3M Specialty Materials

3M Center
St. Paul, MN 55144-1000
651 733 1100

FYI-0600-1378

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AR226-0578

Contain NO CBI

June 8, 2000

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Dr. Charles Auer
Director
Chemical Control Division
Office of Pollution Prevention and Toxics
United States Environmental Protection Agency
401 M Street, Southwest
Room 403 East Tower (Mail Code 7405)
Washington, D.C. 20460

37077

37077

Re: Information of Perfluorooctanoic Acid & Salts – UEIP Form

Dear Charlie:

3M is enclosing the completed "Use and Exposure Information Profile" or "UEIP" for perfluorooctanoic acid and salts.

With respect to industrial hygiene information, you should be aware that each 3M plant that produces perfluorooctanoic acid and salts has an industrial hygienist on staff and is supported by a corporate industrial hygiene group. 3M's industrial hygiene program focuses on task-based exposure assessment and control. Exposures are identified and assessed qualitatively and/or quantitatively. Qualitative assessments are performed by an industrial hygienist. Quantitative assessments include task-based personal sampling for certain, specific fluorochemicals and/or source or area sampling. The results of the assessments support decisions on exposure control. Engineering controls are preferred, but personal protective equipment may be used on an interim basis or when effective engineering control is not feasible.

In certain situations, 3M has gathered personal industrial hygiene and area/source monitoring data for a specific compound and has included the personal industrial hygiene data in the profile. The area/source sample results and/or surface wipe sample results are used to target areas with employee exposure potential as part of exposure assessment under 3M's industrial hygiene program and are not measurements of actual employee exposures. Hence, they are not included with this submission. In other situations, neither personal sampling data nor area/source data have been collected for a specific chemical.

The sample results of any air monitoring are compared to the ACGIH TLV-TWA of 0.01 mg/m3 [skin] for the ammonium salt and to 3M's voluntary exposure guideline (EG) of 0.1 mg/m3 (milligrams of fluorochemical per cubic meter of air) for the acid and sodium salt. The EG is an 8-hour time-weighted average (TWA) personal breathing zone exposure chosen to minimize potential for uptake.

Similar to the industrial hygiene program, each 3M facility that produces fluorochemicals has one or more environmental engineers on-site and is also supported by a corporate and division level environmental organization. The environmental engineers assist the process engineers with calculations and emission estimates. The corporate environmental organization develops methods for analyzing emissions. In addition to these resources, several teams were established in recent years to identify, characterize and reduce specific fluorochemical emissions from the manufacturing sites.

While analytical methods have improved over time, large variability still exists for certain matrices and compounds, so data available for this report is mostly of a qualitative nature. Although limited monitoring data exists, most emission and waste estimates are based upon process models and engineering calculations. Engineering calculations, however, have limitations with respect to fluorochemicals because fluorochemical losses were not always included in the analysis of each intermediate step.

The accuracy of the emissions data submitted varies due to several factors. Batch process system emissions are difficult to measure due to quickly changing process conditions, venting pressures and difficulty in isolating processes to take measurements. Additionally, the unique characteristics of these compounds cause them to behave differently from conventional compounds, and physical chemical data properties are not available for all intermediate reaction steps.

Please do not hesitate to contact me at 651-733-6374 should you have any questions.

Very truly yours,

William A. Weppner

William A. Weppner, Ph.D.
Director
Environmental, Health, Safety and
Regulatory Affairs
3M Specialty Material Markets Group
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St. Paul, MN 55144-1000
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Attachments

AR226-0579

Voluntary Use and Exposure Information Profile
Perfluorooctanoic Acid and Salts

I. CHEMICAL IDENTIFICATION

Chemical Name: Perfluorooctanoic Acid & Salts
CAS Number: Various, including: 335-67-1 (acid)
3825-26-1 (ammonium salt)
335-95-5 (sodium salt)

II. COMPANY IDENTIFICATION

Company Name: 3M

Site Locations: 1) 10746 Innovation Road
Cottage Grove, MN 55016

2) 1400 State Docks Road
Decatur, AL 35601

Technical Contact: W.A. Weppner
Phone: 651/733-6374
Address: 3M Center, Building 236-1B-10
St. Paul, MN 55144

III. ON-SITE ACTIVITIES

CAS #	Mfg. (1997)	Imported (1997)
335-67-1 3825-26-1 335-95-5	Less Than 1,100,000 lb/yr.	Less than 200,000 lbs.

Estimate the amount of subject chemical distributed off-site: 48.5%

Narrative Description and Process Flow Schematic:

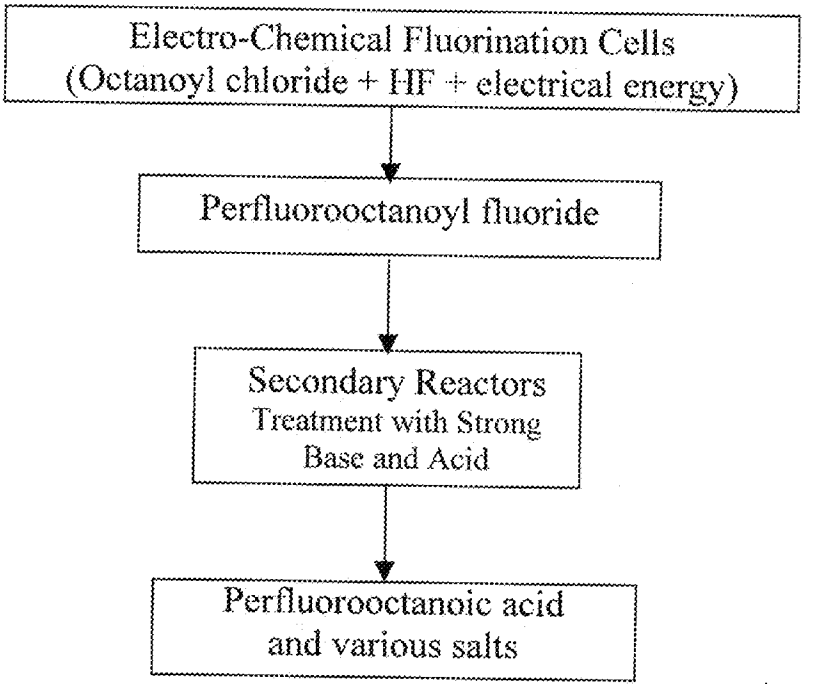
Perfluorooctanoic acid and its salts are produced from perfluorooctanoyl fluoride that has been synthesized via the Simons Electro Chemical Fluorination (ECF) process. The starting feedstock is octane chloride.

$$C_7H_{15}COCl + 16\,HF \xrightarrow[ECF]{} C_8F_{17}COF + 15H_2 + HCl$$

Perfluorooctanoyl fluoride is not itself a commercially viable product, but is 100% used as an on-site intermediate in the manufacture of perfluorooctanoic acid (PFOA) and the salts of the acid. The PFOA is manufactured by base hydrolyzing the perfluorooctanoyl fluoride to the corresponding octanoic acid in batch reactors. The salts are manufactured by base neutralization of the acid to the salt in a separate reactor.

The following block flow diagram describes the process discussed above.

BLOCK FLOW DIAGRAM FOR PERFLUOROOCTANOIC ACID (PFOS)



IV. SITE RELEASE AND TRANSFER INFORMATION FOR TRI CHEMICALS

Not Applicable.

V. SITE RELEASE AND TRANSFER INFORMATION FOR NON-TRI CHEMICALS

While analytical methods have improved over time, large variability still exists for certain matrices and compounds, so data available for this report is mostly of a qualitative nature. Although limited monitoring data exists, most emission and waste estimates are based upon process models and engineering calculations. Engineering calculations, however, have limitations with respect to fluorochemicals because fluorochemical losses were not always included in the analysis of each intermediate step.

The accuracy of the emissions data submitted varies due to several factors. Batch process systems are difficult to measure due to quickly changing process conditions, venting pressures and difficulty in isolating processes to take measurements. Additionally, the unique characteristics of these compounds cause them to behave differently from conventional compounds, and physical chemical data properties are not available for all intermediate reaction steps.

Production of perfluorooctanoyl compounds began in Decatur in 1999. In prior years Decatur's emissions result from byproduct formation.

A. ON-SITE AIR RELEASES

ALL PLANTS - Fugitive emissions may occur from vacuum charging from drums, sampling from reactors, drumming of product/intermediate, flaking monomer, drying operations. Materials may be handled in a molten or solid state; vapors are produced from molten material.

Industrial Hygiene monitoring has been conducted for some compounds. Some minor amounts of these compounds have been detected as fugitive emissions during industrial hygiene exposure testing.

DECATUR, ALABAMA ONLY:

Wastewater fugitive emission data was based upon 1999 wastewater testing.

Fugitive emissions may have occurred during some handling steps but have not been quantified.

Decatur, AL

	Estimated Total Annual Releases (lbs. 1999)	Estimated % Accuracy of Estimate (optional)	# days/years release occurs
Fugitive - wastewater	< 1 in 1999		250
Stack (point)			

Engineering calculations and models of process vent emissions are used for estimates of point source emissions.

	Estimated Total Annual Releases (lbs. 1997)	Estimated % Accuracy of Estimate (optional)	# days/years release occurs
PFOA compounds	No data available		

Cottage Grove, MN

Emissions estimates are from process engineer's estimates and emission models.

	Estimated Total Annual Releases (lbs. 1997)	Estimated % Accuracy of Estimate (optional)	# days/years release occurs
Fugitive (non-point)	No data available		
Stack (point)			
PFOA compounds	1950		100-200

Comments:

B. WATER RELEASES FROM SITE

Decatur, AL

The data presented was determined during wastewater testing conducted during 1998-1999.

Production of perfluorooctanoyl compounds began in Decatur in 1999. In prior years Decatur's emissions result from byproduct.

	Estimated Total Annual Releases (total annual)	**Estimated % Accuracy of Estimate (optional)**
Water releases:	< 30,000	

Number of days/year release occurs: Releases are estimated at 250 days per year

Receiving Water Name: Baker's Creek at the junction with the Tennessee River

NPDES Number: ALD004023164

Comments:

Cottage Grove, MN

Engineering calculations were used to estimate the amount of material discharged to wastewater. The amount of material discharged to the river was determined through use of existing removal efficiency testing results from another facility. Estimates were based upon 1999 production information since no wastewater data was available for 1997 or 1998.

	Estimated Total Annual Releases (lbs. 1999)	**Estimated % Accuracy of Estimate (optional)**
Water releases:	< 15,000	

Number of days/year release occurs: 100-200

Receiving Water Name: Mississippi

NPDES Number: MN0001449

Comments:

C. ON-SITE LAND RELEASES

Decatur, AL

The land treatment of Decatur sludge was discontinued in mid-1998. Sludge is now transported to an offsite landfill, after passing through a thickener and a sludge press. An impoundment was used in 1997 as part of the wastewater treatment operation but is now only used for back-up operation.

Levels of PFOA in the sludge were determined from wastewater data.

	Estimated Total Annual Releases (lbs. 1997)	**Estimated % Accuracy of Estimate (optional)**
Landfill	0	
Land Treatment/Land Amendment	<500 – No longer used	
Surface Impoundments	No data available/No longer used	
Underground Injection	0	
Other (specify):		

Comments:

D. OFF-SITE TRANSFERS

Decatur, AL

Process wastewaters are managed in an on-site wastewater treatment facility and are not sent to the POTW.

D1. Transfer to Publicly Owned Treatment Works (POTW)

Number of days/year the release occurs:

Annual Transfer (lb): 0

Estimated % Accuracy of Transfer Estimate (optional) (%):

POTW Name:
Street Address:
City: **Country:**
State: **Zip:**
NPDES Number: Not Applicable

Comments:

Cottage Grove, MN

Process wastewaters are managed in an on-site wastewater treatment facility and are not sent to the POTW.

D1. Transfer to Publicly Owned Treatment Works (POTW)

Number of days/year the release occurs:

Annual Transfer (lb): 0

Estimated % Accuracy of Transfer Estimate (optional) (%):

POTW Name:
Street Address:
City: **Country:**
State: **Zip:**
NPDES Number: Not Applicable

Comments:

D2. TRANSFERS TO OTHER OFF-SITE LOCATIONS

General Waste Information: There is limited information by CAS number for compound specific reporting and off-site transfers cannot be readily verified. Rather, wastes are classified by halogen content, regulatory waste codes, physical properties and non-specific fluorochemical categories. Where wastes are tracked by CAS number, the amounts have been included.

Decatur, AL

A review of 1998 plant records regarding waste disposal locations for Decatur fluoride-containing (not CAS number specific) wastes indicates that 70% was disposed through incineration at various off-site locations and approximately 30% was landfilled at a hazardous waste landfill. Incineration is now the primary disposal method for these materials.

	Estimated Total Annual Releases (lbs. 1997)	**Estimated % Accuracy of Estimate (optional)**
Incineration:	No specific CAS number data available.	
Wastewater Treatment (Excluding POTW)	0	
Underground Injection	0	
Hazardous Waste (RCRA Subtitle C) landfill	No specific CAS number data available.	
Other Landfill	No specific CAS number data available.	
Recycle or Recovery	0	
Unknown or Other	0	

Comments:

Cottage Grove, MN

Cottage Grove facility utilizes incineration for all their drummed wastes.

Sludge from the Cottage Grove facility is sent to an industrial landfill.

	Estimated Total Annual Releases (lbs. 1997)	**Estimated % Accuracy of Estimate (optional)**
Incineration:	4500	
Wastewater Treatment (Excluding POTW)	0	
Underground Injection	0	
Hazardous Waste (RCRA Subtitle C) landfill	0	
Other Landfill	0	
Recycle or Recovery	0	
Unknown or Other		

Comments:

VI. ON-SITE WORKPLACE EXPOSURE

CAS Number 335-67-1 Company: 3M Company, Specialty Materials Manufacturing Division, Cottage Grove, MN

This information will assist EPA in characterizing the number of workers potentially exposed and the magnitude, frequency, and duration of potential exposure. When providing monitoring data, ensure that data is linked with worker activities described in question 2.

1. **Estimate the number of workers potentially exposed routinely to the subject chemical for each of the exposure duration times. If a worker is involved in more than one activity, enter only his/her most typical activity in the table. Don't count a worker more than once. The total number in the table should equal the total number of workers potentially exposed.**

Hours/Day	Days/Year			
	<10	10-100	100-250	>250
<.25	4	4		
.25-1	4	4		
1-8		4		
>8				

2. **Describe the routine worker activities to which the workers in question 1 are exposed: sampling, removal of filter cake, and drumming of liquids, manufacture an article, etc. For these activities, describe the physical state of the subject chemical (liquid, gas, particulate, or aerosol, etc.) and, if in a mixture, the chemical's concentration:**

Molten (ca 130F) material ranging in concentration from 35-75% is vacuum charged into fractionation equipment. Various concentrated (ranging up to 100%) molten "fractions" are drummed and later vacuum-charged to other process equipment. Other exposure opportunities involve quality sampling, process area cleanup, and maintenance activities (e.g., changing flange, hose, pipe, valve, filter, pump or sight glass).

3. **Provide industrial hygiene monitoring data, if available, with a brief description of the sampling method and exposure scenario monitored, e.g., describe the specific worker activities performed by the individuals monitored. For privacy considerations, please do not include any personal identifiers such as a worker's name or social security number with any data submitted to EPA.**

There is no chemical-specific personal industrial hygiene monitoring data or area/source monitoring data for this specific material at this facility. Recent qualitative assessment of potential exposure to this material under 3M's ongoing industrial hygiene program has identified significant exposure tasks, and appropriate engineering, administrative and personal protective equipment controls have been established.

Each 3M plant that produces fluorochemical carboxylates has an industrial hygienist on staff and is supported by a corporate industrial hygiene group. 3M's industrial hygiene program focuses on task-based exposure assessment and control. Exposures are identified and assessed qualitatively and/or quantitatively. Qualitative assessments are performed by an industrial hygienist. Quantitative assessments include task-based personal sampling for certain, specific fluorochemicals and/or source or area sampling. The results of the assessments support decisions on exposure control. Engineering controls are preferred, but personal protective equipment may be used on an interim basis or when effective engineering control is not feasible.

4. **Briefly describe the engineering controls used to minimize exposure to this chemical:**

Materials are transferred using closed piping (where possible) from reactor vessels to other containers. Vacuum charging of materials from drums is a standard practice. Positionable local exhaust ventilation hoods are situated at significant point sources such as at drum bangs when drumming. General room air provides for dilution of airborne materials.

5. **Briefly list the personal protective equipment your workers regularly wear to prevent exposure of this chemical:**

Process operating standards list the respirator (e.g., supplied air, half mask or full facepiece organic vapor cartridge with particulate prefilter, or particulate filtering), glove by elastomer (e.g., neoprene or nitrile), chemical protective clothing (e.g., 2-piece PVC disposable coveralls), eye protection (e.g., chemical splash goggles with or without full faceshield depending on type of respirator used) to be used by the employee when the task involves exposure to a particular fluorochemical material.

Comments: (This section is available to clarify the responses given. Attach additional pages if desired.)

CAS Number 335-67-1 Company: 3M Company, Specialty Materials Manufacturing Division, Decatur, AL

This information will assist EPA in characterizing the number of workers potentially exposed and the magnitude, frequency, and duration of potential exposure. When providing monitoring data, ensure that data is linked with worker activities described in question 2.

1. **Estimate the number of workers potentially exposed routinely to the subject chemical for each of the exposure duration times. If a worker is involved in more than one activity, enter only his/her most typical activity in the table. Don't count a worker more than once. The total number in the table should equal the total number of workers potentially exposed.**

Hours/Day	Days/Year			
	<10	10-100	100-250	>250
<.25	4	4		
.25-1	4	4	32	
1-8		4		
>8				

2. **Describe the routine worker activities to which the workers in question 1 are exposed: sampling, removal of filter cake, and drumming of liquids, manufacture an article, etc. For these activities, describe the physical state of the subject chemical (liquid, gas, particulate, or aerosol, etc.) and, if in a mixture, the chemical's concentration:**

This material is a solid at room temperature (melting point = 120 F) which is drummed as a molten liquid (concentration 35-75%). Other exposure opportunities involve quality sampling, process area cleanup, and maintenance activities (e.g., changing flange, hose, pipe, valve, filter, pump or sight glass). Products containing 335-67-1 at concentrations ranging from 75% to 100% are melted and added to process reactors as raw materials.

3. **Provide industrial hygiene monitoring data, if available, with a brief description of the sampling method and exposure scenario monitored, e.g., describe the specific worker activities performed by the individuals monitored. For privacy considerations, please do not include any personal identifiers such as a worker's name or social security number with any data submitted to EPA.**

There is no chemical-specific personal industrial hygiene monitoring data or area/source monitoring data for this specific material at this facility. Recent qualitative assessment of potential exposure to this material under 3M's ongoing industrial hygiene program has identified significant exposure tasks and appropriate engineering, administrative and personal protective equipment controls have been established.

Each 3M plant that produces fluorochemical carboxylates has an industrial hygienist on staff and is supported by a corporate industrial hygiene group. 3M's industrial hygiene program focuses on task-based exposure assessment and control. Exposures are identified and assessed qualitatively and/or quantitatively. Qualitative assessments are performed by an industrial hygienist. Quantitative assessments include task-based personal sampling for certain, specific fluorochemicals and/or source or area sampling. The results of the assessments support decisions on exposure control. Engineering controls are preferred, but personal protective equipment may be used on an interim basis or when effective engineering control is not feasible.

4. **Briefly describe the engineering controls used to minimize exposure to this chemical:**

During draining and charging, the operators use local exhaust to control any mists or vapors.

5. **Briefly list the personal protective equipment your workers regularly wear to prevent exposure of this chemical:**

The required PPE for draining, charging and sampling consists of respiratory protection (full face supplied air for draining and organic vapor cartridge respirators with P100 prefilters for charging and sampling) rubber gloves and splash resistant, disposable clothing.

Comments: (This section is available to clarify the responses given. Attach additional pages if desired.)

CAS Number 3825-26-1 Company: 3M Company, Specialty Materials Manufacturing Division, Cottage Grove, MN

This information will assist EPA in characterizing the number of workers potentially exposed and the magnitude, frequency, and duration of potential exposure. When providing monitoring data, ensure that data is linked with worker activities described in question 2.

1. **Estimate the number of workers potentially exposed routinely to the subject chemical for each of the exposure duration times. If a worker is involved in more than one activity, enter only his/her most typical activity in the table. Don't count a worker more than once. The total number in the table should equal the total number of workers potentially exposed.**

Hours/Day	Days/Year			
	<10	10-100	100-250	>250
<.25	2	4		
.25-1	2	8		
1-8	2	4	2	
>8				

2. **Describe the routine worker activities to which the workers in question 1 are exposed: sampling, removal of filter cake, and drumming of liquids, manufacture an article, etc. For these activities, describe the physical state of the subject chemical (liquid, gas, particulate, or aerosol, etc.) and, if in a mixture, the chemical's concentration:**

The material (3825-26-1) is produced in a slurry form and close-transferred to spray drying equipment. The powdered product (ca 100% concentration) is drummed. In this form the material is entrainable as an airborne dust. It is also hygroscopic. The powder may be shipped as a product or dissolved in water. Drumming powder, transferring powder from one container to another, and dissolving powder in water represent significant inhalation and dermal exposure tasks. Handling the material dissolved in water presents mainly dermal exposure potential. Maintenance activities (e.g., changing flange, hose, pipe, valve, filter, pump or sight glass) provide additional opportunity for mainly dermal exposure.

3. **Provide industrial hygiene monitoring data, if available, with a brief description of the sampling method and exposure scenario monitored, e.g., describe the specific worker activities performed by the individuals monitored. For privacy considerations, please do not include any personal identifiers such as a worker's name or social security number with any data submitted to EPA.**

Personal sampling for this material is currently (late 1999 to present) done using OSHA Versatile Sampler tubes with XAD-4 resin and mixed cellulose ester or glass fiber prefilter. Sample analysis is by GC-ECD. See attached table for air sample results.

There has been area/source air monitoring data and/or surface wipe sampling data collected for this material at the plant. Area/source sample results and/or surface wipe sample results are used to identify areas with employee exposure potential as part of exposure assessment under 3M's industrial hygiene program and are not measurements of actual employee exposures. Hence, they are not included with this submission. Prior to 1999, these samples were considered to be semi-validated.

Surfaces in production and administration areas were sampled beginning in 1994 and most recently in 2000. Results indicated the presence of these materials on floors and equipment surfaces in production areas. This resulted in improvements to Hazard Communication practices, personal hygiene emphasis, personal protective equipment emphasis, and several engineering and administrative changes.

The sample results of any air monitoring are compared to the ACGIH TLV-TWA of 0.01 mg/m^3 [skin] for 3825-26-1.

Each 3M plant that produces fluorochemical carboxylates has an industrial hygienist on staff and is supported by a corporate industrial hygiene group. 3M's industrial hygiene program focuses on task-based exposure assessment and control. Exposures are identified and assessed qualitatively and/or quantitatively. Qualitative assessments are performed by an industrial hygienist. Quantitative assessments include task-based personal sampling for certain, specific fluorochemicals and/or source or area sampling. The results of the assessments support decisions on exposure control. Engineering controls are preferred, but personal protective equipment may be used on an interim basis or when effective engineering control is not feasible.

Exposure Task	Sample Number Yr-Number	Exposure Concentration 3825-26-1 mg/m^3*	Minimum	Maximum	Geom mean	Geom Std Dev
Manual transfer of powdered material	97-075	32.1**	4.1	32.1	11.5	4.3
	97-076	4.1				
Operate spray dryer	91-001	0.04	0.001	0.04	0.009	6.8
	92-034	0.016				
	93-017	0.001				
Dissolving powdered material in drums	98-075	0.559	0.11	4	0.7	3.4
	98-076	1.51				
	00-7841	4				
	00-7841	0.9				
	00-7398	0.11				
	00-7403	0.35				
Operate spray dryer sampling product	98-055	1.87	<0.002	1.87	0.91	2.8
Operate spray dryer change drums	95-030	<0.002				
	98-106	0.443				
Operate other process	91-003	0.04	0.004	<0.1	0.063	1.9
Washing filters	95-026	<0.1				

* All exposure concentrations represent task-based personal samples.

** The TWA exposure concentration was 11.4 mg/m^3. This was a one-time task that was not repeated.

4. **Briefly describe the engineering controls used to minimize exposure to this chemical:**

Materials are transferred using closed piping (where possible) from reactor vessels to other containers. Vacuum charging of materials from drums is a standard practice. Positionable local exhaust ventilation hoods are situated at significant point sources such as at drum openings when drumming. The drumming process areas are enclosed from other process areas. Facilities have been established for employees to decontaminate (doff and containerize contaminated chemical protective clothing, remove respiratory protection for decontamination, and wash hands and other skin surfaces that may have been exposed) after performing significant powder exposure tasks.

5. Briefly list the personal protective equipment your workers regularly wear to prevent exposure of this chemical:

Process operating standards list the respirator (e.g., full face supplied air [for exposures up to 1000x OEL], half mask [up to 10x the OEL] or full facepiece [up to 50x the OEL] organic vapor cartridge with P100 particulate prefilter), glove by elastomer (e.g., neoprene or nitrile), chemical protective clothing (e.g., 2-piece PVC or plain tyvek™ disposable coveralls), eye protection (e.g., chemical splash goggles with or without full faceshield depending on type of respirator used) to be used by the employee when the task involves exposure to a particular fluorochemical material.

Comments: (This section is available to clarify the responses given. Attach additional pages if desired.)

Process tasks involving exposure to 3825-26-1 in particulate form currently require rigorous decontamination using decontamination facilities attached to process areas. 3M has recently (2000) established a Biological Limit Value of 5 ppm for perfluorooctanoate anion in blood serum. Biological monitoring was voluntary in 1995 and 1997. In several cases, employees with higher serum levels were removed from further exposure. All employees with potential for significant exposure to 3825-26-1, 335-67-1, or 335-95-5 are required to participate in the biomonitoring program to work in such areas.

CAS Number 3825-26-1 Company: 3M Company, Specialty Materials Manufacturing Division, Decatur, AL

This information will assist EPA in characterizing the number of workers potentially exposed and the magnitude, frequency, and duration of potential exposure. When providing monitoring data, ensure that data is linked with worker activities described in question 2.

1. **Estimate the number of workers potentially exposed routinely to the subject chemical for each of the exposure duration times. If a worker is involved in more than one activity, enter only his/her most typical activity in the table. Don't count a worker more than once. The total number in the table should equal the total number of workers potentially exposed.**

Hours/Day	Days/Year			
	<10	10-100	100-250	>250
<.25				
.25-1			52	
1-8				
>8				

2. **Describe the routine worker activities to which the workers in question 1 are exposed: sampling, removal of filter cake, and drumming of liquids, manufacture an article, etc. For these activities, describe the physical state of the subject chemical (liquid, gas, particulate, or aerosol, etc.) and, if in a mixture, the chemical's concentration:**

This material is added by vacuum charge or poured into process vessels as a raw material in aqueous solution (concentration 30%). Exposure is primarily via skin contact. Other exposure opportunities involve quality sampling, process area cleanup, and maintenance activities (e.g., changing flange, hose, pipe, valve, filter, pump or sight glass). Resultant products contain 0.5% 3825-26-1, which is removed (to less than 10 ppm) by subsequent process steps.

3. **Provide industrial hygiene monitoring data, if available, with a brief description of the sampling method and exposure scenario monitored, e.g., describe the specific worker activities performed by the individuals monitored. For privacy considerations, please do not include any personal identifiers such as a worker's name or social security number with any data submitted to EPA.**

There is no chemical-specific personal industrial hygiene monitoring data or area/source monitoring data for this specific material at this facility. Recent qualitative assessment of potential exposure to this material under 3M's ongoing industrial hygiene program has identified significant exposure tasks and appropriate engineering, administrative and personal protective equipment controls have been established.

Each 3M plant that produces fluorochemical carboxylates has an industrial hygienist on staff and is supported by a corporate industrial hygiene group. 3M's industrial hygiene program focuses on task-based exposure assessment and control. Exposures are identified and assessed qualitatively and/or quantitatively. Qualitative assessments are performed by an industrial hygienist. Quantitative assessments include task-based personal sampling for certain, specific fluorochemicals and/or source or area sampling. The results of the assessments support decisions on exposure control. Engineering controls are preferred, but personal protective equipment may be used on an interim basis or when effective engineering control is not feasible.

4. Briefly describe the engineering controls used to minimize exposure to this chemical:

Positionable local exhaust ventilation hoods are situated at significant point sources such as at drum openings when drumming. General room air provides for dilution of airborne materials.

5. Briefly list the personal protective equipment your workers regularly wear to prevent exposure of this chemical:

Process operating standards list the respirator (e.g., supplied air, half mask or full facepiece organic vapor cartridge with P100 particulate prefilter), glove by elastomer (e.g., neoprene or nitrile), chemical protective clothing (e.g., 2-piece PVC disposable coveralls), eye protection (e.g., chemical splash goggles with or without full faceshield depending on type of respirator used) to be used by the employee when the task involves exposure to a particular fluorochemical material.

Comments: (This section is available to clarify the responses given. Attach additional pages if desired.)

CAS Number 335-95-5 Company: 3M Company, Specialty Materials Manufacturing Division, Cottage Grove, MN

This information will assist EPA in characterizing the number of workers potentially exposed and the magnitude, frequency, and duration of potential exposure. When providing monitoring data, ensure that data is linked with worker activities described in question 2.

1. **Estimate the number of workers potentially exposed routinely to the subject chemical for each of the exposure duration times. If a worker is involved in more than one activity, enter only his/her most typical activity in the table. Don't count a worker more than once. The total number in the table should equal the total number of workers potentially exposed.**

Hours/Day	Days/Year			
	<10	10-100	100-250	>250
<.25	2			
.25-1	4			
1-8				
>8				

2. **Describe the routine worker activities to which the workers in question 1 are exposed: sampling, removal of filter cake, and drumming of liquids, manufacture an article, etc. For these activities, describe the physical state of the subject chemical (liquid, gas, particulate, or aerosol, etc.) and, if in a mixture, the chemical's concentration:**

This material is produced in an aqueous solution at 20% concentration. The material is not volatile in this form and exposure is primarily to skin during sampling, drumming of the solution, and maintenance activities.

3. **Provide industrial hygiene monitoring data, if available, with a brief description of the sampling method and exposure scenario monitored, e.g., describe the specific worker activities performed by the individuals monitored. For privacy considerations, please do not include any personal identifiers such as a worker's name or social security number with any data submitted to EPA.**

There is no chemical-specific personal industrial hygiene monitoring data or area/source monitoring data for this specific material at this facility. For most areas of the facility, recent qualitative assessment of potential exposure to this material under 3M's ongoing industrial hygiene program indicates a low exposure potential for this material. Nonetheless, 3M has identified exposure tasks and appropriate engineering, administrative and personal protective equipment controls have been established.

Each 3M plant that produces fluorochemical carboxylates has an industrial hygienist on staff and is supported by a corporate industrial hygiene group. 3M's industrial hygiene program focuses on task-based exposure assessment and control. Exposures are identified and assessed qualitatively and/or quantitatively. Qualitative assessments are performed by an industrial hygienist. Quantitative assessments include task-based personal sampling for certain, specific fluorochemicals and/or source or area sampling. The results of the assessments support decisions on exposure control. Engineering controls are preferred, but personal protective equipment may be used on an interim basis or when effective engineering control is not feasible.

4. **Briefly describe the engineering controls used to minimize exposure to this chemical:**

   During draining, the operators use local exhaust to control any mists or vapors.

5. **Briefly list the personal protective equipment your workers regularly wear to prevent exposure of this chemical:**

   The required PPE for sampling and draining consists of rubber gloves, safety glasses, and splash resistant, disposable coveralls.

Comments: (This section is available to clarify the responses given. Attach additional pages if desired.)

VII. CHEMICAL END USES

A. END USE AS AN INTERMEDIATE CONSUMED TO MAKE OTHER CHEMICALS

A1. On-Site Use as a Intermediate:

Product chemical class or product chemical (Include CAS number if appropriate)	% of total* volume of subject chemical manufactured or imported
1. The vast majority of perfluorooctanoic acid (335-67-1) is consumed to make the ammonium (3825-26-1) or sodium salts (3356-95-5)	50%
2.	
3.	
4.	

*As reported in Part III, p.2

A2. Off-Site Use as an Intermediate:

Product chemical class or product chemical (Include CAS number if appropriate)	% of total volume of subject chemical manufactured or imported*
1.	
2.	
3.	
4.	

*As reported in Part III, p.2

B. END USES OTHER THAN AS A CONSUMED INTERMEDIATE

The following two tables present a summary of the information contained in VII.B.

Table 1 details the end applications in which a particular CAS Number is used. For each CAS number, the percent used in each application totals to 100%.

Table 1. CAS Number by Application

CAS NUMBER	APPLICATION
335-67-1	1. Reactive intermediate for synthesis of fluoroacrylate ester used in coating applications
335-95-5	1. Processing aid in the industrial synthesis of fluoropolymers and fluoroelastomers
3825-26-1	1. Processing aid in the industrial synthesis of fluoropolymers and fluoroelastomers 2. Post Polymerization aid to stabilize fluoropolymer and fluoroelastomer suspensions 3. Processing aid for factory applied fluoropolymer coatings

Table 2 details the multiple CAS Numbers which may be used in any one application.

Table 2. Application by CAS Number

CAS NUMBER	APPLICATION
335-67-1	Reactive intermediate
335-95-5 3825-26-1	Processing aid for fluoropolymer and fluoroelastomer polymerizations
3825-26-1	Post-polymerization aid to stabilize fluoropolymer and fluoroelastomer suspensions
3825-26-1	Processing aid in coating fluoropolymers

CAS Number 3825-26-1, Ammonium Perfluorooctanoate

Use Number 1 of 3
Description of Chemical End Use: Used as a processing aid in the industrial synthesis of fluoropolymers and fluoroelastomers which have a variety of industrial and commercial uses. These fluoropolymers and fluoroelastomers have use in consumer products.

Percent of total manufactured or imported Volume going to this use: 98 ± 1.0

If used in a mixture check appropriate box To indicate weight fraction. Average Values are acceptable:

X <1 *
___ 1-30%
___ 30-60%
___ 60-90%
___ >90%

Check all physical forms of the chemical during this use:

___ Aerosol
___ Dry Powder
___ Pellets or large crystals
___ Water or solvent – wet solid
___ Gas or vapor
X Liquid solution
X Other (Explain)
As dry coatings on metal implements; as molded parts; as fabricated articles.

Use Number 2 of 3
Description of Chemical End Use: Used as post polymerization processing aid to stabilize fluoropolymer and fluoroelastomer suspensions prior to further industrial processing.

Percent of total manufactured or imported Volume going to this use: 1 ± 0.5

If used in a mixture check appropriate box To indicate Weight fraction. Average Values are acceptable:

X <1% *
___ 1-30%
___ 30-60%
___ 60-90%
___ >90%

Check all physical forms of the chemical during this use:

___ Aerosol
___ Dry Powder
___ Pellets or large crystals
___ Water or solvent – wet solid
___ Gas or vapor
X Liquid solution
X Other (Explain)
As dry coating on metal implements, as molded parts, as fabricated articles.

*<0.5% in liquid solution, <0.0001% (1 ppm) in dry coatings.

Use Number 3 of 3

Description of Chemical End Use: Used as processing aid for factory applied fluoropolymer coatings on fabrics, metal surfaces and fabricated or molded parts.

Percent of total manufactured or imported Volume going to this use: 1 ± 0.5

If used in a mixture check appropriate box To indicate Weight fraction. Average Values are acceptable:

X <1% *
___ 1-30%
___ 30-60%
___ 60-90%
___ >90%

Check all physical forms of the chemical during this use:

___ Aerosol
___ Dry Powder
___ Pellets or large crystals
___ Water or solvent – wet solid
___ Gas or vapor
X Liquid solution
X Other (Explain)
Dry coating on metal implements, as molded parts, as fabricated articles.

*<0.5% in liquid solution, <0.0001% (1 ppm) in dry coatings.

CAS #335-95-5 Sodium Perfluorooctanoate

Use Number 1 of 1
Description of Chemical End Use: Used as a processing aid in the industrial synthesis of fluoropolymers which have a variety of uses commercially and in consumer products.

Percent of total manufactured or imported Volume going to this use: 100%

If used in a mixture check appropriate box To indicate Weight fraction. Average Values are acceptable:

X <1% *
___ 1-30%
___ 30-60%
___ 60-90%
___ >90%

Check all physical forms of the chemical during this use:

___ Aerosol
___ Dry Powder
___ Pellets or large crystals
___ Water or solvent – wet solid
___ Gas or vapor
X Liquid solution
X Other (Explain)
As dry coating on metal implements, as molded parts, as fabricated articles.

*<0.5% in liquid solution, <0.0001% (1 ppm) in dry coatings.

CAS #335-67-1 Perfluorooctanoic Acid

Use Number 1 of 1
Description of Chemical End Use: Used as a reactive intermediate in the industrial synthesis of a fluoroacrylic ester. This latter material is subsequently used in an industrial coating application.

Percent of total manufactured or imported Volume going to this use: 100%

If used in a mixture check appropriate box To indicate Weight fraction. Average Values are acceptable:

X <1%
___ 1-30%
___ 30-60%
___ 60-90%
___ >90%

Check all physical forms of the chemical during this use:

___ Aerosol
___ Dry Powder
___ Pellets or large crystals
___ Water or solvent – wet solid
___ Gas or vapor
X Liquid solution
___ Other (Explain)