Proposed AB 32 Discrete Early Action Regulation:

Regulation for Reduction of Sulfur Hexafluoride from Non-Utility and Non-Semiconductor Manufacturing

February 26, 2009

California Environmental Protection Agency

Air Resources Board
Importance of Regulating SF$_6$

- SF$_6$ is the most potent greenhouse gas the IPCC has identified
- Increasing at 5% per year
- Many uses are emissive (capture and recycling not feasible)
- Lifetime of over 3,200 years

1 lb of SF$_6$ is equivalent to:
- 10 metric tons of CO$_2$
- Driving around the world once

1 oz of SF$_6$ is equivalent to:
- 1.5 barrels of oil
Sulfur Hexafluoride Regulations

• Fluorinated gases in semiconductor manufacturing

• SF$_6$ in electric utilities

• This regulation: SF$_6$ in non.utility and non-semiconductor manufacturing
Emissions and Sources

- Tracer Gas Testing
- Magnesium Casting
- Other uses (military, research, consumer products, medical)
- Total emissions are 0.15 MMTCO$_2$E
Proposed Regulation

Reduce emissions of $\text{SF}_6$ from non-semiconductor and non-electricity applications

• Staff evaluated broad spectrum of options
• Reduction of 0.1 MMTCO$_2$E annually
• Low Cost
• Blocks new uses
• Could serve as model for other states
Components of Regulation

- SF$_6$ emissions
- Phased-Out Uses
- Allowed Uses
- Exemption Process
- Registration, Reporting, and Record-keeping
## Phase-Out Dates

<table>
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<tr>
<th>Applications</th>
<th>Phase-Out Dates</th>
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<tbody>
<tr>
<td>All uses except those listed below*</td>
<td>January 1, 2011</td>
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<tr>
<td>Tracer Gas Testing</td>
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<tr>
<td>Magnesium Sand Casting</td>
<td>January 1, 2013</td>
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<td>Magnesium Investment Casting</td>
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<td>Military Applications</td>
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*This regulation does not apply to semiconductor manufacturing or electric utilities as separate focused regulations will address these source categories*
Tracer Gas Testing

• Uses includes:
  – Atmospheric transport
  – Characterization of ventilation systems
  – Air infiltration studies
  – Leak testing
  – Characterizing flow patterns
  – Other uses including for military purposes

• Alternatives

• Status
Tracer Gas Testing – Fume Hoods

• Cal/OSHA and ASHRAE 110 standard required for energy saving setback technology (allowed use due to GHG reductions)

• Testing fume hoods with SF₆ outside of Cal/OSHA regulation (not allowed)

1 fume hood test = ~40,000 miles driven
Magnesium Casting

• SF$_6$ used to prevent oxidation during magnesium casting

• Timing allows for testing results and re-certification of methods

• Alternatives

• Status
Other Uses

To be Phased Out:
• Consumer product, military and research
• Any future use

To be Exempted
• Medical Uses
  – Only 4 pounds of SF\textsubscript{6} used per year (0.00004 MMTCO\textsubscript{2}E)
  – Potential alternatives not considered as effective
• Research for concentration measurements, on health impacts, or on alternatives to SF\textsubscript{6}
• Other uses will be judged on a case-by-case basis in exemption process
Exemption Process

• One of two criteria for an exemption:
  – Uses that result in reduced GHG emissions
  – Uses with no alternatives

• Flexible enough to allow variety of applications

• Applications must include mitigation plan
Registration, Record keeping and Reporting

• Distributors (<30 firms)
  – Register
  – Keep records of sales for 3 years
  – Provide an annual report of each sale (quantity and date)

• Purchasers (40-70 users)
  – Keep records of annual quantity of SF$_6$ purchased and used
Environmental & Economic Impacts

• Emission reduction = 0.10 MMTCO$_2$E per year

• Cost-effectiveness = ~$2 per MTCO$_2$E

• Total cost is $200,000 a year over 20 years
  – Costs borne by both industry and their clients
  – General public not greatly impacted

• Other states may adopt the regulation

• Can be harmonized with a high GWP mitigation fee in the future
Regulatory Development Process

• 3 public workshops

• 2 workgroup meetings and 2 sub-workgroup meetings

• Outreach
  – Government agencies
  – Industry
  – Academia

• ISOR posted on 1/8/2009

• Comments
Conclusion & Recommendation

- Reduces GHG emissions
- Attainable with existing technology
- Cost-effective

- STAFF RECOMMENDS BOARD ADOPTION