

New MON Requirements

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New MON Requirements

- ▶ Miscellaneous Organic NESHAP (40 CFR 63 Subpart FFFF)
- ▶ Important for entire Chemical Sector – not just sources subject to MON
- ▶ Substantial effort will be required to comply
- ▶ Rule amendments follow Refinery Sector Rule (RSR) template
- ▶ RSR lessons learned will be beneficial

Background

- ▶ Stemmed from CAA-required Risk and Technology Review
 - ▶ Required for EPA every 8 years after setting MACT standards
 - ▶ Account for improvements in air pollution controls and/or prevention
 - ▶ Assess remaining health risks (“residual risk”) for the source category
- ▶ 8/12/2020 – Final Amendments published in Federal Register (85 FR 49084)
- ▶ Compliance dates in 2021 (some light liquid pumps), 2022 (ethylene oxide), & 2023 (or upon startup)

What's NOT in the updated MON

- ▶ Fenceline monitoring – not in MON but may still affect MON sources
 - ▶ Consent Decrees
 - ▶ Negotiated Settlements
 - ▶ Neighboring facilities that are required to do fenceline monitoring
- ▶ Some MON flares unaffected by new flare requirements

Subcategories

- ▶ Ethylene Oxide
 - ▶ Flares
 - ▶ Process vents
 - ▶ Storage tanks
 - ▶ Equipment (pumps and connectors) in ethylene oxide service
- ▶ Flares for MCPUs that produce olefins or polyolefins
 - ▶ Applies to MCPUs that “manufacture ethylene, propylene, polyethylene, and/or polypropylene as a product”
 - ▶ By-products and impurities as defined in [§ 63.101](#), as well as wastes and trace contaminants, are not considered products.

Flares

- ▶ Rule amendment directly applies the petroleum refinery flare rule requirements in MACT CC to ethylene oxide and olefins/polyolefins MCPU flares with clarifications.
- ▶ Added substantial monitoring and operational requirements
- ▶ Capital expenditures
- ▶ Many hours of effort
- ▶ Added definition and requirements for pressure-assisted multi-point flares

Flares – New Requirements

- ▶ Vent Gas Net Heating Value (NHV) monitoring
 - ▶ Gas Chromatograph (GC)
 - ▶ Calorimeter
 - ▶ Mass Spectrometer (MS)
 - ▶ Grab Samples
- ▶ Volumetric flow rate monitoring for assist air/steam
- ▶ Smokeless design capacity
- ▶ Flare Management Plan (FMP)
- ▶ Root Cause Analysis (RCA)

Startup/Shutdown/Malfunction – Major Changes

- ▶ Eliminating general exemptions for startup, shutdown, and malfunction (SSM) emissions
- ▶ Implementing work practices for some SSM activities
 - ▶ Pressure relief device (PRD) releases
 - ▶ Maintenance vents

Other Provisions

- ▶ Updating monitoring and repair provisions for heat exchanger leaks – El Paso Method required
- ▶ Adding provisions for electronic reporting of performance test results and reports and Notification of Compliance Status (NOCS) reports

Deadlines

- ▶ Compliance dates on August 12 in 2021 (some light liquid pumps), 2022 (ethylene oxide), & 2023 for affected sources that commenced construction or reconstruction on or before December 17, 2019
- ▶ Affected sources that commenced construction or reconstruction after December 17, 2019, must be in compliance with the new requirements upon initial startup, or on August 12, 2020, whichever is later.

Gap Assessment and Internal Compliance Plan

- ▶ Compare new requirements to existing requirements
- ▶ Flares (if applicable) will require tremendous effort
- ▶ Startup/shutdown/malfunction exemptions ending and work practices starting – what documentation do you need?
- ▶ Heat exchanger/cooling water monitoring with El Paso Method – outside contractor or internal resources?
- ▶ Continue through the rest of the new requirements
- ▶ Internal Compliance Plan – road map



Refinery Sector Rule - Maintenance Vents

What are Maintenance Vents?

- ▶ Maintenance Vents Are Process Vents That Are Used Only As A Result Of Startup, Shutdown, Maintenance, Or Inspection Of Equipment.
- ▶ Refinery Compliance Date For Maintenance Vent Control Provisions Was December 26, 2018.



What are the Control Requirements for Maintenance Vents?

- ▶ Prior To Venting The Equipment To The Atmosphere:
 - 1) De-inventory liquids from the equipment as much as practical.
 - 2) De-pressure the equipment to a MACT CC-compliant flare or control device until one of the following conditions is met:
 - a) The equipment served by the vent contains less than 72 lbs total VOC. (Note: MON has 50 lb threshold vs. Refinery MACT 72 lb threshold)
 - b) The vapor in the equipment served by the vent is <10% LEL.
 - c) If LEL of the vapors in the equipment cannot be measured:
 - i. Reduce the equipment pressure to ≤ 5 psig before opening, and
 - ii. Once open, do not actively purge equipment until the vapor is <10% LEL.
 - d) If the maintenance vent is associated with equipment containing pyrophoric catalyst, and a pure hydrogen supply is not available, reduce vapor to <20% LEL (<35% LEL allowed once per year).
 - e) Meet the requirements of the Blind Flange Provision (see next slide).

Note: MON also includes thresholds for hydrogen halide and halogen HAP

What is the blind flange provision for Maintenance Vents?

- ▶ If None Of The Other Vent Criteria Can Be Met Prior To Installing Or Removing A Blind Flange...
 - ▶ Reduce the pressure of the equipment served by the vent to ≤ 2 psig.
 - ▶ Only use active purging if the equipment pressure at the location the purge gas is introduced is maintained at ≤ 2 psig.
 - ▶ Additional records:
 - ▶ Why use of the alternative standard was required,
 - ▶ The equipment pressure and %LEL of the vapors in the equipment at the time of discharge,
 - ▶ The pressure of the equipment during blind installation/removal if active purging was used, and
 - ▶ Records used to estimate the total quantity of VOC in the equipment.



Exit Ramps

- 1) Equipment Is Exempt From MACT CC Definition Of Miscellaneous Process Vent, And By Extension, Control Standards For Maintenance Vents.
- 2) After Liquid De-inventory To Controlled Location, Equipment Has No Potential To Contain ≥ 72 lb VOC Prior To Opening To Atmosphere.
- 3) Equipment Contains ≥ 72 lb VOC After Liquid De-inventory And Must Meet One Of The MACT Maintenance Vent Control Provisions:
 - ▶ Reduce internal VOC quantity to < 72 lb by controlled purging;
 - ▶ Reduce internal VOC to $< 10\%$ LEL; and
 - ▶ Reduce internal pressure to < 5 psig, with no active purging until LEL $< 10\%$.
 - ▶ For pyrophoric catalyst equipment without pure H₂ supply, meet LEL $< 20\%$.
 - ▶ Meet requirements of 'Blind Flange' provision.

Note: MON has 50 lb VOC threshold instead of Refinery MACT's 72 lb threshold

MACT CC 72 lb Threshold Tools (MON has 50 lb threshold)

Material	Worst-Case Threshold Volume where VOC <72 lb, by Equipment Type					
	Isolated Piping	Pumps and Compressors	Filters	Exchangers – Shell Side	Exchangers – Tube Side	Vessels
	(ft ³)	(ft ³)	(ft ³)	(ft ³)	(ft ³)	(ft ³)
LPG	390.25	415.80	418.54	380.32	383.18	419.92
Light Distillate	448.06	491.19	495.97	431.94	436.56	498.39
Gasoline	476.32	525.37	Estimated emissions, in pounds, for a Vessel constructed with 2:1 elliptical heads, containing residual <u>butane</u> vapors (as worst case). $E_{total} = SA * t / 12 * 7.4805 * W_L + P * V / (10.73 * (T + 459.67)) * M_V$			
Crude Oil	538.25	1,157.56				
Middle Distillate	833.70	4,866.79				

		Vessel Height, ft																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Vessel Diameter, ft	1	0.0	0.7	1.4	2.1	2.8	3.4	4.1	4.8	5.5	6.2	6.8	7.5	8.2	8.9	9.6	10.2	10.9	11.6	12.3	13.0	13.6
	2	0.4	3.1	5.8	8.5	11.2	13.9	16.6	19.3	22.0	24.7	27.4	30.1	32.8	35.5	38.2	40.9	43.6	46.3	49.0	51.7	54.4
	3	1.2	7.3	13.3	19.4	25.5	31.5	37.6	43.7	49.7	55.8	61.9	67.9	74.0	80.1	86.1	92.2	98.3	104.3	110.4	116.5	122.5
	4	2.9	13.6	24.4	35.2	46.0	56.7	67.5	78.3	89.1	99.8	110.6	121.4	132.2	142.9	153.7	164.5	175.2	186.0	196.8	207.6	218.3
	5	5.6	22.4	39.3	56.1	72.9	89.7	106.5	123.4	140.2	157.0	173.8	190.7	207.5	224.3	241.1	257.9	274.8	291.6	308.4	325.2	342.1
	6	9.7	33.9	58.1	82.3	106.5	130.8	155.0	179.2	203.4	227.6	251.8	276.0	300.3	324.5	348.7	372.9	397.1	421.3	445.5	469.7	494.0
	7	15.4	48.3	81.3	114.2	147.2	180.1	213.1	246.0	279.0	311.9	344.9	377.8	410.7	443.7	476.6	509.6	542.5	575.5	608.4	641.4	674.3
	8	23.0	66.0	109.0	152.0	195.1	238.1	281.1	324.1	367.1	410.2	453.2	496.2	539.2	582.2	625.3	668.3	711.3	754.3	797.4	840.4	883.4
	9	32.7	87.1	141.6	196.0	250.4	304.9	359.3	413.8	468.2	522.6	577.1	631.5	686.0	740.4	794.8	849.3	903.7	958.2	1,013	1,067	1,121
	10	44.8	112.0	179.2	246.4	313.6	380.8	448.0	515.2	582.4	649.6	716.8	784.0	851.2	918.4	985.6	1,053	1,120	1,187	1,254	1,322	1,389
	11	59.7	141.0	222.3	303.6	384.9	466.2	547.5	628.8	710.1	791.4	872.7	954.0	1,035	1,117	1,198	1,279	1,360	1,442	1,523	1,604	1,686
	12	77.5	174.2	271.0	367.7	464.4	561.2	657.9	754.7	851.4	948.2	1,045	1,142	1,238	1,335	1,432	1,529	1,625	1,722	1,819	1,916	2,012
	13	98.5	212.0	325.5	439.1	552.6	666.1	779.7	893.2	1,007	1,120	1,234	1,347	1,461	1,574	1,688	1,801	1,915	2,029	2,142	2,256	2,369
	14	123.0	254.6	386.3	518.0	649.6	781.3	912.9	1,045	1,176	1,308	1,440	1,571	1,703	1,835	1,966	2,098	2,230	2,361	2,493	2,625	2,756
	15	151.3	302.4	453.5	604.6	755.8	906.9	1,058	1,209	1,360	1,511	1,663	1,814	1,965	2,116	2,267	2,418	2,569	2,720	2,872	3,023	3,174
	16	183.6	355.5	527.4	699.4	871.3	1,043	1,215	1,387	1,559	1,731	1,903	2,075	2,247	2,419	2,591	2,763	2,935	3,107	3,279	3,451	3,622
	17	220.2	414.3	608.4	802.5	996.6	1,191	1,385	1,579	1,773	1,967	2,161	2,355	2,549	2,743	2,938	3,132	3,326	3,520	3,714	3,908	4,102
	18	261.3	478.9	696.5	914.1	1,132	1,349	1,567	1,785	2,002	2,220	2,437	2,655	2,872	3,090	3,308	3,525	3,743	3,960	4,178	4,396	4,613
	19	307.3	549.8	792.2	1,035	1,277	1,520	1,762	2,004	2,247	2,489	2,732	2,974	3,217	3,459	3,701	3,944	4,186	4,429	4,671	4,914	5,156
	20	358.4	627.1	895.7	1,164	1,433	1,702	1,970	2,239	2,507	2,776	3,045	3,313	3,582	3,850	4,119	4,388	4,656	4,925	5,194	5,462	5,731

What Records are Required for Maintenance Events?

- ▶ For Maintenance Vents, Maintain The Following Records:
 - ▶ Standard site procedures used for the safe de-inventory of equipment (including previous versions);
 - ▶ For each maintenance event during which an applicable standard was not met prior to venting to the atmosphere:
 - ▶ The maintenance vent and the equipment which is served by it.
 - ▶ The date of the vent opening.
 - ▶ The %LEL reading, pressure reading, and/or mass quantity of VOC in the equipment at the time the vent was opened (as appropriate), and any required supporting documentation.

What Records are Required for Maintenance Events?

- ▶ For Maintenance Vents, Maintain The Following Records:
 - ▶ For 'blind flange' events:
 - ▶ Why use of the alternative standard was required,
 - ▶ The equipment pressure and %LEL of the vapors in the equipment at the time of discharge,
 - ▶ The pressure of the equipment during blind installation/removal if active purging was used,
 - ▶ Records used to estimate the total quantity of VOC in the equipment.
 - ▶ For equipment meeting the <72 lb VOC standard, records used to estimate the VOC quantity, and the type and size limits of equipment which meet this standard.

Note: MON has 50 lb VOC threshold instead of Refinery MACT's 72 lb threshold

The Problem!

- ▶ A Typical Refinery Has Many Maintenance Vent Opportunities Each Year (Vessels, Towers, Filters, Tanks, And Reactors).

Unit	Unit ID	Equipment ID	Equipment Name	Equipment Type
AMINE	0550-AMIN	E-551A	LEAN/RICH MDEA EXCHANGER (UPPER)	Exchanger
AMINE	0550-AMIN	E-551B	LEAN/RICH MDEA EXCHANGER (LOWER)	Exchanger
AMINE	0550-AMIN	E-552A	LEAN MDEA AIR COOLER (EAST) (F-F)	Air Cooler
AMINE	0550-AMIN	E-552B	LEAN MDEA AIR COOLER (WEST) (F-F)	Air Cooler
AMINE	0550-AMIN	E-553A	LEAN MDEA TRIM COOLER (UPPER)	Exchanger
AMINE	0550-AMIN	E-553B	LEAN MDEA TRIM COOLER (LOWER)	Exchanger
AMINE	0550-AMIN	T-551	FUEL GAS MDEA ABSORBER (20 TRAYS)	Tower
AMINE	0550-AMIN	V-55006	AMINE SUMP	Vessel
AMINE	0550-AMIN	V-552	ABSORBER FEED K.O. DRUM	Vessel
AMINE	0550-AMIN	V-553	ABSORBER OFF-GAS KO DRUM	Vessel
AMINE	0550-AMIN	V-80073	FUEL GAS KO DRUM (For Amine Unit)	Vessel
AMINE	0550-AMIN	V-804	PLANT FUEL GAS MIX DRUM *	Vessel
AMINE	0550-AMIN	Z-55001A	#1 ARU AMINE FILTER (EAST)	Filter
AMINE	0550-AMIN	Z-55001B	#1 ARU AMINE FILTER (WEST)	Filter
AMINE	0550-AMIN	Z-552	CARBON FILTER	Filter

- ▶ How Does A Refinery Environmental Staff Keep Track?

Generic Safety Process for Equipment Opening/Line Breaking Pre-RSR Maintenance Vent Requirements

1) Depressure/drain/purge equipment to controlled system	
2) Safety Department/Operator measures LEL inside equipment from a bleeder/vent	
If LEL >10%	If LEL <10%
3) Suspend work	3) Proceed with opening
4) Conduct risk meeting a) Identify actions to be taken to mitigate hazards b) Document meeting	
5) Obtain management approval	
6) Proceed with opening	

Generic Safety Process for Equipment Opening/Line Breaking Post-RSR Maintenance Vent Requirements

If LEL > 10%
3) Suspend work
4) Conduct risk meeting a) Identify actions to be taken to mitigate hazards b) Document meeting
5) Obtain management approval
6) Proceed with opening



This is the step where environmental is inserted into the process.

Generic Safety Process for Equipment Opening/Line Breaking

Post-RSR Maintenance Vent Requirements

If LEL > 10%	
3) Suspend work	
4) Safety Department notifies Environmental	
5) Environmental estimates VOC content; documents	
If VOC content < 72 lbs	If VOC content > 72 lbs
6) Conduct risk meeting a) Identify actions to be taken to mitigate hazards b) Env validates VOC < 72 lbs c) Document meeting	6) Operations resumes purge to controlled system
	7) Recycle back to step #2: Safety Department/Operator rechecks LEL
7) Obtain management approval	
8) Proceed with opening	

Note: MON has 50 lb VOC threshold instead of Refinery MACT's 72 lb threshold

Generic Safety Process for Equipment Opening/Line Breaking Post-RSR Maintenance Vent Requirements

1) Operator depressure/drain/purge equipment to controlled system		If LEL <10% 3) Proceed with opening
2) Safety Department/Operator measures LEL inside equipment from a bleeder/vent		
If LEL >10%		
3) Suspend work		
4) Safety Department notifies Environmental		
5) Environmental estimates VOC content; documents		
If VOC content <72 lbs	If VOC content >72 lbs	
6) Conduct risk meeting a) Identify actions to be taken to mitigate hazards b) Env validates VOC <72 lbs c) Document meeting	6) Operations resumes purge to controlled system	
7) Obtain management approval	7) Recycle back to step #2: Safety Department/Operator rechecks LEL	
8) Proceed with opening		

Note: MON has 50 lb VOC threshold instead of Refinery MACT's 72 lb threshold

Summary

- ▶ Start early to prepare for compliance dates
- ▶ Budget time and money for extensive effort required to comply with new requirements
- ▶ Leverage lessons learned from Refinery Sector Rule implementation
- ▶ Planning And Leveraging Existing Work Processes Can Minimize The Burden Of The New Maintenance Vent Requirements.

Question Time!

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