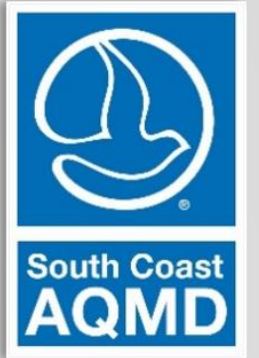


Working Group Meeting #2

September 14, 2023

1:00 PM



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

**JOIN ZOOM MEETING**

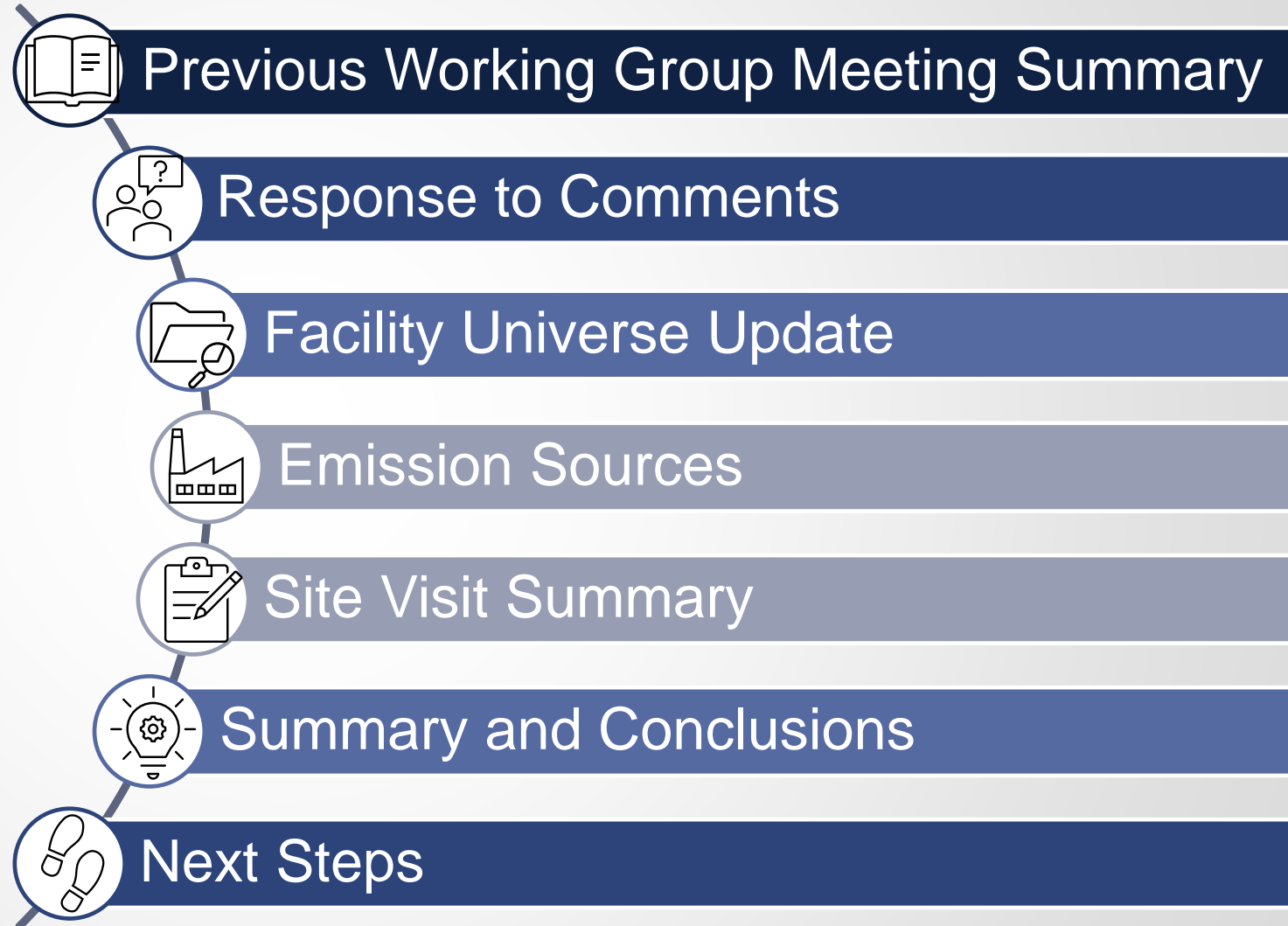
**[HTTPS://SCAQMD.ZOOM.US/J/91059006846](https://scaqmd.zoom.us/j/91059006846)**

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# AGENDA



# WORKING GROUP MEETING #1 RECAP

- Presented background information
  - South Coast AQMD air toxics control program to protect public health
  - Community concerns
  - Air Quality Management Plan control measure
  - South Coast AQMD rule development process
- Provided an overview of laser and plasma arc cutting equipment
  - Initial review of facility universe



# STAKEHOLDER COMMENTS (WORKING GROUP MEETING #1)

## Comment #1

- How are particulate matter (PM) and toxic air contaminant (TAC) emissions from laser and plasma arc cutting estimated?

## Comment #2

- Has South Coast AQMD conducted testing of hexavalent chromium emissions at laser and plasma arc cutting facilities?

# RESPONSE TO COMMENT #1: HOW ARE EMISSIONS FROM LASER AND PLASMA ARC CUTTING ESTIMATED?



Emissions are estimated during the permitting process based on operating parameters and equipment

## Examples of operating parameters

- Metal properties (density, compositional weight percentages of toxic metals)
- Activity data (cut speed, depth, width [kerf] and operating schedule)

## Conceptual example of estimating emissions without equipment source test

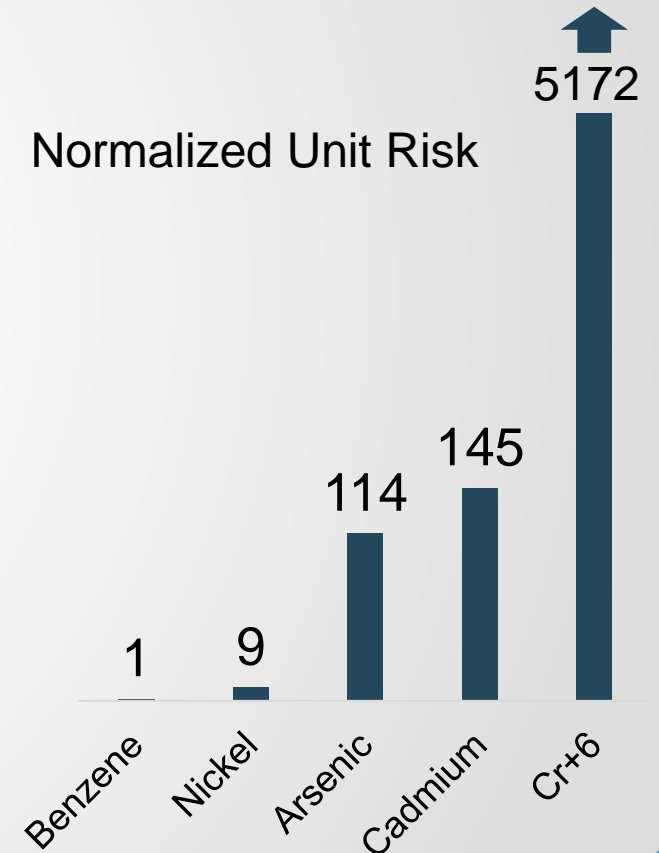
- Step 1 Calculate process weight (amount of metal cut)
- Step 2 Estimate uncontrolled PM emissions
- Step 3 If applicable, determine controlled PM emissions (PM emissions x control device efficiency)
- Step 4 Calculate TAC emissions\* (controlled PM emission x toxic metal content [% weight])

\* Hexavalent chromium ( $Cr^{+6}$ ) emissions are estimated on a case-by-case basis

# RESPONSE TO COMMENT #2: TESTING OF HEXAVALENT CHROMIUM EMISSIONS AT LASER AND PLASMA ARC CUTTING FACILITIES



- Source testing can be required as part of the permitting process
- Limited source testing has been conducted on laser and plasma arc cutting equipment
  - Collection efficiency evaluated (e.g., smoke test, capture velocity calculations, etc.) as part of a source test
- Samples collected prior to control device show measurable hexavalent chromium (i.e., Cr<sup>+6</sup> does not revert to less toxic forms of chromium)
- Although documented emissions are low, emissions remain a concern due to toxicity risk of hexavalent chromium





# UPDATED FACILITY UNIVERSE

# DATA REVIEW

## Preliminary Equipment Inventory (presented in WGM #1)

### Potentially Affected Facilities

- Review of available permits
- Count of facilities with active laser and plasma arc cutting permits

### Main Industry Categories

- Identified three main industry categories using NAICS codes



## In-Depth Permit Review

Detailed review of permit applications for active permits

- Portability, rating, associated control devices, control device efficiency, etc.
- Non-metal cutting equipment excluded from the data review

Results presented in following summary slides

Purpose: Obtain additional information to find areas for improvement in controlling toxic emissions from laser and plasma arc equipment used to cut metals

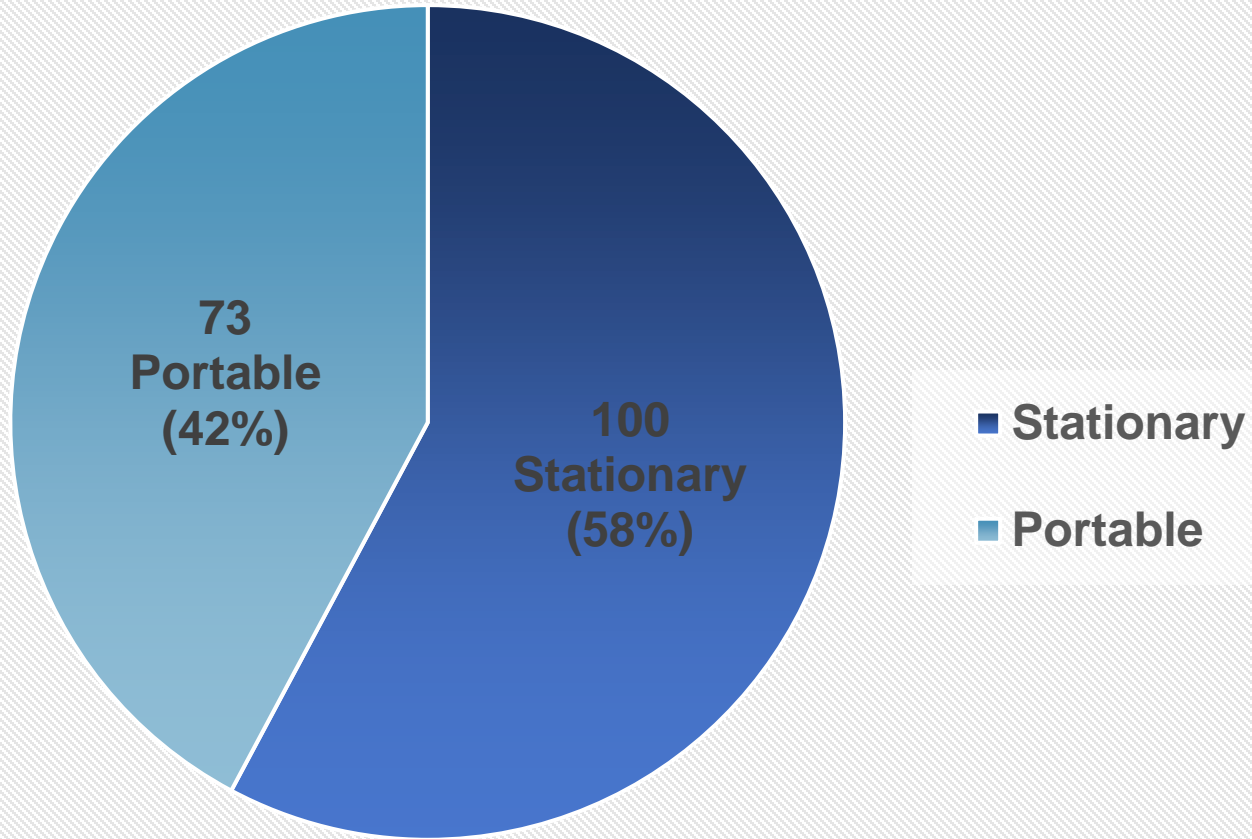




## PLASMA ARC CUTTING

- Stationary and portable equipment
- Industries include:
  - Aerospace, automotive, aircraft, appliance, agriculture, construction, cosmetics, trade school, utility
- Types of metal cut
  - Stainless steel, mild steel, carbon steel, aluminum alloy, nickel alloy
- Air pollution control equipment includes:
  - Dust collectors (some include HEPA filtration)
  - Water tables with and without dust collectors
  - Water shroud or spray

## Plasma Arc Cutting Equipment Portability



# PLASMA ARC CUTTING EQUIPMENT SUMMARY

Detailed review of 173 existing permits

# PLASMA ARC CUTTING CONTROL DEVICE SUMMARY

## Portable Equipment

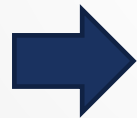
- Approximately half of portable equipment do not have a control device



| Control Efficiency Range | Control Type                             | Quantity  | [%] of Total |
|--------------------------|------------------------------------------|-----------|--------------|
| ≥ 99%                    | Dust Collector and Dust Collector + HEPA | 33        | 45           |
| 80-98%                   | Lower Efficiency Dust Collector          | 5         | 7            |
| N/A                      | No Control                               | 35        | 48           |
|                          | Total                                    | <b>73</b> | 100          |

## Stationary Equipment

- Majority of stationary equipment have a high efficiency dust collector\*
- 34% of equipment have a lower efficiency control device (24%) or no control device (10%)



| Control Efficiency Range | Control Type                             | Quantity   | [%] of Total |
|--------------------------|------------------------------------------|------------|--------------|
| ≥ 99%                    | Dust Collector and Dust Collector + HEPA | 58         | 58           |
| ≥ 99%                    | Water Table with Dust Collector          | 8          | 8            |
| 50-98%                   | Water Table                              | 24         | 24           |
| N/A                      | No Control                               | 10         | 10           |
|                          | Total                                    | <b>100</b> | 100          |

\*High efficiency dust collector - dust collector with control efficiency ≥ 99%



## LASER CUTTING

- Stationary equipment only
- Industries include:
  - Aerospace, automotive, aircraft, appliance, agriculture, construction
- Types of metal cut
  - Stainless steel, mild steel, carbon steel, aluminum alloy, nickel alloy
- Air pollution control devices include:
  - Dust collectors
    - Some include secondary filtration [HEPA or Ultra Low Penetration Air (ULPA)]

| Control Efficiency Range | Control Type                    | Quantity   | [%] of Total |
|--------------------------|---------------------------------|------------|--------------|
| ≥ 99%                    | High Efficiency Dust Collector  | 111        | 94           |
| 90-98%                   | Lower Efficiency Dust Collector | 3          | 3            |
| N/A                      | No Control                      | 3          | 3            |
|                          | <b>Total</b>                    | <b>117</b> | <b>100</b>   |

Majority of laser cutting equipment have an associated control device

- **94%** of laser cutters have a high efficiency dust collector
- A few have no control device or a control device with less than 99% control efficiency

## LASER EQUIPMENT SUMMARY

Detailed review of 117 existing permits

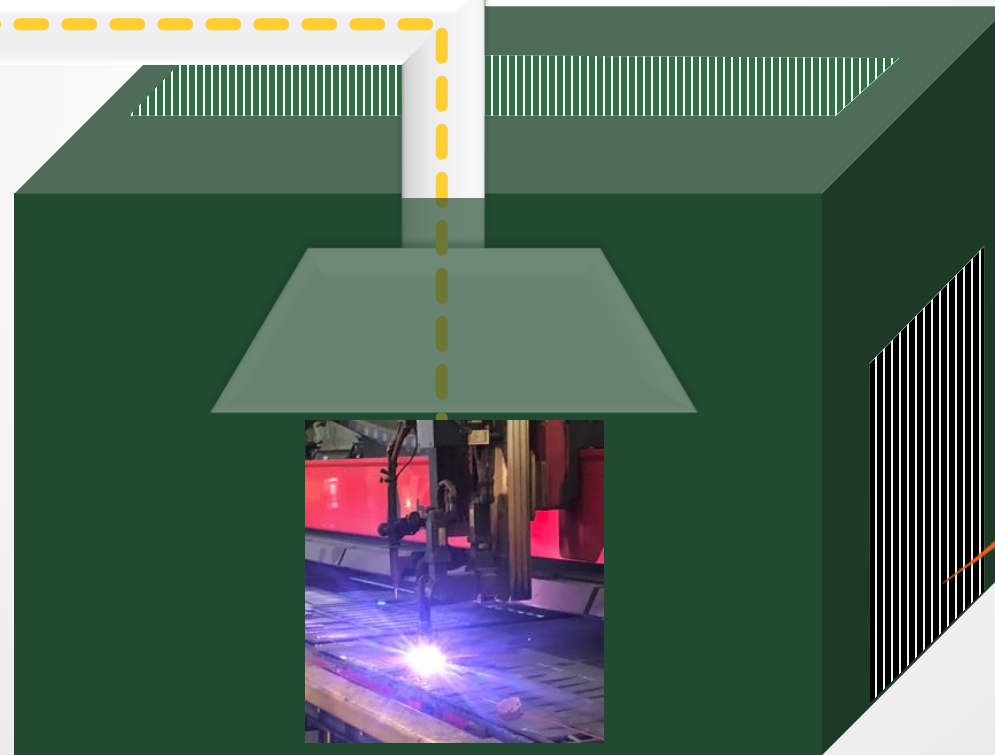
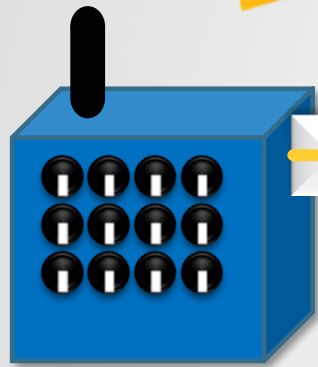


# EMISSIONS SOURCES



## Point Source

Emissions originate from a fixed point, such as a stack



## Fugitive Source

Facility generated emissions that become airborne, excluding emissions directed to a stack

# EXISTING REQUIREMENTS – POINT SOURCES

- Laser and plasma arc cutting equipment and associated control devices are required to obtain permits
- Under the permitting process, applications are evaluated to estimate emissions and to determine compliance with South Coast AQMD Rules, including
  - Regulation IV - Prohibitory Rules
  - Regulation XIII - New Source Review
  - Regulation XIV - New Source Review of Toxic Air Contaminants
- Control device requirements are primarily in response to
  - Rule 1303 – Requirements [Best Available Control Technology (BACT)]
  - Rule 1401 – New Source Review of Toxic Air Contaminants



# EXISTING REQUIREMENTS – POINT SOURCES

## BACT (Best Available Control Technology)

- New sources, relocations, and modifications of existing sources that increase nonattainment air contaminant emissions are subject to New Source Review which require BACT
- **BACT** means the most stringent emission limitation or control technique which has been achieved in practice for such category or class of source

## Rule 1401

- Rule 1401 specifies health risk thresholds for new permit units, relocations, and modifications for existing permit units which **emit toxic air contaminants**

## Other Prohibitory Rules

- Regulation IV
  - Rule 401: Visible Emissions
  - Rule 402: Nuisance
  - Rule 403: Fugitive Dust
  - Rule 404: Particulate Matter - Concentration
  - Rule 405: Solid Particulate Matter - Weight

# RULE 1401 EVALUATION

## Rule 1401 – New Source Review of Toxic Air Contaminants

For new permit units, relocations, or modifications to existing permit units emitting toxic air contaminants, Rule 1401 specifies thresholds for

- maximum individual cancer risk (MICR)
- cancer burden
- acute and chronic hazard index (HI)

## Current Methods to meet South Coast AQMD Rule Requirements

### Permit Conditions – Operating Parameters

- Examples found: Limitations on operating hours, amount of metal cut, metal type, metal thickness, TAC weight percentage of toxic metals, etc.

### Permit Conditions – Control Devices

- Examples found: Water tables, dust collectors, dust collectors + HEPA or ULPA filtration



# FUGITIVE EMISSIONS – EXISTING REQUIREMENTS

## Capture Efficiency

- An integral part of controlling air pollutants that are vented to an air pollution control device is ensuring that the exhaust system is designed to collect all emissions (i.e., capture or collection efficiency)
- Emissions not collected by the exhaust system and vented uncontrolled into the atmosphere can have a much greater impact than controlled emissions
- Rule 1155 – Particulate Matter (PM) Control Devices (adopted 2009) requires any new process vented to a new baghouse to include a ventilation system that meets a minimum capture efficiency based on U.S. Industrial Ventilation Handbook (American Conference of Governmental Industrial Hygienists)

## Housekeeping

- No existing requirements for housekeeping or best management practices for laser and plasma arc cutting equipment

## FUGITIVE EMISSIONS – OTHER AIR TOXICS RULES

Recently adopted and amended South Coast AQMD metal particulate air toxics rules have requirements for routine housekeeping and implementation of best management practices to minimize fugitive emissions

| Rule   | Title                                                                                                          | Date* |
|--------|----------------------------------------------------------------------------------------------------------------|-------|
| 1407   | Control of Emissions of Arsenic, Cadmium, and Nickel from Non-Chromium Metal Melting Operations                | 2019  |
| 1407.1 | Control of Toxic Air Contaminant Emissions from Chromium Alloy Melting Operations                              | 2021  |
| 1420   | Emissions Standard for Lead                                                                                    | 2017  |
| 1420.1 | Emission Standards for Lead and Other Toxic Air Contaminants from Large Lead-Acid Battery Recycling Facilities | 2015  |
| 1420.2 | Emission Standards for Lead from Metal Melting Facilities                                                      | 2015  |
| 1426   | Emissions from Metal Finishing Operations                                                                      | 2021  |
| 1430   | Control of Emissions from Metal Grinding Operations at Metal Forging Facilities                                | 2017  |
| 1460   | Control of Particulate Emissions from Metal Recycling and Shredding Operations                                 | 2022  |
| 1469   | Hexavalent Chromium Emissions from Chromium Electroplating and Chromic Acid Anodizing Operations               | 2021  |
| 1469.1 | Spraying Operations Using Coatings Containing Chromium                                                         | 2021  |

\* Adoption or last amendment date



# SITE VISIT SUMMARY

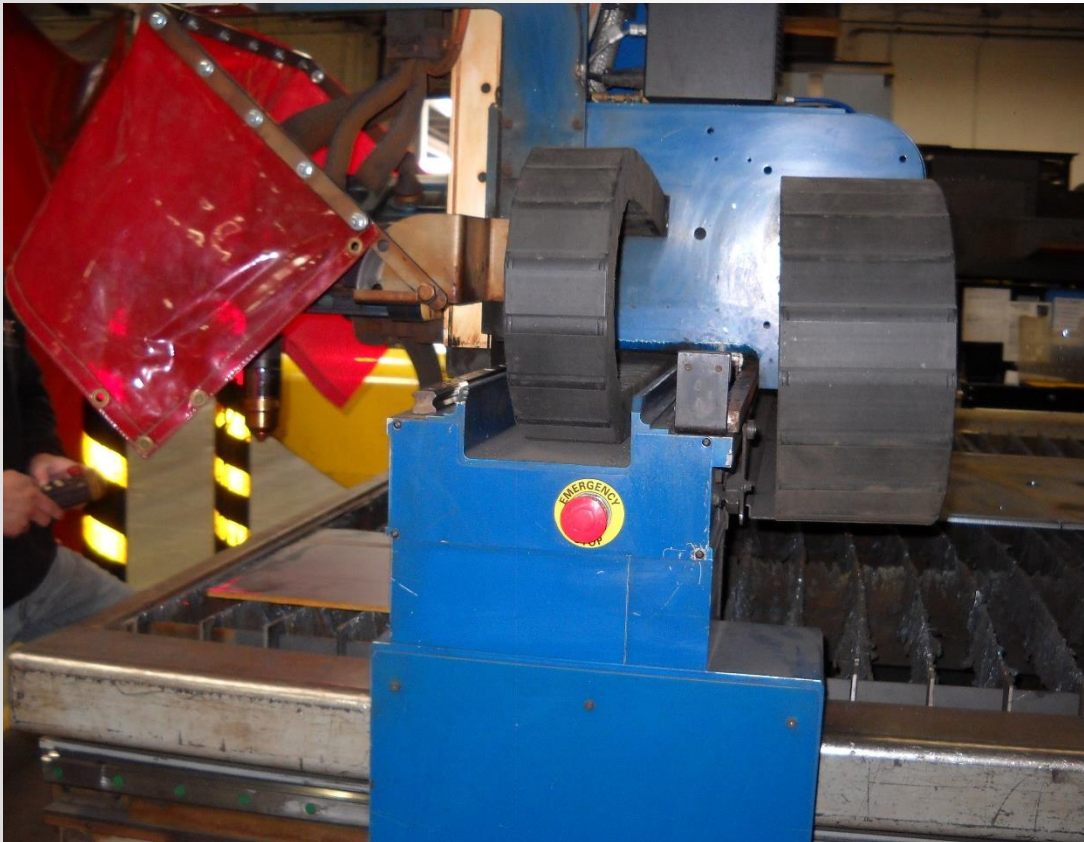
## SITE VISIT SUMMARY

- Conducted 10 site visits
  - 6 job shops
  - 1 manufacturer
  - 1 utility
  - 2 aerospace
- Stationary equipment had controls
  - Dust collector
  - Dust collector with additional filtration
  - Water table
- Portable equipment with and without controls





# PARTICULATE COLLECTION



- Staff observed use of different particulate collection systems:
  - Down draft table
  - Collection hood
  - Cutting equipment operated within an enclosure
  - Water table

# PARTICULATE CONTROL



- Staff observed use of different particulate control systems:
  - Dust collector
  - Dust collector with HEPA or ULPA filtration
  - Water table



# ENCLOSURES

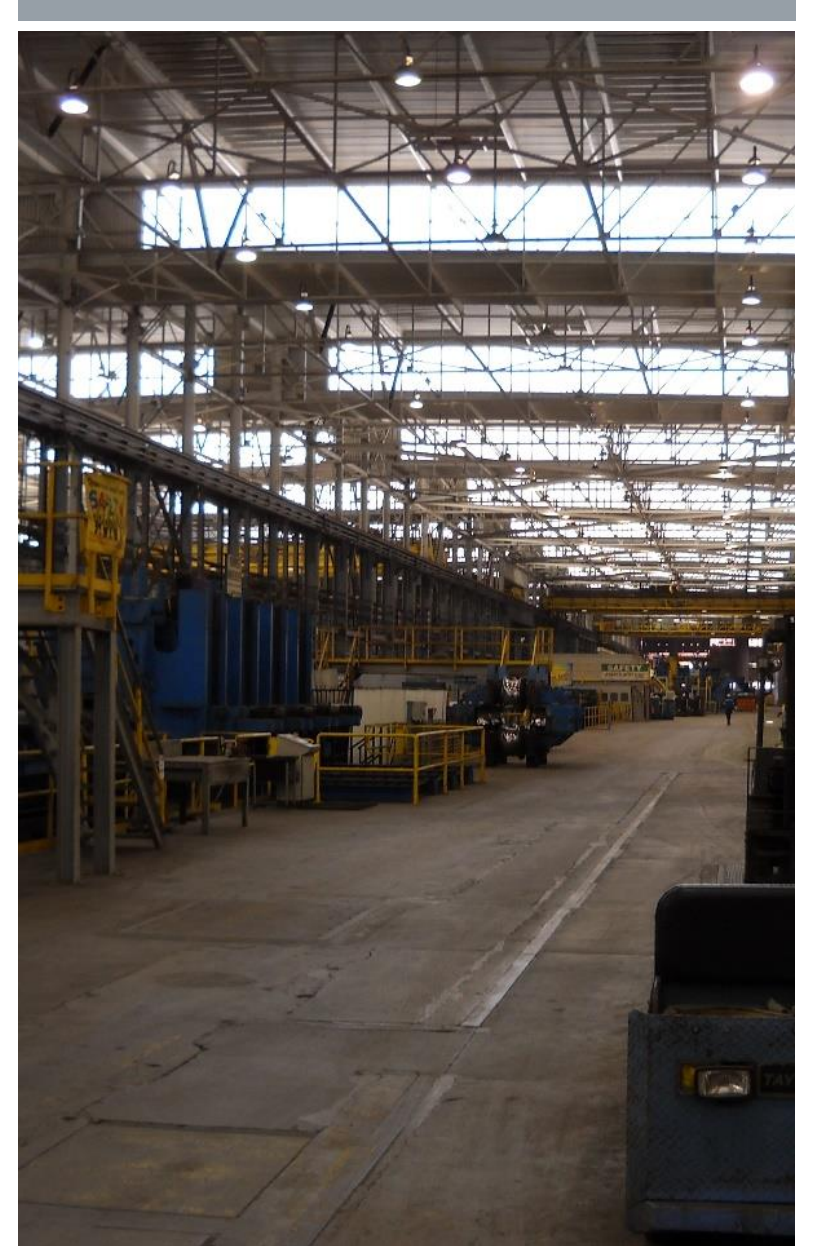
- Enclosures can minimize fugitive emissions
- Staff observed cutting equipment operated indoors
- Some equipment operated within dedicated enclosures that vent directly to control devices





# HOUSEKEEPING

- Clean-up activities around cutting equipment or other sources can generate fugitive emissions that can include hexavalent chromium
- Staff observed use of different housekeeping techniques (e.g., dry vacuum, sweeping) and frequencies (e.g., daily procedures)





# HANDLING/STORAGE/DISPOSAL PRACTICES

- Accumulated material can become fugitive during handling, storage and disposal activities

Dust Collection Barrel



# SUMMARY AND CONCLUSIONS

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# SUMMARY OF WORKING GROUP MEETING #2

## Plasma Arc Cutting Equipment

- Portable: Approximately half have no air pollution control devices
- Stationary: Approximately 10 percent have no controls
- Stationary: Approximately 24 percent have control devices with efficiency below 99 percent

## Laser Cutting Equipment

- Nearly all equipment vented to control devices with efficiency of at least 99 percent

## Areas to Achieve Further Toxic Emission Reductions

- Control devices are available for uncontrolled equipment, including portable equipment
- Higher efficiency control devices are available
- Minimize fugitive emissions by incorporating similar requirements as existing South Coast AQMD metal particulate air toxics rules (e.g., capture efficiency demonstrations, best management practices, and routine housekeeping)

# NEXT STEPS

Continue to obtain additional facility information



Preliminary Rule Concepts



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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