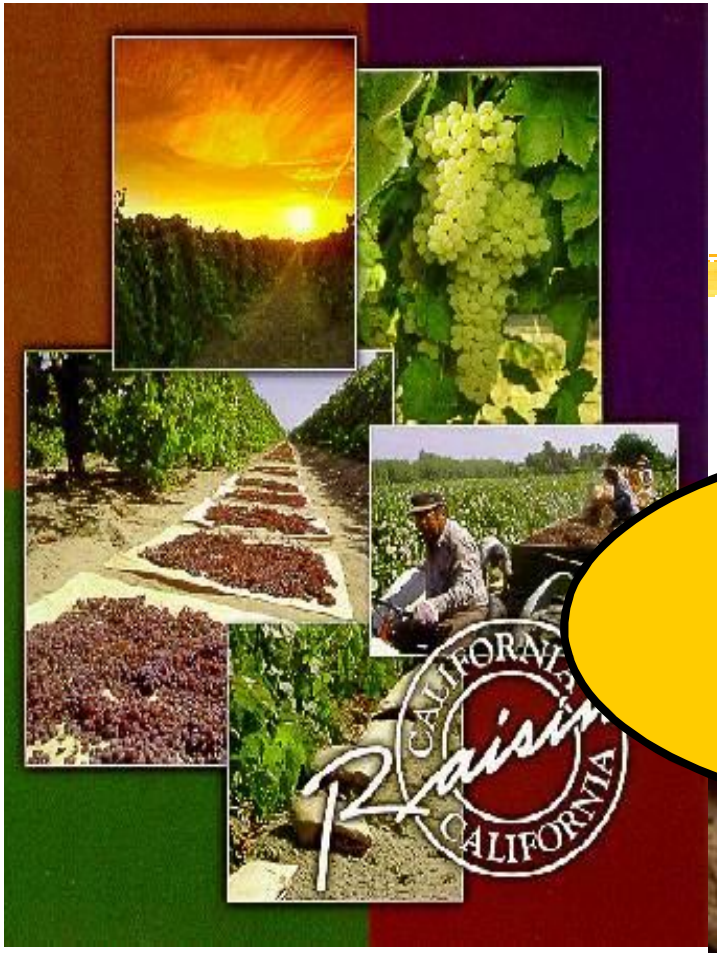


Dow AgroSciences

ProFume*

Gas Fumigant

*Trademark of Dow AgroSciences LLC

Regulatory Update for ProFume® Gas Fumigant

Dave Barnekow

MB Alternatives: Focus on ProFume and IPM Tactics

Topics

- Registration History
  - 2004 Registration
  - 2005 Registration
- Registration Review Process
  - Opened June 24, 2009
  - Expected New Data Requirements
- Special Issue
  - Climate Change

Registration History

Registration History

- 2004 Registration
  - Grain Processing Facilities, Stored Cereal Grains,
    Dried Fruits and Tree Nuts
  - First Establishment of Food Residue Tolerances
- 2005 Registration
  - Food Processing Facilities
  - Established Tolerances for food commodities in
    Food Processing Facilities

Registration Review Process

Registration Review Process

Registration Review for Sulfuryl Fluoride Projected Registration Review Timeline	
Milestone	**Date**
Opening the Docket	
Open Docket & Public Comment for Preliminary Work Plan	June 2009
Close Public Comment	Aug. 2009
Case Development	
Final Work Plan	Oct. 2009
Issue DCI	July – Sept. 2010
Data Submission	July – Sept. 2012
Open Public Comment for Preliminary Risk Assessment	Jan. – March 2014
Close Public Comment Period	Apr. – June 2014
Registration Review Decision	
Open Public Comment for Proposed Registration Review Decision	July – Sept 2014
Close Public Comment	Oct. – Dec. 2014
Final Reg Review Decision and begin post-decision follow-up	2015
Total	6 years

Registration Review Process

- The Agency anticipates requiring the following:
  - Toxicology
  - Occupational/Residential Exposure Studies
  - Post-Application Inhalation Exposure
  - Product Use Information
  - Eco-toxicity (Avian and Plants)
  - Monitoring Data on Fumigated Commodities (special study)
- The Agency will also reexamine aggregate fluoride exposure and risk

Registration Review Process

- DAS Response to anticipates toxicology and 0ccupational/residential exposure studies:
  - Submitted 15 Studies to Address Exposure:
    - applicators
    - workers near fumigated facilities
    - workers who handle fumigated commodities
    - ambient air monitoring around facilities
    - dietary exposure and risk refinements
  - Develop Data to Address:
    - Toxicology

Special Issue - Climate Change

GWP in Perspective – Background

Kyoto Protocol (KP)

- Objective is to *stabilize concentrations* of greenhouse gases (GHG) at reduced levels, *not to ban or phase them out*
- Six gases or families of gases are included in the KP. The most significant are: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). SF is not on this list
- Negative effects of global warming include rising sea levels, glacier retreat, Arctic shrinkage, altered patterns of weather and agriculture
- US signed but did not ratify the KP
- The amount of GHG reductions for each country is not mandated by KP although the global target for industrialized countries is 5.2% below 1990 levels.

GWP in Perspective – Background

- The GWP compares the energy absorbing ability of a gas to CO_2 on a Kg per Kg basis, usually on a 100 year time frame.
  - CO_2 is assigned a GWP of 1
- The GWP of a gas is also a function of its atmospheric lifetime.
- The GWP value can be used to compare other gases to CO_2 equivalents
- The global impact of a gas as a greenhouse gas is a

Current situation (con't)

- Atmospheric Chemistry of Sulphuryl Fluoride, SO2F2. Dillon, T.J.; Horowitz, A.; Crowley, J.N. Atmospheric Chemistry and Physics **2008** *8*:1547-1557.

- Experimental and Theoretical Study of the Atmospheric Chemistry and Global Warming Potential of SO2F2. Papadimitriou, V.C.; Portmann, R.W.; Fahey, D.W.; Mühle, J.; Weiss, R.F.; Burkholder, J.B., *Journal of Physical Chemistry A* **2008** *112*(49):12657-12666

- Atmospheric Chemistry of Sulfuryl Fluoride: Reaction with OH Radicals, Cl Atoms and O3, Atmospheric Lifetime, IR Spectrum, and Global Warming Potential. Sulbaek Andersen, M.P.; Blake, D.R.; Rowland, F.S.; Hurley, M.D.; Wallington, T.J. *Environmental Science and Technology* **2009**

- Sulfuryl Fluoride in the Global Atmosphere. Mühle, J.; Huang, J.; Weiss, R.F.; Prinn, R.G.; Miller, B.R.; Salameh, P.K.; Harth, C.M.; Fraser, P.J.; Porter, L.W.; Greally, B.R.; O'Doherty, S.; Simmonds, P.G. *Journal of Geophysical Research D* (**2009**)

SF GWP in Perspective – Key Facts

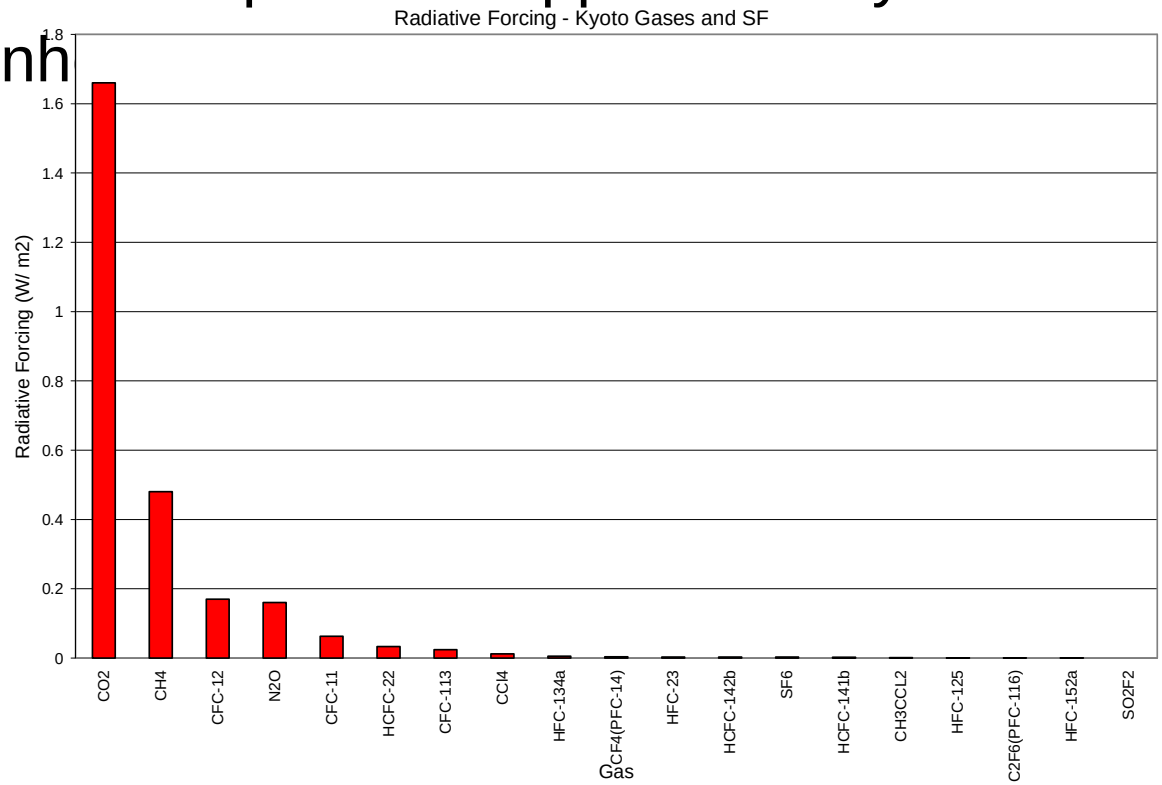
- The current atmospheric concentration of SO_2F_2 is ~1.5 ppt.
- The atmospheric concentration of SO_2F_2 has been increasing at approximately 5% per year since 1978
- The most accurate estimate of the atmospheric lifetime of SO_2F_2 is 36 ± 11 years
- Laboratory experiments demonstrate that SO_2F_2 does not degrade at significant rates in the atmosphere. The major known degradation route is through hydrolysis with the ocean surface.

SF – Atmospheric Fate

- SF does not degrade at significant rates by photolysis or by reaction with atmospheric oxidants.
- Approximately 1/3 of the SF used may be destroyed during fumigation and not emitted to the atmosphere.
- The radiative efficiency of SF is approximately 0.2 W m^{-2} ppb^{-1}, comparable to that of other long-lived greenhouse gases

SF – Climate Change Impact

- The current radiative forcing of SF is approximately 3.3 x10^{-4} W m^{-2}, which is low relative to other greenhouse gases and represents approximately 0.01% of greenh



Other Views - SF

- Australia (2008)
  - "*GWP estimates over a 100 year time horizon range from between 278 and 477 to between 500 and 2,000 and as high as 8,000. Atmospheric lifetimes range from less than 4.5 years, to approximately 30 years. Available data suggests, however, that SO_2F_2's current contribution is likely to be small.*"
  - *"In contrast to the other proposed gases, sulfuryl fluoride has not been reviewed by the IPCC. No consensus exists on the data required to determine its contribution to climate change. In the absence of such information, there is not a good case to include sulfuryl fluoride in the second commitment period. Australia would welcome work by the IPCC to*

Other Views - SF

- European Parliament (2009)
  - *The Commission is aware of the recent study indicating that sulfuryl fluoride remains in the atmosphere up to 10 times longer than previously thought, and that its GWP amounts to approximately 4800. Noting that the Fourth Assessment report of the Intergovernmental Panel on Climate Change (IPCC) does not indicate the GWP value for sulfuryl fluoride, the Commission considers that, even on the basis of the estimate of this study, the CO2eq emissions*

Other Views - SF

- European Parliament (2009)
  - *In the above mentioned context, the EU, in line with its overall strategy for the negotiations on climate change, does not, at this stage, intend to propose the inclusion of sulfuryl fluoride in a future agreement under the United Nations Framework Convention on Climate Change (UNFCCC).*

Thanks for your interest

- Additional Questions