



**ENVIRONMENTAL SERVICES DEPARTMENT  
AIR QUALITY DIVISION**

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**OPTIONAL COMPLIANCE DEMONSTRATIONS  
PROCEDURE**

**A GUIDELINE**

**FOR**

**SEMICONDUCTOR INDUSTRY**

**Part III, Volatile Organic Compounds (VOC)  
Abatement Performance Test**

**November 12, 2001**

**GENERAL**

The purpose of this "Optional Compliance Demonstrations Program" is to illustrate a standard permit condition format for performance tests, and further to present different options as needed for a semiconductor source to demonstrate compliance. This Guideline is established to recognize concerns that were typically experienced by the semiconductor industry to meet the performance test requirement imposed by Maricopa County Environmental Services Department (MCESD).

Semiconductor fabrication facilities commonly produce very dilute emission streams, which are typically a result from the high ventilation airflow used in a clean room environment. Because of the very dilute pollutant concentrations, the source often finds it is difficult, sometimes even impractical, to demonstrate compliance by conducting a traditional performance test.

Since late 1999, a study team was formed and representatives from semiconductor industries have initiated a series of meetings with MCESD to address the above concerns and the subsequent

compliance issues. Many options were proposed and evaluated by the team members. This Guideline summarizes the findings and presents what the semiconductor industry and MCESD believe is a viable alternative to demonstrate compliance.

Part III addresses VOC emissions and abatement performance tests.

As stressed in the following sections, participation in this program is strictly voluntary for the semiconductor source. MCESD is seeking ways to communicate with industries to improve and update our regulatory and enforcement policies. Therefore, feedback and comments for MCESD's review are always welcomed.

### **NOTES**

*Definition:* Point of Use (POU) Control Device

Please see Section B-5 Point of Use (POU) Unit (page 5 of this document) for applicability.

- A Point of Use (POU) Control Device is installed in close proximity to the process equipment and is installed for the purpose of abating regulated air pollutants.
- Normally, a POU is not interlocked with the associated process equipment.

### **INTRODUCTION**

This program is intended to be a voluntary program.

The pilot program applies only to a source that meets all of the following criteria:

- Semiconductor Industry
- True Minor or Synthetic Minor Facilities
- VOC Emissions
- Performance Test in conformance with EPA Test Methods (40 CFR 60, Appendix A), or alternate test methods as approved by MCESD
- Excludes groundwater and soil remediation processes

### **STANDARD PERMIT CONDITION FOR PERFORMANCE TEST**

To be consistent for all applicable sources on emissions testing requirements, the following standard permit condition has been developed and will be used in future permits.

**GENERAL PERMIT CONDITION:**

The Permittee shall conduct a test for VOC emissions within 60 days after the issuance date of this permit or within 60 days after the new applicable equipment has achieved the capacity to operate at its maximum production rate on a sustained basis, whichever occurs last. The testing deadline may be extended by the Control Officer for good cause, but in no case shall the testing deadline be extended beyond 180 days after the above applicable date.

Per Rule 270, Section 400, the testing shall be performed with the process equipment operating at the maximum sustained production rate or under such conditions as approved by the Control Officer, based on representative performance of the source or facility.

The testing shall be conducted in accordance with USEPA approved test procedures. The test shall demonstrate a minimum removal efficiency of 90% by weight of the appropriate constituent.

The Permittee shall submit a test protocol to the Department for review and approval at least 30 days prior to the emissions test. A fee for each stack to be tested, as required by Rule 280, shall be submitted with the test protocol.

The Permittee shall notify the Department in writing at least two weeks in advance of the actual time and date of the emissions test so that the Department may have a representative attend.

The Permittee shall complete and submit a report to the Department within 30 days after completion of the emissions test. The report shall summarize the results of the testing in sufficient detail to allow a compliance determination to be made.

The following Optional Compliance Demonstrations section will be available to the source as an alternative to the above standard permit condition. It is on an "upon request" basis and a written request must be submitted from the source. Once requested, these alternate conditions will be used by the MCESD Compliance Section as a Guidance to review the subsequent submittals and to make a determination of the source compliance status.

**OPTIONAL COMPLIANCE DEMONSTRATIONS**

**NOTE: All new or replacement installations of VOC emissions abatement equipment are required to be performance tested in accordance with MCESD Rule 270. Upon completion of the initial start-up performance test, should the source find the results of the performance test to be inadequate to demonstrate compliance, the following optional compliance demonstrations are available to the source as a supplement to the existing permit conditions.**

**OPTION A: Compliance demonstration options for the installation of new, replacement, or substantially similar VOC abatement equipment.**

**If necessary, the source may choose from the following option(s) to perform a compliance demonstration as described below:**

**A-1 NON-DETECT**

- Conduct a standard performance test as specified above.
- If the test results show that the total VOCs measured as propane are not detected in the stack at the test method detection limit, submit all supporting data.
- MCESD will accept as non-detect an outlet concentration of 10 ppmv or less total VOCs measured as propane. Multiple stacks from the same abatement equipment may be proportionately averaged.
- If necessary, permit conditions will be revised upon source's request per Rule 220, Section 400 to reflect the implementation of the option demonstrating compliance.
- O&M Plan parameters can be revised in two phases: Initial (before the test) and sustaining (after the test).

**OPTION B: If the source meets any one of the following options, the source is eligible to request an exemption to the performance testing requirements.**

**B-1 SUBSTANTIALLY SIMILAR VOC ABATEMENT EQUIPMENT:** After conducting an initial start-up performance test in accordance with Rule 270, subsequent performance tests may be exempted upon approval by MCESD for substantially similar VOC abatement equipment. See Note 3 for a list of required deliverables.

**OR**

**B-2 VOC ABATEMENT EQUIPMENT INSTALLED FOR:**

- Non-production emission sources, or
- Emission sources for which emission reductions are not claimed, and sources whose inlet concentration does not exceed 10 ppmV total VOCs measured as propane prior to abatement equipment.

The source shall calculate emissions before control using MCESD approved emission estimating techniques (EETs) and/or with material balance.

**OR**

**B-3 CONTINUOUS EMISSIONS MONITORING:** If the source proposes to install and operate Continuous Emissions Monitoring Equipment on the exhaust of the VOC abatement

equipment to measure total VOCs (measured as propane, methane or other), a requirement for a performance test may be exempted.

**OR**

**B-4 UNREGULATED AIR POLLUTANTS:** If the source installs abatement equipment for unregulated air pollutants (e.g. acetone), MCESD will not require a performance test.

**OR**

**B-5 POINT OF USE (POU) UNIT:** Upon approval by MCESD, some VOC abatement units may not require a performance test. This could be due to the size and configuration of relatively small piping to the unit. In this case, EPA test methods are neither feasible nor applicable to these types of devices due to the piping size constraint.

However, the source may submit manufacturer test data or other documents for MCESD's review to support the claim of emission reduction.

## **Notes from MCESD**

1 **Initial Startup** should be determined as the earliest occurrence of one of the following dates:

- the date that maximum (or permitted) production capacity occurs; or
- the date that a marketable product has been produced; or
- the date that sustained product manufacturing occurs; or
- The date that the production line(s) or production processes, exhausted to the air pollution abatement equipment that require the test, have been qualified to produce product that meets customer requirements.

2 **Substantially Similar VOC Abatement Equipment** Pollution abatement equipment (previously source tested) that meets the following criteria may not be required to conduct performance testing for the purpose of demonstrating compliance with permit conditions.

### **Applicability:**

- Existing equipment that has had an official source test conducted, and is substantially similar to replicate equipment, or
- Installed as a standby unit to make existing equipment redundant, or to be used as additional equipment.

3 **Definition of Substantially Similar VOC Abatement Equipment**

The substantially similar abatement equipment is of the same make, design, capacity, and technology (e.g. thermal oxidation, carbon adsorption, etc.), and reduces VOC emissions as efficiently (or better) as the original abatement equipment being replaced, or for which redundancy or additional capacity is being provided.

The Operations and Maintenance (O&M Plan) requirements are the same for the substantially similar equipment as were approved by MCESD for the original equipment. A revised O&M Plan is required for the addition of substantially similar equipment.

### **Deliverables**

- Substantially similar equipment performance testing exemption request in writing to MCESD,
- Latest, revised O&M Plan,
- MCESD approved start-up performance test data for equipment it is replacing or duplicating,
- A statement certifying that the substantially similar VOC abatement is operating as designed with respect to VOC abatement and optimum burner efficiency (where applicable).

## **4 Regulated Air Pollutants (RAP)**

RAP is any compound as defined in MCESD Rule 100, Section 200.90.