

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5**

In the Matter of:	)	
	)	
Stepan Company	)	NOTICE AND FINDING OF VIOLATION
Elwood, Illinois	)	
	)	EPA-5-24-IL-09
Proceedings Pursuant to	)	
the Clean Air Act,	)	
42 U.S.C. §§ 7401 et seq.	)	

NOTICE AND FINDING OF VIOLATION

The U.S. Environmental Protection Agency finds Stepan Company (Stepan or you) in violation of Section 112 of the Clean Air Act, 42 U.S.C. § 7412. Specifically, Stepan is in violation of the National Emission Standards for Hazardous Air Pollutants for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater at 40 C.F.R. Part 63, Subpart G (Subpart G HON); the National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing at 40 C.F.R. Part 63, Subpart FFFF (the MON); the Illinois State Implementation Plan; and the facility's Title V Permit, as follows:

Regulatory Authority

1. The Subpart G HON applies to all process vents, storage vessels, transfer racks, wastewater streams, and in-process equipment subject to 40 C.F.R. § 63.149 within a source subject to subpart F of Part 63. See 40 C.F.R. § 63.110(a).
2. The National Emission Standards for Hazardous Air Pollutants for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry (Subpart F HON) applies to chemical manufacturing process units that: (1) manufacture as a primary product one or more of the chemicals listed in table 1 of this Subpart F, or tetrahydrobenzaldehyde, or crotonaldehyde; (2) use as a reactant or manufacture as a product, or co-product, one or more of the organic hazardous air pollutants listed in table 2 of Subpart F; and (3) are located at a plant site that is a major source of HAP.
3. The NESHAP for Organic Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing (the MON) applies to miscellaneous organic chemical manufacturing process units (MCPU) that are located at, or are part of, a major source of HAP.

Catalytic Incinerator

4. The Subpart G HON, at 40 C.F.R. § 63.114(a), requires the owner and operator of a Group 1 process vent to reduce emissions of total organic HAP by 98% by weight.
5. The Subpart G HON, at 40 C.F.R. § 63.114(a), requires the owner and operator of a process vent that uses a catalytic incinerator to comply with the requirements in 40 C.F.R.

§ 63.113(a)(1) or (a)(2) to install temperature monitoring devices in the gas stream immediately before and after the catalyst bed.

6. The Subpart G HON, at 40 C.F.R. § 63.114(e), requires, for each parameter monitored under 40 C.F.R. § 63.114(a), the owner or operator to establish a range that indicates proper operation of the control or recovery device. In order to establish the range, the information required in 40 C.F.R. § 63.152(b) shall be submitted in the Notification of Compliance Status (NOCS) Report or the operating permit application or amendment.

7. The Subpart G HON, via 40 C.F.R. § 63.118(a)(1), 40 C.F.R. § 63.153(c)(2), and Table 3, requires that each owner or operator subject to the control provisions for Group 1 process vents and using a catalytic incinerator shall record and report in semiannual reports, all daily average upstream temperatures that are outside the range established in the NOCS Report and all daily average temperature differences across the catalyst bed that are outside the range established in the NOCS Report.

8. The Subpart G HON, at 40 C.F.R. § 63.152(b)(2), requires, for each monitored parameter for which a range is required to be established under 40 C.F.R. § 63.114, that the NOCS Report shall include:

- (i) The specific range of the monitored parameter(s) for each emission point;
- (ii) The rationale for the specific range for each parameter for each emission point, which shall be based on the parameter values measured during the performance test if a performance test is required, and may be supplemented by engineering assessments and/or manufacturer's recommendations.
- (iii) A definition of the source's operating day for purposes of determining daily average values of monitored parameters. The definition shall specify the times at which an operating day begins and ends.

9. The Subpart G HON, at 40 C.F.R. § 63.152(c)(2)(ii), provides that the parameter monitoring data for Group 1 emission points that are required to perform continuous monitoring shall be used to determine compliance with the required operating conditions for the monitored control devices.

10. The Subpart G HON, at 40 C.F.R. § 63.152(c)(2)(ii)(A)(1), provides that a daily average value of one or more monitored parameters outside the permitted range is considered an excursion.

11. The Subpart G HON, at 40 C.F.R. § 63.152(c)(2)(iii), requires that Periodic Reports shall include the daily average values of monitored parameters for both excused and unexcused excursions.

Scrubbers

12. The MON, at 40 C.F.R. § 63.2460(a), requires that batch process vents comply with each emission limit in Table 2 of Subpart FFFF.

13. Table 2 of the MON requires, in part, that processes with Group 1 batch process vents must reduce the collective organic HAP emissions from the sum of all process vents by 98% or greater.

14. The MON, at 40 C.F.R. § 63.2450(e), requires that, an owner or operator who reduces organic HAP emissions by venting emissions through a closed-vent system to any combination of control devices (except a flare) or recovery devices, must meet the requirements of § 63.982(c) and the requirements referenced therein.

15. The MON, at 40 C.F.R. § 63.2450(k)(2), provides that, “when subpart SS of this part 63 uses the term ‘a range’ or ‘operating range’ of a monitored parameter, it means an ‘operating limit’ for a monitored parameter for the purposes of this subpart.”

16. The MON, at 40 C.F.R. § 63.2450(k)(5), requires that, for absorbers that control organic compounds and use water as the scrubbing fluid, an owner or operator must conduct monitoring and recordkeeping as specified in paragraphs (k)(5)(i) through (iii) of this section instead of the monitoring and recordkeeping requirements specified in §§ 63.990(c)(1), 63.993(c)(1), and 63.998(a)(2)(ii)(C).

- (i) You must use a flow meter capable of providing a continuous record of the absorber influent liquid flow.
- (ii) You must determine gas stream flow using one of the procedures specified in § 63.994(c)(1)(ii)(A) through (D).
- (iii) You must record the absorber liquid-to-gas ratio averaged over the time period of any performance test.

17. The MON, at 40 C.F.R. § 63.2460(c)(3), requires that an owner or operator must establish operating limits under the conditions required for the initial compliance demonstration, except that operating limit(s) may be established for conditions other than those under which a performance test was conducted as specified in paragraph (c)(3)(i).

- a. Paragraph (c)(3)(i) provides that “The operating limits may be based on the results of the performance test and supplementary information such as engineering assessments and manufacturer's recommendations. These limits may be established for conditions as unique as individual emission episodes for a batch process. You must provide rationale in the precompliance report for the specific level for each operating limit, including any data and calculations used to develop the limit and a description of why the limit indicates proper operation of the control device. The procedures provided in this paragraph (c)(3)(i) have not been approved by the Administrator and determination of the operating limit using these procedures is subject to review and approval by the Administrator.”

18. The MON, at 40 C.F.R. § 63.2520(d)(2)(iii), requires the submission of a notification of compliance report which contains, among other things, descriptions of the operating limits established during the initial compliance demonstrations, including data and calculations to support the levels you establish.

19. The MON, via 40 C.F.R. § 63.982(a), provides that an owner or operator who is referred to Subpart SS for controlling regulated material emissions process vents by venting emissions through a closed vent system to a nonflare control device shall comply with the applicable provisions of paragraph (c)(2) of this section.

20. The MON, via, 40 C.F.R. § 63.982(c), requires that owners or operators who control emissions through a closed vent system to a nonflare control device shall meet the requirements in § 63.983 for closed vent systems, the applicable recordkeeping and reporting requirements of §§ 63.998 and 63.999, and the applicable requirements listed in § 63.982(c)(1) through (3).

- a. 40 C.F.R. § 63.982(c)(2) provides that, for process vents, an owner or operator using absorbers to comply must meet the requirements of § 63.990; the applicable general monitoring requirements of § 63.996 and the applicable performance test requirements and procedures of § 63.997; and the monitoring, recordkeeping and reporting requirements referenced therein.

21. The MON, via 40 C.F.R. § 63.996(c)(6), requires that the owner or operator shall establish a range for monitored parameters that indicates proper operation of the control or recovery device.

22. The MON, via 40 C.F.R. § 63.999(b)(3), requires that the owner or operator submit as part of the Notification of Compliance Status, the operating range for each monitoring parameter identified for each control, recovery, or halogen reduction device as determined pursuant to § 63.996(c)(6). It also requires that the specified operating range represent the conditions for which the control, recovery, or halogen reduction device is being properly operated and maintained.

23. The MON, via 40 C.F.R. § 63.999(b)(3)(ii)(A), provides that if a performance test is required by a referencing subpart for a control device, the operating range identified in the Notification of Compliance Status shall be based on the parameter values measured during the performance test and may be supplemented by engineering assessments and/or manufacturer's recommendations.

Sulfonator Waste Tank

24. The Illinois SIP provision at 35 IAC 214.301 provides that no person shall cause or allow the emission of sulfur dioxide into the atmosphere from any process emission source to exceed 2000 ppm.

25. The Facility's Title V Permit issued December 15, 2016, restated 35 IAC 214.201 at Condition 4.2.2.c.i.A.

Factual Background

26. Stepan owns and operates a specialty organic chemicals manufacturing facility at 22500 Stepan Drive, Elwood, Illinois (Facility). The Facility includes many process areas, including the Phthalic Anhydride (PA) Facility (PA Facility).

Catalytic Incinerators

27. Stepan's PA Facility is subject to the Subpart G HON, as acknowledged by Stepan in its August 20, 1994 HON Notification letter to EPA. The process uses one or more compounds listed in

Table 2 of Subpart F, for example o-xylene, or produce one or more compounds listed in Table 1 of Subpart F, for example phthalic anhydride, and the Facility is a major source of HAP.

28. The continuous process vents from the PA Facility are controlled using three catalytic incinerators, termed Combustors 3, 4 and 5, operated in parallel.

29. On December 16, 1997, Stepan submitted a NOCS Report for the PA Facility pursuant to Subpart G of the HON, which provided, in part, as follows:

- a. Inlet Temperature: The NOCS Report stated that Combustor 3 had achieved over 98% destruction of HAP with a temperature inlet for catalyst bed 3 of 366°C, and over 99% destruction across Combustor 4 with a temperature inlet of 345.0°C. It further stated that the manufacturer's recommended inlet temperature was 345°C, and that any daily average less than 344°C would be considered an excursion. Therefore, the NOCS Report set the inlet temperature parameter at 344°C for all three combustors.
- b. Temperature Differential: The NOCS Report stated that Combustor 3 had achieved over 98% destruction of HAP with a temperature differential across catalyst bed 3 of 95°C, and over 99% destruction across Combustor 4 with a temperature differential of 97.8°C. The NOCS also stated that the Combustor 5 design would be identical to that of No. 4 and would thus have identical performance. The NOCS did not include any engineering assessments and/or manufacturer's recommendations regarding the temperature differential, and thus the temperature differential parameter was set at 95°C for Combustor 3 and 97.8°C for Combustors 4 and 5.

30. In response to a Section 114 Information Request issued by EPA on December 16, 2020, and later updated pursuant to an email request from EPA, Stepan provided the daily average temperatures at the inlet and outlet of each combustor through December 31, 2022. EPA used that data to determine the temperature differential for each day. As detailed in the attached Table 1, for the period of January 1, 2019, through December 31, 2022, the temperature differential fell below the required temperature differential a majority of the time:

Combustor No.	Number of Days Temperature Differential Not Maintained to Minimum	Number of Days of Operation from 1/1/2019 – 12/31/2020	Percent of Time Combustor Operated Below Minimum Temperature Differential (%)
3	446	606	73.6
4	813	819	99.3
5	721	761	94.7

31. From January 1, 2019, through December 31, 2020, the combustor inlet temperature fell below 344°C on the following dates:

Combustor No.	Date	Inlet Temperature
3	3/2/2019	342.5
3	6/17/2019	342.8
3	7/29/2019	341.4
3	8/9/2019	268.4
3	9/17/2020	312
3	2/14/2021	343
3	2/28/2021	343
3	3/13/2021	343
3	4/19/2021	343
3	6/7/2021	343
4	7/10/2019	341.4
4	9/17/2020	332
4	2/9/2021	341
4	2/15/2021	343
4	2/16/2021	343
4	5/6/2021	205
5	8/28/2020	343
5	1/15/2021	339
5	1/25/2021	149
5	2/9/2021	343
5	3/28/2021	284

32. Stepan's HON semiannual reports for the relevant time periods did not identify the inlet and outlet temperature deviations described in Paragraphs 30 and 31 as being outside the range established in the NOCS.

Scrubber S-803

33. On November 2, 2007, Stepan submitted a Precompliance Report pursuant to the MON. (2007 Precompliance Report). This report proposed operating parameters for Scrubber S-803 as detailed in Table 1 below. It also included a design sheet for Scrubber S-803 which stated the parameters under which the manufacturer guaranteed 98% control of methanol. The proposed parameter for vapor flow rate was supported by the design sheet for scrubber S-803, but the proposed parameter for L/G ratio was not supported by any documentation or description. Rather, the provided design sheet indicated that multiple other parameter limits were necessary in order to assure proper operation of the control device.

34. On August 8, 2008, Stepan submitted an Initial Notification of Compliance Status under the MON (2008 NOCS). The 2008 NOCS established that S-803 controls emissions from Group 1 batch process vents (see 57th page of the document).

- a. As detailed in Table 1 below, this report proposed various operating parameter limits for Scrubbers S-803 which differed from those proposed in the 2007 Precompliance report. It also identified performance testing which had been conducted to demonstrate compliance with the requirement to reduce HAP emissions by greater than 98% pursuant to the MON. It also included the same design sheet for Scrubber S-803 as had been included in the 2007 Precompliance Report.
- b. The vapor flow and vapor temperature operating limits were justified by the scrubber design sheet. However, the water flow operating limit did not align with either the parameter measured during the performance test or the parameter recommended by the manufacturer to achieve 98% control. Stepan did not provide any supplemental engineering assessment to support the proposed water flow operating parameter. Rather, the design sheet indicated that a higher water flow rate is necessary to achieve 98% reduction of methanol.

35. Stepan conducted an additional performance test of Scrubber S-803 in October 2017 as detailed in Table 1 below.

36. In response to an EPA Section 114 Information Request, Stepan provided a table which identified the operating parameter limit it believed applied to Scrubber S-803, laid out in Table 1 below. This parameter did not align with operating limits established in the 2008 NOCS or the 2007 Precompliance Report.

37. On January 31, 2022, Stepan submitted an updated Initial Notification of Compliance Status under the MON (2022 NOCS). It established that Scrubber S-803 controls emissions from a Group 1 batch process vent, a Group 1 transfer rack, and a Group 1 storage tank (2800th page of the document).

- a. It proposed a different operating parameter limit than had been proposed in the 2007 Precompliance Report and the 2008 NOCS, as laid out in Table 1 below.
- b. The proposed parameter for L/G ratio was not supported by any documentation or description. Rather, the design sheet for the scrubber indicated that multiple other parameter limits are necessary in order to assure proper operation of the control device.

	<i>Table 1: Scrubber S-803 Parameters</i>						
	2007 Precompliance Report		2008 NOCS			2020 Section 114 Information Request Response (Q12)	2022 NOCS
	98% Guarantee from Design Sheet (pg 5)	Proposed operating parameters (pg 3)	Performance Test (pg 78)	Operating Parameter Limit (pg. 52)	Oct 2017 Performance Test		Operating Parameter Limit (pg. 280)
Vapor Flow (scfm)	<100	<100	46.2	<100	21.4		
Vapor temperature (°F)	100		86.5	<60	67.5		
Water flow rate (gpm)	>3.4 ¹		3.4	>2.4	2.9		
Scrubbant temperature (°F)	<50						
Liquid-to-gas ratio		>0.034	0.074		0.136	>0.034	0.073 or as demonstrated by most recent MON test

¹ The design sheet stated that the minimum water flow rate to provide proper liquid distribution was 2.4 gpm, but that the scrubber was only guaranteed to achieve 98% removal of methanol with a water flow rate of 3.4 gpm.

Scrubber S-105

38. The 2007 Precompliance Report proposed operating parameters for Scrubber S-105 as detailed in Table 2 below. It also included a design sheet for Scrubber S-105 which stated the parameters under which the manufacturer guaranteed 98% control of methanol. The proposed parameter for vapor flow rate was supported by the design sheet for scrubber S-105, but the proposed parameter for L/G ratio was not supported by any documentation or description. Rather, the provided design sheet indicated that multiple other parameter limits were necessary in order to assure proper operation of the control device.

39. The 2008 NOCS established that Scrubber S-105 controls emissions from Group 1 batch process vents (58th page of the document).

- a. As laid out in Table 2 below, the 2008 NOCS proposed various operating parameter limits for Scrubbers S-105 which differed from those proposed in the 2007 Precompliance report. It also identified performance testing which had been conducted to demonstrate compliance with the requirement to reduce HAP emissions by greater than 98% pursuant to the MON. It also included the same design sheet for Scrubber S-105 as had been included in the 2007 Precompliance Report.
- b. The vapor flow and vapor temperature operating limits were justified by the scrubber design sheet. However, the water flow operating limit did not align with either the parameter measured during the performance test or the parameter recommended by the manufacturer to achieve 98% control. Stepan did not provide any supplemental engineering assessment to support the proposed water flow operating parameter. Rather, the design sheet indicated that a higher water flow rate is necessary to achieve 98% reduction of methanol.

40. Stepan's response to EPA's Section 114 Information Request also identified the operating parameter limit it believed applied to Scrubber S-105, laid out in Table 2 below. This parameter did not align with operating limits established in the 2008 NOCS, or the 2007 Precompliance Report.

41. Stepan conducted a performance test of Scrubber S-105 on October 21-22, 2020, as detailed in Table 2 below.

42. On October 15, 2021, Stepan replaced Scrubber S-105. In response to a request from EPA, Stepan provided the design sheet for the new S-105, whose parameters are laid out in Table 2 below.

43. The 2022 NOCS established that Scrubber S-105 controls emissions from a Group 1 batch process vent, a Group 1 transfer rack and a Group 1 storage tank (see 2808th page of the document).

- a. The 2022 NOCS proposed a different operating parameter limit than had been proposed in the 2007 Precompliance Report and the 2008 NOCS, as laid out in Table 2 below.
- b. The proposed parameter for L/G ratio in the 2022 NOCS was not supported by any documentation or description. Rather, the design sheet for the scrubber indicated that multiple other parameter limits are necessary in order to assure proper operation of the control device.

44. Stepan conducted a performance test of the new Scrubber S-105 from October 4-5, 2022, as detailed in Table 2 below.

45. From January 1, 2019, through June 30, 2023, Scrubber S-105 operated with a water flow rate below the rate at which the manufacturer guaranteed 98% removal of methanol, and below which it had demonstrated compliance, on 1,119 days.

	<i>Table 2: Scrubber S-105 Parameters</i>								
	2007 Precompliance Report		2008 NOCS		2020 Section 114 Information Request Response (Q12)	98% Guarantee from New Design Sheet	Oct 2020 Performance Test	Oct 2022 Performance Test	2022 NOCS Operating Parameter Limit (pg. 280)
	98% Guarantee from Design Sheet (pg 4)	Proposed operating parameters (pg 3)	Performance Test (pg 78)	Operating Parameter Limit (pg. 53)					
Vapor Flow (scfm)	<150	<150	146.0	<150		>60, <150	37.36	24.9	
Vapor temperature (°F)	115		111.9	<115		115		68.9	
Water flow rate (gpm)	22 ²		22.0	>11		>25 ³	20.84	21.0	
Scrubbant temperature (°F)	<50					60	68.46		
Liquid-to-gas ratio		>0.147	0.151		>0.1474	>0.167	0.558	0.84	0.46 or as demonstrated by most recent MON test

² The design sheet stated that the minimum water flow rate to provide proper liquid distribution was 11 gpm, but that the scrubber was only guaranteed to achieve 98% removal of methanol with a water flow rate of 22 gpm.

³ The design sheet stated that the minimum water flow rate to provide proper liquid distribution was 16 gpm, but that the scrubber was only guaranteed to achieve 98% removal of methanol with a water flow rate of 25 gpm.

Scrubber S-928

46. On August 8, 2006, Stepan submitted an Initial Notification of Compliance Status under the MON for EU-Biodiesel (2006 EU-BD NOCS). The 2006 EU-BD NOCS established that Scrubber S-928 is used to a control Group 1 batch process vent and Group 1 storage tanks. It proposed parameters to be monitored as vapor flow into the scrubber < 86 scfm; water flow into the scrubber >7.5 gpm if vapor flow is above 45 scfm, and water flow into the scrubber > 5.5 gpm if vapor flow is below 45 scfm.

47. The 2007 Precompliance Report proposed operating parameters for Scrubber S-928 as detailed in Table 4 below. It did not provide the scrubber design sheet and thus had no justification for the proposed parameter, which differed from the parameters proposed in the 2006 EU-BD NOCS.

48. The 2008 NOCS established that Scrubber S-928 controls emissions from Group 1 batch process vents (see 57th page of the document).

- a. As laid out in Table 2 below, the 2008 NOCS proposed various operating parameter limits for Scrubbers S-105 which differed from those proposed in the 2007 Precompliance report. It also identified performance testing which had been conducted to demonstrate compliance with the requirement to reduce HAP emissions by greater than 98% pursuant to the MON. It included a design sheet for Scrubber S-928 which stated the parameters under which the manufacturer guaranteed 98% control of methanol.
- b. The vapor flow and vapor temperature operating limits were justified by the scrubber design sheet. However, the water flow operating limit did not align with either the parameter measured during the performance test or the parameter recommended by the manufacturer to achieve 98% control. Stepan did not provide any supplemental engineering assessment to support the proposed water flow operating parameter. Rather, the design sheet indicated that a higher water flow rate is necessary to achieve 98% reduction of methanol.

49. Stepan's response to EPA's Section 114 Information Request also identified the operating parameter limit that Stepan believed applied to Scrubber S-928, laid out in Table 3 below. This parameter did not align with operating limits established in the 2008 NOCS, or the 2007 Precompliance Report.

50. In response to a request from EPA, Stepan provided a data sheet for Scrubber S-928. It indicated that the required scrubbing water rate was 5.5 gpm for air flow rates under 75 scfm; however, it also stated that performance at that level was estimated (i.e. vs. guaranteed).

51. The 2022 NOCS established that Scrubber S-928 controls emissions from Group 1 batch process vents and a Group 2 transfer rack (2808th page of the document).

- a. It proposed a different operating parameter limit than had been proposed in the 2006 EU-BD NOCS, the 2007 Precompliance Report, and the 2008 NOCS, as laid out in Table 2 below.

- b. The proposed parameter was not supported by any documentation or description. Rather, the design sheet for the scrubber indicated that multiple other parameter limits are necessary in order to assure proper operation of the control device.

52. Based on information provided by Stepan to EPA, from January 1, 2019, through at least December 31, 2021, the vapor flow meter for S-928 was not working properly, preventing Stepan from determining the gas flow and the L/G ratio for that time period.

53. From January 1, 2019, through June 30, 2023, Scrubber S-928 operated with a water flow rate below the rate at which the manufacturer guaranteed 98% removal of methanol, and below which it had demonstrated compliance, on 34 days.

Table 3: Scrubber S-928 Parameters								
	2006 EU-BD NOCS Proposed operating parameters	2007 Precompliance Report	2008 NOCS			2020 Section 114 Information Request Response (Q12)	2022 NOCS	
		Proposed operating parameters (pg 3)	98% Guarantee from Design sheet (pg 301)	Performance Test (pg 63)	Operating Parameter Limit (pg. 52)		June 2021 Performance Test (pgs 71 & 136)	Operating Parameter Limit (pg. 280)
Vapor Flow (scfm)	< 86 scfm	<86	<100	89.7	<86		44	
Vapor temperature (°F)			95	94.0	<95		81.49	
Water flow rate (gpm)	>7.6 / 5.5 ⁴		7.3	8.0	>5.5		8.01	
Scrubbant temperature (°F)			<60					
Liquid-to-gas ratio		>0.088		0.089		>0.088	0.182	0.154 or as demonstrated by most recent MON test

⁴ Under the heading of “Batch Vent for EUBD-F28K Re: 40 CFR 63 .2460” on the 5th page of the document, Stepan proposed operating parameters of water flow into the scrubber of >7.6 gpm if vapor flow is above 45 scfm, and > 5.5 gpm is vapor flow is below 45 scfm.

Scrubber S-102

54. The 2007 Precompliance Report proposed operating parameters for Scrubber S-102 as detailed in Table 4 below. It also included a design sheet for Scrubber S-102 at page 6 which stated that the scrubber was guaranteed to achieve 95% reduction of methanol under certain conditions. The proposed parameter for vapor flow rate was supported by the design sheet for scrubber S-102, but the proposed parameter for L/G ratio was not supported by any documentation or description. Rather, the provided design sheet indicated that multiple other parameter limits are necessary in order to assure proper operation of the control device.

55. The 2008 NOCS did not specifically identify whether Scrubber S-102 controlled any Group 1 sources emissions, nor did it provide a performance test demonstrating compliance with the 98% reduction efficiency requirement or propose operating parameter limits as it did for the other Group 1 control equipment. Therefore, at the time of the 2008 NOCS, Stepan may have believed Scrubber S-102 to only control Group 2 sources. The 2008 NOCS included the same design sheet for Scrubber S-102 as had been included in the 2007 Precompliance Report (page 309 of the document).

56. Stepan's response to EPA's Section 114 Information Request also identified the operating parameter limit it believed applied to Scrubber S-102, laid out in Table 2 below. This parameter did not align with operating limits established in the 2008 NOCS, or the 2007 Precompliance Report.

57. On October 15, 2021, Stepan installed a new scrubber to replace the existing S-102.

58. Stepan conducted a performance test of Scrubber S-102 on January 20, 2022, as detailed in Table 4 below.

59. Stepan conducted another performance test of Scrubber S-102 on October 4-5, 2022, as detailed in Table 4 below.

60. The 2022 NOCS established that Scrubber S-102 controls emissions from a Group 1 transfer rack and six Group 1 storage tanks (2815th page of the document).

- a. It proposed an operating limit for L/G ratio which did not align with either the parameter measured during the performance test or the parameter recommended by the manufacturer to achieve 98% control. Stepan did not provide any supplemental engineering assessment to support the proposed L/G ratio operating parameter. Rather, the design sheet indicated that multiple other parameter limits were necessary in order to assure proper operation of the control device.

61. Prior to October 2020, Stepan was controlling the six Group 1 storage tanks and transfer rack with a scrubber which was only guaranteed to achieve 95% removal of HAP.

62. From January 1, 2019, through June 30, 2023, Scrubber S-102 operated with a water flow rate below the rate at which the manufacturer guaranteed 95-98% removal of methanol on 711 days.

	<i>Table 4: Scrubber S-102 Parameters</i>						
	2007 Precompliance Report		2020 Section 114 Information Request Response (Q12)	Jan 2022 Performance Test	Oct 2022 Performance Test	2022 NOCS	
	95% Guarantee from Design Sheet (pg 6)	Proposed operating parameters (pg 3)				Operating Parameter Limit (pg. 2816)	98% Guarantee from Design Sheet (pg 362)
Vapor Flow (scfm)	<100	<100		3.68	9.52		<100
Vapor temperature (°F)	110			27.30	73.0		110
Water flow rate (gpm)	11 ⁵			16.17	12.5		11 ⁶
Scrubbant temperature (°F)	<50						<60
Liquid-to-gas ratio		>0.11	>0.11	4.39	1.31	0.74 or as demonstrated by most recent MON test	

⁵ The design sheet stated that the minimum water flow rate to provide proper liquid distribution was 7.4 gpm, but that the scrubber was only guaranteed to achieve 95% removal of methanol with a water flow rate of 11 gpm.

⁶ The design sheet stated that the minimum water flow rate to provide proper liquid distribution was 7.4 gpm, but that the scrubber was only guaranteed to achieve 98% removal of methanol with a water flow rate of 11 gpm.

Sulfonator Waste Tank

63. On January 27, 2010, Stepan conducted a test of the emissions from the Sulfonator Waste Tank 305 vent. The test found over 2,000 ppm of SO₂ during the process line blowout.

64. On January 30, 2012, Stepan implemented a project to change the process line blowout to reduce the SO₂ emissions, however it has not conducted a subsequent emissions test.

Violations

Catalytic Incinerators

65. As described in Paragraph 30, Stepan failed to maintain the temperature differential across the catalytic incinerators, in violation of 40 C.F.R. §§ 63.152(c)(2)(ii) and 63.152(c)(2)(ii)(A)(1).

66. As described in Paragraph 31, Stepan failed to maintain the combustor inlet temperature above 344°C, in violation of the HON at 40 C.F.R. §§ 63.152(c)(2)(ii) and 63.152(c)(2)(ii)(A)(1).

67. As described in Paragraph 32, Stepan failed to report all dates during which the combustor inlet temperatures fell below 344°C, in violation of the HON at 40 C.F.R. § 63.152(c)(2).

Scrubbers

68. As described in Paragraphs 33, 38, 47, and 54, for Scrubbers S-803, S-105, S-928 and S-102, respectively, Stepan failed to provide rationale in the precompliance reports for the specific level or each operating limit or why the limit indicates proper operation of the control device, in violation of the MON at 40 C.F.R. § 63.2460(c)(3)(i).

69. As described in Paragraphs 34, 37, 39, 43, 48, 51, and 60, for Scrubbers S-803, S-105, S-928, and S-102, Stepan failed to set operating ranges which represents proper operation of the control device, or base the range on the parameter values measured during the performance test or the manufacturer's recommendations, in violation of the MON at 40 C.F.R. §§ 63.2460(c)(3), 63.996(c)(6), and 63.999(b)(3), including 63.999(b)(3)(ii)(A).

70. As described in Paragraph 45, 53, and 62, Stepan has operated Scrubbers S-105, S-928, and S-102 with a water flow rate outside the ranges at which those devices have achieved or are guaranteed to achieve 98% reduction of HAP, in violation of the MON at 40 C.F.R. § 63.2460(a) and Table 2 of Subpart FFFF.

71. As described in Paragraph 52, prior to 2022, Stepan failed to have a working vapor flow meter on Scrubber S-928, in violation of the MON at 40 C.F.R. § 63.2450(k)(5).

72. As described in Paragraph 55, Stepan failed to specify an operating range for Scrubber S-102 in the 2008 NOCS, in violation of the MON at 40 C.F.R. §§ 63.2520(d)(2)(iii) and 63.999(b)(3).

73. As described in Paragraph 61, prior to October 2020 Stepa failed to control the HAP emissions from six Group 1 storage tanks and transfer rack by 98%, in violation of 40 C.F.R. § 63.63.2460(a) and Table 2 of Subpart FFFF.

Sulfonator Waste Tank

74. As described in Paragraphs 63-64, Stepan failed to keep SO₂ emissions from the sulfonator waste tank under 2,000 ppm, in violation of 35 IAC 214.301 and Condition 4.2.2.c.i.A of the Title V Permit.

MICHAEL
HARRIS

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Michael D. Harris
Division Director
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