UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

April 13, 1992

MEMORANDUM

SUBJECT: Transmittal of EFED RED Chapters for Sulfuryl Fluoride (Case #0176, Chemical #078003)

FROM: Kathy Monk
Science Integration and Policy Staff
Environmental Fate and Effects Division

THRU: Amy Rispin, Chief
Science Analysis and Coordination Staff
Environmental Fate and Effects Division

TO: Lois Rossi, Chief
Reregistration Branch
Special Review and Reregistration Division

Attached please find the following documents for the completed EFED portion of the RED for Sulfuryl Fluoride:

1. EEB chapter
2. EFGWB chapter
3. SACS integration of branch chapters
4. Electronic copy of SACS integration

If you have any questions concerning this case, please contact Kathy Monk on 305-6120.

cc Anne Barton
Hank Jacoby
Doug Urban
List C File
List C RED File

April 13, 1992

MEMORANDUM

Subject: EFED Cover Memo for the Reregistration Eligibility Document (RED) for Sulfuryl Fluoride

From: Kathy Monk, SACS/EFED

Thru: Amy Rispin, Chief/SACS

To: Lois Rossi, Chief/RB/SRRD

INTRODUCTION

There are currently two registrants for this chemical. One registrant is DowElanco which markets the product as VIKANE. Another product whose registration was transferred to Platte Chemical Company in 1989, has been suspended. The review manager, Donald Mackey, reports that the registration for this product is being canceled.

Sulfuryl Fluoride is an insecticide and/or rodenticide. The target pests are existing infestations of termites, powder post beetles, old house borers, death watch beetles, bedbugs, clothes moths, carpet beetles (except egg stage), cockroaches (Oriental, American, German, and brown-banded), and rodents (rats and mice).

Sulfuryl fluoride is a gas at ordinary room temperature (25°). It is formulated as a liquified gas in pressurized cylinders. It is produced at a concentration of 99% sulfuryl fluoride and 1% impurities which are present as part of the manufacturing process. The chemical formula is SO_2F_2.

The pesticide is applied as a fumigant within closed or enclosed structures. It is a restricted use pesticide due to its very high level of acute toxicity. Fatalities may occur from inhalation of the gas for relatively short periods of time. If the target pests are insects, the rate of application of the product depends on temperature. At 70° or above, one pound/1000 cubic feet of space for 24 hours is required; at 55-65° 2 pounds are required. If the target pests are rodents, increased dosages are not required at lower temperatures.

The use patterns for this chemical are Terrestrial Non-food (wood protection treatment to forest products-seasoned); Terrestrial Non-food and Outdoor Residential (wood protection treatment to buildings and products outdoors); Indoor Food (agricultural and farm structures, buildings and equipment); Indoor non-food (commercial transportation facilities; commercial, institutional,

and industrial premises and equipment, indoor); and Indoor Residential (domestic dwellings; household and domestic dwelling's contents; wood protection treatment to buildings and products, indoor).

It was decided based on the pesticide's chemical properties, that the terrestrial non-food and outdoor residential use patterns did not apply. The pesticide acts not as a wood protection treatment, but simply as a fumigant to control existing infestations. After the treatment and aeration of the fumigated areas there are no residues of sulfuryl fluoride which would involve human exposure or impact the environment by leaching into ground water.

However, two other uses involving potential environmental exposure raised some questions. Use of the chemical for fumigation of ships in port appears in LUIS as Indoor non-food, however, EEB and EFGWB questioned the subsequent pumping of bilges into port water. In addition, one method of application involves creating an enclosed space by covering the object to be fumigated with a tarpaulin. The surrounding soil is moistened with water, and the tarp sealed with soil, sand, or weighted snakes. There was a question about escape of the pesticide through the soil. These questions about the availability of sulfuryl fluoride to nontargets under these use conditions were satisfied by analysis of the chemical properties of the pesticide. Because of its extremely high reactivity under these conditions of use, it is expected to become unavailable extremely rapidly.

ENVIRONMENTAL ASSESSMENT

1. Environmental Fate

a. Summary of Data Requirements and Data Review

The use patterns are terrestrial non-food; terrestrial non-food and outdoor residential; indoor food; indoor non-food; and indoor residential. Under normal circumstances the terrestrial non-food and terrestrial non-food and outdoor residential use patterns would trigger environmental fate data requirements.

However, in this case it is a highly specialized use which involves gas fumigation of barns, household or domestic dwellings, ships, buses, railway cars, commercial storages or warehouses, seasoned forest products and residential building materials to control existing infestation of insects and pests such as termites, beetles, old house borers, bedbugs, clothes moths, cockroaches, and rodents. EFGWB has concluded that sulfuryl fluoride is a highly volatile compound which hydrolyses readily under basic conditions, is prone to nucleophilic attack,

and appears to leave no residues on treated surfaces. After the treatment and aeration of the fumigated areas there are no residues of sulfuryl fluoride which would involve human exposure or impact the environment by leaching into ground water. Therefore, EFGWB does not see a need for additional data to support these use patterns.

The data on hydrolysis which are needed for all indoor and outdoor food and nonfood use chemicals are not required for sulfuryl fluoride because the fate of Sulfuryl Fluoride in water is known and is reported in the literature.

EFGWB had questions about two uses and their impact on the environment. These were fumigation of large ocean-going vessels in port and fumigation of houses and construction material that involved covering the objects with a tarpaulin and moistening the surrounding soil with water. The question concerning the ocean going vessels focused on the potential of pumping bilge water contaminated with sulfuryl fluoride into harbors. The question about tarpaulin fumigation focused on the potential of sulfuryl fluoride to move through the soil profile.

These are no longer questions at issue. Sulfuryl fluoride hydrolyses very slowly in water under neutral conditions. However, it does undergo hydrolysis under alkaline conditions to form fluorosulfuric acid (HSO_3F) and HF. These degradation products are easily removed from water by further reacting with oxides and salts of oxo acids. Sulfuryl fluoride also reacts readily with nucleophilic compounds. Because sea water is normally around pH of 8 and soil contains many nucleophilic substances, it is not expected that residues of the intact parent would remain in the environment from these uses for any significant time.

b. Environmental Fate Assessment

Sulfuryl fluoride is a highly volatile compound which hydrolyses readily under basic conditions, is prone to nucleophilic attack, and appears to leave no residues on treated surfaces. After the treatment and aeration of the fumigated areas there are no residues of sulfuryl fluoride which would involve human exposure or impact the environment by leaching into ground water.

EFGWB had questions about two uses and their impact on the environment. These were fumigation of large ocean-going vessels in port and fumigation of houses and construction material that involved covering the objects with a tarpaulin and moistening the surrounding soil with water. The question about the ocean going vessels focused on the potential of pumping bilge water contaminated with sulfuryl fluoride into harbors. The question

about tarpaulin fumigation focused on the potential of sulfuryl fluoride to move through the soil profile.

These are no longer questions at issue. Sulfuryl fluoride hydrolyses very slowly in water under neutral conditions. However, it does undergo hydrolysis under alkaline conditions to form fluorosulfuric acid (HSO_3F) and HF. These degradation products are easily removed from water by further reacting with oxides and salts of oxo acids. Sulfuryl fluoride also reacts readily with nucleophilic compounds. Because sea water is normally around pH of 8 and soil contains many nucleophilic substances, it is not expected that residues of the intact parent would remain in the environment from these uses for any significant time.

2. Ecological Effects

a. Ecological Hazard

1. Topical Summary

Based on the chemical properties of sulfuryl fluoride, no data were required for fish or wildlife. Sulfuryl fluoride's use patterns are terrestrial non-food; terrestrial non-food and outdoor residential; indoor food; indoor non-food; and indoor residential. Under normal circumstances the basic wildlife toxicology tests would be required. However, the Environmental Fate and Groundwater Branch (EFGWB) states, sulfuryl fluoride is a highly volatile compound which hydrolyses readily under basic conditions, is prone to nucleophilic attack, and appears to leave no residues on treated surfaces. After the treatment and aeration of the fumigated areas there are no residues of sulfuryl fluoride which would involve human exposure or impact the environment by leaching into ground water. As a result of this statement, the potential for terrestrial or aquatic exposure is believed to be minimal. Based on the conclusions of EFGWB and the limited use sites, environmental exposure is not a concern. Therefore, wildlife toxicology data will not be required and subsequently a risk assessment will not be performed.

2. Disciplinary Review

No fish or wildlife data were required or submitted as part of the reregistration of this chemical.

b. Ecological Effects Risk Assessment

Based on the conclusions of EFGWB and the limited use sites, environmental exposure is not a concern. Therefore, wildlife

toxicology data will not be required and subsequently a risk assessment will not be performed.

c. Labeling

The following is from the proposed amended VIKANE label:

"Pesticide wastes are toxic. Improper disposal of excess pesticide is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, consult your State Pesticide or Environmental control Agency, or the Hazardous Waste representative of the nearest EPA Regional Office for guidance".

EEB feels this statement is adequate. However, any changes to the proposed label (3/6/90) would require EEB review.

Summary of Data Gaps

No data gaps remain for this chemical.

D172046
DP BARCODE (RECORD)

078003
SHAUGHNESSEY NO.

REVIEW NUMBER

ECOLOGICAL EFFECTS BRANCH REVIEW

DATE: 12-16-91 **OUT** 4/10/92

CASE # : 819186
SUBMISSION # : S407952
ID # : 078003

REREG CASE # :
LIST A, B, C, D

DATE OF SUBMISSION 12-6-91

DATE RECEIVED BY EFED 12-12-91

SRRD/RD REQUESTED COMPLETION DATE 1-31-92

EEB ESTIMATED COMPLETION DATE 1-31-92

SRRD/RD ACTION CODE/TYPE OF REVIEW 627 GENERIC DATA SUBMISSION

MRID #(S)

DP TYPE

PRODUCT MANAGER, NO. LARRY SCHNAUBELT, 72

PRODUCT NAME(S) SULFURYL FLUORIDE

TYPE PRODUCT: I, D, H, F, N, R, S INNSECT./RODENT. FUMIGANT

COMPANY NAME

SUBMISSION PURPOSE R.E.D.

INCLUDE USE(S)

COMMON CHEMICAL NAME SULFURYL FLUORIDE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

April 14, 1992

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Reregistration Eligibility Document for Sulfuryl Fluoride.

FROM: Douglas Urban, Acting Chief
Ecological Effects Branch
Environmental Fate and Effects Division

Douglas J. Urban 4/14/92

TO: Amy Rispin, Chief
Science and Coordination Staff
Environmental Fate and Effects Division

Attached is EEB's science chapter for the Reregistration Eligibility Document (RED) for Sulfuryl Fluoride.

Sulfuryl Fluoride Reregistration Eligibility Document

Ecological Effects Profile

Disciplinary Review

Fish and Wildlife Data

No fish or wildlife data have been submitted as part of the reregistration of this chemical. No data was required based on the chemical properties of sulfuryl fluoride. Sulfuryl fluoride's use patterns include terrestrial nonfood, residential outdoor, and indoor nonfood; under normal circumstances the basic wildlife toxicology tests would be required. However, the Environmental Fate and Groundwater Branch (EFGWB) states "the chemical is highly volatile, hydrolyses readily under basic conditions, is prone to nucleophilic attack, and appears to leave no residues on treated surfaces.... After the treatment and aeration of the fumigated areas there are no residues of sulfuryl fluoride which would involve human exposure or impact the environment by leaching into ground water." As a result of this statement, the potential for terrestrial or aquatic exposure is believed to be minimal. Based on the conclusions of EFGWB and the limited use sites, environmental exposure is not a concern. Therefore, wildlife toxicology data will not be required and subsequently a risk assessment will not be performed.

Formulations and Uses

Information on the formulations and uses have been taken from the LUIS report (10/4/91), EPA Pesticide Fact Sheet (6/30/85), Registration Standard for Sulfuryl Fluoride (6/84), and the proposed amended VIKANE label (3/6/90).

Sulfuryl Fluoride is an inorganic acid halide insecticide/rodenticide. Sulfuryl fluoride is a gas at room temperature, the registered end use products are marketed as a liquified gas in pressurized steel cylinders containing 99% pure sulfuryl fluoride and 1% inert impurities which are part of the manufacturing process. The marketable registered gas is of the same purity as the Technical Grade of the Active Ingredient (TGAI). There are two manufactured end use products registered, VIKANE by Dow Elanco and Sulfuryl Fluoride Fumigant by Platte Chemical Company.

Vikane's use sites include: barns, household or domestic dwellings, commercial storages or warehouses, and ships. Sulfuryl Fluoride Fumigant's use sites include: household or domestic dwellings, household or domestic dwelling contents, buses (non-feed/food), and railway cars (non-feed/food). Invertebrates and vertebrates are the target pests. VIKANE has a restricted use due to its acute human inhalation toxicity.

Environmental Labeling

The following is from the proposed amended VIKANE label:

"Pesticide wastes are toxic. Improper disposal of excess pesticide is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, consult your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance".

EEB feels this statement is adequate. However, any changes to the proposed label (3/6/90) would require EEB review.

DP Barcode : D172158
PC Code No. : 078003
EFGWB Out :

TO: Larry Schnaubelt, Product Manager 72
Don Mackey, PM Team Reviewer
Special Review and Reregistration Division (H7508W)

FROM: Emil Regelman, Supervisory Chemist MAR 12 1992
Environmental Chemistry Review Section #2
Environmental Fate & Ground Water Branch/EFED (H7507C)

THRU: Henry Jacoby, Chief
Environmental Fate & Ground Water Branch/EFED (H7507C)

Attached, please find the EFGWB review of...

Reg./File # :078003

Common Name :Sulfuryl Fluoride

Product Name :N/A

Company Name :N/A

Purpose :Review of data for the development of Registration Eligibility Document.

Type Product :Insecticide Action Code: 627 EFGWB #(s): 92-0318 Review Time: 3.0 days

EFGWB Guideline/MRID/Status Summary Table: The review in this package contains...

161-1	162-4	164-4	166-1
161-2	163-1	164-5	166-2
161-3	163-2	165-1	166-3
161-4	163-3	165-2	167-1
162-1	164-1	165-3	167-2
162-2	164-2	165-4	201-1
162-3	164-3	165-5	202-1

Y = Acceptable (Study satisfied the Guideline)/Concur P = Partial (Study partially satisfied the Guideline, but additional information is still needed)
S = Supplemental (Study provided useful information, but Guideline was not satisfied) N = Unacceptable (Study was rejected)/Non-Concur

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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MEMORANDUM

SUBJECT: Review of data for the development of Reregistration Eligibility Document.
Sulfuryl Fluoride (Chemical #078003)

OFFICE OF PESTICIDES AND TOXIC SUBSTANCES

FROM: Mah T. Shamim, Ph.D., Chemist
Review Section #2
Environmental Fate and Groundwater Branch
Environmental Fate and Effects Division (H7507C)

TO: Larry Schnaubelt, Product Manager 72
Don Mackey, PM Team Reviewer
Reregistration Section #2
Reregistration Branch
Special Review & Reregistration Division (H7508W)

THRU: Emil Regelman, Supervisory Chemist
Review Section #2
Environmental Fate and Groundwater Branch
Environmental Fate and Effects Division (H7507C)

MAR 12 1992

Henry M. Jacoby, Chief
Environmental Fate and Groundwater Branch
Environmental Fate and Effects Division (H7507C)

EFGWB has been requested to review data on Sulfuryl Fluoride for the development of the Reregistration Eligibility Document (RED). The use pattern is Terrestrial Nonfood and Domestic Outdoor which under normal circumstances would trigger the environmental fate data requirements; however, in this case it is a highly specialized use which involves gas fumigation of barns, household or domestic dwellings, buses, railway cars, commercial storages or warehouses, seasoned forest products and residential building materials to control existing infestation of insects and pests such as termites, beetles, old house borers, bedbugs, clothes moths, cockroaches, and rodents (rats and mice). The chemical is highly volatile, hydrolyses readily under basic conditions, is prone to nucleophilic attack, and appears to leave no residues on treated surfaces. Since after the treatment and aeration of the fumigated areas there are no residues of Sulfuryl Fluoride which would involve human exposure or impact the environment by leaching into ground water, EFGWB does not have any data requirements for the above use pattern.

EFGWB, however, has concerns about the impact of Sulfuryl Fluoride on the environment if used near water resources since it is fairly soluble in water (149-186 ppm) and could contaminate the water

resources it comes in contact with. Although the LUIS report lists no aquatic uses of Sulfuryl Fluoride, the label indicates its use in fumigation of large ocean-going surface ships in port. EFGWB is concerned about the contaminated water in the bilges being pumped in the closed water of the port; however a coast guard policy prohibiting the emptying of bilges in port water appears to satisfy these concerns. Also the use of Sulfuryl Fluoride in tarpaulin fumigation of the houses and construction material involves moistening of the soil with water to create a barrier for the escape of the gas through the soil. EFGWB is concerned about the fate of the contaminated water after tarpaulin fumigation and its potential for leaching into ground water. Again these concerns appear to be satisfied by the degradation of the pesticide, by hydrolysis or nucleophilic attack, into known products which pose little danger to the environment.

The data on hydrolysis which is needed for all indoor and outdoor food/nonfood use chemicals is not required for Sulfuryl Fluoride because the fate of Sulfuryl Fluoride in water is known and is reported in the literature. Sulfuryl Fluoride does not hydrolyze in water under neutral conditions, however, it does undergo hydrolysis under alkaline conditions to form HSO_3F and HF. Fluorosulfuric acid is easily removed from water by reacting with oxides and salts of oxo acids.