

**VENTURA COUNTY APCD  
FINAL STAFF REPORT  
Rule 74.31, Metalworking Fluids and Direct-Contact Lubricants  
Proposed Amendment to Rule 23, Exemptions from Permit  
September 23, 2013  
EXECUTIVE SUMMARY**

Staff is proposing to adopt a new rule to reduce the reactive organic compound (ROC) emissions from the use of metalworking fluids and direct-contact lubricants. This rule development will implement an All Feasible Measure as required by the California Clean Air Act (HSC Section 40914). The 2012 Ventura County Triennial Assessment and Plan Update adopted by the Air Pollution Control Board on January 8, 2013, references this rule development as a feasible control measure. Moreover, this rule adoption is supported by the Independent Lubricant Manufacturers Associations (ILMA), an industry association that worked closely with the South Coast AQMD in their rule adoption.

Proposed ROC content limits for the use of metalworking fluids and direct-contact lubricants are based on existing South Coast AQMD Rule 1144, Metalworking Fluids and Direct-Contact Lubricants. The vast majority of fluids used during metalworking and/or metal forming operations are vanishing oils, lubricants, rust inhibitors, and metalworking fluids. Examples of these operations include steel tube and spring manufacturers, aerospace manufacturers, automobile parts manufacturers and rebuilders, as well as machine shops for broaching, drilling, drawing, heading, honing, forging, milling, stamping, tapping, threading, and turning.

Staff is proposing to reduce ROC emissions by the substitution of high-ROC metalworking fluids with low-ROC fluids, which include medium naphthenic oils, paraffinic oils, vegetable oils, synthetic or semi-synthetic oils, and water-reducible fluids. Low-ROC products are available for substitution in each of the regulated metalworking fluid categories in the table of standards in the proposed new Rule 74.31.

The ROC emission reductions focus on the light oil lubricants, vanishing oil lubricants, and corrosion inhibitors. The estimated ROC emission reductions are 41 tons per year using control measure effectiveness of 54 percent and 76 tons per year source category inventory. This estimate is based on a comparative analysis of a source survey performed by the South Coast AQMD, which showed 5.29 tons of VOC per day in 2006, and a VOC emission reduction of 3.97 tons of VOC per day in the South Coast district.

The proposed new rule may affect four sources currently having APCD permits including Advanced Structural Alloys, Aluminum Precision Products,

Arcturus, and Western Saw. The first three of these sources are forging operations and the last one is a steel saw manufacturer that currently uses a mineral oil quench tank (metal treating operation) to obtain the optimum product hardness. However, more than 95 percent of the ROC emissions from this source category are from non-permitted area sources, which include up to 300 machine shops operating in the county. The proposed amendments to Rule 23, Exemptions from Permit, will exempt equipment using Super Compliant (50 grams ROC per liter of material or less) metalworking fluid from APCD permit requirements, except metal forging operations will still be subject to permit requirements. In addition, specialized metalworking equipment, will continue to be exempt from permit requirements regardless of the ROC content of the fluid used. Equipment in this permit exempt category include lapping, Sinker EDM, carbide grinding machine tools, and machining of aluminum or magnesium in single or multiple spindle automatic machines.

Rather than requiring permits of these machine shops, staff is proposing a Sales Prohibition enforcement mechanism to restrict the sale and supply of non-complying high ROC lubricants. The proposed Sales Prohibition is modeled on the adopted version in SCAQMD Rule 1144. In the South Coast district, manufacturers and suppliers are playing the lead roles in rule compliance.

The estimated cost analysis for replacing existing metalworking fluids with low-ROC versions was based on the 2006 technology assessment performed by the Institute for Research and Assistance (IRTA) for South Coast AQMD Rule 1144 and SCAQMD Staff Reports dated March 2009 and May 2010. The cost-effectiveness for these fluid replacements ranged from a cost savings to \$0.40 per pound of ROC reduced. High ROC metalworking fluids have already been reformulated by the lubricant manufacturing industry at a cost of several million dollars in response to South Coast AQMD Rule 1144. However, these reformulations costs have not been passed on the end user, which will result in minimal costs to machine shops.

Transitioning from light oil blends to medium viscosity straight cut oils results in little or no cost impacts. This indicates that the proposal is very cost-effective especially relative to new sources, which may be required under New Source Review to spend

up to \$9 per pound of ROC reduced to install best available control technologies (BACT).

This report contains five additional sections: (1) Background, (2) Proposed Rule Requirements, (3) Comparison of Proposed Rule Requirements with Other Air Pollution Control Requirements, (4) Impact of the Proposed Rule, and (5) Environmental Impacts of Methods of Compliance. The first section provides background information including regulatory history, latest air pollution control

technology and source description. The second section explains the key features of the proposed requirements. The third section compares the proposed requirements with existing federal requirements and Best Available Control Technology (BACT). The fourth section is an analysis of the proposed amendment's effect on ROC emissions, cost-effectiveness, and socioeconomic impacts. The last section examines the environmental impacts of compliance methods and the mitigations of those impacts.

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## BACKGROUND

### Metalworking Fluids: An ROC Emission Source

Until recently, air pollution regulations for the metalworking industry focused on reducing particulate matter and opacity with minor emphasis on limiting the ROC content of lubricants used at forging operations in the county. With the adoption of SCAQMD Rule 1144 in 2009 and a new more reliable test method for ROC content in 2010, it became clear that this industry is a significant source of ROC emissions. In the past, these ROC emissions were thought to be insignificant based on their low vapor pressure and low volatility. However, test results from work done in the South Coast district revealed that a subset of these lubricants have a significant ROC emission potential including light oils, vanishing lubricants, and corrosion inhibitors.

The size of this ROC emission inventory at 76 tons per year, and the fact that industry has already reformulated many of the high-ROC lubricant products that are currently being sold in the South Coast district, are the reasons for proposing this new rule. As an ozone non-attainment area under the California Clean Air Act, Ventura County is required to adopt All Feasible Measures. Based upon the work done together by the South Coast AQMD and the Independent Lubricant Manufacturers Association (ILMA), SCAQMD Rule 1144 is a reasonable and feasible control measure. ILMA supported the adoption of SCAQMD Rule 1144 and supports the adoption of Rule 74.31 in Ventura County.

### 2006 Technology Assessment

Metalworking operations encompass a wide range of manufacturing and metal machining processes. Manufacturing metal products is performed in the county, ranging from large metal forging operations to small machine shops. Typical machine shop operations include broaching, drilling, drawing, heading, honing, milling, stamping, tapping, threading, and turning.

In August 2006, the Institute for Research and Technical Assistance (IRTA) published a technology assessment for this source category called, "Assessment, Development, and Demonstration of Alternatives to VOC-Emitting Lubricants, Vanishing Oils, and Rust Inhibitors." The term VOC (Volatile Organic Compounds) may be used interchangeably with ROC (Reactive Organic Compounds). Scientifically, ROC is a more accurate term since the organic emissions must be both reactive and volatile to form ozone under atmospheric photochemistry. This 2006 technology assessment first determined the feasibility of replacing high-ROC lubricants with low-ROC counterparts.

The 2006 Technology Assessment included case studies involving thirteen different facilities to determine the applicability of switching from high-ROC lubricants to similar performing low-ROC fluids. The initial testing examined one to five alternatives, and if a potential alternative performed well, more extensive or scaled-up testing for a period of one week to three months. Lastly, IRTA analyzed the cost and the performance of the alternatives including any additional processes that may be required such as cleaning or blasting. An important point to remember when evaluating the 2006 technology assessment is that alternatives were limited to those products available at the time and did not include recent reformulations.

### Case Studies- Vanishing Oils

Vanishing oils are designed to provide lubrication for numerous metal forming operations, including drawing, forming, punching, and perforating. In addition, these oils evaporate from the work piece, which explains the origin of the name of this category. Depending on the additives in the base compound, the residue on the part may be dry to the touch, oily, sticky, or nonexistent. This residue

provides in-process rust protection without the need for additional application.

The application method is very important to this operation. If too little lubricant is applied, the fluid may fail to evaporate before the machining is completed, which causes galling or tool wear. On the other hand, if too much is applied, the fluid may fail to evaporate, which can leave the parts wet when they are packed or arrive at the next operation. Vanishing oils are a separate category from Metal Protective Fluids, which includes rust inhibitors that are usually applied after the part is formed and prevents rust formation during storage or shipping.

Vanishing oils consist mainly of mineral spirit type solvents, which are high-ROC emitters. The proposed rule ROC content limits will restrict the use of vanishing oils, and machine shops will be required to switch to other types of lubricants and/or processes that duplicate the function of these oils. The 2006 IRTA study examined the replacement of vanishing oils at four machine shops in the South Coast, including Nelson Nameplate (stamping and cutting), Fred Rippy (stamping), Winders & LeBlanc (forming), and B & B Specialties (cutting). The results of these case studies for vanishing oil replacement are summarized in Table 1. The type of lubricant fluid used to replace the vanishing oil is shown in the table along with the cost-effectiveness of the fluid replacement.

Table 1 Case Studies –Vanishing Oil

| Facility Name              | Compliant Fluid        | Cost-Effectiveness              |
|----------------------------|------------------------|---------------------------------|
| <b>B&amp;B Specialties</b> | <b>Vegetable-Based</b> | <b>\$0.52/lb of ROC reduced</b> |
| <b>Fred Rippy</b>          | <b>Water-Soluble</b>   | <b>90% Savings</b>              |
| <b>Nelson Nameplate</b>    | <b>Vegetable-Based</b> | <b>70% Savings</b>              |
| <b>Winders</b>             | <b>Water-Soluble</b>   | <b>70% Savings</b>              |

Case Studies- Cutting Oil Lubricants

Cutting fluids are used as lubricants in cutting, grinding, turning, and machining of metals. In such operations, the friction is very high because of close contact between the work piece and the tool, which generates a large amount of local heat. This high heat may overheat the tool, and it may lower its temper and hardness. Lubricants are used as cutting fluids to cool the tools to reduce wear and maintain hardness. The cooling is also needed to prevent distortion of the metal work piece. Proper lubrication also reduces power consumption and improves the surface finish of the part.

The 2006 IRTA study also evaluated a number of machining, metal removal, and metal forming operations to determine the cost impacts of replacing the light petroleum oils with vegetable-based ester synthetic oils. As shown in Table 2, the cost ranged from a 70% cost savings to a cost-effectiveness of \$0.90 per pound of ROC reduced. Thus, the cost is highly dependent on the type of machining process.

Table 2 Case Studies – Cutting/Honing Oil

| Facility Name              | Compliant Fluid        | Cost-Effectiveness               |
|----------------------------|------------------------|----------------------------------|
| <b>Fortner Engineering</b> | <b>Vegetable-Based</b> | <b>\$0.90/lb of ROC reduced</b>  |
| <b>Hydro-Aire</b>          | <b>Vegetable-Based</b> | <b>48% Savings</b>               |
| <b>Nelson Nameplate</b>    | <b>Vegetable-Based</b> | <b>70% Savings</b>               |
| <b>S &amp; H Machine</b>   | <b>Vegetable-Based</b> | <b>11% Savings</b>               |
| <b>Weldcraft</b>           | <b>Vegetable-Based</b> | <b>\$0.06/lb. of ROC reduced</b> |

Vegetable-based lubricants may be applied to a wide range of metalworking operations including metal removal, metal forming, and metal protecting. As a proven and test technology since the 1960s, vegetable oils have been recognized for their superior lubricating properties compared to mineral oils. Until the last decade, vegetable oils were used as straight oil applications.

More recently, water-miscible vegetable oil emulsions as cutting fluids were made possible with additives including a new generation of emulsifiers and stability agents. Use of these vegetable emulsions has resulted in significantly improved productions rates of 20 to 30 percent, and a 50 percent or better increase in the tool life. In one example, vegetable oil-based coolant while drilling automotive gears resulted in a threefold increase in tool life. Another application in tapping steel parts for another automotive application resulted in a 15 fold increase in tool life.

Case Studies- Rust Inhibitors

Rust preventive products are designed to protect metal parts from rust and corrosion throughout the stages of manufacturing, assembly, storage, and shipping. Rust preventive products can be applied by dip, brush, roller, spray, or flood method. These products may be designed for both indoor and outdoor storage requirements.

The 2006 IRTA study evaluated a number of different operations using rust (corrosion) inhibitors. At that time, the available complying products were water-based or vegetable –based products, such as Soy Gold. The case studies were performed at the following companies: Dynaflex Products, Deltronic, Tracy Industries, and Robinson Helicopter Company. The summaries of these case studies showed mostly cost savings except the one case study at Dynaflex Products had a cost-effectiveness of \$0.24 per pound of ROC reduced. A table of these case studies has not been included because newer reformulated products have been introduced since that time, which make those comparisons out-of-date.

Since 2006, major manufacturers such as Chem Arrow Corporation have developed newer petroleum-based rust preventive products that displace the water or coolant on the part and comply with 50 g/l ROC super compliant status. These products remove slight dirt and offer the ability to dry parts quickly to be handled within a short period of time. These products provide excellent water displacement, pleasant odor, non-staining, and are designed for both indoor and outdoor storage.

**Emission Source Inventory and ROC Emission Reductions**

The vast majority of sources estimated up to 300 facilities (mostly machine shops) are unpermitted by the District. There are just four district-permitted facilities that would be subject to proposed Rule 74.31 as shown in Table 3.

Table 3 Permitted Metalworking Facilities

| Facility Name             | Process       | ROC tons/yr |
|---------------------------|---------------|-------------|
| Advanced Structural Alloy | Forging       | 0.29        |
| Aluminum Precision        | Forging Press | 0.56        |
| Arcturus                  | Forging       | 0.47        |
| Western Saw               | Quench Oil    | 1.47        |
| <b>TOTAL</b>              |               | <b>2.79</b> |

All four permitted facilities and their devices are in the APCD point source emission inventory as sources of particulate matter emissions. In the future, ROC emissions from this source category will be included in the inventory. Both Arcturus and Advanced Structural Alloys have forge operations using emulsion type lubricants that already comply with the proposed ROC limit of 75 grams per liter.

Although there is no accurate accounting of metalworking fluids and direct-contact lubricants

emission sources in Ventura County, it is possible to estimate the potential number of sources and their emissions using South Coast AQMD’s Final Staff Report for Proposed Amended Rule 1144. Proposed district Rule 74.31 is closely modeled on SCAQMD Rule 1144 and the ROC limits for all metalworking fluid categories in the South Coast became effective as of January 1, 2012.

The SCAQMD Rule 1144 Staff Report contains an estimate of the baseline metalworking fluids emissions inventory subject to Rule 1144 and emission reductions expected from the rule. The baseline metalworking fluid emission inventory was based on a SCAQMD 2006 survey of local manufacturers, distributors and end-users of metalworking fluids and direct-contact lubricants. Baseline emissions were calculated for individual metalworking fluid types in SCAQMD Rule 1144 Staff Report Table III using volume of fluid used (thousand gallons) and sales-weighted average ROC content (g/L). Baseline emissions = 5.29 tons/day ROC in 2006, and overall ROC emissions reductions for Rule 1144 are 3.57 tons/day, amounting to 67% control efficiency. No ROC emission reductions are anticipated from some Rule 1144 fluid categories such as direct-contact lubricants and some naphthenic metalworking fluids having sales-weighted average ROC content less than the rule ROC content.

According to the SCAQMD Rule 1144 Staff Report, about 7,200 facilities in the South Coast, predominantly small businesses classified under NAICS Code 332 (fabricated metal product manufacturing), Code 333 (machinery manufacturing), Code 336 (transportation equipment manufacturing) and Code 324 (petroleum and coal products manufacturing) use metalworking and direct-contact fluids in the South Coast air basin. Fluids used for applications subject to the requirements of SCAQMD Rule 1124, Aerospace Assembly and Component Manufacturing Operations, are excluded. There is a similar exclusion in proposed Rule 74.31 for these sources subject to requirements in District Rule 74.13, Aerospace Assembly and Component Manufacturing Operations. Assuming the 2006 baseline emissions in SCAQMD Rule 1144 Staff Report Table III represent South Coast air basin sources, we can estimate the number of sources and ROC emissions in Ventura County, based on the relative number of businesses and employment between the South Coast air basin and Ventura County using U.S. Census Bureau County Business Patterns data. There were 273 metalworking fluid businesses in Ventura County in 2010 according to County Business Patterns data.

2010 ROC emissions from metalworking fluids in South Coast can be estimated using the 2006 baseline emissions = 5.29 tons/day in table III and assuming a 25% decrease in activity based on the decrease in employment between 2006 and 2010. The SCAQMD Staff Report showed sales of naphthenic metalworking fluids representing about 39% of total metalworking fluid volume in table V had declined by 30-40% since the 2006 survey according to industry stakeholders.

2010 South Coast metalworking fluids ROC emissions = 5.29 tons/day \* (1 - 0.25) = 3.97 tons/day.

2010 ROC emissions from metalworking fluids in Ventura County can be estimated using the 2010 employment ratio between Ventura County and South Coast. The estimated ROC emission reduction calculated below does not include any correction for less than 100 percent rule effectiveness. Since 95 percent of affected sources will be unpermitted, rule compliance will depend on the sales prohibition, which is typically a less than 100 percent enforcement mechanism.

Ventura County metalworking fluids ROC emission inventory = 3.97 tons/day \* 0.0524 = 0.21 tons/day (= ~ 76 tons/year).

**PROPOSED RULE 74.31 REQUIREMENTS and PROPOSED AMENDMENTS TO RULE 23**

**Applicability (Section A)**

Operations subject to this rule range from large forging operations to small machine shop operators. No small source exemption is being proposed because there are a large number of unpermitted operations that accounts for 95 percent of the emission reductions. Rather than requiring new APCD permits for these small operators, the proposed rule enforcement mechanism is a Sales Prohibition that will regulate the sale of noncompliant fluids by the manufacturers and suppliers. Thus, this rule applies to the manufacturers and suppliers as well as to the users of this material.

The proposed rule applies to all types of metalworking fluids used for metal removal, metal forming, and metal treating. In addition both direct-contact lubricants and corrosion inhibitors are subject to the ROC content limits in the rule. However, proposed Rule 74.31 does not apply to existing operations regulated by requirements of other District rules including Rule 74.13, Aerospace Assembly and

Component Manufacturing Operations. For example, Rule 74.13 has an ROC content limit for solid film lubricant for fastener manufacturing of 250 gram per liter. Because this operation is already subject to a Rule 74.13 requirement, it would not be subject to proposed new Rule 74.31. Also, solvent cleaners are not subject to this rule because they are already regulated by VCAPCD Rule 74.6, Solvent Cleaning.

**Proposed ROC Content Limits(Section B.1)**

The proposed rule will reduce ROC emissions from the use of metalworking fluids, including lubricants, coolants, and corrosion inhibitors used for metal forming, metal removal, metal treating, or metal protecting. The proposed ROC content limits are summarized by fluid category in Table 4. Each of fluid categories is defined in the rule to clarify the applicability of each limit, and the proposed limits duplicated those adopted by SCAQMD Rule 1144.

**Table 4 Proposed ROC Content Limits for Metalworking Fluids**

| <b>Fluid Category</b>           | <b>ROC Content Limit –grams/liter (lbs/gal)</b> |
|---------------------------------|---|
| Vanishing Oil                   | 50 (0.42)                                       |
| Metal Working Fluid:            |   |
| Metal Forming                   | 75 (0.63)                                       |
| Metal Removal (General)         | 75 (0.63)                                       |
| Precision Metal Removal         | 130 (1.08)                                      |
| Metal Treating                  | 75 (0.63)                                       |
| Metal Protecting (General)      | 50 (0.42)                                       |
| Military Specified Preservative | 340 (2.83)                                      |
| Direct Contact Lubricant        | 50 (0.42)                                       |

### Prohibition of Sale (Section B.3)

The proposed sales prohibition is based on a similar requirement in South Coast AQMD Rule 1144, and the industry association (ILMA) supports this concept. As explained earlier, a prohibition to sell, offer for sale or supply noncomplying lubricants (which exceed Table 4 ROC Content limits), is needed to enforce the requirements where 95 percent of the emission sources are unpermitted.

An important point to remember when determining compliance with this provision is that the ROC content of the fluid for water reducible material is adjusted for the minimum recommended dilution ratio, as shown on product labels or data sheets. Thus this compliance determination is based on the recommended usage rather than the package ROC content for these emulsions.

Another issue concerns the sale of noncomplying products by independent distributors. Manufacturers or suppliers may not be liable if noncomplying products are sold provided they have notified the independent distributor in writing that the product may not be sold in the district because it would violate the rule sales prohibition.

The proposed sales prohibition does not apply to any metalworking fluid that is controlled by an ROC emission control system. Since this rule development is based on sources using product substitution instead of add-on control equipment as the control measure, it is not anticipated that this exemption will be employed. It is important to remember that particulate matter control devices may not qualify for this exemption.

### Depletion of User Inventory (Section B.2)

Although staff is not proposing a sell through provision for manufacturers or suppliers, users may deplete their inventory of lubricants purchased prior to the effective date of the ROC content limit for up to one year after that date. Purchase records, sales invoices or bills of sale may be used to verify eligibility for this provision. The purpose of this provision is to allow users to deplete existing stocks to avoid unnecessary hazardous waste generation.

### Control Equipment (Section B.4)

As an alternative to meeting the ROC content limits for a metalworking fluid, the operator may elect to install an ROC emission control system. This system must be able to capture at least 90 percent of the ROC

emissions generated by the device, and the control system must reduce the ROC emission by 95 percent, by weight, or the output of the control device is no more than 5 ppm ROC by volume, calculated as carbon with no dilution. If an operator elects to install this emission control system, then a written Authority to Construct and Permit to Operate from the Air Pollution Control Officer is required.

### Administrative Requirements (Section B.5)

The recordkeeping requirements are needed to assist both the machine shop operators and APCD compliance staff to determine the compliance status of the metalworking fluids being used. The recordkeeping consists of two parts. First, the operator must maintain an inventory compliance list, which lists all of the applicable metalworking fluids used at the shop, the corresponding ROC content of each fluid, and the ROC content category and ROC limit for that category. The purpose of this list is to verify the compliance status of each of the fluids used.

The second part of this administrative requirement is to maintain monthly purchase records of each of the metalworking fluids used. No separate usage logs are required that must be dated and signed as is required by SCAQMD Rule 1144. Instead monthly purchase records may be used for complying with this provision as long as the following information is printed on the record: Manufacturer name, product name, product number or ID code, and quantity purchased. VOC information (VOC and ROC may be used interchangeably) is not required on the purchase record. The monthly purchase records may be used to verify the comprehensiveness of the inventory compliance list. All records must be maintained for a minimum of two years, and shall be made available to District personnel upon request.

An exemption from the recordkeeping requirement in Subsection C.5 is being proposed for those metalworking fluids that are super compliant (less than 50 g/l ROC). For most of the fluid categories, super compliant fluids are readily available. So if a small machine shop uses only super-compliant materials, then neither a permit nor recordkeeping is required. However, if a machine shop uses both super-compliant and higher ROC materials, then the recordkeeping requirements still apply to the higher ROC content metalworking fluids.

### Container VOC Labeling (Section B.7)

This requirement to have the VOC content displayed on metalworking fluid containers facilitates both the rule compliance by affected industry and enforcement by APCD inspectors. According to metalworking fluid manufacturers, the industry has already complied with this provision based on a similar requirement in the South Coast AQMD Rule 1144.

### Exemptions (Section C)

Subsection C.1 exempts Air Resources Board (ARB) regulated consumer products (Title 17 CFR, Section 94507) from both the sales prohibition and the administrative requirements. According to ARB consumer products regulation, if a product such as a lubricant is sold directly to the user from the supplier and is labeled "For use in manufacturing only," then it is not a consumer product subject to ARB regulations.

Subsection C.2 exempts hand-held pressurized aerosol lubricants that are subject to ARB consumer regulations from the ROC content limits in Rule 74.31, provided 100 can or fewer per calendar year are used based on purchase records. This exemption is not currently in the South Coast AQMD Rule 1144. The limit of 100 cans per year is being proposed to encourage sources to switch to low-ROC products which can actually result in a cost savings. Robinson Helicopters from Torrance, California, was using 414 aerosol cans per year of an aerosol lubricant.

Other exemptions from rule ROC content limits are proposed for the purpose of maintaining or repairing operator-owned machine tools (Subsection C.2.c) and research operations (Subsection C.2.d).

Both the sales prohibition and the ROC content limits are proposed to be exempt from the following machining operations:

- Lapping
- Sinker EDM (Wire EDM using water based dielectric fluids are still subject to rule requirements)
- Avionics, assembled aircraft, or any assembled aircraft components
- Space vehicle components
- Fluids utilizing the ROC emission control systems

These exemptions were determined by the South Coast AQMD Rule 1144 to be necessary because complying replacement lubricants did not provide adequate performance or the machines were not amenable to replacement lubricants.

### Test Methods (Section D)

Choosing an adequate test method for determining ROC content of lubricants, which are semi-volatile materials, was a challenging task. Both the South Coast AQMD and ILMA (industry association) had many meetings and performed round robin testing over a period of years to define an accurate and repeatable for test method for these materials. The normal EPA test method for coatings, solvents, and adhesives is Method 24, which involves heating a sample for one hour at 110°C. However, this test method was unable to provide repeatable measurements for these semi-volatile materials.

As a result of all of the work in the South Coast district, ASTM E 1868-10, Standard Test Method for Loss-On-Drying by Thermogravimetry, was adopted in SCAQMD Rule 1144 as the reference method for determining ROC content compliance. This method was able to produce very repeatable ROC content readings for a variety of lubricants. It is similar to Method 24 in that heat is applied and samples are weighed to determine evaporative losses. It is more precise because the testing parameters are more well defined using a programmed heater that heats the sample to 81°C for 110 minutes. This test method was found to be simple, repeatable, efficient, and cost-effective.

### Permit Exemptions (Rule 23, Section B.4)

The proposed amendments to Rule 23, Exemptions from Permit, will exempt equipment using metalworking fluids that are Super Compliant (50 grams ROC per liter of material or less) from APCD permit requirements. This proposed exemption will not apply to metal forging operations. Although APCD permits are usually required for point sources subject to rule requirements to insure compliance, staff is proposing the sales prohibition as an alternate compliance mechanism. This will reduce the regulatory burden and eliminate potential permitting costs for the metalworking industry that until now has not been regulated as an ROC emission source.

In addition, the following equipment using any metalworking fluid is exempt from permit requirements regardless of the ROC content of the fluid being used:

- Lapping
- Sinker Electrical Discharge Machining (EDM)
- Carbide grinding machine tools where the machine tool manufacturer specifies the viscosity of the fluid
- Machining of aluminum or magnesium in single or multiple spindle automatic machines.

Since both lapping and Sinker EDM operations are exempt from the ROC content requirements, APCD permits are not needed as an enforcement mechanism. In the case of carbide grinding machine tools and machining of aluminum or magnesium, the proposed sale prohibition will be used to enforce rule

compliance for these operations. Since these operations are not currently required to have APCD permits, this proposed exemption will not change their current status.

### **COMPARISON OF PROPOSED RULE REQUIREMENTS WITH OTHER AIR POLLUTION CONTROL REQUIREMENTS**

Health and Safety Code Section 40727.2 requires Districts to compare the requirements of a proposed revised rule with other air pollution control requirements. These other air pollution control requirements include federal New Source Performance Standards (NSPS), federal National Emissions Standards for Hazardous Air Pollutants (NESHAPS), Best Available Control Technology (BACT), and any other District rule that applies to the same equipment. In addition, Section 183(e) of the Clean Air Act authorized EPA to regulate VOC emissions from consumer and commercial products

via a national rule or a Control Techniques Guideline (CTG). At this time, EPA has not adopted a national rule or a CTG to reduce VOC emissions from metalworking fluids. A review of current BACT determinations from the South Coast AQMD and California Air Resources Board indicates that BACT for this source category has not been defined for any VOC emissions. Instead BACT for particulate matter emissions from metalworking operations have been published, but this is not relevant to this rule adoption.

### **IMPACT OF THE PROPOSED RULE**

#### ROC Emissions Impacts

The estimated ROC emission reductions of 41 tons per year from this source category are significant, and all emission reductions are needed to reach the federal and state ambient ozone air quality standards. The availability, feasibility, and cost-effectiveness of the replacement low-ROC metalworking fluids including lubricants, and corrosion inhibitors make this proposal worthwhile.

#### Cost-Effectiveness

According to the IRTA technology assessment case studies as summarized in Tables 1 and 2, the cost ranged from a cost savings of 90 percent to a cost-effectiveness of \$0.90 per pound of ROC reduced. Another source of cost information was the SCAQMD Rule 1144 Staff Report, which showed costs ranging from a cost savings to \$0.40 per pound of ROC reduced. This indicates that the proposal is very cost-effective especially relative to new sources, which may be required under New Source Review to spend up to \$9 per pound of ROC reduced to install best available control technologies (BACT).

An important point is that the main cost of compliance has already been spent by the fluid manufacturers including reformulation and testing costs in order to comply with South Coast AQMD Rule 1144. In most cases, end users will experience a

cost savings or marginal costs to comply with proposed Rule 74.31.

#### Incremental Cost-Effectiveness Analysis

Health and Safety Code Section 40920.6(a) requires districts to identify one or more potential control options, assess the cost-effectiveness of those options, and calculate the incremental cost-effectiveness. Health and Safety Code Section 40920.6 also requires an assessment of the incremental cost-effectiveness for proposed regulations relative to ozone, carbon monoxide (CO), sulfur oxides (SOx), nitrogen oxides (NOx), and their precursors.

Incremental cost-effectiveness is defined as the difference in control costs divided by the difference in emission reductions between two potential control options achieving the same emission reduction goal of a regulation. The proposed adoption of Rule 74.31 will require the most stringent viable ROC limits and no other viable control option can achieve the same amount of emission reductions. Therefore, the incremental cost-effectiveness analysis does not apply to this rulemaking.

#### Socio-Economic Impacts

Assembly Bill 2061 (Polanco), which became effective January 1, 1992, requires that the District Board consider the socioeconomic impacts of any



new rule. The Board must evaluate the following socioeconomic information on proposed new Rule 74.31.

- (1) The type of industries or businesses, including small business, affected by the rule or regulation.

The adoption of amendments to these rules may directly affect the four permitted operations in the county (see Table 3). Processes affected by the rule include metal forming, metal machining, and metal treating operations. All machine shops, regardless of size, will be affected. Staff estimates that approximately 300 machine shops in the county may be impacted.

- (2) The impact of the rule amendments on employment and the economy of the region.

Revisions to these rules are not expected to have a negative impact on either employment or the economy of Ventura County. According to the cost analysis of the proposed revisions, some companies may benefit from reduced material costs, which should help economic growth. Worst-case cost estimates for the end user are not significant enough to impact employment. Use of environmentally-friendly lubricants will also provide for a cleaner work environment, which should positively impact job performance.

- (3) The range of probable costs, including costs to industry or business, including small business, of the rule or regulation.

Cost reductions were noted for several case studies from the 2006 technology assessment. Based on the SCAQMD staff report, a maximum cost-effectiveness of \$0.40 per pound

of ROC reduced may be expected for replacement of high-ROC lubricants and corrosion inhibitors with low-ROC counterparts.

- (4) The availability and cost-effectiveness of alternatives to the rule or regulation being proposed or amended.

The proposed new rule is the most cost-effective control option, which involves metalworking fluid replacement. An alternative to require add-on control equipment is a much more costly approach.

- (5) The emission reduction potential of the rule or regulation.

The anticipated emission reduction potential of the proposed rule is about 41 tons per year of ROC emissions. These emission reductions result from the use of low-ROC metalworking fluids and corrosion inhibitors.

- (6) The necessity of adopting, amending, or repealing the rule or regulation in order to attain state and federal ambient air standards pursuant to Chapter 10 (commencing with Section 40910).

Ventura County is classified as a serious nonattainment area for the federal Ambient Air Quality Standards for ozone. These proposed rule amendments will reduce ROC emissions that are precursors to the formation of ozone. According to the 2007 AQMP, these emission reductions will help the District in its effort to attain the standards. California Health and Safety Code Section 40914(b)(2) requires that the District adopt every feasible measure to reduce ozone precursors.

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**ENVIRONMENTAL IMPACTS OF METHODS OF COMPLIANCE**

California Public Resources Code Section 21159 requires the District to perform an environmental analysis of the reasonably foreseeable methods of compliance. The analysis must include the following information on proposed new Rule 74.31:

- (1) An analysis of the reasonably foreseeable environmental impacts of the methods of compliance.
- (2) An analysis of the reasonably foreseeable mitigation measures.
- (3) An analysis of the reasonably foreseeable alternative means of compliance with the rule or regulation.

Table 5 lists all reasonably foreseeable compliance methods, the environmental impacts of those methods, and measures that could be used to mitigate the environmental impacts.

Table 5  
Environmental Impacts and Mitigations of Methods of Compliance

| Compliance Methods (including all reasonably foreseeable alternative means of compliance) | Reasonably Foreseeable Environmental Impacts  | Reasonably Foreseeable Mitigation Measures   |
|---|---|--|
| Reformulation of metalworking fluids  | Air Quality Impacts: Reformulation may result in the use of toxic materials.  | Operators may use reformulated products with less or no toxic materials.   |
|   | Water Impacts: Improper disposal of fluids may cause water impacts  | Compliance with wastewater discharge standards and waste disposal requirements will mitigate these impacts.  |
|   | Human Health and Safety Impacts: Metalworking fluids may be replaced with products containing more toxic or more flammable compounds. | Compliance with OSHA safety guidelines (e.g., personal protective equipment, prevention and response, emergency first aid procedures) reduces these impacts. |

This analysis demonstrates that the adoption of new Rule 74.31 will not have a significant effect on the environment due to unusual circumstances.

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#### DISCLAIMER

This report contains references to company and product names to illustrate product availability. Mention of these names is not to be considered an endorsement by the Ventura County Air Pollution Control District.