HEARING OFFICER'S REPORT

TO: The Honorable Shawn M. Garvin
Cabinet Secretary, Dept. of Natural Resources and Environmental Control

FROM: Theresa Newman, Regulatory Specialist, Office of the Secretary,
Dept. of Natural Resources and Environmental Control

RE: Proposed Regulation Amendments to 7 DE Admin. Code 1124:
Section 33- *Solvent Cleaning and Drying*

DATE: June 16, 2021

I. BACKGROUND AND PROCEDURAL HISTORY:

A virtual public hearing was held on Wednesday, December 2, 2020, at 6:00 p.m. via the State of Delaware Cisco WebEx Meeting Platform by the Department of Natural Resources and Environmental Control ("DNREC," "Department") to receive comment on the proposed amendments ("Amendments") to 7 DE Admin. Code 1124: Section 33.0- *Solvent Cleaning and Drying* ("Regulation'"). The Department is proposing the Amendments to update solvent cleaning control requirements based upon the 2012 Ozone Transport Commission ("OTC") Model Rule and to reduce emissions of Volatile Organic Compound ("VOC") from solvent cleaning operations, thus reducing the formation of ground-level ozone in Delaware. The Department will also submit the Amendments to U.S. Environmental Protection Agency ("EPA") as a State Implementation Plan revision.

The OTC is a multi-state organization, to which Delaware is a member of, authorized by the *1990 Clean Air Act*. The OTC's purpose is to develop and implement regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions. The EPA designated certain areas of Delaware as non-attainment of the federal standard for ground-level ozone. Ground-level ozone is formed through the reaction of VOC and other compounds in the air in the presence of sunlight. High levels of ground-level ozone can cause or worsen difficulty in breathing, asthma and other serious respiratory problems. The use of cleaning solvents containing high concentrations of VOCs results in higher levels of ground level ozone being created, whereas lower levels of VOC in cleaning solutions result in lower levels of ground-level ozone.

Solvent cleaning is the process of using solvents to remove contaminants from various plastic, metal or other surfaces. The most common type of solvent cleaning and drying in Delaware is batch cold cleaning. Batch cold cleaning machines include batch-loaded and immersion cold cleaning machines, remote reservoir cold cleaning machines (also known as sink-on-a-drum) and various types of spray booths, flush booths or wash stations. Solvent cleaning and drying can be conducted either in the liquid phase (cold cleaning) or the vapor phase.

Solvent cleaning and drying conducted in the liquid phase consists of soiled parts being scrubbed in a sink-like device or submerged in a batch cold cleaning machine for a prescribed period and then removed, drained and allowed to drip dry. Agitation, ultrasonics or solvent spray may be used to help the cleaning process.

Solvent cleaning and drying conducted in the vapor phase heats the solvent to a boiling point in a batch vapor cleaning machine and the vapors are contained in a zone above the boiling liquid. Parts are lowered into the vapor zone where the vapors condense on the cooler parts and drip back into the boiling liquid, carrying soils.

Liquid or vapor style solvent cleaning and drying also may be accomplished in a conveyorized in-line cleaning machine, typically used for mass production of solvent cleaning. It should be noted that the Department is currently unaware of any conveyorized in-line cleaning machines in Delaware, however the proposed Regulations include provisions for such machines with the understanding that these type of machines could exist.

In 2001, the Department adopted the current Regulation to reduce VOC emissions based upon the 2001 OTC Model Rule for Solvent Cleaning ("2001 Model Rule"). The 2001 Model Rule was developed by the OTC as part of a regional effort to attain and maintain the one-hour ozone standard, address emission reduction shortfalls that were identified by EPA in specific state's plans to attain the one-hour ozone standard, and

reduce eight-hour ozone levels. The 2001 Model Rule has a low vapor pressure VOC limit of less than 1.0 millimeters of mercury ("mm Hg") vapor pressure for solvent in cold cleaning machines, to control the level of VOC emissions while still allowing for the use of 100% VOC solvent in cold cleaning machines. The current Regulation applies to any person who owns or operates a solvent cleaning machine that contains more than one liter of solvent and uses any solvent containing volatile organic compounds in a total concentration greater than 5% by weight, as a cleaning or drying agent. Likewise, the current Regulation exempts users of cold cleaning machines containing one liter or less of solvent and with a VOC concentration of 5% by weight or less.

In 2006 the EPA issued the *Control Techniques Guideline* (CTG)*: Industrial Cleaning Solvents* proposing new VOC limits for solvent cleaning. When the CTG was published, the OTC convened a group of experts that suggested a more stringent model rule than what is provided in the CTG and the 2001 Model Rule. Using the California's South Coast Air Quality Management District (SCAQMD) Rule 1122 and Santa Barbara County Air Pollution Control District Rule 321, the OTC developed the 2012 Solvent Degreasing Model Rule. Per EPA's *Clean Air Act*, 42 U.S. Code 7511c(b)(1)(B), entities in non-attainment areas, are required to adopt ground-level ozone CTGs or make similar VOC reductions.

Subsequent to the approval of the OTC 2012 Solvent Degreasing Model Rule, the Department began development of draft amendments based upon the OTC 2012 Solvent Degreasing Model Rule, the 2006 CTG: *Industrial Solvent Cleaning*, and the SCAQMD Rule 1122. A draft of the proposed amended Regulations were developed and on January 28 and 30, 2020, the Department held two public workshops. The public workshops provided the public with outreach and education opportunities on the draft amended Regulation and allowed the public to provide comments for consideration to the draft language. During said meetings, a total of 39 public members attended the two workshops. Based on the comments received, the Department revised the draft Amendments to clarify the wording of the proposed language.

The Department proposes to amend the Regulations to update solvent cleaning control requirements to further reduce emissions of VOC by: (1) eliminating the exemptions for cold cleaning machines containing one liter or less of solvent and with a VOC concentration of 5% by weight or less; (2) allowing cold cleaning machines to be heated to below boiling; (3) reducing the solvent VOC concentration from 800 grams per liter to 25 grams per liter for most applications; and (4) allowing higher VOC concentrations to be used in conjunction with a VOC capture and control device. It should be noted that in addition to the aforementioned proposed amended Regulations, the Department proposes amendments that provide non-substantive administrative wording edits and corrections.

Using the 2017 National Emissions Inventory data, specifically for Delaware, the Department estimates that by adopting the proposed amended Regulations, VOC emissions will be reduced by 27.42 percent, which will result in a reduction of 40.87 tons per year or 0.11 tons per day. The reduction of VOC emissions from solvent cleaning operations will further reduce the formation of ground-ozone in Delaware. It should be noted that existing users/sources have 1 year from the effective date to comply and new users/sources will be required to comply upon start up, contingent upon approval of the Amendments.

The Department has the statutory basis and legal authority to act with regard to proposed regulatory promulgation, pursuant to 7 *Del.C.* §§6010(a) and (c). The Department published its initial proposed regulation Amendments in the November 1, 2020 *Delaware Register of Regulations*. Thereafter, a virtual public hearing was held on December 2, 2020. There were six (6) members of the public in attendance, with two (2) public comment provided during the virtual hearing. Pursuant to Delaware law, the hearing record ("Record") remained open for fifteen (15) days subsequent to the public hearing for receipt of public comment. The Record formally closed with regard to public comment on December 17, 2020 with one (1) written comment received by the Department in this matter.

Subsequently, the Department's Division of Air Quality expert staff provided a Technical Response Memorandum ("TRM") in response to the comments received by the Department. The comments received by the Department, along with the Department's response to the same, will be addressed in greater detail below. In addition, it should be noted that as a part of the comment received, the Department has made changes to the Amendments. These changes will also be addressed in greater detail below and have been deemed as non-substative changes.

As set forth above, all proper notification and noticing requirements concerning this matter were met by the Department. Proper notice of the hearing was provided as required by law.

II. SUMMARY OF THE PUBLIC HEARING RECORD:

The Record consists of the following documents: (1) a verbatim transcript of the virtual public hearing held on December 2, 2020; (2) fifty-one (51) documents introduced by the responsible Department staff at the time of the aforementioned public and marked by this Hearing Officer accordingly as "Department Exhibits "1-51"; and (3) the TRM prepared by the Department's Division of Air Quality expert staff. The Department's staff primarily responsible for the drafting and overall promulgation of the proposed Amendments, Renae Held, Program Manager II with the Division of Air Quality, developed the Record with the relevant documents in the Department's files.

As noted above, at the request of this Hearing Officer, a TRM was provided by the Department's expert staff in the Division of Air Quality. The Department received two (2) verbal comments and one (1) written comment from the public concerning the proposed Amendments. Multiple questions and concerns were addressed within each comment. The Department's experts identified the concerns and responded to the same in a balanced manner, and have subsequently proposed non-substative revisions to the Amendments based on two concerns addressed by the public.

The Deparment proposes to revise the Amendments as shown below in bold/bracket text, to indicate the following non-substative changes:

- Annual testing of the temperature control system is not required if the system is equipped with a secondary safety thermal cut off sensor, in addition to a primary thermostat. Therefore revising the following Section to include "33.8.9 The owner or operator of a heated cold cleaning machine described in subsection 33.3.3.9 shall perform a test of the temperature control system as provided by the manufacturer at least once per year and after any repairs to the temperature control system. **[If the heated cold solvent cleaning machine has a secondary safety thermal cut off sensor that has a heating setpoint that automatically shuts off the heat source if the primary thermostat malfunctions, this annual test is not required.]**"

- Given the current 1 year backlog for testing of Method 313, the Department proposes to revise the following section as "33.11.1 The VOC content of materials subject to the provisions of Section 33.0 shall be determined by the EPA Reference Method 24 (Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings, Code of Federal Regulations Title 40, Part 60, Appendix A-7), dated May 1, 2019 and hereby incorporated by reference **[~~, or ~~;]** by SCAQMD Method 304 [Determination of Volatile Organic Compounds (VOCs) in Various Materials] contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual, dated 1996 and hereby incorporated by reference **[~~.~~ ;or ~~The VOC content of materials containing 50 g/l of VOC or less shall be determined~~]** by SCAQMD Method 313 (Determination of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry), dated 1991 and hereby incorporated by reference or any other alternative test methods approved by the Department and by EPA."

It should be noted that none of the revisions as proposed in the Department's TRM are substantive in nature, nor do they constitute any new requirements of the regulated community that were not previously vetted at the time of the public hearing. Thus, no additional noticing or hearings are necessary to be held by the Department in this matter.

I find that the Department's TRM offers a detailed review of the *revised* proposed Amendment, identifies the concerns voiced in the public comments received in this matter, and responds to the same in a balanced manner, accurately reflecting the information contained in the Record. Accordingly, the Department's *revised* proposed Amendments and the Department's TRM are attached hereto as Appendix "A" and "B," respectively, and are expressly incorporated herein by reference.

III. RECOMMENDED FINDINGS AND CONCLUSIONS:

Based on the Record developed, I find and conclude that the Department has provided appropriate reasoning regarding the need for the *revised* proposed amendments to 7 DE Admin. Code 1124, Section 33.0. I further find that the *revised* proposed Amendments will enable the Department to update solvent cleaning control requirements based upon a 2012 Ozone Transport Commission Model Rule and reduce emissions of VOC from solvent cleaning operations, thus reducing the formation of ground-level ozone. Accordingly, I recommend promulgation of the same, in the customary manner provided by law.

Further, I recommend the Secretary adopt the following findings and conclusions:

1. The Department has the statutory basis and legal authority to act with regard to this proposed regulatory promulgation, pursuant to 7 *Del. C.* 6010(a) and (c);

2. The Department has jurisdiction under its statutory authority, pursuant to 7 *Del.C.* Chapter 60, to issue an Order adopting these *revised* proposed Amendments as final;

3. The Department provided adequate public notice of the initial proposed Amendments, and all proceedings in a manner required by the law and regulations, and provided the public with an adequate opportunity to comment on the same, including at the time of the public hearing held on December 2, 2020, and during the 15 days subsequent to the hearing (through December 17, 2020), before making any final decision;

4. Promulgation of the *revised* proposed amendments to 7 DE Admin. Code 1124, Section 33.0, as set forth herein, will enable the Department to update solvent cleaning control requirements based upon a 2012 Ozone Transport Commission Model Rule and reduce emissions of VOC from solvent cleaning operations, thus reducing the formation of ground-level ozone;

5. The Department has reviewed the *revised* proposed Amendments in light of the *Regulatory Flexibility Act*, consistent with 29 *Del.C.* §104, and believes the same to be lawful, feasible and desirable, and the recommendations as proposed should be applicable to all Delaware citizens equally;

6. The Department's proposed regulatory Amendments, as initially published in the November 1, 2020 *Delaware Register of Regulations*, and then subsequently *revised*, as set forth in Appendix "A" hereto, are adequately supported, are not arbitrary or capricious, and are consistent with the applicable laws and regulation. Consequently, they should be approved as final regulatory Amendments, which shall go into effect ten days after

their publication in the next available issue of the *Delaware Register of Regulations*; and

7. The Department shall submit the *revised* proposed Amendments as final regulatory amendments to the *Delaware Register of Regulations* for publication in its next available issue, and provide such other notice as the law and regulation require and the Department determines is appropriate.

Theresa L. Newman
Public Hearing Officer

\ahear\ Reg.Amend.1124: Section 33- Solvent Cleaning and Drying. 2021

Attachments/Appendix:
Appendix A: Proposed *Revised* Reg. Amendments
Appendix B: Technical Response Memorandum

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DIVISION OF AIR QUALITY

Statutory Authority: 7 Delaware Code, Section 6010(a) and (c) (7 **Del.C.** §6010(a) & (c))
7 **DE Admin. Code** 1124

FINAL

REGISTER NOTICE
SAN # 2019-05

1124 Control of Volatile Organic Compound Emissions
(Break in Continuity of Sections)

33.0 Solvent Cleaning and ~~Drying.~~ Drying

~~11/11/2001~~ xx/xx/xxxx

33.1 Applicability

(Break in Continuity Within Section)

33.8 Monitoring. The owner or operator of a solvent cleaning machine subject to the provisions of ~~33.4~~ subsections 33.3 through 33.7 ~~of this regulation~~ shall conduct monitoring as follows.

(Break in Continuity Within Section)

33.8.9 The owner or operator of a heated cold cleaning machine described in subsection 33.3.3.9 shall perform a test of the temperature control system as provided by the manufacturer at least once per year and after any repairs to the temperature control system. **[If the heated cold solvent cleaning machine has a secondary safety thermal cut off sensor that has a heating setpoint that automatically shuts off the heat source if the primary thermostat malfunctions, this annual test is not required.]**

(Break in Continuity of Sections)

33.11 Test Methods

33.11.1 The VOC content of materials subject to the provisions of Section 33.0 shall be determined by the EPA Reference Method 24 (Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings, Code of Federal Regulations Title 40, Part 60, Appendix A-7), dated May 1, 2019 and hereby incorporated by reference **[~~, or~~ ;]** by SCAQMD Method 304 [Determination of Volatile Organic Compounds (VOCs) in Various Materials] contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual, dated 1996 and hereby incorporated by reference **[~~.~~ ; or ~~The VOC content of materials containing 50 g/l of VOC or less shall be determined~~]** by SCAQMD Method 313 (Determination of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry), dated 1991 and hereby incorporated by reference or any other alternative test methods approved by the Department and by EPA.

(Break in Continuity of Section)

TECHNICAL RESPONSE MEMORANDUM

To: Theresa Newman, Hearing Officer

Through: Valerie Gray *vag* 4/27/2021

From: Renae Held *rjh* 4/27/2021

Re: Department's responses to comments received on the proposed amendments to 7 **DE Admin. Code** 1124 – *Control of Volatile Organic Compound Emissions,* Section 33.0

You presided over a virtual public hearing on Wednesday, December 2, 2020 beginning at 6:00 PM. The subject of the public hearing was the proposed amendments to 7 **DE Admin. Code** 1124 Section 33.0 "Solvent Cleaning and Drying" and a related Delaware State Implementation Plan (SIP) revision.

At the hearing, the Department received comments from the following:

Name	Affiliation	Position
Billy Ross	Safety-Kleen Systems	Senior Vice President
Tom Webster	DuPont de Nemours, Inc.	Senior Consultant

Both commenters gave verbal testimony at the hearing, which is included in the verbatim transcript[1]. In addition, Maggie Tennent, Safety-Kleen, Vice President of Environmental, Health and Safety, submitted written comments after the hearing via the Department's Public Hearing Comment Form[2]. The Department thanks commenters for their comments on this amended proposed regulation.

This memorandum provides a summary of the comments received and the responses of the Division of Air Quality (Department) on behalf of the Department.

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[1] Hearing Transcript, "Proposed Amendments to 7 DE Admin. Code 1124, Section 33.0 "Solvent Cleaning and Drying" and Revision to Delaware State Implementation Plan, Wilcox & Fetzer, www.wilfet.com, available at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/ Comments by the Safety-Kleen Systems representative (a total of two) can be found on pages 24 through 28. Comments by the DuPont de Nemours, Inc. representative (a total of five) can be found on pages 28 through 30.

[2] Maggie Tenant, Safety-Kleen, dated 12/15/20, available at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/ Comments by this Safety-Kleen Systems representative (a total of 14) can be found in this document.

Comment 1

A comment provided by Safety-Kleen Systems stated: "The heaters used in aqueous parts washers are typically engineered to negate the need for testing the temperature control system. For example, aqueous parts washer heaters will include a primary thermostat and secondary safety thermal cut off sensor. If the primary thermostat fails, the secondary safety thermal cut off senses a temperature above its fixed set point and kills power to the heater. The secondary safety thermal cut off helps ensure the cleaning solution isn't heated to an unsafe (e.g., scalding temperatures) or non-compliant (temperatures that exceed the boiling point of the cleaning solution) temperature. For this reason, most aqueous parts washer manufacturers will not have any recommended test procedures for temperature control systems. Aqueous parts washer operators would not be able to comply with this requirement if such recommendations from the manufacturer are not available. The annual temperature system performance test is an additional regulatory burden to the user and is not necessary with the typical design of an aqueous parts washing unit."

Department Response

The Department will revise subsection 33.8.9 in the amended final regulation, as shown below in bold/bracket text, to indicate that annual testing of the temperature control system is not required if the system is equipped with a secondary safety thermal cut off sensor, in addition to a primary thermostat:

"33.8.9 The owner or operator of a heated cold cleaning machine described in subsection 33.3.3.9 shall perform a test of the temperature control system as provided by the manufacturer at least once per year and after any repairs to the temperature control system. **[If the heated cold solvent cleaning machine has a secondary safety thermal cut off sensor that has a heating setpoint that automatically shuts off the heat source if the primary thermostat malfunctions, this annual test is not required.]**"

Comment 2

The comments provided by Safety-Kleen Systems and by DuPont de Nemours, Inc. indicated the only laboratory currently equipped to perform test Method 313 described in the amended proposed regulation (subsection 33.11.1) is the laboratory at the California (CA) South Coast Air Quality Management District (SCAQMD). The commenters stated that there is a current testing backlog of approximately one year for Method 313, which could delay the use of a particular 25 gram/liter cleaning solution.

Department Response

The Department believes Method 24 and SCAQMD Method 304 provide adequate testing results to meet the needs for a 25 gram /liter cleaning solution. Therefore, given the current

backlog regarding Method 313, the Department will revise subsection 33.11.1. The revision, shown below in bold/bracket text, given the current backlog regarding Method 313 "33.11.1 The VOC content of materials subject to the provisions of Section 33.0 shall be determined by the EPA Reference Method 24 (Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings, Code of Federal Regulations Title 40, Part 60, Appendix A-7), dated May 1, 2019 and hereby incorporated by reference **[~~, or ~~;]** by SCAQMD Method 304 [Determination of Volatile Organic Compounds (VOCs) in Various Materials] contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual, dated 1996 and hereby incorporated by reference **[;or ~~The VOC content of materials containing 50 g/l of VOC or less shall be determined~~]** by SCAQMD Method 313 (Determination of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry), dated 1991 and hereby incorporated by reference or any other alternative test methods approved by the Department and by EPA."

Comment 3

A comment provided by DuPont de Nemours, Inc. asked why the expected emissions reductions calculations changed from the public Workshop to the hearing, for the proposed adoption of a 25 grams/liter VOC limit. In addition, commenter asked for more detail about the Department's current calculation of an expected emissions reduction of VOC of 110 tons per year, from the proposed adoption of a 25 grams/liter VOC limit.

Department Response

The VOC emissions reduction presented at the public Workshops in early January 2020, was based upon a method from the March 16, 2001 "Ozone Transport Commission (OTC) Model Regulations for Nitrogen Oxides (NOx) and Photo-reactive Volatile Organic Compounds (VOCs), Technical Support Document", revised August 25, 2016; Public Hearing Exhibit 5, page 29, under Emissions Reduction Benefit. The OTC developed a standard VOC emissions reduction method that could be used by all OTC states. The method uses per capita extrapolations to determine the estimated VOC reductions. The OTC Technical Support document (page 30) provided an estimated reduction for the Ozone Transport Region (OTR) of 81 tons per day in 2014. Using this information, and estimated population figures of 960,000 for Delaware in 2020 and 66 million in the OTR, Delaware calculated a potential VOC reduction of approximately 1.2 tons/day for Delaware in 2020.

At the public Workshop, AQ staff received comments from attendees that they believed the emissions reduction calculation was high, based on their knowledge of solvent cleaning operations in Delaware. Subsequently, in order to create a more Delaware specific calculation, AQ staff used National Emissions Inventory (NEI) data specifically for Delaware, to calculate potential emissions reductions.

The NEI includes reliable data for the emission of VOC from various types of solvent cleaning activities, based upon the number of people described in Bureau of Labor Statistics data which has the number of people actually involved in performing various tasks. In addition, the use of federal data for the quantity of solvents shipped to Delaware for specific uses, the use of Bureau of Labor Statistics for the number of workers actually involved in the tasks, coupled with the North American Industry Classification System (NAICS) data provides an improved way to determine the quantity of emissions.

AQ staff used the most recent NEI data from 2017 to estimate the emissions reductions that would be expected from the adoption of a 25 gram/liter VOC limit. Total 2017 NEI solvent cleaning emissions for Delaware were 149.05 tons per year. AQ staff estimated that applying the new 25 gram/liter VOC limit to 2017 emissions would reduce emissions by 27.42 percent, as compared to the current VOC limits in 7 **DE Admin. Code** 1124, Section 33.0. This would result in a reduction of 40.87 tons/year or 0.11 tons/day. Therefore, application of the new VOC limit is estimated to reduce emissions from 149.05 tons/year to 108.18 tons/year. The Delaware specific 0.11 tons/day expected reduction, from applying the 25 gram/liter limit, is much lower than the population based OTC calculation of 1.2 tons/day.

The 110 tons per year figure quoted at the December 2, 2020 public hearing was the expected "total" amount of emissions, after implementation of the proposed regulation. It was mistakenly quoted as the expected "reduction" in emissions from implementation of the proposed regulation. As stated above, the expected emission "reduction" is 40.87 tons/year or 0.11 tons per day.

Comment 4

A comment provided by DuPont de Nemours, Inc. asked if the Department had considered all the cost factors involved in the switch from the current cold solvent cleaning system to the 25 grams VOC per liter cleaning solution required by the amended proposed regulation, including solvent use and disposal costs.

Department Response

The Department completed a Regulatory Flexibility Analysis (RFA) as part of the regulatory development process (Public Record Exhibit 44). The Attachment for the RFA, which may be found after page 9 of Exhibit 44, included a detailed Cost Analysis for small businesses, regarding the implementation of the amended regulation:

RFA ATTACHEMENT

"Although some users of liquid phase solvent cleaning machines are large companies, such as major automobile dealers, the refinery and Dover Air Force Base, many are small service and manufacturing companies.

Existing facilities may need to purchase new equipment more compatible with aqueous, low-VOC cleaning solutions. Facilities may be able to offset equipment costs by selling their old, incompatible equipment. Also, part of these additional costs can be counteracted by using new lower VOC solutions, which can be less expensive to obtain and dispose.

New facilities, that were previously exempted under the current regulation, will be required to keep and report a small amount of additional information. Most small businesses may not require a permit under 7 **DE Admin. Code** 1102, as potential VOC emissions might be below the permitting threshold; but the facilities will still need to meet the requirements of the proposed regulation. A more detailed analysis of potential costs is shown below.

COST ANALYSES

This amendment is based upon an Ozone Transport Commission (OTC) model rule (2012). The OTC develops model rules that member states can use as a template for the implementation of regulatory changes designed to reduce ground-level ozone. The OTC model rule was based on two documents:

- EPA Control Techniques Guidelines (CTG) for Industrial Cleaning Solvents (EPA 453/R-06-001; September, 2006)
- South Coast Air Quality Management District (SCAQMD) rule for Solvent Degreasing (Rule 1122; October, 2004).

EPA's 2006 CTG recommended using cleaning solutions containing 50 grams per liter (g/l) of cleaning solution. As an OTC state, Delaware is obligated by 42 U.S. Code 7511c (b)(1)(B) to adopt CTGs or an equivalent.

Annualized Cost Savings - Switching From 100% VOC to 50 g/l - CTG

The 2006 CTG presents annualized 2006 costs for operating with 100% VOC cleaners vs. 50 g/l cleaners. In relation to costs, the CTG found that "...there is a cost saving associated with replacing high-VOC cleaning materials with low-VOC, water-based cleaning materials...".

Costs associated with switching from High-VOC cleaners to aqueous, or Low-VOC cleaners include: the initial cost of equipment amortized over a 10-year life, solvent costs, filters, electricity, and waste disposal costs. Many of these costs are also incurred when operating High-VOC solvent cleaners. While it can cost more to dispose of Low-VOC cleaners, this can be offset by the lower cost of some Low-VOC solutions. Users that switch from 100% VOC to 50 g/l may be required to replace cold cleaning machines to

accommodate the use of aqueous based solutions, as these solutions will corrode oil-based cold cleaning machines. A study on parts cleaners has shown typical 2006 annualized costs for 100% VOC parts cleaners as $1,453[3]. Estimates of annualized costs for Low-VOC parts cleaners, in comparison, range from $1,171 to $1,480, as shown in the table below.

Since the proposed compliance year will be 2022, the 2006 annualized cost savings data must be adjusted for inflation in 2022. The increase in inflation from 2006 to 2022 can be determined by adjusting the 2006 CTG information above by the Consumer Price Index (CPI) between 2006 and 2020, and then adding an inflationary increase of 2 percent per year from 2020 until the 2022 compliance date. Estimated annualized costs for High-VOC cleaners increase to $1,976 per year. Estimated annualized Low-VOC cleaners increase to a range of $1,595-$2,013. Estimated annualized cost savings for switching from a high-VOC cleaner to a low-VOC cleaner are shown for 2006 and 2022 in the table below:

ANNUALIZED COSTS for COLD SOLVENT CLEANERS				
Year	High-VOC Cleaner	Low-VOC Cleaner	Annualized Cost Savings High-VOC vs Low-VOC Cleaners	
			Lower Estimate	Upper Estimate
2006	$1,453	$1,171-$1,480	$282	-$27
2022	$1,976	$1,595-$2,013	$383	-$37

Annualized Cost Savings - Using 25 Grams VOC/Liter Instead of 50 g/l

The proposed Delaware regulation is more stringent than the CTG and requires the use of 25 grams VOC per liter of cleaning solution. There are minimal cost differences between the use of 50 g/l (as analyzed above) and 25 g/l solutions.

The primary cost in switching from a 100% cleaner to a 50 g/l cleaner is the cost of a new cold cleaning machine to accommodate the use of more corrosive aqueous based solutions. Both 50 g/l and 25 g/l solutions contain water; therefore, this change would not require users to purchase a different cleaning machine.

It is possible that 50g/l solutions could be diluted to meet the 25g/l limit and still adequately meet the users cleaning requirements. Therefore, the switch from 50 g/l to 25 g/l solution would not cause a substantial increase in operational costs. In fact, the overall cost of

[3] Bay Area Air Quality Management District, Staff Report: Proposed Amendments to BAAQMD Regulation 8, Rule 16: Solvent Cleaning Operations, September 2002, available at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/

purchasing, using and disposing of a 25 g/l VOC containing cleaning solution could be slightly lower, since less VOC would be used.

There are many lower VOC cleaners commercially available. SCAQMD has a website devoted to listing manufacturers of certified low-VOC cleaning solutions, which currently contains 97 products from 38 manufacturers (SCAQMD Rule 1122 requires the use of 25 g/l solution)."[4]

Comment 5

A comment provided by DuPont de Nemours, Inc. requested the removal of the word "signed" in Section 33.10.3, which says; "…obtain from any person from whom they purchase or obtain any solvent containing VOC for use in a cold cleaning machine, a signed document specifying the following accurate information specific to all purchased or obtained product." The commenter stated that it's difficult for users to get a signature. Therefore, it should not be a requirement in the regulation.

Department Response

The Department agrees with this comment. As a result, the Department proposed to strike the requirement to have a signature in subsection 33.10.3, as shown below, and published the change in the November 1, 2020 Register of Regulations. Therefore, this comment has already been addressed.

Original language from public workshop

"33.10.3 Obtain from any person from whom they purchase or obtain any solvent containing VOC for use in a cold cleaning machine, a signed document specifying the following accurate information specific to all purchased or obtained product:…"

Language published in the November 1, 2020 Register of Regulations

"33.10.3 Beginning on [insert date twelve months after effective date], obtain from any person from whom they purchase or obtain any solvent containing VOC for use in a cold cleaning machine, a document specifying the following accurate information specific to all purchased or obtained product:…"

Comment 6

A comment provided by DuPont de Nemours, Inc. asked that; "… under 33.3, standards to batch cold cleaning, the businesses in Delaware would greatly appreciate having an example work practice suitable for posting, describing 33.33[sic] and suggest a placard stating the requirements, as well."

[4] As of this submittal, the SCAQMD website contains 98 products from 38 manufacturers.

Department Response

The Department will provide for posting an example "Workplace Practices" document on their website (after the regulation becomes effective.

Comment 7

A comment provided by Safety-Kleen Systems asked that the definition of "owner" should be removed or revised. The commentor asked that; "…requirements within 33.0 of the proposed rule refer to 'the owner or operator'. A large portion of the parts washer industry involves leasing parts washers to users. There are several requirements in the rules that cannot be applicable to the owner of a leased parts washer while it is under the control of a leaser and must be only applicable to the operator of the unit. For example, an owner of a parts washer is not able to complete monthly inspections of the cover of the unit as required by 33.8.3 when the unit is located at the location of the operator. In an effort to prevent ambiguity and reduce confusion, the references to 'owner' should be removed or revised to clearly list the responsibilities of the operator or owner of the operating entity."

Department Response

The definition of owner or operator in 7 **DE Admin. Code** 1124 Section 2.0 "Definitions" is: "means any person who owns, leases, controls, operates or supervises a facility, a source, or air pollution control or monitoring equipment". The term "owner or operator" has been in 7 **DE Admin. Code** 1124 since at least 2001 and has not caused confusion with leased facilities in the past. Therefore, the Department does not recommend any changes to the proposed language.

Comment 8

A comment provided by Safety-Kleen Systems stated; "…Section 33.3.3 applies to "Batch cold cleaning machines". The definition for a "Batch cold cleaning machine" in section 33.2 includes remote reservoir cold cleaning machines, like a sink-on-a-drum style parts washer. Section 33.3.3.3 states that flushing of parts using a flexible hose shall only be performed within the freeboard area of the cold cleaning machine. Remote reservoir style parts washers (e.g., sink-on-a-drum), are designed so that rinsing with a flexible hose is performed within the sink area. The freeboard area (air vapor and solvent interface) on a sink-on-a-drum parts washer is the opening of the sink drain which is approximately 4.5 inches in diameter. This section needs to be expanded to specify that the flushing of parts is to be done within the sink area of remote reservoir units and not the freeboard area as it is not possible to flush parts within the 4.5 inch drain opening. As an

alternative, a definition for freeboard area could be added as it applies for a sink-on-a-drum style parts washer."

Department Response

The Department sees no need for a definition of the freeboard area. We believe the "freeboard area" is dependent upon the size and type of parts to be cleaned; size of the container or cleaning machine used; and, mode of cleaning. The freeboard height is required to calculate the freeboard ratio, which is not needed for a sink-on-a-drum.

The Department does not agree that for a sink-on-a-drum parts washer, the definition requires that parts washing be conducted inside the 4.5 inch diameter of the drain opening. The definition of freeboard height states, in part "…the distance from the liquid solvent level to the lip of the solvent cleaning machine…." In the case of a sink-on-a-drum cleaning machine that is the distance from the liquid in the drain (either variable or none if the drain is empty and the drum level has not risen to enter the drain of the sink) to the lip of the sink portion of the sink-on-a-drum (the top edge of the sink itself).

The sink sides must be high enough to contain the liquid splashing when pumping from the drum to the sink area. That is why the regulation restricts the flushing stream to a solid stream, not a spray, and to a pressure of no more than 10 pounds per square inch gauge (subsection 33.3.3.3).

Comment 9

A comment provided by Safety-Kleen Systems stated that with the current language in 33.3.4 which says; "For up to twelve months after [insert effective date], no person shall use, sell, or offer for sale for use in a cold cleaning machine any solvent with a vapor pressure of 1.0 millimeters of mercury (mm Hg) or greater, measured at 20°C (68°F) that contains volatile organic compounds". This means, they say that "… a compliant aqueous cleaning solvent would be banned since the vapor pressure of water at 20°C is approximately 17.5 mm Hg. We suggest new language which would not restrict compliant aqueous cleaners. For example: *"*For up to twelve months after [insert effective date]*, no person shall use, sell, or offer for sale for use in a cold cleaning machine any solvent where the composite* ***vapor pressure of regulated VOCs*** *is 1.0 millimeters of mercury (mm Hg) or greater, measure at 20°C (68°F)."* If this language is not corrected it will result in confusion in the regulated community and with field inspectors and may prevent operators from using compliant aqueous cleaners."

Department Response

This comment also was made after the public Workshops by the same commenter. The Department evaluated the comment at that time and determined that no changes to the proposed language were necessary.

This regulation was constructed on the basis that almost all, if not all, cold solvent cleaning machine users would find it necessary to make a number of changes to their operations for which the Department has provided a 12-month compliance period after the effective date (the effective date is usually 10 days after the final regulation is published in the Delaware Register of Regulations). Those operations are allowed to operate for that 12-month period under the current regulation which requires using the current regulation restriction for VOC to be less than 1.0 mm mercury vapor pressure. Users can use aqueous solutions and solvent containing 25 grams/liter VOC or less (subsection 33.3.7) at any time.

Comment 10

A comment provided by Safety-Kleen Systems requested that: "…the Department consider the tremendous undertaking it will be to transition all solvent based parts washers within the state when setting an implementation date. A three-year implementation period is suggested for a change of this magnitude. Some of the factors to consider include the following:

1) Petroleum based (higher VOC) solvent parts washers are not compatible with the aqueous solutions. Due to the mild steel components, pump incompatibilities, and need for a heater, these units must be replaced with parts washers specifically designed for aqueous solutions. Distributers likely do not have the inventory readily available to swap all the petroleum solvent based units within the state and will have to manufacture additional units. Sourcing of parts and increasing production at manufacturing facilities will easily take over one year to produce the needed inventory. The available inventory issues are amplified by the COVID-19 pandemic, and the recent implementation of a similar solvent VOC reduction regulation in New York which further reduces any availability of aqueous parts washers.

2) Adding to the challenges for a service provider and user are the legal contracts with government, municipalities, and large corporations which will require renegotiation to change any agreed upon products or pricing….

Finally, all businesses and industry sectors have been impacted by the COVID-19 pandemic. As a result, businesses are running at reduced capacity with reduced staffing and have been forced to cut labor and costs in order to maintain operations. Regardless of the size of a business, the cost to install new equipment and the increased operation and disposal costs will need to be planned and budgeted for within the regulated community and may not be feasible for some businesses at this time. Industry desperately needs some time to recover from the impacts of COVID-19."

Department Response

A similar comment also was made after the public Workshops by the same commenter. The Department evaluated the comment at that time and determined that no changes to the proposed language were necessary. The Department's position remains the same, as stated below:

1) Replacement of Cold Solvent Cleaning Machines

The Department agrees that cold cleaning machines may need to be replaced but, believes a 12-month compliance period is adequate time to complete the replacement process, if needed. Around the year 2000, industry was required to supply over 13,000 cold cleaning machines to CA SCAQMD users in one year, with no apparent problems[5]. Therefore, the Department believes that the construction or purchase of new units for a smaller state, such as Delaware, in 12 months is achievable. We believe it can be done in the time allotted as there are many manufacturers of cold solvent cleaning equipment.

In addition, users also have the option of using an exempt VOC[6] instead of water as the solute. In this situation, the user would not need to change out the current cold solvent cleaning machine (since water is not being used) and would be exempt from 25 gram/liter provisions of Section 33.0.

In addition, a delay in compliance date would reduce the amount of VOC emissions realized by approximately 41 tons per year. Therefore, a two-year delay could potentially result in the emission of 82 more tons VOCs.

2) Large Contracts Negotiation

The Department believes that the currently proposed 12-month compliance period is sufficient time to complete contract negotiations. The Department is unaware of cold solvent cleaning machines being used by large corporations in Delaware. The majority of cold solvent cleaning machines are used by small businesses such as automobile repair shops.

[5] Bay Area Air Quality Management District, Staff Report: Proposed Amendments to BAAQMD Regulation 8, Rule 16: Solvent Cleaning Operations, September 2002, page 4, available at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/

[6] An exempt VOC is one that has been determined by the EPA to have a negligible photochemical activity in the formation of ground-level ozone and may be excluded from consideration as a VOC. Such compounds may be found in 7 **DE Admin. Code** 1101 "Definitions and Administrative Principles", Section 2.0 Definitions, under the definition for Volatile Organic Compounds, available as Exhibit 18 in the Public Record at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/

3) COVID-19

The Department believes that not all Delaware users will need to purchase new cold solvent cleaning machines as a result of the regulation amendments, since users also have the option of using an exempt VOC instead of water as the solute. Therefore, the Department believes that the 12-month compliance period should be sufficient time to acquire new machines, as there are many manufacturers of cold solvent cleaning equipment.

Comment 11 A comment provided by Safety-Kleen Systems stated; "The Ozone Transport Commission (OTC) Model Rule for Solvent Degreasing (rev 2012) Section 7.0 and California South Coast Air Quality Management District (SCAQMD) Rules 1122 (k), 1124(l), and 1171 (c) include multiple additional exemptions (e.g., cleaning of medical devices, high precision optics, aerospace, military, etc.). The South Coast rules have been effective at implementing the VOC solvent reduction in industry while accommodating the special needs of specific industry sectors without debilitating businesses and the economy. We suggest Delaware include the same exemptions to help ensure consistency across all states with similar regulations and to avoid limiting or preventing these industries from operating within the state of Delaware."

Department Response

This comment also was made after the public Workshops by the same commenter. The Department evaluated the comment at that time and determined that no changes to the proposed language were necessary.

Subsection 33.3.7.3 of the proposed regulation, as stated below, allows for control devices to be used in processes where a solvent with more than 25 gram/liter VOC may be needed. Therefore, the Department does not believe that exemptions are necessary.

"33.3.7.3 A cold cleaning machine may use greater than the VOC content for cold cleaning machines as specified above (25 g/l or 150 g/l) by using any of the VOC capture and control devices that control VOC air emissions to no more than would be experienced if the cleaning solution were VOC compliant in absence of the capture and control device…."

Comment 12

A comment provided by Safety-Kleen Systems stated; "Small businesses that view the costs as too onerous may discontinue service. When customers discontinue a service, they continue to operate and may not dispose of generated waste properly. In this situation, the increased cost burdens result in environmental health and safety consequences that should be considered in this rule proposal."

Department Response

The Department believes that this regulation does not appreciably increase costs to small businesses, as stated in the response to Comment 4. Therefore, the Department believes

that businesses will be unlikely to discontinue the use of a solvent service provider because of the proposed regulation amendments.

Comment 13

A comment provided by Safety-Kleen Systems stated; "While aqueous cleaners may have low VOC emissions, aqueous cleaners are sometimes perceived as not as effective in cleaning in certain situations by the user. Under these circumstances, operators may opt to use unregulated high VOC solvents. For example, some operations may rely on unsafe solvents, such as gasoline, diesel, methyl ethyl ketone, perchloroethylene, or acetone instead of using an aqueous cleaner where they perceive aqueous solutions as less effective. These chemical substitutes may pose greater worker exposure and fire/explosion hazards. Safety-Kleen clean parts washers are not rated for acetone use and would not meet NFPA or UL requirements and will result in a fire hazard.

Additionally, our experience has shown that there is an increase in the use of solvent spray cans after a parts cleaner user switches to aqueous cleaners. Aerosols disperse directly into the air when used and, in addition to VOCs, may contain ozone depleting compounds, and hazardous air pollutants."

Department Response

The Department opted to break this comment into three sub-parts: (1) negative perception of aqueous cleaning solutions, (2) substituting use of non-regulated VOCs, and (3) using hand-held or spray cans for parts cleaning.

(1) Negative perception of aqueous cleaning solutions

The Department believes the perception that aqueous cold solvent cleaning solutions are not as effective in cleaning in certain situations has changed over time; as manufacturers have developed more low and non-VOC cold solvent cleaning solutions, which have been shown to be as effective as high VOC cold solvent cleaning solutions.

California and the EPA have helped the transition to lower VOC solvents by contracting with outside groups to research ways in which to accomplish cleaning of routine and special parts using water-based systems. The benefits to businesses of using water-based solvents can include: lower cost; worker safety; benefit to the environment; and extended solvent life[7]. More information about major low VOC solvent studies is shown below:

[7] "Case Studies in Aqueous Parts Cleaning, Best Environmental Practices for Auto Repair Shops", November 2001, available as Exhibit 17 in the Public Record at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/

- The Bay Area Pollution Prevention Group contracted with the Institute for Research and Technical Assistance (IRTA), to study using water-based cold solvent cleaning solutions as opposed to mineral spirits for parts cleaning. IRTA developed an 8-page brochure for distribution that showed the advantages of using a water-based system, which included: lower costs and worker safety[8]

- SCAQMD contracted with IRTA in 2003 to study the low-VOC systems for their companion rule to Rule 1122, Rule 1171 "Solvent Cleaning Operations"[9]. In the course of this project, IRTA focused on finding low-VOC solvent alternatives in three cleaning categories including:

    - electronics and high technology cleaning applications
    - coating and adhesive spray equipment cleaning
    - screen and specialty flexographic ink cleanup

  This study is referenced because Delaware includes cleaning of screens used in screen printing, for example tee shirts, signage, etc., and cleaning press parts removed from printing presses in 7 **DE Admin. Code** 1124, Section 33.0 "Solvent Cleaning and Drying". This type of cleaning is handled in SCAQMD Rule 1171 and was included in DE 7 **DE Admin. Code** 1124, Section 8.0 "Handling, Storage, and Disposal of Volatile Organic Compounds (VOCs)", but now is included in the amended regulation.

- Cal/EPA's Department of Toxic Substances Control (DTSC) and EPA Region IX sponsored a study of low-VOC, low toxicity solvents for the screen printing industry in 2005[10]. IRTA worked with nine screen printers in southern California to find low-VOC solvent alternatives that performed effectively for the screen printing industry and were cost effective.

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[8] "Switching to Water-Based Cleaners in Repair and Maintenance Parts Cleaning" Institute for Research and Technical Assistance (IRTA), Dr. Katy Wolf and Mike Morris, February 1999, available as Exhibit 12 in the Public Record at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/

[9] "Assessment, Development and Demonstration of Low-VOC Cleaning Systems for the South Coast Air Quality Management District Rule 1171", Mike Morris and Katy Wolf, Institute for Research and Technical Assistance, August 2003, available as Exhibit 14 in the Public Record at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/

[10] "Alternative Low-VOC, Low Toxicity Solvents for The Screen Printing Industry", by Mike Morris and Katy Wolf (IRTA), April 2005 , available as Exhibit 13 of the Public Record at https://dnrec.alpha.delaware.gov/events/public-hearing-solvent-cleaning-and-drying-regulations/

- EPA Region IX sponsored a study report by IRTA on safer alternatives in cleaning and thinning operations[11]. This document includes information regarding cold solvent cleaning, printing press cleaning (of parts removed from presses, not cleaning solutions for blanket and roller wash which are the subject of other regulations), and screen printing screen cleaning. IRTA identified low-VOC solvent alternatives that performed effectively for the printing press and screen printing industries and were cost effective.

In addition, California's SCAQMD has a website devoted to listing manufacturers of certified low-VOC cleaning solutions, which currently contains 98 products from 38 manufacturers. This resource provides a list of solvents that are compliant with the proposed 25 grams/liter VOC limit proposed in Regulation 7 **DE Admin. Code** 1124, Section 33.0.

(2) Substituting use of non-regulated VOCs

It is important to note that almost all VOC containing solutions are regulated. Gasoline, diesel, and methyl ethyl ketone (the VOCs mentioned above by the commenter) are regulated VOCs as shown in the definition of a VOC in 7 **DE Admin. Code** 1101.

The Department believes that users are aware of the safety and health issues associated with the above listed solvents. In addition, there are many safer low or non-VOC solvent options available to users, that comply with the proposed 25 grams/liter VOC limit. Other solvent options such as perchloroethylene (perc) and acetone do not cause undue elevation of ground-level ozone and they and other such compounds are legal and remain legal under the EPA and Delaware regulations.

Some of these compounds have other adverse effects that require attention if used (such as toxicity and flammability), but prudent precaution can mitigate those impacts. Users can take precautions such as wearing protective equipment, maybe self-contained breathing equipment, explosion proof electrical equipment, to reduce health and safety risks.

(3) Using hand-held or spray cans for parts cleaning

Finally, in regard to the potential for increased hand-held solvent cleaning of parts, this comment was also made after the public Workshops. The Department evaluated the comment at that time and determined that no changes to the regulation were required. The potential for increase in use of high VOC hand-held solvents (including spray cans) as a result of the implementation of the proposed language was considered unlikely. Hand-held solvents are more expensive than low-VOC alternatives, which would substantially increase user costs.

[11] Certified Clean Air Solvents. SCAQMD. http://www.aqmd.gov/home/programs/business/business-detail?title=certified-clean-air-solvents

Comment 14

A comment provided by Safety-Kleen Systems stated; "Aqueous cleaners use heat in order to adequately clean parts. The environmental consequences of increased energy usage should be considered when evaluating the environmental goals of the Department."

Department Response

The use and costs of heating some cold solvent cleaning solutions to improve the speed of cleaning was covered in the response to Comment 10 above. Not all cold solvent cleaning solutions will require heating. Parts in equipment repair shops (which represent a large portion of the facilities that use cleaning solvents in Delaware) are not required to be cleaned rapidly, unlike in a production line. Once the time of cleaning is not an important variable, users may move on to another repair job and come back when the first set of parts has been cleaned and dried. In addition, there are many new cold solvent cleaning solutions that work well and quickly without heat; some of which do not contain VOC, which would mean Regulation 1124, Section 33.0 would not be applicable.