Working Group Meeting #3

November 1, 2023

2:30 PM

PROPOSED RULE 1445 – CONTROL OF TOXIC EMISSIONS FROM LASER AND PLASMA ARC CUTTING

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AGENDA


Previous Working Group Meeting Summary
Response to Comments
Potential Rule Concepts
Summary of Working Group Meeting #3
Next Steps

WORKING GROUP MEETING #2 RECAP

- Responded to comments made in WGM #1
- Presented results from in-depth permit review
  - Detailed review of laser and plasma arc equipment permit applications
- Presented an overview of emission sources and existing requirements for laser and plasma arc cutting operations
- Provided a site visit summary

STAKEHOLDER COMMENTS (WORKING GROUP MEETING #2)

Comment #1

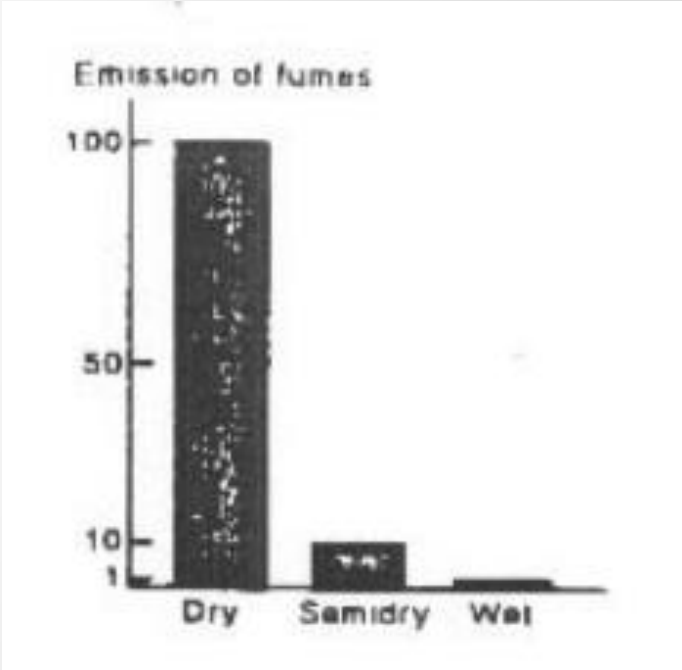
- For a water table, is there a difference in control efficiency between semi-dry and wet cutting?

Comment #2

- Are there specific activities or types of metal cutting that are a greater concern?

RESPONSE TO COMMENT #1: IS THERE A DIFFERENCE IN CONTROL EFFICIENCY BETWEEN SEMI-DRY AND WET CUTTING?

- Water table can be used to reduce emissions from plasma arc cutting
- Limited emissions studies available for these systems
  - A 1994 comparative study measured plasma arc cutting airborne fume emissions from mild steel (8 mm thick) and two types of stainless steel (8 and 35 mm thick)*
    - Three different scenarios were evaluated
      - Dry cutting
      - Semi-dry cutting (water about 50 mm under plate)
      - Wet cutting on an adjustable water table (burner 70 mm below water surface)
  - Results indicate wet cutting had the lowest fume emissions
    - Each scenario indicated a constant ratio between the amount of emitted fumes of 100:10:1 where dry =100, semi-dry =10, wet=1



* https://www.epa.gov/sites/default/files/2020-11/documents/welding.pdf

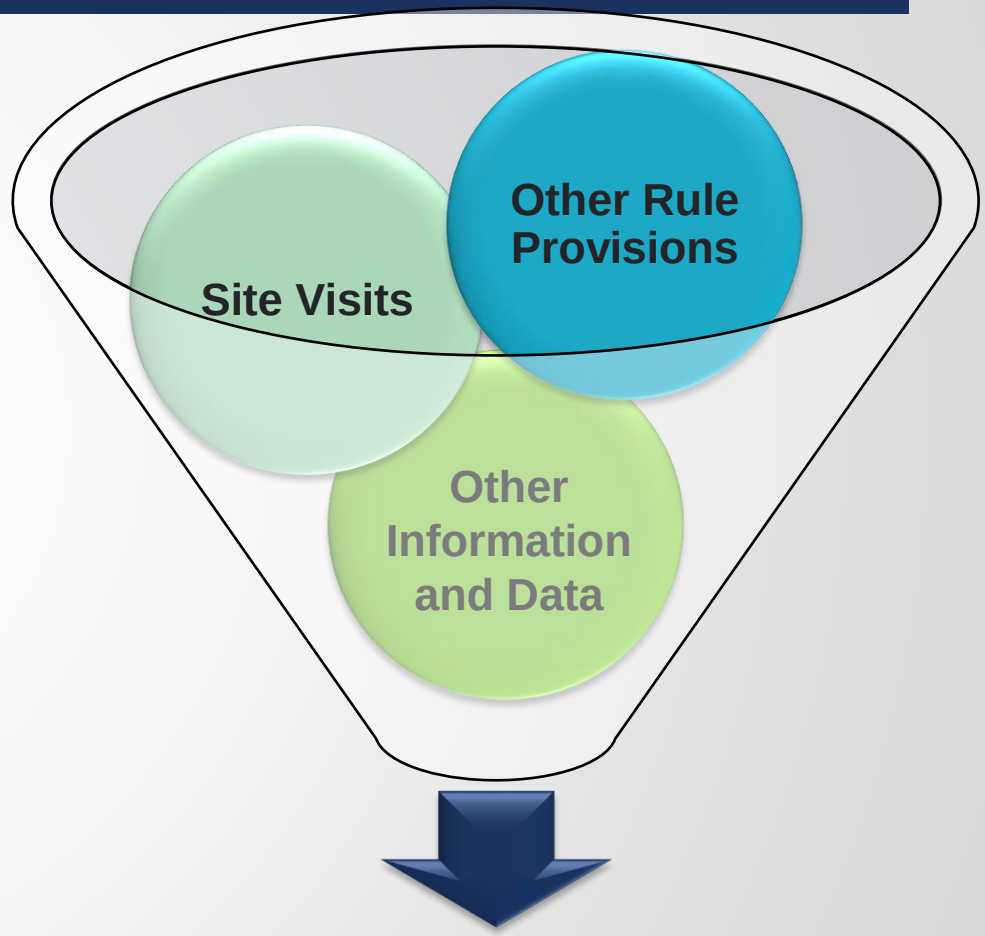
RESPONSE TO COMMENT #2: ARE THERE SPECIFIC ACTIVITIES OR TYPES OF METAL CUTTING THAT ARE A GREATER CONCERN?

- Permit applications for equipment used in laser and plasma arc cutting activities include a rules evaluation that typically includes an air toxics analysis
- Review of recent permit applications indicates metals with higher percentages of chromium and nickel may require permit conditions to limit equipment throughput to meet Rule 1401 – New Source Review of Toxic Air Contaminants thresholds
- Key toxics drivers include:
  - Hexavalent chromium for cancer risk
  - Nickel for acute Hazard Index (HI)

POTENTIAL RULE CONCEPTS

OVERVIEW

- Rule concepts are initial thoughts for proposed provisions and consider:
  - Provisions in other toxic metal particulate rules
  - Information gathered from facilities during site visits
  - Other information and data
- Stakeholder input on rule concepts helps shape Proposed Rule Language



POTENTIAL RULE CONCEPTS – KEY TOPICS

- Facilities that operate laser or plasma arc equipment to cut metal

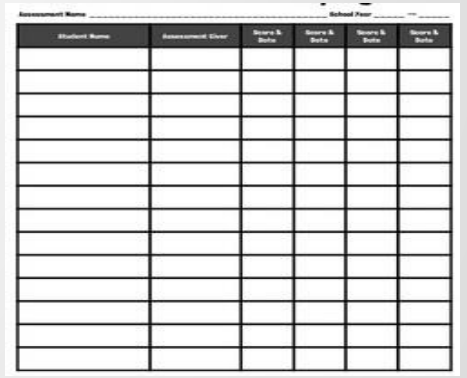
1. Rule Applicability

2. Control Devices

3. Housekeeping

4. Best Management Practices

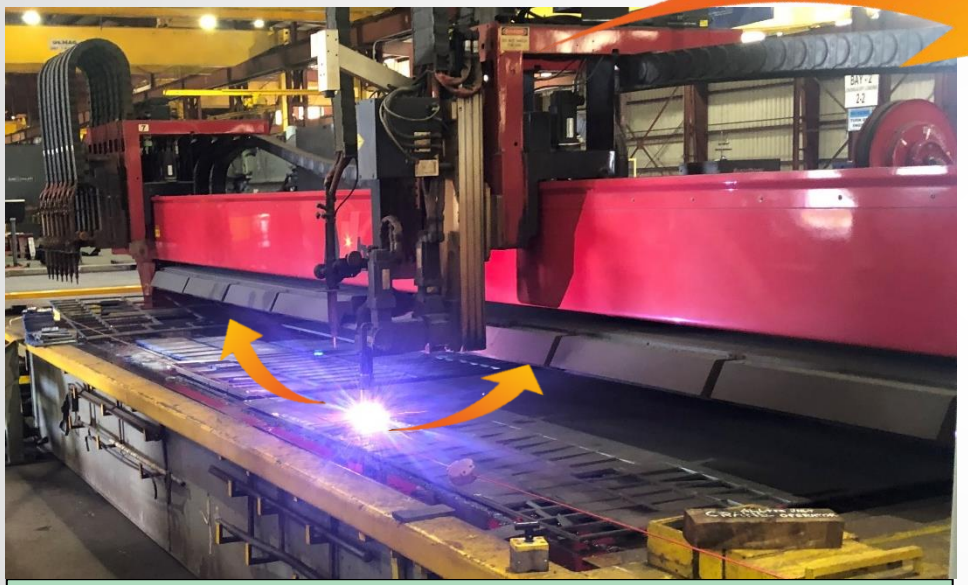
5. Parametric Monitoring



6. Recordkeeping

2. CONTROL DEVICES

BACKGROUND - KEY ELEMENTS OF CONTROL DEVICE SYSTEMS



Collection Efficiency
Proper design and operating parameters to collect emissions

Control Device Efficiency
Measurement of how well a control device prevents the release of air contaminants

BACKGROUND – CONTROL DEVICE EFFICIENCY ASSUMPTIONS

Cartridge Dust Collector

- Waste gas stream is passed through cartridge filters
- Cartridge filters contain either paper or non-woven fibrous filter media
- **Can achieve 99% control efficiency**

Water Tables

- Specific to plasma arc cutting equipment
- Wet cutting – water table completely submerges the part to be cut under water during the entire cutting process
- **Can achieve 99% control efficiency**

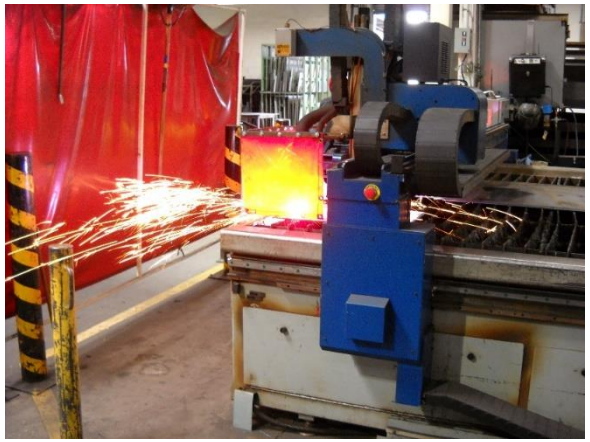
Dust Collector with Secondary (HEPA) Filtration

- In most cases, final component in a PM control system, downstream from other PM control devices such as dust collectors or baghouses
- **Can achieve 99.97% control efficiency**

CONTROL DEVICES - APPLICABILITY

Proposed Applicability

- Permitted laser and plasma arc cutting equipment used to cut metal



New Equipment	Existing Equipment
Portable	Portable
Stationary	Stationary

NEW EQUIPMENT – RULE CONCEPT

Control device integration for new equipment is more straightforward compared to retrofitting existing equipment

It is common for new equipment to be required to use control equipment with a higher control efficiency

Based on review of existing permit applications, there are laser and plasma arc (including those with water tables) cutting equipment vented to control devices with final stage filters with a control efficiency of 99.97% (i.e., HEPA) or better

Proposal: New laser and plasma arc cutting equipment to be vented to equipment with HEPA final stage filters or better

NEW EQUIPMENT – RULE CONCEPTS (CONTINUED)

Collection (Capture) Efficiency

Background

- Collection efficiency ensures pollution control device is collecting particles
- Low collection efficiency can lead to increased fugitive emissions

Rule Concepts

- Install and maintain a ventilation system that meets a minimum capture velocity requirement specified in the applicable standards of the most current Edition of the U.S. Industrial Ventilation Handbook, American Conference of Governmental Industrial Hygienists, at the time of installation

EXISTING EQUIPMENT – BACKGROUND

Existing Control Technology Summary

Plasma Arc - Stationary

- ~70% have a high efficiency (≥99%) dust collector
- ~23% have HEPA final stage filters (99.97% control efficiency)

Plasma Arc - Portable

- ~50% have a high efficiency dust collector
- ~27% have HEPA filtration

Laser

- 94% of laser cutting equipment have a high efficiency dust collector
- ~35% have HEPA filtration

Considerations for Developing Rule Concepts

Commercial Availability

- Control devices with a demonstrated control efficiency are commercially available

Technical Feasibility

- Majority of laser and plasma arc cutting equipment are currently associated with a high efficiency control device
- HEPA devices have been used to reduce emissions from portable and stationary equipment

Equipment Useful Life

- Laser and plasma arc cutting equipment has a useful life of 15-20 years

EXISTING EQUIPMENT – RULE CONCEPTS

Portable and Stationary Equipment

- Install or upgrade control devices to meet higher control efficiency requirement (99%) by a future date considering emission reduction potential and feasibility

Additional provisions under consideration

- More stringent requirements (99.97% control efficiency) for higher emitting equipment or facilities:
  - Cutting metals containing higher percentage of toxics (e.g., stainless steel, nickel alloys, etc.)
  - Facilities with multiple pieces of equipment

3. HOUSEKEEPING

HOUSEKEEPING - BACKGROUND

- In recent years, a number of toxic metal particulate rules have been amended or adopted
- Housekeeping requirements were strengthened to minimize fugitive emissions from operations involving toxic metal particulates
- Requirements are generally similar across the rules

Proposed housekeeping concepts are primarily based on recent toxic metal particulate rules:

Approved Cleaning Methods

Routine Cleaning

Waste Collection and Storage

HOUSEKEEPING RULE CONCEPTS

Approved Cleaning Methods

- Require the use of approved cleaning methods similar to other metal toxics rules when conducting routine cleaning
  - Examples include wet cleaning and HEPA vacuum

Routine Cleaning

- Routine cleaning of areas where particles containing toxics metals can accumulate (e.g., near cutting equipment) minimizes potential for fugitive emissions

Waste Collection and Storage

- Waste materials from PR 1445 housekeeping activities and equipment must be stored and transported in closed, nonporous containers
- All waste containers must be closed or covered unless waste materials are being added or removed

4. PARAMETRIC MONITORING

PARAMETRIC MONITORING - BACKGROUND

Monitoring of key parameters of pollution controls can identify operational issues of air pollution control equipment

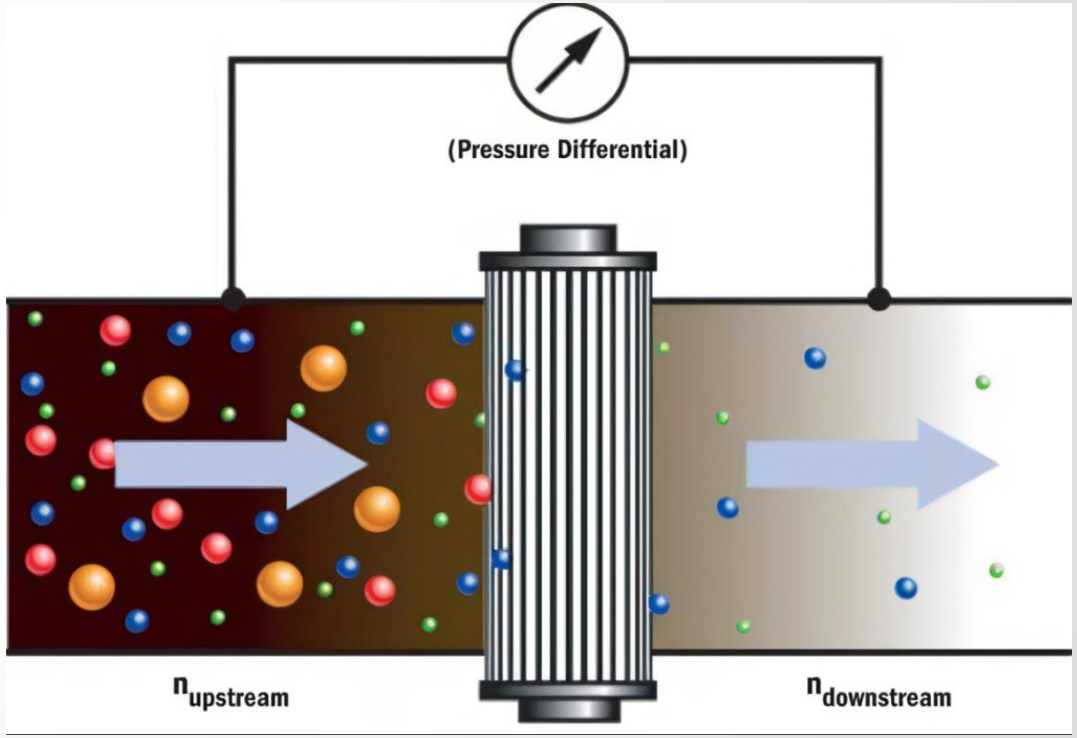
Benefits of parametric monitoring:

- Provides a more continuous status of operating conditions
- Can provide indication if emissions are not well controlled
- Can alert the operator of operational issues or needed maintenance on the pollution control equipment

PARAMETRIC MONITORING – DIFFERENTIAL PRESSURE

Measurement of airflow resistance

- Can be used to monitor air flow and filter performance for an air pollution control device
  - Filters that are clogged will not allow proper airflow through the exhaust system and reduce the ability to capture particles (pressure increase)
  - Filters that are torn or not seated properly will allow particles to escape through the exhaust (pressure decrease)



PARAMETRIC MONITORING – DIFFERENTIAL PRESSURE (CONTINUED)

Monitoring differential pressure can assist in maintaining optimal control device conditions and can lead to

- Maximizing filter life
- Maintaining air volumes
- Energy savings

Examples of existing air pollution control device permit conditions

- Gauge to measure pressure differential (in inches water column) across the cartridge filters and maximum pressure differential
- Separate (additional) gauge to measure pressure differential and maximum pressure differential for secondary filtration (e.g., HEPA)

PARAMETRIC MONITORING – RULE CONCEPT

Proposal

- Require a gauge to measure pressure differential (in inches water column) across final stage filtration
- Maintain the differential pressure across each filter stage of the emission control device within the range specified by the manufacturer or according to permit conditions for the emission control device
- Require facility to record pressure differential readings on days when equipment is in use

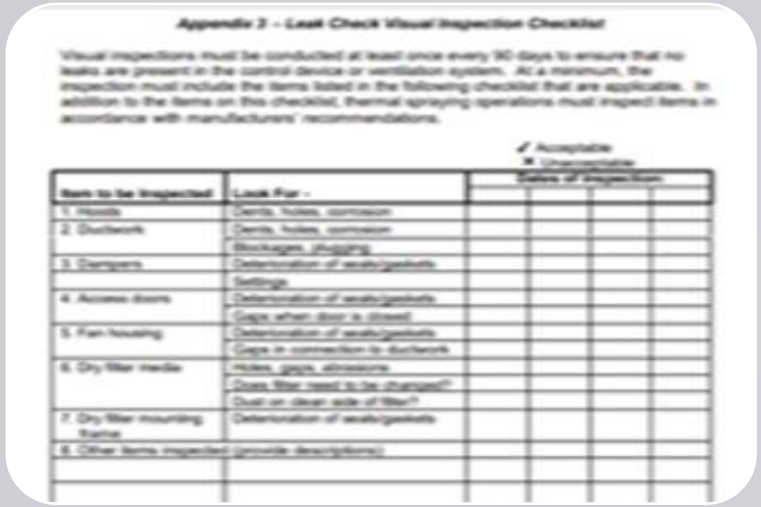
Differential Pressure Monitor

5. BEST MANAGEMENT PRACTICES

BEST MANAGEMENT PRACTICES - BACKGROUND

- Best management practices include a suite of different types of requirements that when implemented can ensure:
  - Proper operation of pollution controls
  - Fugitive emissions are minimized
- Some examples of best management practices that staff is evaluating include:
  - Measures to minimize building cross draft (e.g., building openings)
  - Visual inspections of air pollution control devices

BEST MANAGEMENT PRACTICES - CONCEPTS



Appendix 2 - Leak Check Visual Inspection Checklist

Visual inspections must be conducted at least once every 90 days to ensure that no leaks are present in the control device or ventilation system. At a minimum, the inspection must include the items listed in the following checklist that are applicable. In addition to the items on this checklist, thermal spraying operations must inspect items in accordance with manufacturers' recommendations.

✓ Acceptable
✖ Unacceptable

Item to be Inspected	Look For -	Dates of Inspection			
1. Hoods	Dents, holes, corrosion				
2. Ductwork	Dents, holes, corrosion				
	Blockages, chipping				
3. Dampers	Deterioration of seals/gaskets				
	Settings				
4. Access doors	Deterioration of seals/gaskets				
	Gaps when door is closed				
5. Fan housing	Deterioration of seals/gaskets				
	Gaps in connection to ductwork				
6. Dry filter media	Holes, gaps, abrasions				
	Does filter need to be changed?				
	Dust on clean side of filter?				
7. Dry filter mounting frames	Deterioration of seals/gaskets				
8. Other items inspected (provide descriptions)					

Visual inspections of air pollution collection and control systems

Practices to minimize building cross draft

6. RECORDKEEPING

RECORDKEEPING - BACKGROUND

Background

- Provides a mechanism to confirm compliance with rule requirements
- Recordkeeping requirements included in recent toxic metal particulate rules
- In some instances, checklists can streamline the process

RECORDKEEPING – RULE CONCEPTS

Concepts

- Records required for:
  - Housekeeping
  - Control device inspections
  - Parametric monitoring
- Records to be maintained for five years, at least two years of most recent records available on site

SUMMARY OF WORKING GROUP MEETING #3

Potential rule concepts discussed

- Control device requirements
  - New equipment
  - Existing equipment
- Housekeeping
- Best management practices
- Parametric monitoring
- Recordkeeping

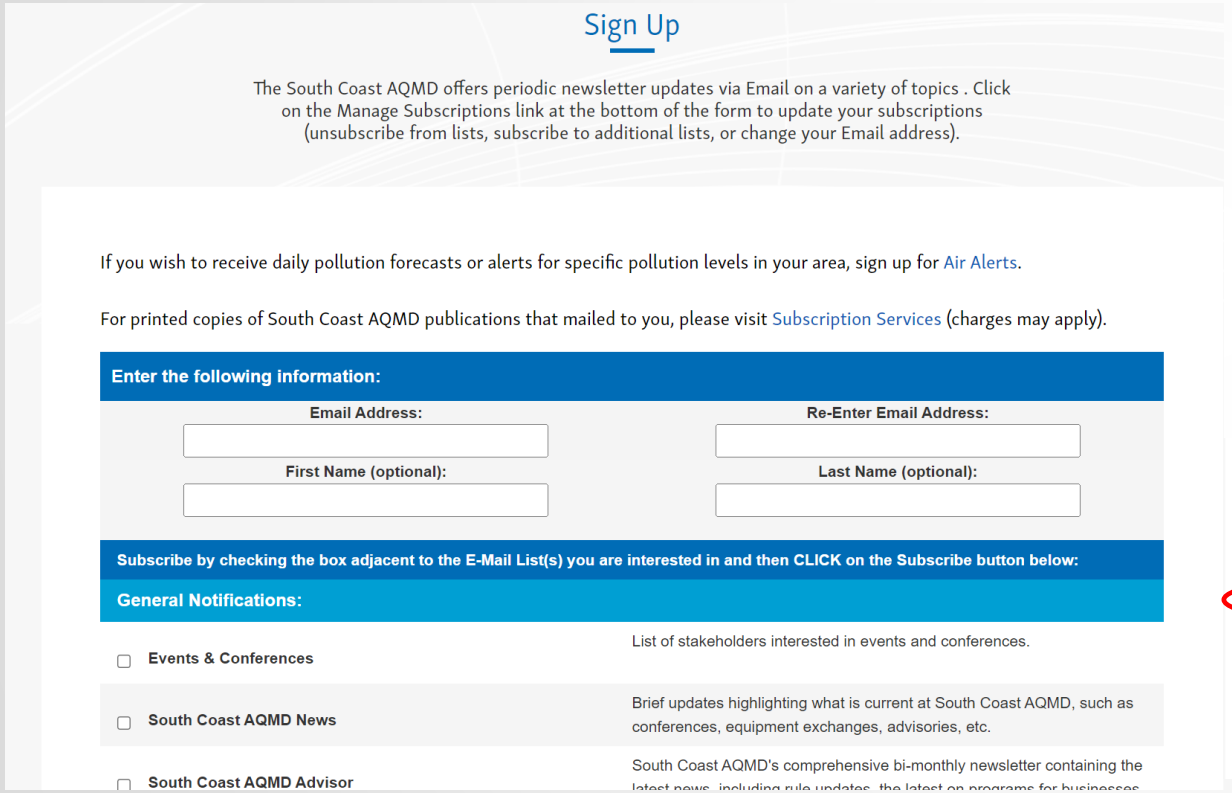
NEXT STEPS

Continue to obtain additional facility information

Develop Initial Preliminary Draft Rule Language

Next Working Group meeting

STAYING UPDATED



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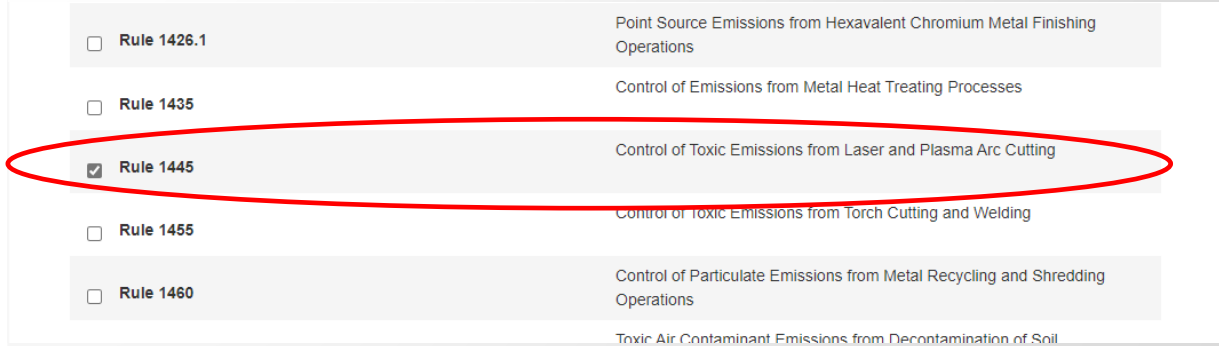

☐ Rule 1426.1	Point Source Emissions from Hexavalent Chromium Metal Finishing Operations
☐ Rule 1435	Control of Emissions from Metal Heat Treating Processes
☑ Rule 1445	Control of Toxic Emissions from Laser and Plasma Arc Cutting
☐ Rule 1455	Control of Toxic Emissions from Torch Cutting and Welding
☐ Rule 1460	Control of Particulate Emissions from Metal Recycling and Shredding Operations
	Toxic Air Contaminant Emissions from Decontamination of Soil

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