

Proposed Airborne Toxic Control Measure to Reduce Hexavalent Chromium and Nickel Emissions from Thermal Spraying



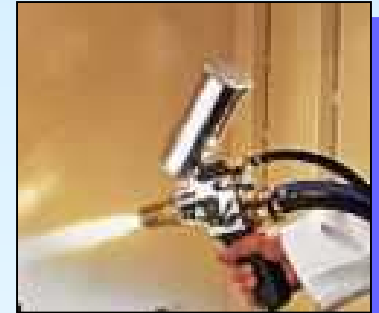
**Board Hearing
Sacramento CA
December 9, 2004**

California Environmental Protection Agency

 **Air Resources Board**

Today's Presentation

- **Background**
- **Reasons for proposed ATCM**
- **ATCM Development**
- **ATCM Requirements**
- **Benefits & Impacts**
- **Proposed Modifications**
- **Summary & Recommendation**



Background

Background

ARB's Air Toxics Program

- **Identification of Toxic Air Contaminants**
 - **AB 1807** requires TAC identification
 - **Hexavalent Chromium - 1986**
 - **Nickel - 1991**
- **Risk Management**
 - **Airborne Toxic Control Measures (ATCMs)**
 - **12 ATCMs adopted**
 - **3 ATCMs for Hexavalent Chromium**
 - **Other control measures**



Background

What is thermal spraying?

Materials are heated and sprayed onto a surface to form a coating.

Includes:

- Flame Spraying
- Plasma Spraying
- Twin-Wire Electric Arc
- HVOF
- Detonation Gun



Background

**Feed
Material**

**Oxygen &
Fuel Gas or
Electric Arc**



**Molten
Metal**

Background

- Materials are powders, wires, or rods
- May contain chromium, nickel, and other toxic air contaminants
- Generates air emissions of hexavalent chromium & nickel



Background

- **Used in a wide variety of industries:**

- Aerospace
- Oil Refineries
- Printing
- Power Plants
- Electronics
- Computers

- **Applications:**

- Wear resistance
- Corrosion protection
- Thermal barrier
- Electromagnetic shielding
- Build up damaged surfaces



Background

Portable Thermal Spraying

- **Conducted at power plants, refineries, etc.**
- **Limited data available**
- **NOT included in proposed ATCM**
 - Will be investigated

Background

Most Thermal Sprayers Have Booths & Control Devices:

- HEPA Filter
- Dry Filter Cartridge
- Baghouse
- Wet Scrubber
- Water Curtain



Background

Current Requirements

- **Air Permits**
- **Toxics New Source Review**
- **AB 2588 Air Toxics Hot Spots**



Reasons for Proposed ATCM

Reasons for Proposed ATCM

- Board request
- Potential use as replacement for hard chromium electroplating
- Hexavalent chromium is very toxic
- Nickel can cause cancer & other health effects
- Community Health/Environmental Justice
- No existing thermal spraying regulations





ATCM Development

ATCM Development

Key Survey Findings

Total Active Operations =	51	
Use Products w/Cr or Ni	37	73 %
Permitted	28	55 %
Unpermitted	23	45 %
Conduct Spraying in a Booth	46	90 %
Have Existing Control Devices	45	88 %
Have HEPA Filters	20	39 %

ATCM Development

Emission Estimates

- Worked with districts to develop emission estimation methodology
- Based on stack tests, scientific research, and industry data

	Actual Emissions (lbs/yr)
Hexavalent Chromium	9.4
Nickel	105

ATCM Development

District Breakdown

	Use Cr/Ni	Emissions (lbs/yr)	
		Cr ⁺⁶	Ni
Bay Area AQMD	6	1.5	22.2
Feather River AQMD	1	0.04	0.3
South Coast AQMD	18	7.6	70.1
San Diego APCD	7	0.3	6.4
San Joaquin APCD	3	0	6.0
Ventura APCD	2	0	0.01
Totals =	37	9.4	105

ATCM Development

Risk Estimates

Cancer Risk (chances per million)

Cr⁺⁶ <1 to 300

Ni <1 to 30



ATCM Requirements

ATCM Requirements

Types of Operations:

- **Existing** - In operation prior to Jan. 1, 2005
- **New/Modified** - Initial Startup/Modification on or after Jan. 1, 2005

Compliance Dates:

- **Existing** - Jan. 1, 2006
- **New/Modified** - Upon Initial Startup



ATCM Requirements

- **Existing Operations -
Best Available Control Technology**
- **New & Modified Operations -
Maximum Control Efficiency
(e.g., HEPA Filter)**
- **All Operations -
Emission Inventory
Permitting & Recordkeeping**

ATCM Requirements

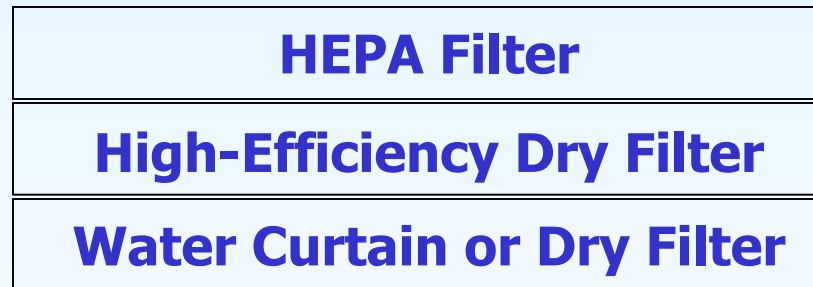
Existing Operations

- Based on emissions
- Control efficiency: 90% - 99.97%

*Larger
Source*



*Smaller
Source*



ATCM Requirements

Existing Operations - Remotely Located

- **Allows 90% control efficiency for remotely located thermal spraying operations.**
- **A site-specific analysis must be conducted by district to ensure public health protection**

ATCM Requirements

Modified Operations

- Modification on or after January 1, 2005
- Must meet maximum control efficiency (e.g., HEPA Filter)



ATCM Requirements

NEW Operations

New operations emitting hexavalent chromium or nickel must meet all of the following criteria:

- **Must meet maximum control efficiency (e.g., HEPA filter)**
- **Must be located outside of and at least 500 feet from the boundary of an area zoned residential or mixed-use**
- **A site-specific analysis conducted by district ensures public health protection**

Benefits & Impacts

Benefits & Impacts

Emission Reductions

- Overall control efficiency after ATCM will be 98%
- Will reduce current Cr⁺⁶ emissions by 80% *
- Will reduce current Ni emissions by 51% *

**** Most operations are already controlled.***

Benefits & Impacts

Risk Reductions

- **Residual Cancer Risk will be <1 to 2 potential cancer cases per million**



Benefits & Impacts

Economic Impacts

- **Total Capital Cost = \$670,000**
- **Total Operating Cost = \$55,000/year**
- **Total Annual Cost = \$150,000/year**

Proposed Modifications

- **Clarify Two Definitions**
- **Clarify New Source Requirements**
- **Clarify Monitoring Requirements**

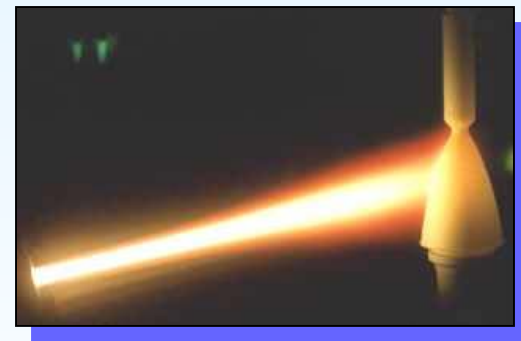
Summary & Recommendation

Summary

- **The proposed ATCM is BACT**
- **The proposed ATCM is consistent with ARB's environmental justice goals**
- **Reduces hexavalent chromium and nickel emissions and public exposure**

Recommendation

- **Adopt the proposed ATCM**
- **Direct staff to investigate portable thermal spraying operations**



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