** CRITICAL->	4	VOC EMISSIONS
***** CRITICAL->	5	CASS GAS USAGE
***** CRITICAL->	6	CO2 - CHG REPORT
STOP - THE REPORT IS COMPLETE		
SAVE AS ("YEAR, 3LTR MONTH, EMISSIONS")		
(E.G."22 JAN EMISSIONS")		

PivotTable Fields

Choose fields to add to report:

Search

ProdLine
Size
Good(EA)
Scrap(EA)

More Tables...

Drag fields between areas below:

Filters | Columns: Values

Rows: ProdLine, Size | Values: Sum of Size, Sum of Good(EA), Sum of Scrap(EA)

Program Edit Goto System Help

Plant operations report

Front end | Back end | Rework | HFI Activity

MONTHLY EMISSION CALCULATIONS - COATING USAGE & VOC EMISSIONS

MONTH: March <- CHANGE THESE VALUES
YEAR: 2022

	(a) COATING USAGE (gal)	(a1) COATING USAGE (lb)	(b) COATING DENSITY (lb/gal)	(c) VOLUME % SOLIDS (gal/gal)	(d) VOC CONTENT (lb VOC/gal solids)	(e) OVERALL EFFICIENCY	(f) EMISSION FACTOR (lb VOC/gal) (c/100 x d)	(g) COATING USAGE (lb) (a x b)	(h) VOC EMISSIONS (lb VOC) (a x f)(1-e)	(i) VOC EMISSIONS (tons VOC) (g/2000)
INSIDE SPRAY										
20Q53AP (lines 1,2 & 5)	16,614		8.43	18.20	5.80	0.00%	1.056	140,059	17,538	**8.77**
20Q53AP (line 6)	7,027		8.43	18.20	5.80	13.23%	1.056	59,240	3,873	**1.94**
20Q53AP (lines 3 & 4)	9,454		8.43	18.20	5.80	13.23%	1.056	79,699	5,211	**2.61**
20Q53AP (lines 7, 8, 9 & 10)	2,187		8.43	18.20	5.80	8.92%	1.056	18,437	275	**0.14**
TOTAL	**35,283**							**278,998**	**26,622**	**13.45**
CK SUM FROM ARMS	**35,283**						**TONS/MONTH FOR CK SUM**	**139.50**		
PPG 2012823 - BPANI (lines 1,2 & 5)	7,854		**8.40**	**17.70**	6.90	0.00%	1.221	65,977	9,593	**4.796**
PPG 2012823 - BPANI (Line 6)	3,322		**8.40**	**17.70**	6.90	13.23%	1.221	27,906	2,118	**1.059**
PPG 2012823 - BPANI (Lines 3 & 4)	4,469		**8.40**	**17.70**	6.90	13.23%	1.221	37,544	2,850	**1.425**
PPG 2012823 - BPANI (Lines 7, 8, 9 & 10)	1,034		**8.40**	**17.70**	6.90	8.92%	1.221	8,685	150	**0.075**
TOTAL	**16,680**							**140,112**	**14,711**	**7.36**
CK SUM FROM ARMS	**16,680**						**TONS/MONTH FOR CK SUM**	**70.06**		
OVER VARNISH										
PPG CC3625XLV (lines 1,2, & 5)	7,530		8.75	**33.50**	2.90	0.00%	0.972	65,887	7,315	**3.66**
PPG CC3625XLV (line 6)	3,185		8.75	**33.50**	2.90	0.00%	0.972	27,868	3,094	**1.55**
PPG CC3625XLV (lines 3 & 4)	4,285		8.75	**33.50**	2.90	0.00%	0.972	37,492	4,163	**2.08**
PPG CC3625XLV (lines 7, 8, 9 & 10)	991		8.75	**33.50**	2.90	11.89%	0.972	8,673	143	**0.07**

INSTRUCTIONS - START HERE | ARMS DATA-CURRENT MONTH | FORCED USAGE | VOC EMISSIONS MONTH | SAP PRODUCTION | ALLOCATION BY L ...

Sources

- https://www.epa.gov/clean-air-act-overview/clean-air-act-requirements-and-history#text
- https://epa.ohio.gov/static/Portals/41/sb/publications/SBAirPermit.pdf

Workshop J – Air Permitting & Compliance

Practical Tips and Best Practices...Calculating Emissions and Applying Best Available Technology

July 20, 2023

Amanda Jennings – Managing Consultant

Topics

- Importance of an Emissions Inventory
- Special Considerations for Emissions Inventory
  - Sources to Include
  - Fugitive Emissions
  - Particulate Emissions
- Calculation Techniques
  - Guidance Documents
- De Minimis Exemption Emissions Calculations

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Importance of Emissions Inventory

- Exemptions
- Permits-by-Rule (PBRs)
- Express PTIs/PTIOs
- General PTIs/PTIOs
- PTI/PTIO
  - Synthetic minor PTIs & federally enforceable PTIOs (FEPTIOs)
- PTI with Federal NSR
  - PSD
  - Offset Permit (NANSR)
- Title V operating permits

Minor New Source Review (NSR)

Major NSR

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Major Source Emissions Thresholds

Pollutant	Title V	Major NSR (Existing Major)
Regulated NSR (NO_X, SO_2, VOC, PM_{10}/$PM_{2.5}$, CO, etc.)	PTE: >100 tpy	PTE Attainment Area: >250 tpy (Attainment) >100 tpy (List of 28) PTE Nonattainment Area: >100 tpy (NA pollutants)
Hazardous Air Pollutant (HAP)	PTE: >10 tpy Ind. HAP, or >25 tpy Combined HAP	-

- Potential to Emit (PTE) is site-wide, including all air contaminant sources at the facility, even those that are exempt from air permitting in Ohio (i.e., 3745-31-03 exempt, de minimis, & grandfathered)!

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Importance of Emissions Inventory

- Title V Categories
  - Major
  - Minor
- Major NSR Source Categories
  - Existing Minor
  - Existing Major
  - Major Modification
- HAP Source Categories
  - Major
  - Area
- Synthetic Minor Avoidance Options!

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Importance of Emissions Inventory

- Other Air Permitting Programs to Consider

  - Ohio Air Dispersion Modeling Requirements
    - Project-based increases
    - Increase in Allowable Emissions
      - Air Toxics
      - Regulated NSR Pollutants

  - Major or Area Source for Hazardous Air Pollutants (HAP)
    - Based on Potential to Emit (PTE)
      - Generally Available Control Technology (GACT)
      - Maximum Achievable Control Technology (MACT)

Pollutant	Ohio Modeling Threshold (tpy)
PM_{10}	15
$PM_{2.5}$	10
NO_X	40
SO_2	40
CO	100
Air Toxics	1

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Special Considerations – Sources to Include

- Include all permitted, grandfathered, permit exempt/de minimis sources in emissions inventory to determine major source status
  - For non-Title V sources, these can be excluded from listing in permit (PTIO) applications
  - For Title V sources, these can be excluded from TV applications only if they have no applicable requirements
- Only **trivial** sources can be excluded from Emissions Inventory (Title V guidance)

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Special Considerations – Fugitive Emissions

- Fugitive Emissions
  - Emissions that could not reasonably pass through a stack, chimney, vent, or similar opening.
    - Roadways, aggregate storage piles, equipment leaks from piping components (valves, pumps), quarries

Permitting Program	Include Fugitives?	Exceptions
Title V	No	• Source on List of 28 • HAP Major Source Thresholds • Source regulated by Pre-Aug 1980 NSPS or NESHAP rule
NSR Major Source Determination	No	• Source on List of 28 • Source regulated by Pre-Aug 1980 NSPS or NESHAP rule

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Special Considerations – List of 28

Table 1
28 Source Categories

Coal cleaning plants with thermal dryers	Charcoal production plants
Portland cement plants	Kraft pulp mills
Iron and steel mills	Primary zinc smelters
Primary copper smelters	Primary aluminum ore reduction plants
Hydrofluoric acid plants	Municipal incinerator capable of charging more than 250 tons of refuse per day
Nitric acid plants	Sulfuric acid plants
Lime plants	Petroleum refineries
Coke oven batteries	Phosphate rock processing plants
Carbon black plants (furnace process)	Sulfur recovery plants
Fuel conversion plants	Primary lead smelters
Secondary metal production plants	Sintering plants
Fossil fuel boilers (or combination thereof) totaling more than 250 MMBtu/hr heat input	Chemical process plants (does not include ethanol production facilities that produce ethanol by natural fermentation, included in NAICS codes 325193 or 312140)
Fossil fuel fired steam electric plants of more than 250 MMBtu/hr heat input	Petroleum storage transfer units, total storage capacity over 300,000 barrels
Taconite ore processing plants	Glass fiber processing plants

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Emissions Inventory – Chemical Plant Example

- Existing Inventory

Emissions Unit	NO_X	CO	VOC	Total HAP	Ind. HAP
Boiler #1	42.5	36.0	2.3	0.8	0.7
Process Line #1	-	-	52.0	12.0	6.0
Total	**42.5**	**36.0**	**54.3**	**12.8**	**6.7**

TV & NSR Minor

HAP Area

- Project
  - Install a duplicate second line, that doubles capacity

- Site-wide Potential Emissions - After Project

Emissions Unit	NO_X	CO	VOC	Total HAP	Ind. HAP
Total	**85.0**	**72.0**	**108.6**	**25.6**	**13.4**

Title V

Existing Major

Title V & MACT

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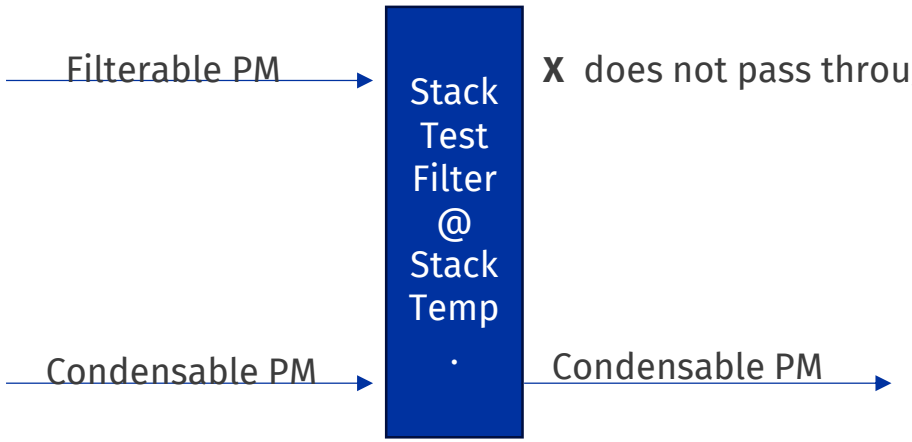
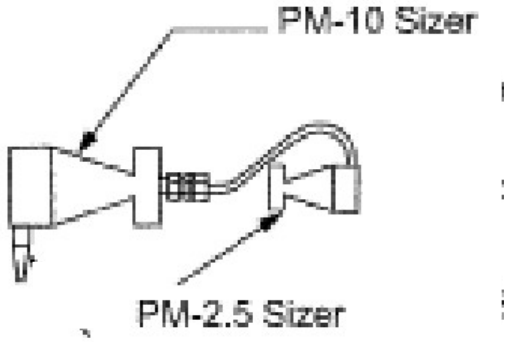
Special Considerations – Particulate Emissions

- Types of Particulate Matter
  - Filterable vs. Condensable

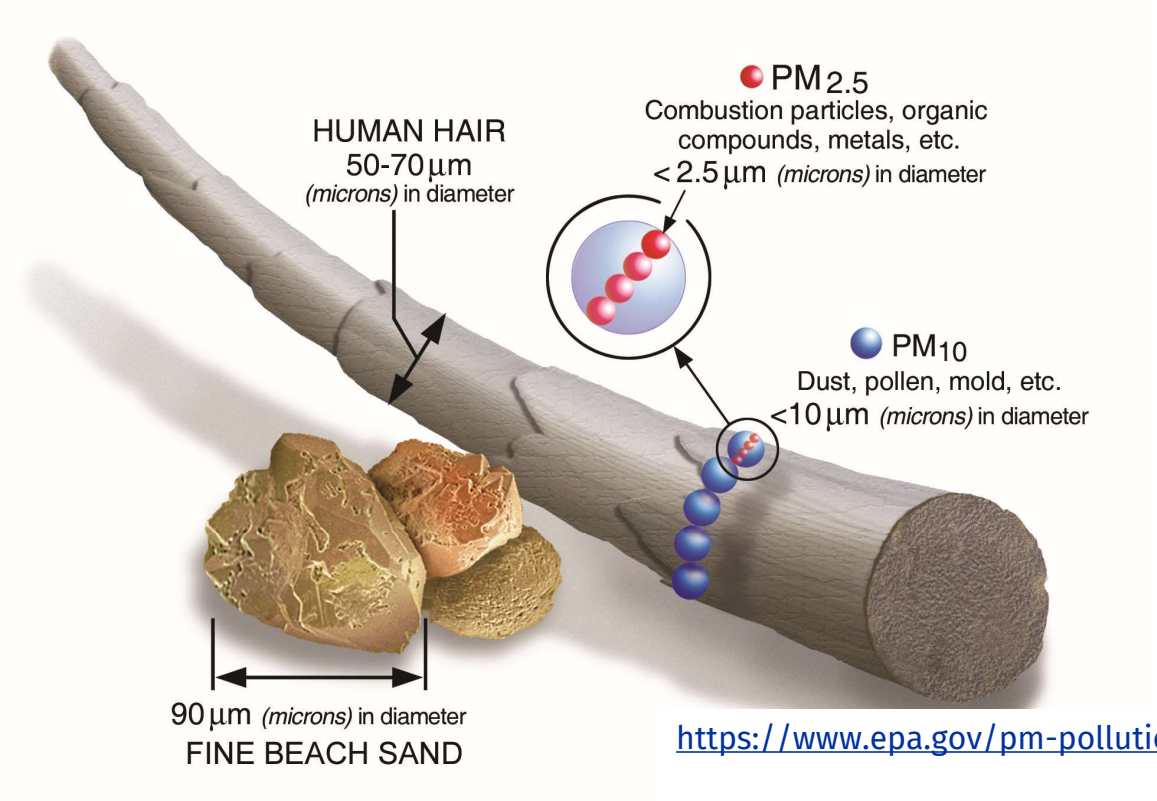


- Size of Particulate Matter
  - Filterable PM10 vs. Filterable PM2.5
    - Less than or equal to 10 microns; less than or equal to 2.5 microns



Special Considerations – Particulate Emissions

- Particulate Emissions



https://www.epa.gov/pm-pollution/particulate-matter-pm-basics

Special Considerations – Particulate Emissions

Types of PM	Description	EPA Test Method	How is it Regulated?	Other Considerations?
Filterable PM	Solid/liquid particles at the stack/filter temperature	5, 17	• Ohio SIP (3745-17) • NSPS • Major NSR	Fee Emissions Report (FER)
Condensable PM	Vapor or gas at stack conditions that condenses immediately after stack discharge, all $PM_{2.5}$	202	Not independently regulated	FER
PM_{10}	PM with aerodynamic diameter <10 microns, **includes condensable** PM	201A	• Title V • Major NSR	Calculate Filt. PM_{10} Portion for FER
$PM_{2.5}$	PM with aerodynamic diameter <2.5 microns, **includes condensable** PM	201A	• Title V • Major NSR	Calculate Filt. $PM_{2.5}$ Portion for FER

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Emission Calculation Techniques

- Always use the most representative approach!
- **Stack tests or CEMS data**
  - Best if normalized to produce emission factor (e.g., lb/ton or lb/MMBtu)
- **Mass balance**
  - Typically used for coating and solvent use operations
  - Typically assume 100% of organics emitted or directed to control device
- **Vendor Guarantees**
  - For example, outlet grain loading for dust collector (gr/dscf) or lb/MMBtu for boiler or heater
  - Generally based on testing of similar equipment
- **Emission factors**
  - Provide emissions in mass per unit production basis that can be scaled to different throughputs (e.g., lb/MMBtu, lb/ton)
  - AP-42 (https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors) & WebFIRE (http://cfpub.epa.gov/webfire/) are most common EPA references containing emission factors

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Emission Calculation Tools

- Storage Tank Calculations
  - AP-42 Chapter 7.1 – last updated in 2020
    - Includes Landing/Cleaning
    - Software Options - TankESP
- Wastewater Treatment Processes
  - Toxchem
  - U.S. EPA Water9
- Batch Emission Calcs
  - Software Options - Emission Master
- Other (e.g., Oil & Gas, Chemical)
  - ChemCAD
  - ProMax

TOXCHEM™

BR&E Bryan Research & Engineering, LLC

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Emission Calculation Guidance

- U.S. EPA provides guidance for emission calculations for:
  - Emergency generators
  - Grain handling
  - Batch chemical operations
  - Fugitive equipment leaks
  - Paint, ink, coating manufacturing
  - Petroleum refineries
  - Surface coating, etc.
- Ohio EPA Engineering Guide #80 - Methods for calculating PTE

  https://epa.ohio.gov/divisions-and-offices/air-pollution-control/guides-and-manuals/engineering-guides-notebook

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Calculating Emissions for De Minimis Exemption

- OAC 3745-15-05 – *De minimis* Exemption Rule
  - *De minimis* sources are exempt from all OAC requirements (permitting, emission limits, etc.)
    - No ongoing recordkeeping outside of PTE calculation
    - De minimis does not exempt from federal rules
    - Can be excluded from Title V Applications
    - Must be included in major source determinations (TV, NSR)

  - OAC 3745-15-05(B) - *De minimis* exemption based on Potential to Emit (PTE)
    - Exempt, unless PTE exceeds **ten pounds per day** of any air contaminant

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Key *De Minimis* Source Terms

- Potential-to-emit or potential emissions – the amount of emissions of an air contaminant, based on maximum rated capacity, which would be emitted from a source during a twenty-four hour calendar day or calendar year basis, whichever is applicable, if that source were operated without the use of air pollution control equipment unless such control equipment is, aside from air pollution control requirements, necessary for the facility to produce its normal product or is integral to the normal operation of the source.
  [3745-15-05(A)(6)]
  - Integral control will typically be material recovery device
  - Use of control device interlock/kill switch – see Eng. Guide #80
- **De minimis PTE = 24 hr/day and 8,760 hr/yr operation at max hourly capacity without air pollution controls!**

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De minimis Exemption

- De minimis exemption **DOES NOT** apply if:
  - Total Hazardous Air Pollutant (HAP) potential emissions more than **one** tpy
    - Example, EU is *not* de minimis:

Pollutant	Daily PTE	Annual PTE
VOC	8 lb/day	1.46 tpy
HAP 1	5 lb/day	0.91 tpy
HAP 2	3 lb/day	0.55 tpy

**HAP = hazardous air pollutant*

  - A CAA or SIP regulation limits unit to (or restricts operation in a manner equivalent to a limit of) less than ten lbs/day (e.g., MACT, GACT, NSPS, SIP)
  - The source alone or in combination with similar sources at the facility has potential emissions exceeding **twenty-five** tpy

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Key *De Minimis* Source Terms

- Similar sources are:
  - Sources for which construction and operation are essentially the same, although, the capacity of each source is not necessarily the same;
  - Sources in which the physical or chemical process occurring in each source is essentially the same; and
  - Sources from which essentially the same air pollutants are emitted.

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Questions?

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BAT/Synthetic Minors

Workshop J

July 20, 2023

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Ohio Environmental Protection Agency

Topics

- Determining Best Available Technology (BAT)
- BAT Cost-Effectiveness Studies
- Understanding Synthetic Minors

Ohio Environmental Protection Agency

BEST AVAILABLE TECHNOLOGY

Ohio Environmental Protection Agency

What is BAT?

- Ohio Administrative Code (OAC) 3745-31-05
- Required new or modified sources to install Best Available Technology to control emissions
- Idea is to install controls on new sources – more cost effective than to retrofit old
- Requires installation of state-of-the-art controls taking into account costs
- Does not apply to <10 ton/yr sources

Ohio Environmental Protection Agency

What is BAT?

- A combination of work practices, raw material specifications, throughput limitations, source design characteristics, or add-on controls
- Control technique must have been used in Ohio or other similar states
- Costs are taken into account
- Definition:

"Best available technology" or "BAT" means any combination of work practices, raw material specifications, throughput limitations, source design characteristics, an evaluation of the annualized cost per ton of air pollutant removed, and air pollution control devices that have been previously demonstrated to the director of environmental protection to operate satisfactorily in this state or other states with similar air quality on substantially similar air pollution sources.

Practical Selection Advice

- Look at recently issued permits for similar sources.
- Exclude “serious” non-attainment areas like California, some east coast
- Permit contact can help you find permits
- If no control is required – BAT is typically based on equipment design

Practical Selection Advice

Emissions Range (Ton/yr)*	Practical BAT Approach
<10 ton/yr	No BAT required
10 ton/yr to about 80 ton/yr	BAT most frequently based on similar sources. Cost effectiveness not typically needed. Ohio EPA most often looks at similar sources to determine if your requested BAT is acceptable.
> 80 ton/yr	Similar sources give good direction but sometimes need case-by-case analysis/cost effectiveness. See Engineering Guide #89. Check w permit writer. BACT or LAER apply? Then BAT is equivalent to BACT/LAER.

*There is no hard and fast rule on these ranges except for the <10 ton/yr no BAT needed rule. So, take these with a grain of salt.

Ohio Environmental Protection Agency

What Does the Law Say?

- Guidance on selecting BAT
- Issued revised guidance February 7, 2014
- http://epa.ohio.gov/dapc/sb265.aspx
- Significant changes for new or modified after August 3, 2009

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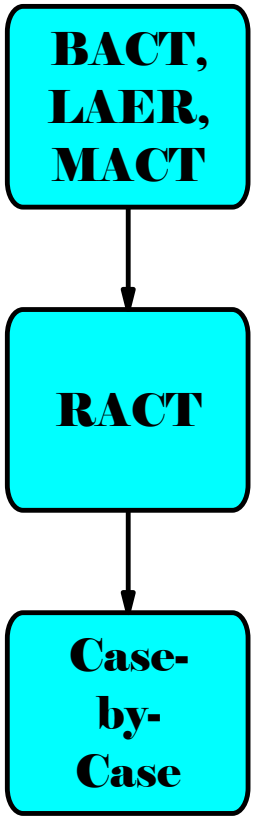
Determining BAT

- Follows 2006 SB 265 approach
- BAT = MACT, GACT, BACT or LAER
- If not, then BAT = RACT…
- If not, then case-by-case BAT



Note: Does not include NSPS requirements.

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How do you determine BAT?

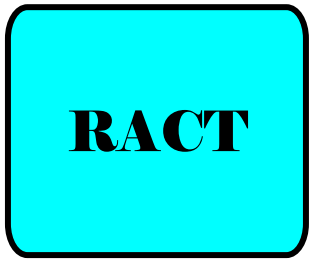
- Check each pollutant separately
- Check to see if MACT, GACT, BACT, LAER applies
- If so, then establish BAT
- If not, then review RACT rules

BACT, LAER, MACT

Ohio Environmental Protection Agency

RACT Rule Review for VOC

- Review 01/01/06 version of Chapter 21 for VOC limits
- VOC limits apply anywhere in the state to the same size and type of source?
- If so, then find most stringent, establish limit as BAT floor for VOC
- Then move on to case-by-case approach for VOC



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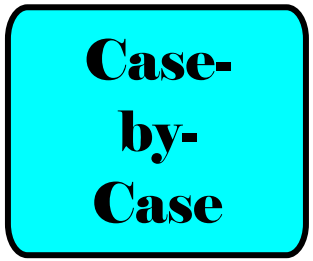
Case-by-Case BAT

- Step one – complete case-by-case analysis for BAT
  - Review similar sources
  - Complete cost-effectiveness
  - Each criteria pollutant and each operating scenario
- Determine control level/emission level for BAT
- More stringent than RACT floor?



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Case-by-Case BAT

- Step two – determine how BAT should be ***expressed***

Case-by-Case

Ohio Environmental Protection Agency

SB 265 Expression Options

- Must express BAT using one of the four options:
  - Work Practice
  - Source Design Characteristic/Design Efficiency
  - Raw Material/Throughput
  - Monthly Allowable

Work Practices

- Most will be description of work practice or implementation of a work practice plan
- No opacity, no ton/yr
- Few will be traditional opacity – only if company wants

Source Design/Design Efficiency

- Applies when source/control was designed to limit a particular pollutant
- Short term appropriate but:
  - No emission limit in permit
  - Only “designed for” approach
- BAT = “Install a baghouse designed to meet 0.03”

Ohio Environmental Protection Agency

Source Design/Design Efficiency

- Larger sources… can do initial test
- No ongoing emission limit obligation
- Will need to maintain per manufacture's recommendations
- Will need to maintain records on maintenance
- OAC/other rules provide short-term backup
- U.S. EPA has concerns…

Raw Material Specifications or Throughput Limitations

- Typical of part of synthetic minor limitations
- “45.6 tons of steel processed per rolling twelve-month period”
- No lb/hr, ppm, etc. for BAT… may need these for synthetic minor, however
- This format not used too often for BAT

Ohio Environmental Protection Agency

Monthly Allowable

- Similar to synthetic minor limitations
- "3.2 tons VOC/**month** averaged over a 12-month rolling period"
- Old way: 38.4 tons VOC/rolling 12-month period
- Overall restriction ends up the same but just described differently

Monthly Allowable

- Will need monitoring, recordkeeping and reporting
- No lb/hr, ppm etc. short-term limits
- OAC/other rules provide short-term

5

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BAT COST-EFFECTIVENESS STUDY

Ohio Environmental Protection Agency

What is BAT Cost-Effectiveness?

- Cost analysis to determine which control technique is appropriate
- Looks at available control techniques
- Looks at control efficiency, cost of each technique
- Results in annualized $/ton of pollutant reduced
- $/ton too high? – technique eliminated

Cost-Effectiveness for BAT

- Engineering Guide #89 describes approach
  - https://epa.ohio.gov/static/Portals/27/engineer/eguides/89BATCostEffectivenessStudy.pdf
- Before you do the work, check with permit contact to see if it is needed
- For many sources control requirement is “obvious” based on other permits

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Cost-Effectiveness for BAT

- Must look at each pollutant separately
- Guide has a long list of situations where cost-effectiveness analysis is not needed
  - PSD, NNSR, Case-by-case MACT, MACT, GACT, NESHAPS and recent NSPS.
  - Emissions <1.2 (Lead) to 200 (CO) ton thresholds (double major mod thresholds)
  - Identical source to recent BAT
  - Control w/in 12% of best controlled
  - Control w/in average of the top 5 controlled
  - DO/LAA contact and CO NSR contact agree not needed

Cost-Effectiveness for BAT

- Guide narrows down needed cost-effective studies
- Practically means larger sources that don't trip other regs
- Guide also has cost-effectiveness study checklist – identifies information needed

What $/ton is too high?

- No set value
- Value can be different depending upon the type and size of source, the type of pollutant.
- We look at similar size and type of source
- Look at U.S. EPA's RACT/BACT/LAER database for costs of similar sources. See:
  - https://www.epa.gov/catc/ractbactlaer-clearinghouse-rblc-basic-information

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SYNTHETIC MINORS

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What is a Synthetic Minor?

- Synthetic minors are restrictions put in permits to keep you below rule applicability thresholds.
- Typical rule threshold based on ton/year potential to emit value
- Synthetic minor restrictions are designed to limit the potential emissions, so you are below the rule threshold.

Synthetic Minor

- Legally and practically enforceable
- Must have appropriate limit, monitoring, record keeping, reporting and testing
- Must limit some process, not just emissions
- U.S. EPA 1989 guidance on limiting potential to emit: https://www3.epa.gov/airtoxics/pte/june13_89.pdf

Simple Example

- Painting, Inc.
- Wants to install new paint booth.
- Actual emissions 20 tons VOC/yr
- Potential emissions 50 tons VOC/yr
- PSD threshold 40 tons VOC/yr
- Because potential >40 tons VOC/yr, PSD applies

Ohio Environmental Protection Agency

Synthetic Minor Example

- Painting, Inc. agrees to restrict their emissions to <35 tons VOC/yr
- How do you set up the synthetic minor?
  - Must restrict process variable – use gallons of paint, VOC content (3.5 lbs VOC/gallon paint)
  - 35 tons VOC/yr *2000 lbs/ton = 70,000 lbs VOC/yr
  - 70,000 lbs VOC/yr * 1 gallon paint/3.5 lbs VOC = 20,000 gallons paint/yr

Synthetic Minor Example

- Can’t have an annual restriction
- U.S. EPA says waiting a year to see if you are in compliance is too long.
- Instead, daily or monthly is ok.
- So, limits are typically set up as monthly limits or rolling 12-month limits where compliance is checked each month.

Synthetic Minor Example

- 20,000 gallons/yr * 1/12 = 1667 gallons/month
- 35 tons VOC/yr * 1/12= 2.92 tons VOC/month
- Synthetic minor limit:
  - 1667 gallons paint/month; 2.92 tons VOC/month; 3.5 lbs VOC/gallon
  - These will be put in the permit

Synthetic Minor Example

- Could be a rolling 12-month limit
- 20,000 gallons per rolling 12-months
- Each month must calculate last 12 months
- Need an initial table:

Months	Gallons Allowed
1	1667 gallons
1-2	3334 gallons
1-3	5001 gallons
Etc…	

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Synthetic Minor Example

- Permit includes:
  - Syn Minor limits
  - Monthly records on amount of paint used, VOC content
  - Submit report monthly, quarterly, semi-annual or, perhaps, annual

When Not to Get a Synthetic Minor

- Synthetic minors add restrictions, monitoring, record keeping, reporting and testing
- These restrictions better or worse that just complying w the rule?
- Don’t accept synthetic minors that restrict production too much.
- Relaxing synthetic minors need permit actions and time

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What Rule Cites will you See?

- OAC rule 3745-31-05 (D), (E), and (F)

Paragraph	Purpose
(D) Synthetic Minors	Standard rule cite for synthetic minors. Rule describes when it can be used and describes what needs to be in a synthetic minor. Can also be used to establish restrictions to support federally enforceable requirements.
(E) State-only enforceable limitations	Designed to establish a limitation on a State-only requirement. For instance, air toxics requirements are State-only enforceable. Want to avoid air toxics modeling? Establish a State-only restriction <1.0 ton/yr for toxic. May not need fully synthetic minor terms.
(F) Voluntary limits on allowable emissions	Non-synthetic minor restrictions the company wants. For instance, company agrees to some restriction through orders w U.S. EPA but not required by rule.

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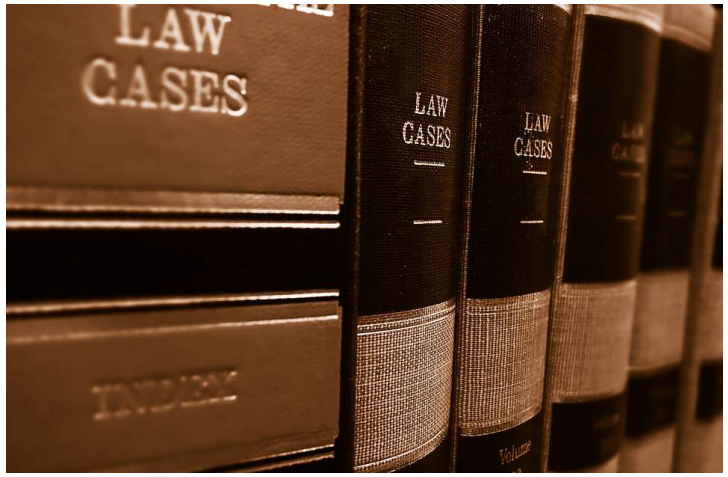
What Rule Cites will you See?

- EG #86 talks about the use of each rule cite.
- If you are not sure why a particular cite was used, talk to your permit writer.



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Wrap-up

- U.S. EPA limiting PTE - https://www3.epa.gov/airtoxics/pte/june13_89.pdf
- Ohio EPA EG #80 - https://epa.ohio.gov/static/Portals/27/engineer/eguides/guide80.pdf
- DAPC Web - https://epa.ohio.gov/divisions-and-offices/air-pollution-control
- Questions?

Ohio Environmental Protection Agency

Biographical Information

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Tracie Sorvillo is a Senior Environmental Engineer at Ardagh Metal Packaging NA, headquartered in Chicago, IL. She supports all ten United States Aluminum can manufacturing plants in Clean Air Act, Clean Water Act, SARA, Waste permitting, and compliance. AMP has three Aluminum can manufacturing plants located in the Northwest Ohio area. She has degrees in Chemical Engineering, Information Technology and obtained her MBA from The Ohio State University. Tracie has permitted and managed both Title V and non-Title V air permits during her 15 years of environmental health and safety work. She has been part of starting up a new state-of-the-art aluminum can manufacturing facility and creating environmental compliance tracking data analytics for all NA facilities.

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Amanda Jennings is a Managing Consultant in Trinity's Westerville, Ohio, office and provides air quality support for several industries in Ohio, including but not limited to, petroleum refining/distribution, chemical manufacturing, surface coating, asphalt processing/shingle manufacturing, and fiberglass and foam insulation manufacturing. She graduated from Ohio University with a Bachelor of Science Degree in Chemical Engineering. Amanda has completed numerous projects over her 18 years of consulting experience ranging from minor and major source state construction permit to install (PTI) or permits to install and operate (PTIO) applications, Fee Emissions Reports (FERs), emissions inventories, Toxic Release Inventory Reports (TRIs), Title V operating permit renewal and modification applications, MACT and GACT general consulting/compliance assistance, and regulatory applicability analyses. Also, she routinely teaches Trinity's *Strategic Air Permitting in Ohio* training course.

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Andrew Hall became Manager of the Permitting Section of the Ohio EPA, Division of Air Pollution Control (DAPC) in January 2006. His current duties include overseeing the permitting staff in the DAPC Central Office as well as providing technical and permit-related guidance to Ohio EPA field office permit writers. Andrew provides key technical guidance and oversight of Title V permits and major NSR permits issued by the division. Andrew led the team responsible for the initial development of the combined permit-to-install and operate (PTIO) program to it's successful implementation. Andrew graduated in 1993 from the University of Cincinnati with a BS in Chemical Engineering and enjoys yoga, triathlon (swim/bike/run) and paddleboarding.