

# BAY AREA AIR QUALITY MANAGEMENT DISTRICT



Regulation 2, Rule 1 General Requirements  
Regulation 8, Rule 27 Synthetic Solvent Dry Cleaning Operations  
Regulation 8, Rule 17 Non-halogenated Solvent Dry Cleaning Operations  
Regulation 11, Rule 16 Perchloroethylene and Synthetic Solvent Dry Cleaning Operations

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## Workshop Report

Prepared by

Marc Nash  
Toxic Evaluation Section  
Engineering Division

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Workshop Report outlining the proposed amendments to the District's Dry Cleaning Regulations. This report has been prepared by the staff of the Bay Area Air Quality Management District. Publication does not signify that the mention of trade names or commercial products constitute endorsement or recommendation for use.

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## I. INTRODUCTION

The staff of the Bay Area Air Quality Management District (District) is proposing changes to four existing regulations that control air emissions from dry cleaning equipment: Regulation 2, Rule 1 General Requirements, Regulation 8, Rule 27 Synthetic Solvent Dry Cleaning Operations, Regulation 8, Rule 17 Non-halogenated Solvent Dry Cleaning Operations and Regulation 11, Rule 16 Perchloroethylene and Synthetic Solvent Dry Cleaning Operations. The key driving factors of the proposed rule revisions are amendments by the United States, Environmental Protection Agency (USEPA) to the National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities, and by the California Air Resources Boards (CARB) to the Airborne Toxics Control Measure (ATCM) for Emissions of Perchloroethylene from Dry Cleaning Operations. Additionally, developments in the many different types of “Alternative Technology” solvents and improved dry cleaning equipment control technologies also significantly contributed to the recommended changes.

The proposed Rule 11-16 incorporates recent changes in State Law. The California Air Resources Board amended the ATCM for Perc dry cleaning operations, which became effective on December 27, 2007. The proposed changes (*summarized in Table 1*) would prohibit new installations and relocations of dry cleaning equipment using Perc and phase out existing Perc solvent dry cleaning equipment.

The District regulated synthetic solvents, or halogenated organic solvent dry cleaning equipment since 1980 under Rule 8-27, although this was more specific to Perc solvent until 1990. Rule 11-16, first adopted 1994 addressed changes in USEPA and CARB statutes. This rule has set emission standards for synthetic solvents used in textile cleaning by limiting air emissions of these compounds, with the goal of reducing exposure levels and potential harmful health impacts to the Public.

Many, but not all synthetic solvents have chemical properties that produce negative health effects over long-term exposure. The best synthetic solvent example is one of the most widely used dry cleaning solvents: Perchloroethylene. Also known as Tetrachloroethylene or Perc, this solvent is classified as a Group IIA, “probably carcinogenic” by the International Agency for Research on Cancer (IARC).

**Table 1. Major Provisions of Proposed Regulation 11, Rule 16**

- Prohibit the installation of new Perc dry cleaning machines.
- Prohibit Dip Tank Operations.
- Eliminate the use of existing Perc machines at co-residential facilities and converted machines by July 1, 2010.
- Effective July 1, 2010, require that all Perc machines must be removed from service once they become 15 years old.
- Require that remaining Perc machines must be removed from service by January 1, 2023.
- Expand good operating practices.
- Expand recordkeeping and reporting requirements
- Prohibit halogenated solvent spotting solutions.

The proposed changes to Rule 8-17 (*summarized in Table 2*) reflect the significant improvements in control technologies available in the newer solvent dry cleaning equipment and the development of alternatives to Perc and Stoddard solvent. Hydrocarbon solvents with high flashpoints were created in response to environmental regulatory restrictions in Germany in 1991. The German Dry Cleaning Industry also created third generation closed loop technology for these newer solvents. As Perc solvent has become increasingly expensive in California and environmentally unfavorable, dry cleaning facilities adopted the newer alternative technologies. Rule 8-17 needs to be updated to address and incorporate the new technologies. Additionally, the solvent definition needs expansion to address newer solvent formulations that are not currently described by the rule or any other District dry cleaning regulation.

**Table 2. Major Provisions of Proposed Regulation 8, Rule 17**

- Rename the rule to Non-halogenated Solvent Dry Cleaning Operations.
- Incorporate new solvent applicability to the rule.
- Prohibits transfer or vented equipment
- All new machines must be closed loop.
- Prohibits Dip Tank Operations.
- No transfer of materials from the drum mid-cycle from a closed loop machine to a separate dryer.
- No halogenated solvents such as Perchloroethylene or trichloroethylene in spotting solutions.
- All facilities must keep records for exemption or permit compliance.
- All facilities must report annually or as required.
- All facilities must register new equipment.

The proposed changes to Regulation 2, Rule 1, Section 120 Exemption, Dry Cleaning Equipment would reduce the qualifying amount of solvent from the current 700 gallons/year to 200 gallons/year. Registration would be required for all facilities that continue to qualify for this exemption. All facilities that use more than 200 gallons/year would require permits for their equipment.

Staff proposes deletion of Regulation 8, Rule 27 Synthetic Solvent Dry Cleaners: This rule was not removed from the active regulation listing because of various stages of classification imposed at the Federal level. Originally classified as a Volatile Organic Compound (VOC), Perc was added to a group of compounds known as “negligibly-reactive” in 1983. The USEPA further proposed for Perc to be “excluded” from the VOC categorization in 1993. However, the re-designation was not approved until January 26, 1996. In the interim, USEPA completes their hazardous air pollutant evaluation and creates a new standard for Perc emissions that require the District to address and adopt Rule 11-16 in 1994. As a precautionary measure for the state implementation plan (SIP), due to the length of consideration by USEPA and the differing categories and requirements, this rule was never removed from the active regulation listing.

## **II. BACKGROUND**

### **A. Regulation 8, Rule 27**

#### **1. Impact Summary**

There will be no impact to any dry cleaning facility from the deletion of this rule: it is obsolete. The regulation of all synthetic solvent dry cleaning equipment previously administered by Rule 8-27 has been delegated to Rule 11-16 since 1994.

#### **2. Regulatory History**

Initially adopted by the District on March 5, 1980 as an ozone control measure, Rule 8-27 explicitly focused on Perc solvent requirements. The rule was amended on March 17, 1982 to address emission control requirements under Section 302. The USEPA added Perc to a list of negligibly-reactive compounds which would be exempt from regulation under the State Implementation Plan for attainment of the ozone standard on October 24, 1983, but did not make a final decision about toxicity prompting a less restricted use of the solvent. Still, the 1982 revisions had a phase-in clause that increased the applicability of the rule over a 3 year period; requiring permits and further regulating most Perc equipment.

The next amendment to Rule 8-27 occurred to Section 301 on November 21, 1984 to comply with hazardous waste disposal requirements mandated by the California Code of Regulations (CCR), known then as the California Administrative Code (Title 22, Division 4, Chapter 30). It was also a forerunner of limiting waste solvent evaporation, requiring covers and metal containers to prevent evaporation.

Rule 8-27 was last amended on September 5, 1990, to address operating standards and control requirements for closed loop and vented dry-to-dry technology. Additional halogenated solvents such as trichlorotrifluoroethane (CFC-113) and 1,1,1-trichloroethane (TCA) prompted the District to expand the scope of the regulation. The title of Rule 8-27 was revised from "Perchloroethylene Dry Cleaning Operations" to "Synthetic Solvent Dry Cleaning Operations."

### **B. Regulation 8, Rule 17**

#### **1. Impact Summary**

The impact will be fairly minimal for all sources currently covered by this rule and for the sources projected to be covered by this rule, once the proposed changes are adopted. Closed loop equipment has been standard technology for the dry cleaning industry for over 10 years. The lower operational costs were one of the driving factors leading to the abandonment of the older transfer equipment that dominated most of the 20<sup>th</sup> Century. The changes to the Rule 8-17 will describe and update these operational requirements incorporating the current lower emitting equipment standards and prohibiting the reintroduction of the older technology. Additionally, the solvent definition will be expanded and the rule will be renamed to address all non-halogenated solvents.

#### **2. Regulatory History**

The District originally adopted the Rule 8-17, Petroleum Solvent Dry Cleaning Operations rule as an ozone control measure on May 21, 1980. All equipment types then were first generation transfer units, with a separate washer and dryer. Emission Control requirements were updated on March 17, 1982 to amend emission control requirements similar to Rule 8-27 (also updated on this date).

The next rule revision occurred on March 20, 1985 where the medium user exemption (section 112) was eliminated and solvent filtration requirements (section 303) were identified and addressed. Additionally, standards for condensers used in solvent recovery dryers and requirements for filter cartridge solvent evaporation were added.

Rule 8-17 was last updated on September 5, 1990 to insert leak check requirements, update hazardous waste transport standards and to implement minor improvements in control technology standards. Recordkeeping requirements, manual of procedure (MOP) requirements and stringent controls for solvent evaporation were also added on this date.

Additional requirements from other regulations also were reviewed for applicability. The USEPA under section 111 of the federal Clean Air Act has established pollution control requirements for specific industrial activities that emit significant "criteria air pollutants" such as volatile organic compounds (VOCs). These standards are intended to establish minimum nationwide requirements for new facilities and are known as new source performance standards (NSPS).<sup>1</sup> Petroleum Dry Cleaners have an NSPS provision for transfer equipment that was established on September 21, 1984. This was after the original 1980 Rule 8-17 adoption date. The District has since received delegation by USEPA on September 5, 1990 for this standard and the current rule meets or surpasses this standard. The proposed changes will be more stringent and will improve on the current Rule 8-17 standards, thus the District should continue to qualify for USEPA NSPS delegation.

## **C. Regulation 2, Rule 1, Section 120**

### **1. Impact Summary**

Lowering of the exemption level to 200 gallons/year from 700 gallons/year is expected to have minimal impact on alternative solvent facilities. Approximately 95% of existing exempt facilities will continue to qualify for Rule 2-1, Section 120 exemption and the remaining 5%, which are the larger solvent users will need permits. The District currently has approximately 330 alternative solvent facilities. This translates to roughly 17 – 20 facilities losing their permit exemption status. Additionally, the lower exemption level should encourage better solvent conservation practices for facilities choosing to continue to qualify for this exemption.

### **2. Regulatory History**

This section was originally adopted on October 10, 1983, and the initial qualifying exemption level was 700 gallons/year for Petroleum dry cleaning. The upper limit for this exemption has remained the same for over 25 years, but extended for alternative non-halogenated solvents as an incentive to switch from using Perc.

## **D. Regulation 11, Rule 16**

### **1. Impact Summary**

All Perc solvent equipment in the Bay Area will be impacted by the proposed changes to this regulation. Approximately 500 Perc solvent Dry Cleaning facilities will be phased-out by the modifications to this rule. The largest number of facilities affected will be affected by July 1, 2010 when approximately 66 % of the 500 facilities (330 facilities) will be required to replace their equipment with an alternative solvent technology or shut down. The remaining 34% will be affected over the next 13 years until January 1, 2023 when all Perc solvent equipment will be prohibited. Facilities with shut-down equipment are expected to contract with other facilities in operation with valid permits or with facilities in operation with alternative solvent technology, becoming a drop shop, where no dry cleaning is done on premises. Table 3 shows the breakdown by year of projected number of facilities retiring their Perc solvent equipment.

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<sup>1</sup> NSPS are detailed in 40 CFR Part 60.

Table 3. Projected Facilities Impacted by Proposed Regulation 11, Rule 16 Changes

Date	Number of Facilities Affected	Percent
July 1, 2010	330	66
January 1, 2011	50	10
January 1, 2013	40	8
January 1, 2015	30	6
January 1, 2017	27	5.2
January 1, 2019	15	3
January 1, 2021	7	1.2
January 1, 2023	3	0.6
Total	500	100

## 2. Regulatory History

The District has a history of implementing regulatory requirements in advance of state or federal government agencies and this is reflected in part, by the history of dry cleaning regulations. For example, Rule 8-27 was the first District rule to regulate Perc solvent dry cleaning. It was adopted by the District's Board of Directors on March 5, 1980. The last modification to Rule 8-27 took place on September 5, 1990 and expanded the scope of the regulation to include all synthetic solvents. The requirements of the USEPA and CARB began 1990, 10 years later with the critical identification of Perc as potentially harmful.

### a) Perc Identification as a Hazardous Air Pollutant

Although recommended for reclassification as negligible to ground level ozone formation since 1983 by the USEPA, Perc became one of 189 chemicals classified as a hazardous air pollutant (HAP) by the 1990 Clean Air Act amendments. This HAP designation meant that a federal control standard for Perc would have to be identified and adopted.

### b) Perc Identification as a Toxic Air Contaminant

The California Air Resources Board (CARB) identified Perchloroethylene (Perc) as a toxic air contaminant (TAC) under California's Toxic Air Contaminant Identification and Control Program (Health and Safety Code section 39650 et. seq.) in October 1991, prompting the state to review Perc solvent dry cleaning equipment emissions and the adopt appropriate action.

### c) Perc NESHAP Standard

In September 1993, USEPA adopted a new NESHAP standard to address the Perc regulatory deficiency and it became known as the "National Perchloroethylene Air Emissions Standards for Dry Cleaning Facilities." The NESHAP established three source categories: small, large and major. Equipment types (dry-to-dry, transfer) were also identified. Maintenance (leak check and repair schedules) and recordkeeping provisions were also established. It also specified air emissions control based on the type of equipment used, the installation date and the amount of Perc purchased per year.

d) Perc ATCM Standard

On October 14, 1993, one month after the Perc NESHAP standard was approved; CARB adopted the ATCM for Emissions of Perc from Dry Cleaning Operations and the Environmental Training Program for Perchloroethylene Dry Cleaning Operations (Perc Certification Program). Similar in scope to the Perc NESHAP but more stringent, the Dry Cleaning Operations ATCM identified the equipment, operation, maintenance, recordkeeping, and reporting requirements for Perc solvent dry cleaning operations. Further, the Environmental Training Program set forth the guidelines and criteria for CARB to train and approve instructors who then teach dry cleaning operators the proper operational standards and maintenance procedures for their Perc solvent dry cleaning equipment.

e) District Hazardous Pollutant Standard

Based on the new regulatory standards at both the Federal and State level, District staff proposed a new regulation. Regulation 8, Rule 27, Synthetic Solvent Dry Cleaners would be replaced with a rule that would conform to the new legislative and regulatory changes. This new rule would incorporate the federal requirements, the state requirements, the risk reduction measures outlined in SB1731<sup>2</sup> and implement the risk reduction objectives outlined in the District's Toxic Air Contaminant Risk Reduction Plan. The rule would contain additional exposure reduction requirements for high density population areas in the Bay Area that typically contain dry cleaning facilities in buildings co-located with residences and other commercial businesses. The District Board of Directors approved this new regulation, Regulation 11, Rule 16, Perchloroethylene and Synthetic Dry Cleaning Operations, on December 12, 1994.

Rule 11-16 had a four-year implementation schedule. However, as the control equipment requirement milestones approached over the years, the cost for the required additional controls became controversial with many owners of Perc solvent dry cleaning equipment. They expressed their concerns at a few District Board Meetings and lobbied for a permanent exemption or a multi-year variance. A one year variance was granted. At the end of the fifth year, all Perc solvent dry cleaning facilities were in compliance. Alternative solvent dry cleaning technologies existed at this time, but no incentive existed for Perc solvent facilities to adopt alternative solvent equipment until October 2003, when the California's State Legislature's passed AB998 (Assembly Bill 998).

f) AB998

AB998 established a Non-Toxic Dry Cleaning Incentive Program to provide financial grants for the dry cleaning industry to switch from equipment using Perc solvent to non-toxic, non-smog forming alternatives. These grants are financed by a three-dollar (\$3) per gallon tax on California Perc Solvent Distributors. This fee, starting in 2004, increases one-dollar (\$1) per gallon per year from 2005 through 2013. CARB administers the collected funds via a grant program, providing up to \$10,000 financial assistance in the form of grants, to assist dry cleaners in switching to alternative cleaning technologies such as wet cleaning and carbon dioxide (CO<sub>2</sub>) cleaning. The balance of funds are to be used to establish demonstration programs that would showcase and promote acceptable alternative solvent technologies.

The tax requirement from this state law acted like a catalyst of change: Perc equipment owners in reaction to the increase in solvent prices and the projected solvent price increases began to investigate non-Perc solvent technologies and (The additional incentives of lower permit fees and fewer regulatory requirements also supported their decision.) the media focus of environmentally responsible dry cleaning also helped to distinguish these new technologies and galvanize public support. Dry cleaning facilities began to adopt alternative cleaning technologies to keep overhead costs low and to demonstrate environmental good will.

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<sup>2</sup> Senate Bill 1731, Facility Toxic Air Contaminant Risk Reduction Audit and Plan -- Section 44390 et al of the California Health and Safety Code.

g) Amended District Standard

Rule 11-16 was updated in 2005 to incorporate the new provisions of Regulation 2, Rule 5, Toxics New Source Review.

h) Amended Perc NESHAP Standard

The original NESHAP update was proposed in 2006, but USEPA has released several updates with the most recent on July 11, 2008. The updated Perc NESHAP identified three source categories: major, area and co-residential. Fortunately, there are no facilities with Perc equipment within the District that qualify for the NESHAP definition of a major source. Accordingly, by default, the District is in compliance with all provisions for this source category. The District's current rule also meets or exceeds all Federal requirements for area sources. Thus, the District is in compliance with all provisions for area sources. Co-residential sources on the other hand, need to be addressed.

The NESHAP co-residential requirements have been updated to contain criteria that are more stringent than the District's current rule. Specifically, there are two new NESHAP equipment phase out requirements: no new co-residential facilities after 12/21/05, and all co-residential facilities must cease operation on or after 12/21/2020. Although there has been no new or modified permit activity for co-residential facilities since 2005, putting the District by default in compliance with this first provision; Rule 11-16 currently has no phase out provision for Perc dry cleaning equipment at co-residential facilities. The proposed revisions will incorporate a prohibition on the installation of new equipment.

i) Amended Perc ATCM Standard

The amended CARB ATCM was approved on January 25, 2007 and the revised equipment phase out provision is more stringent than the new NESHAP co-residential phase out requirement and adopting the CARB provisions into Rule 11-16 will also bring the District into compliance with the two remaining NESHAP requirements. More specifically, the revised CARB ATCM for Perc Solvent has a Perc phase out provision that applies to all Perc solvent source types and the phase out implementation starts July 1, 2010, which is ten years earlier than the NESHAP standard. The ATCM is more stringent than the NESHAP requirement because it reduces emissions of Perc solvent sooner than the NESHAP.

The ATCM also prohibits new Perc solvent facilities starting after January 1, 2008. There are also more stringent operational and maintenance procedures for all Perc solvent equipment. The current proposed changes to Rule 11-16 will incorporate the ATCM provisions. A comparison of the requirements of the proposed Rule 11-16, the NESHAP and the ATCM has been completed and summarized in Table 4.

### III. TECHNICAL REVIEW

#### A. Emission Control Technologies

Several factors influenced the development of Dry cleaning technology using Perc, however two major factors may have been from economic and regulatory issues. Historically, most Perc dry cleaning equipment in the US has been designed and built in Europe. Additionally, the European Union (EU), has been defining stricter environmental standards since 1975.<sup>3</sup> Equipment that would be more solvent stringent, saving money and more environmentally sound could create a marketing advantage that might further promote sales. The process has developed similarly for other solvent types. From a regulatory perspective, the evolution of these equipment types has been consolidated into four groups or generations:

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<sup>3</sup> Conference on Security and Co-Operation in Europe, Helsinki 1975.

## 1. First Generation

The first generation of equipment is known as Transfer Machines. The distinguishing characteristics of this generation are a separate washer and dryer. Solvent laden clothes are passed or transferred from washer to dryer by hand. The dryer reclaims the solvent using a water condenser that cools the recirculating air and recovers some of the solvent during the deodorizing part of the dryer cycle. The remaining air is exhausted into a carbon adsorber or a refrigerated condenser in later models. If the dryer is equipped with an adsorber, it is replaced or regenerated during routine maintenance of the machine. A typical solvent emissions profile ranges from 500 to 1000 gallons per year (see Figure III-A1). This equipment type is now prohibited in California.

## 2. Second Generation

The second generation of equipment is known as Vented Machines. The distinguishing characteristics of this generation are that it is dry-to-dry<sup>4</sup> and that it exhausts solvent into the atmosphere. This machine is one unit and equipped with a water-cooled condenser used to recover solvent during the deodorizing part of the drying cycle. During this time, fresh air is drawn into the machine and exhausted through an external carbon adsorber at the end of the cycle. The adsorber is replaced or regenerated during routine maintenance of the machine. Improper maintenance caused excess emissions because of breakthrough issues that would negate the abatement effectiveness of the adsorber. A typical solvent emissions profile ranges from 200 to 400 gallons per year (see Figure III-A1). This equipment type is now prohibited in California.

## 3. Third Generation

The third generation of equipment is known as Closed Loop Machines. The distinguishing characteristics of this generation are that they are dry-to-dry, ventless, and do not exhaust to the atmosphere. Hot air from the drying cycle is passed through a refrigerated condenser, recovering solvent, sending the recovered liquid solvent and water mixture to a water separator, reheating the remaining airstream by the heating coils and recirculating this remainder back into the drum. The solvent recovered by the water separator then goes to the solvent storage tank. Unlike second-generation machines that inject fresh air, deodorization transpires as the vapor pressure of the solvent is lowered by temperature reduction via repeated passes through the refrigerated condenser (30-45 degrees F). Some machine designs use an inductive door fan that draws air through the loading door and drum when the door is ajar to further reduce worker exposure from residual solvent vapor. Other models have a more formalized fugitive control system comprised of an inductive door fan with a carbon adsorber to further reduce solvent emissions. The adsorber is replaced or regenerated during routine maintenance. A typical solvent emissions profile ranges from 60 to 120 gallons per year (see Figure III-A1). This equipment type currently operates in California.

Additionally, as a cost savings measure to extend the lifespan of the equipment, some vented machines (2<sup>nd</sup> gen) were retrofitted with a refrigerated condenser and converted to closed loop. These converted closed loop machines, although not as efficient limiting solvent emissions as a true closed loop machine, meet the minimum definition of a closed loop machine. This modified equipment type currently operates in California.

## 4. Fourth Generation

The fourth generation of equipment is known as Secondary Control Machines. The distinguishing characteristic of this generation is the addition of an integrated carbon adsorber to a closed loop machine. The primary control device on a closed loop machines is the Refrigerated Condenser. The addition of the carbon adsorber, typically an activated carbon bed contained in a metal housing, is the Secondary control device. The two emission control devices work in tandem at the end of the cool down phase of the deodorizing cycle to further reduce fugitive emissions. Solvent vapors from the drum, button and lint

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<sup>4</sup> Clothes go into the machine dry and come out of the machine dry.

traps are routed through the adsorber, reducing the drum concentration of the solvent to 300 ppmv or lower. The carbon is periodically regenerated; using heat and the adsorbed solvent is recovered, further reducing solvent consumption. The regeneration is automatically scheduled and occurs, according to manufacturer's recommendation or after a specific number of wash loads. Other machine designs have retrofitted an external secondary control device onto a closed loop machine. These external adsorbers have not been able to meet the same control efficiencies as the closed loop machines with the integral design. . A typical solvent emissions profile ranges from 30 to 75 gallons per year (see Figure III-A1). This equipment type currently operates in California.

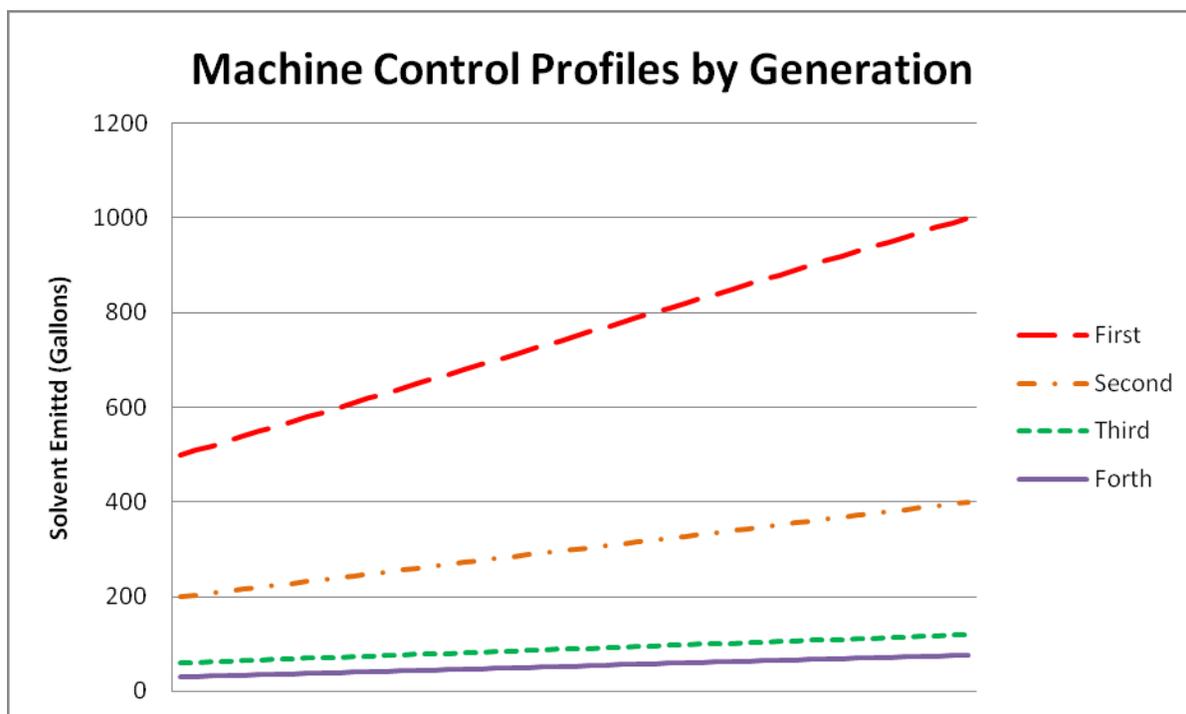


Figure III-A1 – Emission Profiles for Each Generation of Equipment

## B. Ventilation Technologies

Ventilation has been used as a risk mitigating measure at dry cleaning facilities and is implemented in several different ways. Ventilation is important as it affects the dispersion of fugitive solvent vapors and other airborne compounds within the facility. Most Dry Cleaners do not have adequate ventilation systems for good capture or dispersion. Dispersion is typically based on building dimensions, stack dimensions, airflow rate, and capture efficiency of the ventilation system. Dispersion helps to determine the persistence or length of exposure to the solvent vapor, which impacts the potential health risk to nearby residences and businesses. The types of ventilation<sup>5</sup>, in order of increasing effectiveness are:

### 1. Natural Ventilation

Natural ventilation is the most passive form of ventilation and solely depends upon wind and convective forces to move air in and around the facility. Solvent vapors from windows, doors, roof vents or other openings tend to remain trapped and entrained around the facility for longer periods of time, resulting in a greater exposure to workers and nearby residents. Natural ventilation is adequate if the facility is a stand-alone facility with a reasonable buffer zone. It is the least effective form of ventilation.

<sup>5</sup> BAAQMD 2001.

## 2. Window Fans

Window fans, or wall fans, are high flow propeller-type fans installed vertically in an external wall or exterior window type opening in the facility. Solvent vapors are exhausted horizontally and near ground level with the vertical component completely dependent on metrological conditions. Window fans typically exhaust into other co-located businesses or nearby residences increasing exposure to nearby workers and residents.

## 3. General Ventilation

General ventilation configurations typically have one or more large capacity fans on the roof of the facility that exhaust horizontally by design or because of rain caps. Capture efficiency depends on the air exchange rate inside the building and is a function of facility size and the fan air-flow rate. Solvent vapors are released at roof level producing better dispersion at ground level. Although the effects of building downwash tend to trap emissions into nearby empty space or cavity zones located around and near the facility. These zones concentrate the emissions increasing exposure to nearby workers and residents.

## 4. Local Ventilation

Local Ventilation is a descriptor used to define a ventilation system with a high capacity fan, exhaust stack and physical apparatus/structures (fume hoods, shrouds, flexible walls, vertical plastic strips) enclosing the dry cleaning machine and designed to capture fugitive emissions. A ventilation fan captures and exhausts solvent emissions vertically through a stack on the roof of the facility. A combination of walls, plastic curtains and/or plastic strips completely surrounds the equipment with three feet of clearance in front and behind the machine for operation and maintenance.

## 5. Partial Vapor Rooms

Partial Vapor Rooms (PVR) is a descriptor used to define a ventilation system that encloses the back of the dry cleaning machine in a small room with the front panel and loading door exposed for operational convenience (loading/unloading). Maintenance doors are designed to be self-closing and kept closed during routine operation of the machine. PVRs more effectively capture fugitive emissions from leaks and maintenance activities when compared to local or general ventilation systems. A ventilation fan captures and exhausts solvent emissions vertically through a stack on the roof of the facility. The loading door fugitive emissions are captured by one of the follow controls: a shroud, an inductive door fan, a fugitive control system or secondary control system.

## 6. Vapor Barrier Rooms

Vapor Barrier Rooms (VBR) is a descriptor used to define a ventilation system that encloses the entire machine in a small room and is the most health protective vapor capture system. A VBR is constructed with diffusion resistant material (such as metal foil-faced insulation sheets, plastic sheeting between drywall sheets or steel sheeting) with seams and gaps sealed with metalized tape. A ventilation fan captures and exhausts solvent emissions vertically through a stack on the roof of the facility. Maintenance doors are designed to be self-closing and kept closed during routine operation of the machine. VBRs are required for all co-residential dry cleaning facilities in the Bay Area and recommended for non-residential facilities that are located in high-density population areas. Some non-residential facilities can appropriately construct total enclosures without the barrier material and these are known as Vapor Capture Rooms (VCR).

## C. BACT and Toxics NSR

The District describes Best Available Control Technology (BACT) as the most effective emission control device or technique successfully utilized for the type of equipment, or the most stringent emission limitation achieved by an emissions control device determined to be technologically feasible and cost effective. For any new or modified source emitting TACs, Rule 2-5 Toxics New Source Review (NSR) also can apply. This rule can require a more stringent control standard for projects producing a chronic hazard Index (HI) of 0.20 and/or a cancer risk greater than 1.0 in a million ( $10^{-6}$ ) called Toxics Best Available Control Technology (TBACT). Projects with a chronic or acute hazard index greater or equal to 1.0 or a cancer risk of more than 10 in a million are denied (Rule 2-5, Section 302).

### 1. Halogenated Solvent

The existing BACT standard for halogenated solvent dry cleaning equipment is a Secondary Control Machine. If the cancer risk and/or hazard indexes are elevated, effective ventilation is also required to lower these numbers and reduce the exposure to nearby workers and residences. For example, all co-residential facilities require a secondary control machine enclosed in a vapor barrier room (VBR). This is the most effective form of ventilation. Other types of facilities may use other forms of ventilation provided the overall project risk stays below the maximum project risk requirements levels mandated by Rule 2-5, Section 302.

### 2. Petroleum Solvent

The existing BACT standard for petroleum solvent (and similar solvent types) is a Closed Loop Machine.

## D. Solvent Emissions

### 1. Emissions

Solvent emissions are typically determined by material balance. Most of the solvent purchased throughout the year is used to make up the amount that is emitted into the air. Approximately 20-30% of the annual solvent emitted is recaptured and disposed as hazardous waste. A residual amount of solvent is retained by each garment cleaned and slowly evaporates over a several week period. A secondary control system used at the end of each drying cycle, and/or a fugitive control system with an inductive door fan both use a regenerating carbon adsorber to further reduce emissions. One of the largest sources of emissions comes from gasket leaks around the tanks, service maintenance ports, and around the loading door. Good operating practices (weekly leak checks, proper maintenance, and regular adsorber regeneration, if applicable) can further reduce solvent emissions.

### 2. Emission calculations

The following equations are used to determine net solvent emitted from equipment at a dry cleaning facility:

Solvent Emissions = (Solvent Consumption) – (Solvent Waste Credit)

Solvent Consumption = (Solvent Purchases) + (Initial Solvent Inventory) – (Final Solvent Inventory)

Solvent Waste Credit = (Still Oil) (% solvent in Still Oil) + (No. of Filter Cartridges)(solvent/Cartridge)

Default values in lieu of waste test data: 50% volume for still residue; 0.5 gal/cartridge standard or split filters (1 gal/cartridge for Jumbo filters).

## E. Solvent Characteristics

### 1. Toxicity

Perc is the only dry cleaning solvent that has been carefully studied and researched for a long period of time. It has been designated a Hazardous Air Pollutant (HAP) at the federal level and a Toxic Air Contaminant (TAC) at the State level. Perc is known to cause acute<sup>6</sup> non-cancer health effects such as skin and eye irritation, irregular heart rhythm, respiratory irritation and central nervous system effects (headaches, intoxication, drowsiness and dizziness). Chronic<sup>7</sup> exposure may cause liver and kidney dysfunction, and more serious central nervous system effects (diminished cognitive ability). The Office of Environmental Health Hazard Assessment has determined the URV<sup>8</sup> for Perc to be  $5.9 \text{ E-}06 \text{ } (\mu\text{g}/\text{m}^3)^{-1}$ , and the chronic non-cancer reference exposure level to be  $35 \mu\text{g}/\text{m}^3$ .<sup>3</sup> The odor threshold is approximately 50 ppm, which is higher than the chronic threshold. The acute non-cancer reference exposure level is  $20,000 \mu\text{g}/\text{m}^3$ .<sup>3</sup> Rule 2-5, Table 2-5-1 lists information specifics on all TACs regulated by the District.

Reference exposure levels (REL) are used as indicators of potential non-cancer effects. A concentration below the REL would not be expected to exhibit adverse non-carcinogenic health effects. The acute REL is compared to the expected one-hour maximum concentration and the chronic REL is compared to the expected annual average concentration to determine the potential for non-carcinogenic health effects. The District lists all regulated TACs and their associated RELs and URVs in Rule 2-5, Toxics NSR, Table 2-5-1. Dispersion modeling using local meteorological data, facility dimensions, nearby building characteristics, ambient monitoring near dry cleaning facilities and source tests are used in conjunction with the engineering analysis to determine exposure levels to nearby residences and workers. Emission levels, proximity and dispersion can significantly factor into exposure determination.

Another significant solvent used in dry cleaning is Trichloroethylene (TCE), a halogenated solvent that has been used in spotting formulations to remove stains from fabrics and is listed in Table 2-5-1. Additionally, 1-bromopropane, also known as n-propyl bromide, a new halogenated solvent, and a prop 65 listed compound with reproductive effects, is currently being marketed as a spotting solvent.

There are concerns that some of the newer halogenated solvent formulations may include potential health effects and toxic issues that still have to be identified and addressed from a regulatory standpoint. These will be addressed as new data about these newer compounds become known.

### 2. Flammability and Safety

All dry cleaning facilities should know the potential hazards associated with the process or solvent used in their equipment. Converted machine owners should consult their respective machine manufacturer for safety guidance on their solvent choice. The conversion may not be recommended by the solvent manufacturer or the machine manufacturer. Material safety data sheets (MSDS) with the chemical information, technical data and flammability details are available from the solvent distributor and the solvent manufacturer. The local fire department will consult the state fire code to determine proper handling and storage of the solvent.

The fire code classifies solvent on the basis of flammability. A flammable liquid has a flashpoint below 100 degrees F. A combustible liquid has a flashpoint above 100 degrees F and is classified as follows:

- Class II liquids have a flash point at or above 100 degrees F and below 140 degrees F.
- Class IIIA liquids have a flash point at or above 140 degrees F and below 200 degrees F.
- Class IIIB liquids have a flash point at or above 200 degrees F and below 1500 degrees F.

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<sup>6</sup> Short-term

<sup>7</sup> Long-term

<sup>8</sup> Unit Risk Value is the estimated probability of a person contracting cancer from an ambient exposure to  $1 \mu\text{g}/\text{m}^3$  over a 70 yr lifetime.

Most of the newer dry cleaning solvents are classified as combustible liquids. Furthermore, there may be additional building code requirements, such as the installation of sprinkler systems that may have to be addressed, based on the category of the solvent and the amount of solvent used by the equipment. The local planning office will have information on all required building codes, submission requirements and details on the review and approval process.

## F. Halogenated Solvents<sup>9</sup>

### 1. Perchloroethylene

Despite potential health issues, most dry cleaners in the District currently use Perc, but it's classification by CARB as a probable carcinogen has limited its use in recent years and encouraged increasing regulatory restrictions.

The solvent known as Perchloroethylene or Tetrachloroethylene, otherwise more commonly known as Perc, does not naturally occur in the environment. The English scientist Michael Faraday, using a thermal decomposition of hexachloroethane, first formally synthesized Perc in 1821. It is a chlorinated aliphatic hydrocarbon containing a double carbon bond. It is a colorless liquid at room temperature, nonflammable (no flash point) and has a boiling point of 250 degrees F. Perc is relatively insoluble in water and the combination of all of these properties make it an ideal industrial solvent. Perc is also used as a starting material for making other products such as: adhesives, fabric finishers, metal degreasing, silicon lubricants, spot removers, water repellants and wood cleaners. However historically, the largest application has been associated with the cleaning of textiles, known as dry cleaning.

The dry cleaning process uses non-water-based solvents to remove soil and stains from textiles and clothes. Commercial dry cleaning in the United States became more prominent in the early 20<sup>th</sup> century and the early solvents were petroleum based such as kerosene, gasoline and Stoddard. However, Perc had much greater stability than petroleum solvents and had better cleaning properties. By the mid-1930s the US dry cleaning industry had essentially adopted Perc as the preferred solvent.

### 2. 1-Bromopropane (n-propyl bromide)

1-Bromopropane (n-propyl bromide or n-PB or DrySolv™), a VOC, is solvent being developed as a drop-in alternative solvent for Perc secondary control machines. The solvent is more volatile than Perc and is known to have a strong odor. The District requires all halogenated solvent dry cleaning to be completed in a fourth generation machine and operated according to the manufacturer's recommendations. Environtech International, Inc, the solvent manufacturer, additionally recommends the replacement of all existing rubber gaskets and seals with Viton equivalents. The California Department of Health Services identified n-PB as a neurotoxin and a reproductive toxin and it is listed under Proposition 65. The compound has not yet undergone formal evaluation for TAC identification. The USEPA is currently reviewing for n-PB for inclusion in several HAP standards and confirms the harmful health effects, however, EPA has proposed allowing limited use of n-PB, under the Significant New Alternatives Policy program (SNAP), as a replacement for halogenated compounds and ozone depleting compounds (ODC) such as methyl chloroform, 1,1,1-trichloroethane, CFC 113, HCFC 141b and most recently (2007), TCE and Perc in vapor degreasing, circuit board cleaning and other misc applications not related to dry cleaning. Since n-PB is a relatively new solvent to the US markets, replacing higher prioritized ODC compounds, new data regarding potential toxicity are still unfolding.

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<sup>9</sup> Halogenated solvents are subject to Rule 11-16.

## G. Alternative Technologies<sup>10</sup>

### 1. Petroleum Solvent Cleaning

In 1855, Petroleum based solvents such as kerosene and gasoline, discovered accidentally; became one of the first solvents used in the early dry cleaning process. These solvents had a few shortcomings, such as low flash points (below 140 degrees F), odors, and flammability issues that curtailed widespread adoption. Perc, because of its stability, with its lack of a flashpoint, would surpass this technology and become the solvent of choice in the 20<sup>th</sup> century. However, in the last 10 years, with the development of newer high-flash point solvents (above 140 degree F), this technology has become the most widely used alternative to Perc solvent. There are more than 350 petroleum solvent dry cleaners in the District.

The newer formulated solvents are isoparaffins (hydrocarbon chain length: 9 to 13 carbon atoms), which are synthetic hydrotreated aliphatic hydrocarbons. The hydrotreatment removes trace quantities of the aromatic components (such as benzene) producing a less toxic odorless solvent, making it more ideal for dry cleaning applications. All of these solvents are classified by the California State Fire code as Class IIIA combustible liquids which have a flash point above 140 degrees F and below 200 degrees F.<sup>11</sup> There are several trade names for these types of solvents produced by various manufacturers.

The newer machines use third generation technology known as Closed Loop Machines with computerized controls. The distinguishing characteristics are that they are dry-to-dry, ventless, and do not exhaust to the atmosphere. The footprint, or size of the equipment is analogous to a Perc Machine. To address the potential flash point issues, some of the machines are equipped with nitrogen canisters to produce a "nitrogen blanket" that suppresses the potential ignition of the solvent. Hot air from the drying cycle is passed through a refrigerated condenser, recovering solvent, and then sending the recovered liquid solvent and water mixture to a water separator, reheating the remaining airstream by the heating coils and recirculating this remainder back into the drum. The solvent recovered by the water separator then goes to the solvent storage tank. Distillation or solvent filtration by an adsorptive medium such as Tonsil is used to recover the solvent.

Bacterial growth can also be an issue with this solvent, creating odor problems that can be imparted onto garments. Solvents should be frequently distilled, and solvent tanks need to be bottom drained frequently, keeping the solvent clear of water contamination should prevent bacterial growth.

Newer types of petroleum closed loop machines have been designed to use a powdered adsorbent called Tonsil. Tonsil is an acid activated form of calcium bentonite. Machines using this technology typically employ a mixture of 50% Tonsil with an 50% diatomaceous earth blend. The Tonsil manufacturers claim that their product has four major advantages:

- 1) control of bacterial growth (contamination producing odors continues to be an important issue with Petroleum solvents),
- 2) no distillation of solvent is needed (contaminants are adsorbed) reducing potential fire hazards and providing lower power consumption,
- 3) Detergents are not necessary (providing a potential long-term cost savings measure), and
- 4) Non-colorfast dyes are removed (producing no dye bleeding on other garments washed in the same load).

Original load-cycle times for all petroleum closed loop machines were approximately 75 minutes/load, but newer machines now have reduced this time to 60 minutes/load<sup>12</sup>. The quicker cycles use a larger blower capacity to shorten the cycle time. The District currently exempts this source type from permits.

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<sup>10</sup> Non-halogenated solvents will be subject to Regulation 8, Rule 17.

<sup>11</sup> A combustible liquid is defined as having a flash point at or above 100 degrees F.

<sup>12</sup> Typical Perc Cycle times are 45 minute/load.

### a) DF-2000™

ExxonMobil launched DF-2000™ Fluid (DF-2000) in 1994 as an alternative to Stoddard and Perc. At present, it is the most widely used alternative solvent in the Bay Area. It is a synthetic mix of isoparaffins and cycloparaffins (naphthenes) consisting of C<sub>11</sub> to C<sub>13</sub> aliphatic hydrocarbons with a boiling point between 185 and 211 degrees C.

### b) Eco Solv®

Chevron Phillips Chemical Company LP produces a solvent called EcoSolv®, a isoparaffin mixture consisting of C<sub>9</sub> to C<sub>13</sub> aliphatic hydrocarbons with a boiling point between 181 and 209 degrees C.

### c) Shell Sol D60

Previously known as Shell Sol 140 HT (Shell 140), Shell Sol D60 is a high flash point hydrocarbon solvent with flash point @ 142°F. This solvent works well in closed-loop machines. It has a boiling point between 177 and 213 degrees C.

## 2. Volatile Methylated Siloxanes (decamethylpentacyclosiloxane)

In 1998, manufactured in Waterford, New York, manufactured by Dow-Corning, Distributed by General Electric and patented under the trade name Green Earth™, is a cyclopentahexane solvent mixture also known by the name of its chemical structure, D5. The flash point of this solvent is 171 degrees F and is higher than the hydrocarbon solvents. On the basis of flammability, D5 is also classified as a Class IIIA combustible liquid; the same designation given to the newer hydrocarbon solvents. This similarity to hydrocarbon solvents allows it to utilize the same type of closed loop technology. Although Green Earth™ has also been used in modified equipment originally designed to use Perc, both the machine manufacturers and the solvent manufacturers do not recommend this option.

The machines using D5 are third generation technology known as Closed Loop Machines. The distinguishing characteristics are that they are dry-to-dry, ventless, and do not exhaust to the atmosphere. The footprint or size of the equipment is analogous to a Perc Machine. D5 and water have a comparable specific gravity making solvent separation from water more complicated. The machine employs a specialized separator to achieve this task.

Original load-cycle times for all methylated siloxane solvent closed loop machines were typically longer than hydrocarbon. Newer machine designs utilize a larger blower capacity to shorten the cycle time. However, cycle times are still longer than comparably designed hydrocarbon solvent cycles.

Recently OHHEA evaluated the potential toxicity effects from exposure to decamethylpentacyclosiloxane, and issued an memo dated September 13, 2007. The results, while inconclusive, were not final and merits continued tracking from a regulatory perspective. The District currently characterizes the solvent by process as analogous to hydrocarbon dry cleaning and currently regulates this source type using an identical method.

## 3. Stoddard

Stoddard Solvent, also known as Mineral Spirits or White Spirit, is a paraffin-based transparent liquid organic solvent commonly used in many industrial processes including but not limited to, degreasing, printing, painting and dry cleaning. Stoddard is a hydrotreated mixture of saturated aliphatic and alicyclic C<sub>8</sub> to C<sub>12</sub> hydrocarbons with a maximum content of 25% C<sub>8</sub> to C<sub>12</sub> alkyl aromatic hydrocarbons. Stoddard has a flash point of 110 degrees F, contains benzene<sup>13</sup> and smells somewhat like kerosene.

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<sup>13</sup> Benzene is a Toxic Air Contaminant.

Historically, the use of highly flammable petroleum solvents led to many fires and explosions, which resulted in heavy regulation of petroleum solvent dry cleaning in the United States at the start of the 20<sup>th</sup> century. In 1924, a dry cleaner based in Atlanta, Georgia named W.J. Stoddard worked with the Mellon Research Institute to develop a less volatile dry cleaning petroleum solvent. The solvent grew in popularity but was eventually replaced by Perc. Yet during its use, the brand recognition became a permanent synonymous identifier for this type of solvent. Currently, only one facility in the Bay Area uses Stoddard solvent and the technology used is first generation transfer equipment.

#### 4. PureDry®

PureDry® (PureDry) was developed and produced by Niran Technologies, Inc as a replacement for Perc. It is a isoparaffin hydrocarbon blend of approximately 96 Percent by weight aliphatic hydrocarbons (C9 to C12) combined with approximately 4 Percent by weight of two halogenated compounds; a formulated perfluorocarbon (PFC) used to suppress the flashpoint of the hydrocarbons and hydrofluoroether (HFE) used to accelerate drying. The solvent has a flash point 350 degrees F, which is higher than most petroleum solvents and is accordingly classified as a class IIIB combustible liquid (flashpoint greater than 200 degrees F). PureDry can be used in most hydrocarbon machines with minor adjustments to temperature and cycle times.

#### 5. Rynex™ (propylene glycol ether) Cleaning

Rynex™ is the trade name for one of the glycol ether technologies; it is also known as Rynex 3, since this is the third formulation of the solvent. Rynex™ is an biodegradable low volatile organic solvent (VOC) comprised primarily of aliphatic glycol ethers with a flash point higher than petroleum solvents and is classified as a class IIIB combustible liquid (flashpoint greater than 200 degrees F). Although glycol ethers are readily miscible with water making separation difficult in a typical distillation phase, Rynex 3 is lighter than water, and therefore floats on water after separation. Rynex 3 can be used in most hydrocarbon machines with minor adjustments to temperature and cycle times. The differences in the physical properties between Perc and Rynex 3 make solvent conversions for Perc equipment difficult, and expensive. Although Rynex3 has been used in modified equipment originally designed to use Perc, both the machine manufacturers and the solvent manufacturers do not recommend this option. Several Dry Cleaners in the Bay Area currently use this solvent.

#### 6. Carbon Dioxide Cleaning

Liquid carbon dioxide (CO<sub>2</sub>) cleaning was originally examined by the USEPA through a contract with Los Alamos in 1994. Global Technologies and Raytheon Corporation presented a prototype at the Las Vegas Clean show in 1997. Over a dozen states have deployed CO<sub>2</sub> machines since 2000. Carbon dioxide dry cleaning technology uses pressurized CO<sub>2</sub> as a liquid solvent. These machines have a configuration similar to a Perc solvent machine, only with a larger footprint to accommodate the larger components needed to pressurize the drum. The drum is pressurized to a range between 700 and 800 pounds per square inch (PSI), which is about the same pressure used in a typical fire extinguisher.

The system is closed loop with a cleaning chamber (drum), solvent storage unit, filtration, lint trap, and distillation. Jets inside the chamber circulate CO<sub>2</sub> and detergent through the clothes. The jets simulate spinning or agitation motion within the pressurized drum. The CO<sub>2</sub> solvent is eventually evacuated to prevent re-depositing of the dirt onto the garments. A typical cycle is 35 to 40 minutes. At the end of the cycle, the pressure is released and the CO<sub>2</sub> returns to a gaseous state. Cooling and drying of the garments occurs when the CO<sub>2</sub> evaporates, a nearly instantaneous process.

The CO<sub>2</sub> used for solvent in this process does not contribute to global warming; it is already a by-product from another existing industrial operation, usually anhydrous ammonia operations (fertilizer production). Other commercial applications for liquid CO<sub>2</sub> have been to decaffeinate coffee beans and to carbonate beverages, such as soft drinks. The CO<sub>2</sub> can be stored in a bulk storage tank by the cleaner or the cleaner can use a service, which regularly changes out the empty tank as more CO<sub>2</sub> is needed.

Equipment costs for pressurized equipment, typically constructed of stainless steel, are expensive and hinder widespread adoption of this technology. Operational costs to optimally maintain the equipment needed to create the high pressure are more expensive than operational costs of a typical dry cleaner. Also, the cleaning technology is still evolving and with only one manufacturer of CO<sub>2</sub> equipment in the United States, growth will be slow. The District currently has two facilities using CO<sub>2</sub> machines.

## 7. Professional Wet Cleaning

Professional wet cleaning relies on water, detergent, conditioners and degreasers to clean clothing and textiles. Traditionally deployed by Industry as supplementary to PERC dry cleaning, less than a dozen facilities in the Bay Area exclusively use wet cleaning. The wet cleaning process is comprised of specific computer controlled equipment (washer, dryer) and specialized finishing equipment called tensioning equipment. Garments are washed in a carefully controlled environment and dried to a specific moisture level, via computer, to prevent shrinkage. The wet garments are hung and finished with the tensioning equipment. Any shrinkage that has occurred during the cleaning process is removed by stretching during the tensioning process and while the garment still retains residual moisture. This type of equipment has been available since 1991 and is generally less expensive than the equipment used by any of the other solvent alternatives.

## 8. Green Jet

The Green Jet machine also employs computer control similar to Professional wet cleaning to clean and dry garments, but it is completed in a single unit. Garments are dehumidified to reduce surface tension, which allows the kinetic motion of the drum and pulsed air jets to remove non-soluble dust and soil. A lint chamber collects the dislodged grime while a specific amount of water-based cleaner (usually less than a pint) is jet injected, re-hydrating the fabric. The drum agitation combined with the felt pads located along the ribs and drum cylinder absorb the soluble soil. Once the wash cycle concludes, a characteristic drying and cool-down phase follow to complete the cycle.

## H. Emerging Technologies

There are four emerging technologies anticipated to be complete and offered to the dry cleaning industry within the next few years. These technologies are: 1) Hydroclene Fluids, 2) Impress™; 3) Solvair™, and 4) Cold Water Cleaning Systems.

### 1. Hydroclene Fluids

Hydroclene is a clear liquid that represents a mixture of iso-, normal-, and cyclo-paraffins. The solvent has a flash point of 145 degrees F and a boiling point of 187 degrees C. Caled Chemical is the company developing this formulation, which is manufactured by Shell Chemical.

### 2. Impress™ Solvent

Impress™ is a biodegradable dry cleaning solvent that is another glycol-ether-based formulation. The solvent, aliphatic propylene glycol ethers, has a flash point of 190 degrees F and carries the same Combustible Liquid Class IIIA designation as most hydrocarbon solvents. Impress™, a VOC, can be used in most hydrocarbon machines with minor adjustments to temperature and cycle times. Lyondell Chemical Company is the company developing this formulation.

### 3. Solvair™ Dry Cleaning System

Solvair™ is a new hybrid dry cleaning technology that uses dipropylene glycol normal butyl ether (DPNB) and CO<sub>2</sub>. DPNB is not a new solvent; it is a Volatile Organic Compound (VOC) and has been widely used in consumer products for over 20 years. The Solvair™ design exploits the low volatility of DPNB in a pressurized system and uses liquid CO<sub>2</sub> to extract the DPNB without using heat. Once extracted, the garments dry through almost instantaneously, by depressurizing the equipment back to room normal (~14.7 PSI). This technology is being developed by R.R. Street.

### 4. Cold Water Cleaning Systems

Cold water cleaning systems utilize typical wet cleaning transfer equipment (washer and dryer) and temperature specific biodegradable detergents to wash and dry all fabrics. Chilled water (36 to 39 degrees F) is used by the washer to prevent and minimize potential fabric shrinkage and may reduce the amount tensioning needing to be done at the end of each drying cycle. The manufacturers of cold water cleaning systems are Suntech Company, Ltd. and By-For The Cleaners, Inc.

## IV. PROPOSED AMENDMENTS

### A. Regulation 8, Rule 27

The District originally adopted Rule 8-27, for Synthetic Solvent Dry Cleaning Operations as an ozone control measure in 1980. However, as newer federal and state regulatory standards progressed and became valid, new rules needed to be defined at the local level to address the 1993 Perc NESHAP and ATCM requirements. Rule 11-16 was created to identify and establish new solvent standards and control requirements. Once adopted by the District's Board, Rule 11-16 replaced Regulation 8, Rule 27 in 1994. This rule was retained as part of the District's regulations for SIP considerations; however, it is now proper to remove this obsolete rule. Staff recommends deleting this rule as a 'housekeeping' measure.

### B. Regulation 8, Rule 17

The proposed amendments to Rule 8-17 are intended to primarily update the equipment standards, control requirements and solvent definitions into the existing rule. This District regulation is currently applicable to petroleum solvents only. Although most of the newer solvent formulations are petroleum based, some are not. The newer alternative technologies currently available comprise a number of non-halogenated POC and NPOC solvents that need to be formally recognized and incorporated into the solvent definition currently defined by this rule. The title of Rule 8-17 "Petroleum Solvent Dry Cleaning Operations" should be updated to "Non-halogenated Dry Cleaning Operations." Staff recommends updating the solvent applicability and incorporating the new equipment standards into the current rule.

## 1. Operational Requirements

The proposed changes specify additional operational requirements for facilities using non-halogenated solvent. These requirements are more stringent than the District's current rule and are summarized below:

- All new machines must be closed loop.
- Existing transfer machines will continue to operate, but can only be replaced by a closed loop machine.
- All facilities must keep records for exemption or permit compliance.
- All facilities must report annually or as required.
- All facilities must register new equipment.
- All facilities must register ownership change. (Transfer of Ownership)

Additionally, there have been technology advances in alternative technologies since the last amendment in 1990 that need to be identified and codified into the rule. Staff therefore recommends incorporating these requirements into the current rule.

## 2. Prohibitions

The proposed requirements prohibit the highly emissive operational practice of transferring materials from the drum mid-cycle from a closed loop machine to a separate dryer. Additionally, four obsolete equipment types are being prohibited: new transfer equipment, vented machines, drying cabinets and dip tanks. Existing transfer equipment, presently 1 facility within the District, will not be affected. There are no examples of the other types of equipment in operation within the District. Finally, as a preventative measure to prevent reintroduction of toxic and potentially toxic compounds, and paralleling the Rule 11-16 proposal, halogenated solvents such as Perc or TCE are prohibited in spotting solution formulations. Staff recommends incorporating these prohibitions into the current rule.

## 3. District requirements

The District retains the regulatory authority to adopt requirements that are more stringent than state or federal specifications. These control and/or abatement mandates can be exercised in a variety of methods, such as by pollutant, process, equipment type, or even on a case by case basis. The adoption of stricter standards assures implicit compliance with all associated statutes. Often these "standards" are associated with recommended guidelines such as BACT. The District Board of Directors and/or Executive Officer reserve the right to grant the final authorization of these standards.

### a) Existing Standards

All Rule 8-17 standards are currently more stringent than State or Federal provisions.

The District has received delegation from EPA for regulation of petroleum dry cleaning equipment. The only Federal standard that exists for Petroleum Dry Cleaners is the NSPS standard<sup>14</sup>. Since there are no sources within the District that qualify as a Major Source as defined by this standard, the District is in compliance with all NSPS requirements by default. The NSPS definition of a major source uses more than 4700 gallons of petroleum solvent/year and also has a dryer drum capacity greater than 84 pounds (38 kg). The District's standards apply to all Petroleum dry cleaning equipment using less than 4700 gallons of solvent/year.

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<sup>14</sup> New Source Performance Standards.

The Federal Clean Air Act defines a major source as emitting 10 tons/year of any single HAP, or 25 tons/year of any combination of HAPs or 25 tons/year of VOC.<sup>15</sup> Currently, there are no petroleum dry cleaning sources within the District that exceed these emission levels to qualify as a major source.

There are no other existing Federal standards for alternative solvent dry cleaning.

There are currently no state standards for petroleum or alternative solvent dry cleaning.

## b) Proposed Standards

All proposed Rule 8-17 standards are currently more stringent than State or Federal provisions.

The current proposal is to add provisions to Rule 8-17 that continue the District's established practice of setting requirements that are more stringent than state or federal provisions. These new requirements will reflect the current level of technology, reasonable and acceptable improvements to emission control standards and improved recordkeeping and reporting requirements.

### i) Expansion of the definition of solvent

Alternative solvents have existed prior to the mainstream usage of Perc, but with the phase out of Perc mandated by the new Perc ATCM, newer ones are being introduced every year. The current proposal adds to the definition of solvent to reflect the newer products available. Additionally, staff recommends revising the Petroleum Dry Cleaning Operations rule to extend its definition and title to Non-halogenated Solvent Dry Cleaning Operations.

### ii) Additional definitions

Definitions have been added to parallel the definitions of Rule 11-16, when the description or process is similar. Other definitions define the new equipment types or further clarify previous definitions. Appendix A has a more detailed summary of the proposed changes.

### iii) Additional standards

Existing standards have been updated to better organize and define operational parameters. New standards have been added for closed loop machines. Standards have been added to parallel the controls of Rule 11-16, when the description or process is similar. A Prohibited equipment/Operations standard has been added to prevent reintroduction of archaic equipment types and to ban unnecessary or excessive pollution practices. A halogenated spotting solution prohibition has been added and is further discussed for Rule 11-16 in part IV.D.5.b)i) on page 29 of this document. Appendix A has a more detailed summary of the proposed changes.

### iv) Additional administrative requirements

Additional requirements have been proposed to further define the information required by the District, to keep contact and permit information concurrent. A registration requirement is also added. Appendix A has a more detailed summary of the proposed changes.

### v) Recordkeeping requirements

An updated, more definitive recordkeeping requirement has been added. The details parallel Rule 11-16 requirements for determining net solvent usage for permitted sources. Appendix A has a more detailed summary of the proposed changes.

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<sup>15</sup> Section 112(a)(1) Clean Air Act.

## 4. Specific Rule Changes

The proposed changes to Rule 8-17 are listed by section in Appendix A.

### **C. Regulation 2, Rule 1, Section 120**

The existing exemption level is for 700 gallons of solvent/year per facility. The proposed amendment to Regulation 2-1-120 is to broaden and extend the applicability to all alternative solvents subject to Rule 8-17, to lower the qualification level for this exemption and to require registration for equipment that will continue to qualify for this exemption. All of the proposed changes are more stringent than current State or Federal regulations. Staff recommends incorporating these changes into the current rule.

#### 1. Operational requirements

Alternative solvent technology has progressed from first generation transfer equipment to more efficient third generation closed loop controls. Correspondingly, these machines now use less solvent and have lower emissions. From a regulatory perspective, lowering this exemption level is the logical next step to further demonstrate effective regulation and compliance for this source type. The proposal is to lower the gross solvent usage exemption qualification levels for a facility, currently set at 700 gallons/year, down to 200 gallon/yr. Facilities that exceed this limit must obtain a Permit from the District. All exempt facilities using less than 200 gallon/yr must register their equipment with the District.

#### 2. Registration

As a baseline determination tool, registration requirements for exempt dry cleaning facilities would assist in providing a complete picture to determine the location, number of facilities, machine characteristics, and types of solvent used in the Bay Area. Registration would recover the costs of inspecting these facilities.

#### 3. Basis

In 2004, The District surveyed 250 alternative solvent dry cleaning facilities to determine typical usage over a one year period. The data gathered from the questionnaires revealed very different operating practices for different sizes of machines, even from the same manufacturer. Net solvent usage, solvent recovery data, mileage numbers<sup>16</sup> varied widely. Gross solvent usage provided a fairly consistent dimension of measurement. Figure IV – C1 shows that only 13 facilities had gross solvent usage over 200 gallons/yr, which is 5% of all alternative solvent facilities. The information collected by the questionnaire provided compelling evidence that lowering the exemption level was reasonable and would not present an unacceptable burden for alternative solvent equipment.

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<sup>16</sup> The efficiency of solvent use at a facility (pounds of materials cleaned per gallon of solvent).

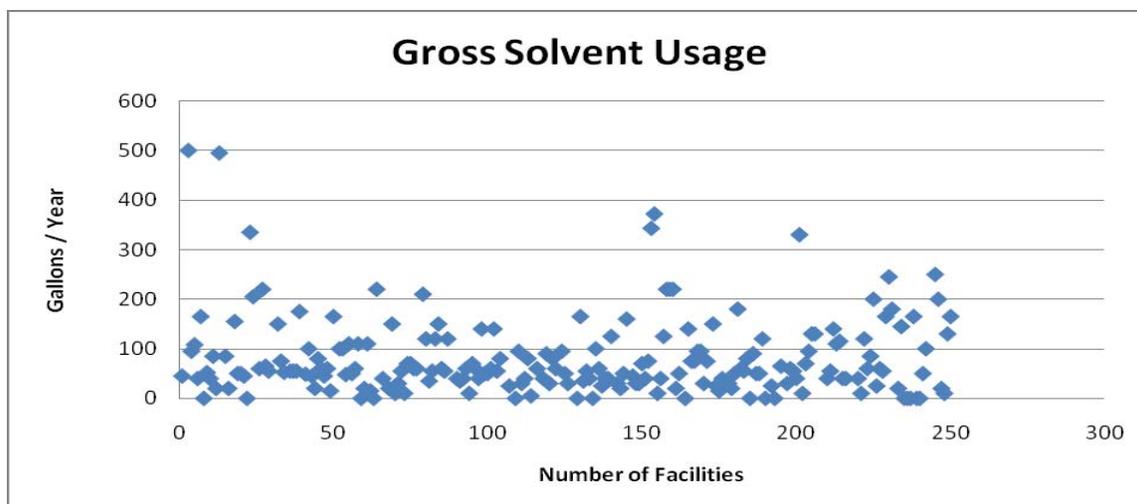


Figure IV – C1 Alternative Solvent Annual Usage

### D. Regulation 11, Rule 16

The proposed amendments to Rule 11-16 are intended to primarily adopt the requirements of the Perc ATCM, now state law, into the existing rule. This District regulation is applicable to both Perc and synthetic solvents, whereas, the ATCM is specific to Perc only. Simply adopting the ATCM by reference would relax the Districts' current standard for all of the existing and potential synthetic solvents currently defined by this rule. Staff recommends incorporating the new Perc ATCM requirements into the current rule. The amended NESHAP, amended ATCM and the proposed rule are compared in Table 4.

#### 1. Operational Requirements

The ATCM specifies additional operational requirements for facilities using Perc solvent. These requirements are more stringent than the District's current rule and are summarized below:

- Facility must report make, model, serial number, and age of machine.
- Annual leak checks with a leak detector that gives a quantitative result.
- Facility must have the following spare gaskets (loading door, still, lint trap, button trap, and water separator) on premises.
- Facility must have a spare lint filter.
- Button and lint traps must be cleaned and inspected on a daily basis.
- Shorter times allowed for repair (up to 7 days in rare cases).
- 5 years of recordkeeping.
- Trained operator must be on site while dry cleaning equipment is in operation.
- The original record for the completion of the environmental certification for each trained operator must be retained during the employment of that person and a copy must be retained up to 2 years beyond separation of employment at the facility.

For the District to demonstrate equivalence, these ATCM standards must be added. Staff therefore recommends incorporating these requirements into the current rule.

## 2. Equipment Prohibitions

The ATCM requirements prohibit new and relocated Perc solvent equipment starting on January 1, 2008. The District is currently enforcing this provision and in compliance with this ATCM mandate. No permits for new or relocated Perc solvent equipment have been issued on or after January 1, 2008. Additionally, three obsolete equipment types are being prohibited: external water repelling operations<sup>17</sup>, drying cabinets and dip tanks. There are no sources of these types operating within the District. Adopting these explicit prohibitions will demonstrate equivalence with the ATCM equipment prohibition standards and prevent a reintroduction of this type of emissive technology for other solvent types. Staff recommends incorporating these prohibitions into the current rule.

## 3. Equipment Phase-out Provisions

The ATCM requirements mandate an equipment phase out starting on July 1, 2010. These requirements are more stringent than the District's current rule and are summarized below:

- Eliminates the use of existing Perc machines at co-residential facilities by July 1, 2010;
- All Converted machines must cease Operation on July 1, 2010.<sup>18</sup>
- Requires that machines that are 15 years or older be removed from service effective July 1, 2010;
- Requires that all Perc solvent equipment prohibited by January 1, 2023.

Once the equipment has been retired on/after July 2010, then the equipment may not be retained after that date for continued water repelling operations. The equipment date of manufacture is the key determining factor used to determine the retirement date. If the date cannot be determined, it must be retired on July 1, 2010. Staff recommends incorporating these Perc solvent ATCM phase out provisions into the current rule.

## 4. Perc manufacturers, Distributors and Reseller Requirements

The ATCM requirements identify recordkeeping requirements for Perc manufacturers, distributors and resellers who do business in the state of California. They are required to report and keep records of all Perc solvent transactions and submit them to regulatory agencies on an as needed basis. Staff recommends incorporating these new requirements into the current rule.

## 5. District requirements

The District retains the regulatory authority to adopt requirements that are more stringent than state or federal specifications. These control and/or abatement mandates can be exercised in a variety of methods, such as by pollutant, process, equipment type, or even on a case by case basis. The adoption of stricter standards assures implicit compliance with all associated statutes. Often these "standards" are associated with recommended guidelines such as BACT, or TBACT. The District Board of Directors and/or the Executive Officer reserve the right to grant the final authorization of these standards.

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<sup>17</sup>Water repelling operations must be completed inside closed loop equipment.

<sup>18</sup> converted to close loop, these once vented machines use an external water-cooled "chiller" for primary control.

## a) Existing Standards

Rule 11-16 currently has three standards that are more stringent than state or federal provisions.

### i) Enhanced Ventilation

The District requires enhanced ventilation to promote dispersion of fugitive solvent vapors and reduce overall solvent exposure to nearby receptors working and living near a dry cleaning facility. Enhanced ventilation is primarily used as a risk mitigating measure, lowering the potential cancer risk to acceptable levels.

### ii) Secondary Control

The process for dry cleaning is very similar in most mechanical and design applications, regardless of solvent type, making the type of emission controls almost universal. The BACT standard for synthetic solvent equipment has been a 4<sup>th</sup> generation secondary control machine. The TBACT NSR standard for synthetic solvent equipment also requires secondary control. Carbon adsorption is currently the most effective form of secondary control available for dry cleaning technology. The solvent emissions concentrations from the drum at the end of a typical Perc solvent cleaning cycle have been measured at less than 300 ppmv, an effective implementation of this equipment standard.

### iii) Synthetic Solvent Applicability

The strict operational, maintenance, recordkeeping and reporting requirements of Rule 11-16 specific to Perc solvent equipment have extended applicability to all synthetic solvent equipment.<sup>19</sup> All synthetic solvents are then subject to the same standards as Perc solvent such as secondary control for all new sources, regular leak checks, proper equipment maintenance, solvent inventory, maintenance records, hazardous waste manifests and annual reporting. This extension of BACT standards to all synthetic solvents is one of the most comprehensive and effective regulatory methods for this solvent type. This maintains a uniform standard for compliance determination, and simplified regulatory requirements for all synthetic solvent equipment.

## b) Proposed Standards

The current proposal is to add three standards to Rule 11-16 that are more stringent than state or federal provisions.

### i) Spotting Solution Formulation Prohibition

Spotting Solutions are commonly used by all dry cleaning facilities to remove localized spots or stains on fabrics such as drapes, clothing or other textiles, and are typically applied before or after the dry cleaning process. Although newer effective spotting solution formulations currently exist that are soy or water based, most formulations contain mixtures of more volatile VOCs; however, halogenated solvents, such as Perc, trichloroethylene (TCE) or methylene chloride are often used, either as a component or in pure form, during more difficult spot removal circumstances.

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<sup>19</sup> unless the section or subsection is specifically worded for Perc solvent.

CARB is in the initial stages of modifying the California Consumer Products Regulation to ban halogenated solvents to prevent product manufacturers from reintroducing these toxic compounds as they reformulate their consumer spotting products to comply with lower VOC requirements. Correspondingly, the elimination of halogenated solvents at the professional level should be done as a preventative measure, to remove the possibility of continued exposure of these solvents to nearby workers and residents even beyond the Perc solvent equipment phase out timetable.

The proposal is to prohibit halogenated solvent spotting formulations, effective immediately to prevent the reintroduction of these compounds into professional products and homebrew formulations. Staff recommends incorporating this new requirement into the current rule.

#### ii) Reporting Requirement

The Perc ATCM mandates all Perc equipment older than 15 years from date of manufacture to cease operation on July 01, 2010. The proposal is to require all facilities using Perc equipment that must cease operation on this initial date to declare their intent by December 31, 2009 either to install alternative solvent equipment or to retire their existing equipment. The intent is to obtain advanced confirmation for scheduling a final inspection by enforcement staff or to encourage submission of all applicable paperwork for the alternative solvent equipment in advance of the deadline. The reporting requirement will facilitate an orderly transition in advance of the initial Perc solvent equipment prohibition date. Staff recommends incorporating this new requirement into the current rule.

#### iii) ATCM Extension

The proposal is to incorporate the new Perc ATCM requirements into the existing synthetic solvent applicability provision. Thus all synthetic solvent equipment subject to Rule 11-16 would be required to comply with the stricter operational, maintenance, recordkeeping and reporting requirements mandated for Perc solvent. These stricter standards were intended to reduce potential exposure to a specific toxic air contaminant, but would become generalized to all potential toxic air contaminants. All synthetic solvent equipment would be required to the following:

- Facility must have the following spare gaskets (loading door, still, lint trap, button trap, and water separator) on premises.
- Facility must have a spare lint filter.
- Button and lint traps must be cleaned and inspected on a daily basis.
- Shorter times allowed for repair (up to 7 days in rare cases).
- 5 years of recordkeeping.

Synthetic solvent equipment would not be subject to Perc operator certification or Perc solvent phase out requirements. Staff recommends incorporating these equipment and operational standards for all synthetic solvents into the current rule.

## 6. Specific Rule Changes

The proposed changes to Rule 11-16 are listed by section in Appendix B. Comparison of the proposed rule with the amended NESHAP and amended ATCM are summarized in Table 4.

**Table 4. Comparison of Proposed Regulation 11, Rule 16 with amended ATCM and amended NESHAP**

BAAQMD Reg. 11-16, Section (s)	ATCM, 17CCR Section 93109 Subsection (s)	NESHAP, Part 63, Subpart M Section (s)	Comments
11-16-101	(a)	320 (a)	District is more explicit because the scope includes Perc and all synthetic solvents. NESHAP & ATCM only regulate Perc Solvent.
11-16-102	(b)&(h)(4)	322 (a) (3)	ATCM :Water Repellant Treatment & Dip Tank Operations are prohibited. NESHAP: allows transfer operations of Perc saturated garments, if enclosed and ventilation operates continuously. The ATCM is more stringent. District is more comprehensive because the applicability is for all synthetic solvent. The District is incorporating the ATCM provisions and will be just as stringent for Perc solvent.
11-16-103	--	--	Exemption & applicability Rule 8-17 for alternative solvents.
11-16-104	(e) & (g)	322 (o) (4)	Relocation exemption- ATCM: no new facilities after 1/1/08 eliminates relocated facilities. NESHAP: no new Co-Residential Facilities or Relocations after 12/1/05. NESHAP is more stringent for Co-Residential Facilities on or after 12/01/05. The District has no facilities that qualify for this provision. The ATCM, once enacted is more stringent because it applies to all facilities. This provision will be deleted to comply with the ATCM.
11-16-105	h (1)	322 (a) (3)	Drying Cabinets - ATCM: prohibited 1/1/08. NESHAP: allows transfer of garments if the source is enclosed. The ATCM provision is more stringent. This provision will be deleted to comply with the ATCM.
11-16-106	e (2)	322 (a) (3)	Pass Through Clean Room Garment Cleaner deletion. Obsolete Definition. No Sources of this type exist.
11-16-108	g	--	ATCM clarification of District approval to mean APCO approval and section g is not applicable. The District is more stringent because relocations for Perc equipment is no longer allowed.
11-16-241	e (2)	322 (a) (3)	Pass Through Clean Room Garment Cleaner deletion. Obsolete Definition. No Sources of this type exist.
11-16-242	--	--	Perceptible Vapor Leak - obsolete definition deleted.
11-16-266	--	--	Water Repellant Operation deleted, replaced by section 279 to be specific as ATCM. No NESHAP equivalent.
11-16-267	d(1)	--	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-268	d(3)	321	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-269	d(16)	321	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-270	d(26)	321	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-271	d(27)	321	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-272	d(37)	321	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-273	d(41)	321	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.

11-16-274	d(44)	--	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-275	d(45)	321	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-276	d(33)	--	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-277	d(34)	--	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-278	--	--	District definition. No equivalent definition in NESHAP or ATCM.
11-16-279	d(56)	--	ATCM incorporation, More specific than NESHAP, District definition equivalent to ATCM.
11-16-301.1.4	e (2)	322	Requirements for existing non-residential facilities: Deletion: Obsolete provision. No sources of this type exist within District. District more stringent than NESHAP or ATCM, applicability for other solvents.
11-16-301.2.1	f	322	Requirements for New Non-residential facilities: Deletion: Obsolete provision for other synthetic solvents. District provision as stringent as ATCM, more stringent than NESHAP for Perc solvent.
11-16-302	f	322 (b)	Requirements for new non-residential facilities: secondary control required; more stringent than ATCM and NESHAP. District provision as stringent as ATCM for Perc solvent.
11-16-302.2	f	322 (a) & (b)	Requirements for new non-residential facilities: Perc Equipment phase out provision added; required by ATCM; more stringent than NESHAP phase out provision. District is more stringent with applicable standards for synthetic solvent other than Perc.
11-16-303	h (3)	322 (a) & (b)	Requirements for Co-residential facilities: is more stringent than ATCM and NESHAP by requiring secondary controls, vapor barrier rooms and ventilation systems. Requirements for Co-residential facilities: more stringent than NESHAP which phases out 12/21/20; ATCM 7/1/10 Perc solvent phase-out provisions added, District as stringent as ATCM provisions for Perc. District provisions more stringent because they apply to all synthetic solvents.
11-16-303.2	e (2)	322	Requirements for Co-residential facilities: Deletion: No sources of this type exist within District: Obsolete provision.
11-16-303.3.1	--	--	Requirements for Co-residential facilities: Deletion: Obsolete Perc Phase-in provision.
11-16-304.1 – 11-16-304.8	--	--	Prohibited equipment/Operations: format change.
11-16-304.3	g (1)	322 (b)	Prohibited equipment/Operations: Language update.
11-16-304.9	e (1)		Prohibited equipment/Operations: ATCM: No new facilities after adoption date. More Stringent than NESHAP. District more stringent than ATCM, this provision applicable to all synthetic solvents.
11-16-304.10	h (1)	322	Prohibited equipment/Operations: ATCM: Dip Tanks, Drying Cabinets are leftover equipment types that are from transfer operations. We have no permitted sources of this type. This is a more stringent requirement than the NESHAP. District more stringent than ATCM, this provision applicable to all synthetic solvents.
11-16-304.11	--	--	Prohibited equipment/Operations: Halogenated Spotting Solution ban prevents facilities finding a new use for potentially toxic leftover chemicals, such as Perc, from being used. More Stringent than ATCM or NESHAP. District Provision.

11-16-304.12	h (3)	322 (o) (4)	Prohibited equipment/Operations: ATCM: Prohibits Co-Residential Facilities after 7/1/10. More Stringent than NESHAP. District as stringent as ATCM.
11-16-304.13	f	322 (a) (3)	Prohibited equipment/Operations: ATCM: Prohibits Converted machines after 7/1/10. More Stringent than NESHAP. District as stringent as ATCM.
11-16-304.14	h (4)	322 (a) (3)	Prohibited equipment/Operations: ATCM :Prohibits equipment 15 yrs or older after 7/1/10. More Stringent than NESHAP. District as stringent as ATCM.
11-16-304.15	h (5)	322 (o) (4)	Prohibited equipment/Operations: ATCM: Prohibits all Perc equipment after 1/1/23. More Stringent than NESHAP, District as stringent as ATCM.
11-16-305.2	--	--	Specifications for Required Equipment: Language update.
11-16-305.5	h (1)	322 (b)	Specifications for Required Equipment: ATCM: Deletion: Drying Cabinet & Pass-through Garment Obsolete Equipment Specification. More Stringent than NESHAP. District provision more stringent than ATCM because it is applicable to all synthetic solvents.
11-16-306		322	Deleted. Obsolete vented equipment standard.
11-16-307	--	322	Ventilation Requirements: language update. District is more stringent than NESHAP or ATCM requirements.
11-16-308	l	322 (b)	Water-Repellant Treatment: Requirements Update required by ATCM. More Stringent than NESHAP. District provision equivalent to ATCM provisions for Perc solvent. District provisions more stringent because of the applicability for all synthetic solvents.
11-16-309.1.4.b	--	--	Deletion of obsolete equipment standards.
11-16-309.2.5	i (2) (E)	322 (j) & (k) & (m)	Good Operating Practices: ATCM Leak Check requirement changes. ATCM more Stringent than NESHAP. District as stringent as ATCM for Perc solvent, but more stringent because the applicability is extended for all synthetic solvents.
11-16-309.6	i (2) (A)(6)	--	Good Operating Practices: Site Gasket Requirement. ATCM more Stringent than NESHAP. District as stringent as ATCM for Perc solvent, but more stringent because the applicability is extended for all synthetic solvents.
11-16-309.7	i (2) (A)(7)	--	Good Operating Practices: Spare lint filter Requirement. ATCM more Stringent than NESHAP. District as stringent as ATCM for Perc solvent, but more stringent because the applicability is extended for all synthetic solvents.
11-16-310.1	i (1) (B)	--	Environmental Training Requirement. ATCM more Stringent than NESHAP. District as stringent as ATCM.
11-16-310.3	i (2) (D)	--	Environmental Training Requirement: Replacement Operator. ATCM more Stringent than NESHAP. District as stringent as ATCM.
11-16-401.4	k	324	Reporting Requirements: Initial Notification - ATCM requires collection of serial numbers of machines. ATCM more Stringent than NESHAP. District as stringent as ATCM.
11-16-401.6	--	--	Reporting Requirements: Initial Notification - Existing Facility provision deleted – obsolete provision.
11-16-402	e	324	Reporting Requirements: District is more stringent than ATCM and NESHAP, requiring waste data used, to calculate emissions.

11-16-403	j	320	Reporting Requirements: Compliance Schedule: Facilities are subject to NESHAP and ATCM until adoption of rule. District will be as stringent ATCM and more stringent than NESHAP.
11-16-404	--	--	Conversion Reporting requirement. District is more stringent than NESHAP or ATCM.
11-16-501	j (1)	324	Recordkeeping: at least as stringent as ATCM and more stringent than NESHAP. Several additional records useful for emissions & compliance determination.
11-16-501.2	--	--	Language update: unit clarification (gallons)
11-16-503	93109.2(a)&(b)	--	Perc Manufacturer Reporting Requirements. District as stringent as ATCM. District more stringent than ATCM.
11-16-504	93109.2(a)&(b)	--	Perc Distributor Reporting Requirements. District as stringent as ATCM. District more stringent than ATCM.
11-16-605	h	323	2-5 Language update: HRSA
Table 11-16-1			Phase out Schedule in table form. Equivalent to ATCM phase out provision requirements. District more stringent than NESHAP

## V. RULE DEVELOPMENT / PUBLIC PROCESS

This report and the associated Public Workshop constitute the most recent step in the District's rule development process for revising the rules regulating dry cleaning equipment. The purpose of the Public Workshop is to solicit comments from the public on the propose amendments to Rule 11-16, Rule 8-17, and Rule 2-1. During the workshop, staff will also respond to questions about information presented in the workshop report. Based on the input received at the end of the workshop and during the associated public comment period, staff will assess whether changes to the proposal are necessary prior to preparing final proposed amendments for consideration at a public hearing before the District's Board of Directors. For informational purposes, some of the information used in this report came from the following methods:

### A. Outreach Efforts

The District sent out a preliminary informational request May 2008 to inform Perc solvent facilities about the new state dry cleaning standards and to request specific equipment information as required by the ATCM. Preliminary information about upcoming changes to District dry cleaning regulations per the state and federal changes also were discussed. Furthermore, the District participated in an EPA grant over a two year period to showcase wet cleaning/CO<sub>2</sub> as viable alternatives. District staff was in attendance at several workshops to discuss upcoming regulatory changes formally and informally.

### B. Public Involvement

District staff attended several public meetings as part of the ARB's outreach efforts to provide information about the changes to the ATCM. Three of these meeting occurred in the evening as part of the outreach to the Korean community<sup>20</sup> in the Bay Area.

<sup>20</sup> Northern California Korean Dry Cleaners and Launderers

### **C. Industry Involvement**

District staff maintains industry involvement by keeping an on-going workgroup, meeting quarterly, that comprises dry cleaning operators, cleaners associations, machine manufacturers, solvent manufacturers and environmental groups. Most of these workgroup members also actively participated in the development of the ATCM amendment process. They also have previewed earlier drafts of the proposals for the dry cleaning rule update and provided technical information.

### **D. Government Agency Involvement**

District staff participated in the development of the ARB's Perc dry cleaning ATCM, and ARB Regulatory Committees via conference calls to review, revise and address issues from a permitting and enforcement perspective regarding the Perc ATCM standards. Additionally, District staff provided input into the 2006 Perc NESHAP revision.

### **E. Dry Cleaning Surveys**

District Staff conducted a survey in 2004 to obtain information on operational practices from alternative solvent facilities. The questionnaire and cover letter was translated into Chinese, Korean, and Spanish to assist owners and/or operators who spoke English as a second language (See Appendix B). The questionnaire was sent to all non-halogenated solvent facilities listed in the District's records. The return rate of the survey was 100 % of the exempted facilities. Enforcement staff provided key assistance to alternative solvent facilities which facilitated such a high return rate.

## **VI. CONCLUSION**

This report describes proposed revisions to District regulations regarding dry cleaning operations. These revisions incorporate recent amendments to state and federal dry cleaning regulations and development of new technology by the dry cleaning industry. Staff will conduct a workshop in December 2008 to present these proposed rule revisions and to receive public comment. The proposed rule revisions are expected to be presented to the Board of Directors for adoption in February, 2009.

## References:

ARB, 1991, Initial Statement of Reasons for Rulemaking, Staff Report/Executive Summary, and Part B, Proposed Identification of Perchloroethylene as a Toxic Air Contaminant, California Air Resources Board, August 1991.

ARB, 1993, Airborne Toxics Control Measure (ATCM) for Emissions of Perchloroethylene from Dry Cleaning Operations, California Air Resources Board, October 14, 1993.

ARB, 2006, California Dry Cleaning Industry Technical Assessment Report, California Air Resources Board, February 2006.

ARB, 2007, Airborne Toxics Control Measure (ATCM) for Emissions of Perchloroethylene from Dry Cleaning Operations, California Air Resources Board, January 25, 2007.

ARB, 2008, Initial Statement of Reasons for Proposed Amendments to the California Consumer Productions Regulation, Spot Removers, California Air Resources Board, May 9, 2008.

IRTA, 2005, Evaluation of New and Emerging Technologies for Textile Cleaning, Institute for Research and Technical Assistance, August 2005

USEPA, 1984, Standards of Performance for New Stationary Sources, Subpart JJJ-Standards of Performance for Petroleum Dry Cleaners, United States Environmental Protection Agency (U.S. EPA), September 21, 1984.

USEPA, 1993, National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities, Subpart M, United States Environmental Protection Agency (U.S. EPA), 40 CFR Part 63, September 22, 1993.

USEPA, 1996, Air Quality; Revision to Definition of Volatile Organic Compounds—Exclusion of Perchloroethylene, United States Environmental Protection Agency (U.S. EPA), 40 CFR Part 51, March 08, 1996.

USEPA, 2006, National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities, Subpart M, United States Environmental Protection Agency (U.S. EPA), 40 CFR Part 63, July 27, 2006.

USEPA, 2008, National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities, Subpart M, United States Environmental Protection Agency (U.S. EPA), 40 CFR Part 63, July 11, 2008.

Appendix A

## Regulation 8, Rule 17 Rule Change Summary

Section	Comments
<b>GENERAL</b>	
101	Updating definition from petroleum to non-halogenated solvent.
102	Applicability definition added.
110	Clarification of solvents subject to other regulations (Rule 11-16)
111	Small user exemption deleted.
112	Exemption added for existing transfer equipment.
<b>DEFINITIONS</b>	
201	The Petroleum solvent definition updated and expanded to include all known alternative solvents
202	The facility definition was update to be equivalent to Rule 11-16.
204	The cartridge filter definition was updated to reflect the improvements in technology.
205	The dry weight definition was updated.
206	The Solvent Liquid leak definition was updated.
207	The Solvent vapor leak definition was updated.
208	The Transfer Cart definition was updated.
209	Adsorptive Filtration System definition added for new technology for hydrocarbon machines.
210	Closed-loop machine definition added to define new technology.
211	Co-located definition added to clarify type of facility.
212	Condenser definition added to define emissions control technology.
213	Cool down definition added to clarify the part of the cycle where solvent recovery occurs.
214	Control device definition added to define the function of the condenser and adsorber devices.
215	Date of compliance definition added to clarify regulatory deadlines.
216	District definition added to demonstrate equivalence with other regulation.
217	Dip tank operations definition added to explain a specific process.
218	Drum definition added to clarify machine operation.
219	Dry cleaning definition added to clarify a specific process.
220	Dry Cleaning equipment definition added to specify equipment category.
221	Dry cleaning system definition added to specify groups of components within equipment.
222	Drying cabinet definition added to specify equipment type.
223	Drying tumbler or dryer definition added to clarify a specific component.
224	Dry-to-dry unit definition added to specify equipment type.
225	Equivalent primary control system definition added to clarify equivalent processes.
226	Existing facility definition added to clarify facility category.
227	Existing machine definition added to clarify equipment category.
228	Gallons of solvent used definition added to clarify solvent usage.
229	Materials definition added to clarify a specific component processed.
230	Muck cooker definition added to identify a process type.
231	New facility definition added to clarify facility category.
232	New machine definition added to clarify equipment type.
233	Pounds of material cleaned per load definition added to clarify measurement.
234	Primary control system definition added to specify solvent recovery technology.
235	Refrigerated condenser definition added to specify type of emissions control technology.
236	Registration definition added to define a type of regulatory process.
237	Relocated machine definition added to clarify facility category.
238	Separator facility definition added to identify a process type.
239	Spotting solution definition added to identify a supplementary cleaning process.
240	Still definition added to identify a solvent recovery process.
241	Transfer machine definition added to clarify equipment type.
242	Transfer of ownership definition added to clarify equipment proprietorship.
243	Used machine definition added to identify an equipment type.

244	Vented machine definition added to clarify equipment type.
245	Waste from dry cleaning operations definition added to identify a component of a solvent recovery process.
246	Wastewater evaporator definition added to identify a specific equipment type.
247	Water-repelling operations definition added to clarify a specific textile treatment process.
<b>STANDARDS</b>	
301	Operating requirements expanded: Leak check requirements expanded to require a checklist to be completed on a monthly basis, noting leaks with 14 days from the recording date to repair them. Closed container requirements are more specifically worded. Solvent minimization requirement formalized. Hazardous waste requirement updated. Existing Transfer Operations modified to minimize transfer times. Solvent recovery and wastewater evaporation requirements added.
302	Emission Control Requirements standard updated to be specific for existing transfer machines
303	Solvent filtration requirement deleted.
304	Equipment requirements standard added to required closed loop technology.
305	Prohibited equipment/operations standard added. New/replacement transfer/vented prohibited. Dip tank/drying cabinets prohibited. Transfer of wet clothes from/to closed loop equipment prohibited. Halogenated solvent spotting prohibited.
306	Specifications for closed loop machines standard added. Exhausting to atmosphere during operation not allowed. Primary control system must reduce mass of solvent during a specific part of the operational cycle and must be as efficient as a refrigerated condenser. Primary control system cannot require additional water if it comes into direct physical contact with the solvent.
307	Water-repelling operations standard added to require this process with closed loop equipment.
<b>ADMINISTRATIVE REQUIREMENTS</b>	
403	Initial notification requirement added to specify minimum written informational requirements for equipment evaluation.
404	Registration requirement added for exempt equipment types.
405	Annual reporting requirement added to specify types of data used for the yearly facility reporting.
406	Transfer of ownership requirement added to keep contact information current.
<b>MONITORING AND RECORDS</b>	
501	Small user record requirement deleted.
502	Solvent filtration records requirement deleted.
503	Recordkeeping requirement added: 2 yrs, date, lbs cleaned/load, solvent consumption, solvent waste, monthly leak checks, and the equipment operations manual must be kept on-site.

Appendix B

## Regulation 11, Rule 16 Rule Change Summary

Section	Comments
<b>GENERAL</b>	
101	Updating description to be consistent with Perc ATCM.
102	Updating applicability to be consistent with Perc ATCM.
103	Updating exemption for other solvents to reference proposed non-halogenated solvent of Rule 8-17.
104	Deleted relocated facility limited exemption.
105	Deleted dry cabinets limited exemption.
106	Deleted pass through clean room garment cleaners limited exemption.
108	Perc ATCM applicability added to demonstrate compliance with ATCM provisions delegated to the District.
<b>DEFINITIONS</b>	
205	Closed loop definition updated to include secondary control machines.
206	Co-commercial definition was updated for clarification purposes.
207	Co-residential definition was updated and simplified for clarification purposes.
214	Dip tank definition was updated to clarify the specific components of the process.
218	Dry cleaning equipment definition was updated to include other equipment types.
219	Dry cleaning system definition was updated to include "any" process.
220	Drying cabinet definition updated for better process definition.
221	Drying cycle definition was updated to clarify equivalent processes on specific equipment types.
223	Drying tumbler definition was deleted.
224	Dry-to-dry unit definition updated to clarify a specific process.
225	Environmental training program definition was updated to better clarify the California Code of Regulations reference.
229	Facility definition was updated to refine the definition.
233	Gallons of solvent used definition was updated definition syntax
234	Halogenated-hydrocarbon detector definition was updated to refer to "Perc".
235	Major facility definition was updated with minor syntax changes.
239	New facility definition was updated to remove the relocated facility reference.
241	Pass through clean room garment cleaner definition deleted.
242	Perceptible vapor leak definition deleted.
243	Perchloroethylene definition was updated to better clarify the California Code of Regulations reference.
246	Primary control system definition was updated to define the specific process used for emission control.
249	Refrigerated Condenser definition was updated to better identify a specific process.
250	Relocated facility definition updated to "relocated dry cleaning equipment" with an updated definition.
251	Secondary control system definition was updated to identify a specific process.
253	Self-service dry cleaning machine definition updated to specify equipment type.
256	Synthetic solvent or solvent definition was updated to include reference to proposed Rule 8-17 changes.
257	Tetrachloroethylene definition updated to better clarify the California Code of Regulations reference.
259	Transfer machine definition was updated to be more specific to equipment.
262	Vapor leak definition updated to further clarify all synthetic solvent, rather than leaks specific to Perc solvent.
263	Vented machine definition updated to further define the exhaust process.
264	Waste from dry cleaning operations definition updated to reference section 309 required good operating practices.
265	Waste water evaporator definition changed to "Wastewater evaporator" and "atomizes" added to the definition.
266	Water repellent treatment definition completed.
267	Add-on secondary control machine definition added to clarify differences in secondary control systems. (ATCM)
268	Carbon adsorber definition added to specify solvent recovery technology. (ATCM)

- 269 Dry cleaning machine definition added to specify category of equipment types. (ATCM)
- 270 Integral secondary control system definition added to specify solvent recovery technology. (ATCM)
- 271 Secondary control system definition added to identify specific components of equipment used in solvent recovery.(ATCM)
- 272 Primary control machine definition added to identify a specific equipment type. (ATCM)
- 273 Recycled synthetic solvent definition added to identify a component of the solvent recovery process. (ATCM)
- 274 Remove from service definition added to clarify inoperable equipment types.(ATCM)
- 275 Residence definition added to specifically identify which households can be categorized as long term. (ATCM)
- 276 Solvent distributor definition added to identify a specific group referenced in the Perc ATCM section 93109.2.
- 277 Solvent manufacturer definition added to identify a specific group referenced in the Perc ATCM section 93109.2.
- 278 Spotting solution definition added to identify a specific solution used by the dry cleaning industry.
- 279 Water-repelling operations definition added to clarify a specific textile treatment process.

**STANDARDS**

- 301 Final equipment requirements standards updated to remove the word final from the standard and deletes the references to equipment types now prohibited.
- 302 Equipment requirements, new non-residential facilities standard updated to include a reference to prohibited equipment in section 304 and an updated reference to Rule 2-5, Toxics NSR.
- 303 Final equipment requirements, co-residential facilities standard updated to remove the word final from the standard and references section 304 to prohibited equipment types.
- 304 Prohibited equipment/operations requirements standard updated the format of existing prohibitions and the Perc ATCM equipment prohibition timeline has been added. Halogenated Spotting solutions also prohibited.
- 305 Specifications for required equipment standard updated to remove standards for updated equipment minor grammatical syntax updated.
- 306 Specifications for interim equipment and controls standard deleted.
- 307 Ventilation requirements standards updated to be consistent with definition syntax.
- 308 Water-repellent treatment and dip tank operations standard updated to remove equipment prohibited by Perc ATCM, such as Dip Tank operations. This standard has been renamed water repelling operations.
- 309 Required good operating practices standard updated to reference that the Perc ATCM standards shall apply to all synthetic solvents. Several CCR references format updated. The applicable standards for equipment types already prohibited are deleted. Grammatical syntax updated throughout standard to be consistent with definitions. Leak repair updated to be consistent with Perc ATCM. Spare gaskets and spare lint trap requirements added to be consistent with Perc ATCM.
- 310 Environmental training requirements standards updated to include the applicable reference to the appropriate CCR references. Additional requirements from the Perc ATCM added, such as operator must be present at all times equipment is in operation and the replacement operator certification must be completed within 15 days.

**ADMINISTRATIVE REQUIREMENTS**

- 401 Initial notification requirement added to specify minimum written informational requirements for equipment evaluation. Serial number, dates of equipment manufacture and types of solvents used requirements added to conform with Perc ATCM.
- 402 Annual reporting requirement updated to include a reference to CCR for Perc ATCM. Format syntax also updated. Make, model, serial number, types of solvents used and date of manufacture requirements added.
- 403 Compliance schedule requirement updated to address a timeline imposed by the Perc ATCM phase out requirements.
- 404 Conversion from Perc to non-Perc requirement added to create a deadline for switching to an alternative dry cleaning method.

**MONITORING AND RECORDS**

- 501 Recordkeeping requirement updated to include a reference to the CCR and the 5 year recordkeeping requirement. Solvent information must kept in gallon units. Minor grammar updates to be consistent with definition syntax.
- 502 Equipment certification/testing requirements updated to reflect minor CCR format change. Inclusion of the District Executive Officer in the approval of testing methods.
- 503 Requirements for solvent manufacturers added to comply with Perc ATCM.
- 504 Requirements for solvent distributors added to comply with Perc ATCM.

**MANUAL OF PROCEDURES**

- 601 Determination of compliance – emissions section references updated.
- 604 Analysis of solvent content of water repellent solution and other liquid materials updated from repellent to repelling.
- 605 Determination of cancer risk updated by adding (HRSA)
- Table 11-16-1 Perchloroethylene Compliance Schedule Table added

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