

9th Working Group Meeting for

Proposed Amended Rule 1469 – Hexavalent Chromium Emissions from Chromium Electroplating and Chromic Acid Anodizing Operations

**South Coast AQMD
January 4, 2018**

Update on PAR 1469

- Public Hearing date is being moved from February 2, 2018 to April 6, 2018 to allow additional time to:
 - Evaluate concerns recently received from public regarding toxicity of chemical fume suppressants
 - Further refine other requirements of PAR 1469
- Preliminary Draft Rule and Staff Report
 - 2nd Revision released November 17, 2017
- Stationary Source Committee
 - Provided summary and update on November 17, 2017
- Public Workshops
 - 2nd Public Workshop held on December 7, 2017
- Public comment period still open – new deadline to be provided at a later date

Chemical Fume Suppressants

Background - Chemical Fume Suppressants

- Used to reduce the surface tension of plating bath which reduces hexavalent chromium emissions from escaping the tank
- Data showed high control efficiencies when surface tensions are maintained at a low level
- Chemical fume suppressants are allowed for low-ampere facilities and is a low-cost option compared to add-on air pollution control devices
- Perfluorooctane sulfonate (PFOS) based chemical fume suppressants were previously used as they did not degrade and could tolerate the acid bath
- In 2012, EPA prohibited the use of chemical fume suppressants that contain PFOS as they were shown to be “persistent, bio-accumulative, and toxic”

Non-PFOS Chemical Fume Suppressant Usage by Rule 1469 Facilities

- 73 facilities utilize chemical fume suppressants
- 46 of these facilities use chemical fume suppressants with an add-on air pollution control device to meet 0.0015 mg/amp-hr limit
 - 42 use HEPA or better than 99.97% control efficiency
 - 4 use other types of add-on air pollution control devices
- 27 of these facilities use chemical fume suppressants to meet 0.01 mg/amp-hr limit
 - 20 use chemical fume suppressants as sole form of control
 - 6 use a combination of chemical fume suppressants and mechanical fume suppressant
 - 1 uses chemical fume suppressant and add-on air pollution control device
 - Many of these facilities are small businesses

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Certification of Non-PFOS Chemical Fume Suppressants

- Beginning 2013, CARB worked with chemical manufacturers, and other stakeholders to certify non-PFOS chemical fume suppressants through the following process:
 - Source Testing – emission and surface tension limits of non-PFOS fume suppressants (SCAQMD assisted)
 - Toxicity Review (OEHHA)
 - CARB Certification
- SCAQMD Certification based on CARB certification

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OEHHA Review of Non-PFOS Chemical Fume Suppressants

- Recently SCAQMD received documents detailing the results of literature reviews of the toxicity of recently certified chemical fume suppressants
- OEHHA reviewed the following products
 - 6:2 Fluorotelomer Alcohol (FTOH)
 - 6:2 Fluorotelomer Sulfoinate (FTSA) and a Perfluorohexanoic Acid (PFHxA)
 - Perfluorohexane Sulfonate (PFHxS)
 - Sodium Diamyl Sulfosuccinate

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Literature Review of Non-PFOS Chemical Fume Suppressants

- 6:2 Fluorotelomer Alcohol (FTOH)
 - Exposure occurs via inhalation
 - Exhibited rapid degradation with a half-life of less than 2 days in soil
 - Capable of long-distance atmospheric transport and surface contamination, producing potentially toxic responses based on animal studies
 - OEHHA developed interim Reference Exposure Levels (iREL)
 - Acute: 20 ppb
 - 8-Hour: 2 ppb
 - Chronic: 1 ppb
- 6:2 Fluorotelomer Sulfoinate (FTSA) and a Perfluorohexanoic Acid (PFHxA)
 - Exposure occurs via inhalation or ingestion
 - FTSA is biopersistent and does not degrade rapidly in soil or water
 - Evidence suggests relatively lower risk compared to PFOS and PFHxS
 - Some evidence of reproductive toxicity, but insufficient evidence to be conclusive
 - No iREL developed

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Literature Review of Non-PFOS Chemical Fume Suppressants (cont.)

- Perfluorohexane Sulfonate (PFHxS)
 - Some evidence of reproductive toxicity, but insufficient evidence to be conclusive
 - Review was not exhaustive and more studies are needed to understand effects
 - Limited literature on toxicity available
 - No iREL developed
- Sodium Diamyl Sulfosuccinate
 - Insufficient information to make conclusions
 - Limited literature on toxicity available
 - No iREL developed

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Summary of Action Items for Non-PFOS Chemical Fume Suppressants

- Non-PFOS chemical fume suppressants have an unknown REL and an unknown emission rate
- SCAQMD staff is working with CARB on these issues
- Input from and discussion with manufacturers is still needed
- Staff is considering a standard for chemical fume suppressants that will allow manufacturers to reformulate
- If needed, the chemical fume suppressants will be phased out

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Additional Key Revisions Since Working Group #8 to PAR 1469 Rule Language (version 11/17/17)

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Definitions (c)

- Revised “Approved Cleaning” to include wet wash system based on feedback from stakeholders
- Revised “Tier II Hexavalent Chromium Containing Tanks” to reflect recent results from emissions testing – more details after discussion of results of recent emissions testing

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Building Enclosures (e) – Closing of Roof Openings

- Revised PAR 1469 to require that all enclosure openings in the roof that are located within **15 feet** from the edge of any Tier II Tank be closed
- Staff is still concerned with roof openings that are directly above the tank regardless of distance
- Clarification
 - Exempt openings include those that provide intake air
 - Staff looking at additional rule language to acknowledge other stacks, such as those venting non-Rule 1469 tanks and how they relate to enclosure openings

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Building Enclosures (e) – Ventilation Equipment in Roof

- Previous rule language prohibited the operation of devices installed in the roof that pulls air from the building enclosure to the outdoor air unless vented to an add-on air pollution control device that is fitted with at least HEPA
- Facilities commented that this is necessary to provide air exchanges for workers; closing would not be an option
- Proposed rule language has been revised to allow operators to continue using ventilation equipment if it is located more than a specified distance edge of a Tier II Tank

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Updates on Additional Emission Testing

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Results of Additional Source Testing

- Current PAR 1469 is recommending a temperature of 140° F for Tier II Hexavalent Chromium-Containing Tanks (Tier II Tanks)
- Industry stakeholders requested that SCAQMD conduct additional source testing to determine if a temperature higher than 140° F can be used to define Tier II Tanks
- SCAQMD staff conducted additional source tests at 150°F and 160°F on November 2nd and 14th using the same alodine tank with a surface area of 10 ft² at different temperatures

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Update on Additional Source Testing

	Run	Tank Cr+6 (ng/m ³)	Tank Cr+6 (mg/hr)	Tank Cr+6 (mg/hr-ft ²)
150°F (Tank Concentration 347 ppm Cr+6)	Run #1	37.9	0.037	3.75E-3
	Run #2	25.7	0.025	2.53E-3
	Run #3	58.8	0.054	5.40E-3
	Average	40.8	0.039	3.89E-3
160°F (Tank Concentration 333 ppm Cr+6)	Run #1	72.7	0.083	8.33E-3
	Run #2	51.3	0.058	5.80E-3
	Run #3	134.9	0.156	1.56E-2
	Average	86.3	0.099	9.92E-3

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Findings from Additional Source Testing

- SCAQMD staff utilized emission factors to determine what tank concentrations would exceed 0.20 mg/hr
 - At 150° F, 0.20 mg/hr would be exceeded when tank hexavalent chromium concentrations exceed 1,780 ppm
 - At 160° F, 0.20 mg/hr would be exceeded when tank hexavalent chromium concentrations exceed 673 ppm
- Results demonstrated that concentrations below the Tier II Tank definition may be a source of hexavalent chromium emissions
- Modification to the definition of Tier II Tanks needed to capture tanks that are sources of hexavalent chromium

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Revised Definition for TIER II HEXAVALENT CHROMIUM-CONTAINING TANKS

- Temperature threshold to be 140°F for any concentration
- Operators with tanks that exceed 140°F shall refer to a table in the rule to determine if the tank is a Tier II Tank

Temperature of Tank	Hexavalent Chromium Concentration
140-150°F	1500 PPM
150-160°F	500 PPM
>160°F	65 PPM

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Previous Emission Standards for Tier II Hexavalent Chromium-Containing Tanks (h)(4)

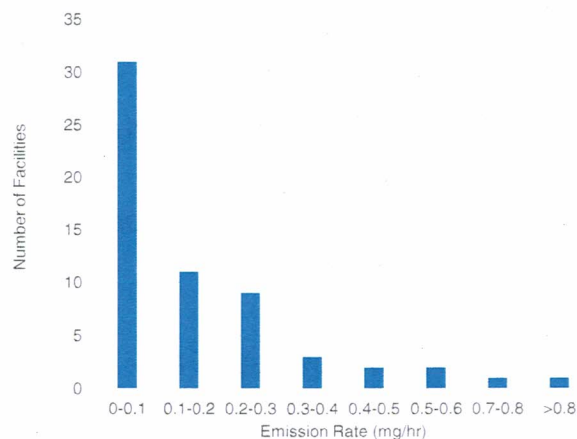
- Added Tier II Tank (excluding chromium electroplating and chromic acid anodizing) emission standards:
 - Existing facilities – 0.0015 mg/amp-hr, if any of the tanks vented by the add-on air pollution control device are electrolytic
 - New facilities – 0.0011 mg/amp-hr, if any of the tanks vented by the add-on air pollution control device are electrolytic
 - 0.20 mg/hr, if all tanks vented to add-on air pollution control device are not electrolytic

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Previous Determination of Tier II Tank Emission Rate of 0.20 mg/hr

- SCAQMD staff used source test data from chromium electroplating and chromic acid anodizing tanks to establish emission limit for Tier II tanks
- Staff reviewed 80 source tests conducted from 1999-2016
- 20 source tests were not used because:
 - Source test was from a stack that is venting multiple tanks
 - Amperes used during the source test was not representative of normal operations
- Average emission rate for remaining 60 source tests was 0.18 mg/hr
- Tier II emission standard of 0.20 mg/hr is feasible because
 - Hexavalent chromium concentration of Tier II tanks typically lower than electroplating and anodizing tanks

Tank Emission Rates by Facility



Emission Rate Range (mg/hr)	Number of Facilities
0.0-0.1	31
0.1-0.2	11
0.2-0.3	9
0.3-0.4	3
0.4-0.5	2
0.5-0.6	2
0.7-0.8	1
>0.8	1

Stakeholder Feedback on Emission Rates

- Non-electrolytic emission rate
 - Difficult to conduct emission tests for ventilation systems with high CFM rates
 - Source tests would take 100+ hours
 - Assumed emission rate would be minimum detection limit
 - Using minimum detection limit would result in an emission rate of 4.00 mg/hr
 - Not scalable – does not consider the surface area of tanks nor the amount of tanks vented to an add-on air pollution control device
- Some facilities need to have ventilation systems capable of generating large exhaust rates due to:
 - Being required to control large tanks that are designed to accommodate large parts
 - Being designed large enough to provide sufficient draft to meet the design requirements to be a Permanent Total Enclosure
 - Having other tanks that are required to be controlled by other SCAQMD rules or permit conditions may be connected to the same ventilation system

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Staff Response to Stakeholder Feedback on Emission Rates

- SCAQMD staff reviewed data presented and agreed that it would be difficult to conduct emission tests for ventilation systems with high CFM exhaust rates
 - Emission rate for ventilation systems less than 5,000 cfm would still be 0.2 mg/hr
 - Emission rate for ventilation systems greater than 5,000 cfm would be based on the surface area of the Tier II tank being controlled
- Permanent Total Enclosure
 - Emission rate for ventilation systems where tanks are located in a Permanent Total Enclosure would be based on the surface area of the Tier II tank and other tanks required to be controlled by SCAQMD Permit

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Revised Emission Rates – Non-Electrolytic

- Revised emission rate to be based on the exhaust flow rate and square footage of the tank

Exhaust Flow Rate	Are Controlled Tanks In a Permanent Total Enclosure?*	Applicable Square Footage to Determine Emission Rate	Emission Rate
≤ 5,000 CFM	Not Applicable	Not Applicable	0.20 mg/hr
>5,000 CFM	No	Controlled Tier II tanks	0.004 mg/hr-ft ²
>5,000 CFM	Yes	Controlled Tier II tanks and tanks requiring controls by a SCAQMD Permit	0.004 mg/hr-ft ²

*Permanent Total Enclosure means a building or containment structure that has limited openings, free of breaks or deterioration, and been evaluated to meet the design requirements set forth in US EPA Method 204 or other design approved by the Executive Officer

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Preliminary Cost Estimates for Key PAR 1469 Requirements

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Preliminary Cost Estimates for Key PAR 1469 Requirements

- SCAQMD staff is conducting a Socioeconomic Impact Assessment for PAR 1469
- Key capital costs include:
 - Installation of add-on air pollution control devices for Tier II Tanks
- Key operating costs include:
 - Hexavalent chromium source test or emission screening test
- Cost data was provided by source test companies or from companies who provide control equipment to the metal finishing industry

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Capital Control Equipment Costs

- Pull-pull system
 - Recommended flow rate of 250 cfm per ft²
 - Cost per cfm was quoted to be \$6-\$7
- Push-pull system
 - Recommended flow rate of 150 cfm per ft²
 - Cost per cfm was quoted to be \$13-\$15
- Average surface area of a tank is 40 ft²

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Breakdown of Control Equipment

- Components of the control equipment that were quoted include the following:
 - Filter systems:
 - Filter Media (2 layers of mesh pads and 1 layer of ULPA filter)
 - Wash-down Equipment
 - Platform
 - Appropriately sized exhaust fans
- Installation costs vary depending on where the equipment will be located
- Additional operating and maintenance cost data are being collected

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Price Quotes for Pull-Pull System

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| <ul style="list-style-type: none">• 35 ft² Tank• 7,500 CFM Composite Mesh Pad/ULPA Filter System<ul style="list-style-type: none">• ~\$37,000• Platform for System<ul style="list-style-type: none">• ~\$3,000• Exhaust Fan at 11,250 CFM<ul style="list-style-type: none">• ~\$10,000• Transportation of Equipment<ul style="list-style-type: none">• ~\$7,000• Total<ul style="list-style-type: none">• ~\$57,000 | <ul style="list-style-type: none">• 45 ft² Tank• 11,250 CFM Composite Mesh Pad/ULPA Filter System<ul style="list-style-type: none">• ~\$50,000• Platform for System<ul style="list-style-type: none">• ~\$5,000• Exhaust Fan at 11,250 CFM<ul style="list-style-type: none">• ~\$14,000• Transportation of Equipment<ul style="list-style-type: none">• ~\$7,000• Total<ul style="list-style-type: none">• ~\$76,000 |
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Source Test Costs

- Source tests are outlet tests conducted per CARB Method 425 or EPA Method 306 to verify the compliant operation of each control device
- Initial or Full Source Test
 - 3 runs
 - Conducted initially and every 3 years
 - \$18,000 per test (includes preparations, mobilization, on-site testing program, and lab analysis)
 - 54 Facilities would be required to conduct a full source test
- Emission Screening
 - 1 run
 - May be done in lieu of a subsequent source test (every 3 years) or initial source test if the owner or operator conducted a source test after October 24, 2009
 - \$14,000
 - Price reduced due to fewer samples to analyze (includes preparation, mobilization, testing, and lab analysis)
- Other site-specific accommodations or other factors may alter the costs

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Other PAR 1469 Rule Developments

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Phase Out of Hexavalent Chromium and Non-PFOS Chemical Fume Suppressants

- Hexavalent Chromium Phase Out Plan
 - SCAQMD staff have been meeting with aerospace manufacturers regarding the approval process of an alternative
 - PAR 1469 rule language will be revised and refined to reflect the new information
- Phase Out of Non-PFOS Chemical Fume Suppressant
 - SCAQMD is requesting additional stakeholder feedback

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Next Steps and Key Dates

- Continue toxicity assessment of chemical fume suppressants
- Public Workshop (tentative) – February 8, 2018
- Close of Public Comments – February 22, 2018
- Governing Board Meeting – April 6, 2018

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