To: Dale L. Bacon/ET-ET&S/3M/US
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Richard E. Purdy/ET-ET&S/3M/US
TIM A. KOENIG[ALLIN1.US266630] @ HOSTMAIL
ROGER G PERKINS[VM01.US112388] @ HOSTMAIL
Subject: HFE-7100 Hydrolysis Study

Dale,

I talked to Roger Perkins this morning about the Huntingdon hydrolysis study on HFE-7100 (T-6334). I told him that in the May 15 draft that Rich, Jim, and I reviewed, we observed many errors and deficiencies ranging from the approach selected and its execution, to the reporting and interpretation of results.

Roger said he would send me a copy of Huntingdon's July 25 report in which Huntingdon had responded to Division concerns. He just received this report recently. Some spot checks done during our phone conversation, showed that this new report draft still has significant errors.

With Jim and Rich's help, I will put together written comments on this July 25 report and send it to Tim Koenig for SCD review. Then, with Division approval, we will send our comments, through Roger, back to Huntingdon and ask them to resolve the many problems with this study.

Eric

To: Eric A. Reiner/ET-ET&S/3M/US
From: DANA SCHNOBRICH[ALLIN1.US239951] @ Hostmail
Date: 09/12/96 08:31 AM

Subject: Flourochemical Wastes

Currently you are in the process of preparing a draft procedure on the disposal and handling of flourochemical wastes. Yesterday in a meeting with Cottage Grove SMD people we were discussing disposal of flourochemical wastes. During the course of this meeting they indicated that at elevated temperatures, perflouroisobutylene may be formed as a decomposition product, and that they material is considered extremely toxic.

Eric, I'm not sure if you are familiar with this issue, but it certainly seems that this would be within the scope of the issues that you would address as a part of the disposal policy.

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Robert D. Howell/ET-ET&S/3M/US

To: Eric A. Reiner/ET-ET&S/3M/US

cc:

From: DANA SCHNOBRICH[ALLIN1.US239951] @ HOSTMAIL
Date: 09/13/96 10:41 AM

Subject: Re: Flourochemical Wastes

Eric,

I miscommunicated my concern in my memo to you. My concern did not deal so much with the emissions during the incineration of flourochmicals, as it did with the formation of PFIB or other toxic compounds during manufacturing and their presence it waste materials. Most of our waste stream profiles have general descriptions such as "flourochemical inerts" on the profile and nothing else. If there are toxic materials present they need to be included in the description so that we can wear the appropriate protective equipment and inform outside parties accordingly.

I'm not sure if this is an issue. One of the engineers in our meeting last week commented that they handle many flourochemical wastes as if they had high concentrations of carcinogens. The waste descriptions certainly don't reflect this. He then mentioned some work on PFIB that had been done by a Russian individual in our labs. This again appeared to potentially be a case of laboratory information not being conveyed to the waste handlers. There may have been nothing in the comment. One more thing for you to consdier.

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3M Internal Correspondence

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cc: See Below

From: DANA SCHNOBRICH[ALLIN1.US239951] @ Hostmail
Date: 10/18/96 02:53 PM

Subject: Flourochemical Waste Disposal Update

This week a meeting was held to evaluate progress on changes in flourochemical waste disposal practices which are being caused by the adoption of the RCRA Subpart CC rules. Provided below is background information for the copy list followed by a progress

report on past action items.

BACKGROUND

Under Subpart CC, TSD facilities which stabilize wastes in tanks must provide vapor emission controls if the VOC concentrations exceed 500 ppm. Facilities which do not currently have vapor emission controls can continue to except >500 ppm wastes if they file an implementation plan by the effective date of the rule(December 6, 1996). All facilities must be in compliance by December of 1997.

The Subpart CC rules have been vigorously contested by industry and EPA has had to issue several extensions while certain issues were being negotiated.

Most of the fluorochemical solid and liquid wastes are now being landfilled at the Laidlaw/USPCI Lone Mountain, Oklahoma facility. The cost ranges from $130-280/drum with the average being around $150/drum. About one half of the waste is hazardous. Hazardous waste must be stabilized(in a tank) prior to placement in the landfill. Lone Mountain does not have vapor emission controls and does not intend on installing vapor emission control by December, 1997. For this reason they will no longer be able to accept >500 ppm on the effective date of the rule.

In May, 1996 Lone Mountain asked 3M Decatur to provide a certification that its waste streams were under 500 ppm. Based on our knowledge of the process we did not expect that volatile organics would be present, but verification testing, using Method 25D, was conducted by Quanterra Labs on Decatur's three hazardous fluorochemical waste streams. Two of the three streams were above 500 ppm. The unexpected failure of these streams to meet this limit generated the following action items:

(1) Identification of Alternative Disposal Sites including Incineration.

(2) Analysis of selected flourochemical wastes for VOC content in conjunction with an evaluation of Method 25D by the Environmental Lab.

(3) Method 25D analysis of selected waste streams at Lone Mountain.

(4) Monitor EPA/industry negotiations to determine ultimate affect on flourochemical disposal.

(5) Development of a flourochemical disposal policy.

Item (5) is a separate but related issue wherein we will attempt to specify the most appropriate disposal method, i.e. incineration or landfilling, for each flourochemical stream which is based on its chemical characteristics.

CURRENT STATUS

(1) Alternative Disposal Sites

Three sites were identified that will have the required Subpart CC controls: EQ(Detroit), Chem-Met(Detroit), and LWD (Kentucky). Ton Ashenmacher reported that EQ and Chem-Met have provided quotations of around $80 and $200 per drum, respectively. The latter number includes transportation. The EQ number is about 50% of the current cost, ironically, the use of this facility could reduce division disposal costs by up to $225,000 per year. Tom will be including the nonhazardous waste volumes to determine whether we can negotiate a lower overall cost. We can expect to be shipping our wastes to EQ by December 6, 1996.

(2) Environmental Lab and Loan Mountain Analysis

The analysis of the Environmental Lab has confirmed that Method 25D most of the flourochemical wastes streams contain volatile organic materials at concentrations which are above 500 ppm. They are continuing there analysis and are identifying the specific organics present. Lone Mountain's(LM) 25D analysis has been similar. Dave Clifton will instruct LM to discontinue testing.

(3) EPA/Industry Negotiations

One new item that has been added to the latest version of Subpart CC is a "constituent specific correction" which provides for the elimination or concentration adjustment of non-regulated VOC's.

(4) Flourochemical Disposal Policy

Eric Reiner is working with Dave Termont to develop this policy. Eric will be providing lists of specific chemicals or chemicals groups that will be targeted during the Environmental Lab's analysis. Guidance will be forthcoming on disposal of specific streams. It was generally agreed that some of the flourochemical wastes that are currently being landfilled will be incinerated in the future.

An additional action item that has been added to our list is the development of a more definitive fluorochemical waste stream list. We believe that many of the WSP profiles are still to generic to allow us to link the appropriate disposal method with the waste. I will be attempting to do this in my new capacity.

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3M Internal Correspondence

To: Scott B. Strand/ET-ET&S/3M/US
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Robert D. Howell/ET-ET&S/3M/US

cc: James D. Johnson/ET-ET&S/3M/US
DANA M. SCHNOBRICH[ALLIN1.US239951] @ HOSTMAIL

From: Eric A. Reiner/ET-ET&S/3M/US
Date: 10/25/96 11:25 AM

Subject: More Ideas on Draft Fluorochemical Waste Disposal Guidance

Scott, Dave, Robert,

The following are some additional risk factors not mentioned in my previous memo about disposal criteria for fluorochemical wastes. I would appreciate your ideas on whether we should, or how we could, include these factors in fluorochemical waste disposal guidance criteria. Can you think of other risk factors we should consider, e.g., other factors that affect movement of fluorochemicals in these wastes or of their degradation products into air or groundwater.

1. Propensity of waste to form dust. This could be addressed by pretreatment to agglomerate dusty materials.

2. Size of the fluorochemical molecules.

3. Susceptibility to and rates of hydrolysis, or other degradation mechanisms. This is particularly relevant for fluorochemicals that are too large to be toxic or mobile in soil. Could fluorochemicals in the waste degrade to form significant concentrations of more mobile, more biologically active fluorochemicals?

4. Modes of bioaccumulation other than partitioning into fatty tissues, e.g., those causing fluorochemical surfactant to persist in blood.

5. Delayed toxicity. Short term toxicity studies may not show toxicity when slowly formed metabolic products cause toxic effects. Some fluorochemical insecticides show such delayed toxicity.

6. Susceptibility to solubilization by other materials. Could salts or other organics, e.g. surfactants, in land disposal sites solubilize otherwise insoluble fluorochemicals?

Eric

3M Internal Correspondence

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cc: DANA M. SCHNOBRICH[ALLIN1.US239951] @ HOSTMAIL
James D. Johnson/ET-ET&S/3M/US

From: Eric A. Reiner/ET-ET&S/3M/US
Date: 10/24/96 05:16 PM

Subject: Draft Fluorochemical Waste Disposal Guidance

Dave, Scott, Robert,

The three of you have agreed to help me develop guidelines that could be used to select appropriate disposal procedures for fluorochemical containing process wastes. Below is a first try at developing such guidance. I would like your input on how this could be improved or expanded. Let me know if you think it would be valuable to for the four of us to meet to brainstorm on further criteria.

The objective of this Fluorochemical Waste Disposal Guidance is to reduce risks to people and the environment. Risks will be reduced by selecting disposal options that minimize human or environmental exposure to fluorochemicals, to hazardous fluorochemical transformation products, and to other hazardous components of the waste stream. We will try to make this guidance consistent with current regulatory requirements but that is not the purpose of the guidance . Those persons disposing of the waste will retain responsibility for regulatory compliance.

DRAFT Fluorochemical Waste Disposal Guidance.

In order to use these guidelines, the user must first characterize the fluorochemical waste. This is done by a thorough review of the waste generating process and its chemistries and may be supplemented by chemical analysis of the waste. If waste stream composition is likely to be variable, chemical analysis should include a sufficient number of samples to be sure that the range of possible compositions is understood. It may be necessary to sample and analyze wastes from each process contributing to the waste stream. Understanding the composition of waste streams and their variability will allow the user to select appropriate treatment or disposal options.

The criteria apply to wastes as they are finally disposed of. Thus, if a waste stream is stabilized or pretreated prior to disposal, the user should characterize the pretreated or stabilized waste, so the nature of the waste actually disposed of is known.

Disposal criteria:

First, comply with RCRA and other applicable regulatory requirements for storing, treating, classifying, and disposing of fluorochemical wastes.

Then, either perform a risk assessment, or comply with the numbered criteria listed below.

If performed, a risk assessment should determine the probability of adverse effects to health and the environment from the storage, treatment, and disposal of a fully characterized fluorochemical waste stream in specific treatment, storage, or disposal facilities. This assessment should consider both the probability of effects during storage, treatment, and disposal processes and of future effects occurring over time. The risk of future effects depends on the potential for waste stream component and degradation products to move from the disposal facility into the environment. Select an alternative disposal approach or facility if the risk is deemed unacceptable.

Do not landfill:

1. Wastes with volatile organic (VO) concentrations, including volatile fluorochemicals, greater than 500 mg/kg . Note: This 500 mg/kg cutoff was selected because under 40 CFR, Part 265, Subpart Cc, treatment, storage, or disposal facilities which stabilize wastes in tanks must provide vapor emission controls if the VO concentrations exceed 500 ppm. There is some question whether the October, 1996 update of Subpart Cc includes all volatile fluorochemicals in the "VO" concentration because EPA exempts some volatile fluorochemicals from the definition of "VOC." Even if EPA also excludes these VOC-exempt fluorochemicals from the definition of VO, this criterion says that 3M will nevertheless treat all fluorochemicals measured by Method 25D or which have vapor pressures > 0.1 Torr, as contributing to the VO concentration of a waste stream.

2. Wastes that in the TCLP test, or an equivalent leaching test, leach a specific fluorochemical at a concentration greater than the lowest reliable LC50 of the fluorochemical. Note: This LC50 is arbitrary but not too inconsistent with some TCLP levels. I am currently searching for the criteria used by EPA in setting universal treatment standards (UTSs). I would like to adopt criteria that are simple yet arguably consistent with those used by EPA for classifying hazardous wastes. Factors that we should be considering for wastes with leachable fluorochemicals are: toxicity to mammals, toxicity to aquatic organisms; bioconcentration potential, and persistence of the leached fluorochemicals.

3. Wastes that leach several specific fluorochemicals if the sum of their leached concentrations is greater than the LC50 of the leached fluorochemical mixture calculated assuming additive toxicity. (Toxicity of the product can be estimated using the lowest LC50, EC50, or IC50 for each component and its concentration in the product. The equation used is: (1/Product LC50, EC50, or IC50) = SUM (fi/li) from i = 1 to i = n for fi = fraction of component i in the product and li = LC50, EC50, or IC50 of component i and n = number of components in product. This calculation does not take into account any synergistic or antagonistic effects that may be present..)

4. Wastes that In the TCLP test, or an equivalent leaching test, leach organic fluorine at > 30 mg/kg. Note: this criterion is for use when simpler analytical procedures that do not identify specific fluorochemicals or when no toxicity information is available for the leached fluorochemicals. This criterion is also arbitrary.

5. Wastes that contain a volatile fluorochemical at concentrations greater than 100 times its exposure limit, e.g., perfluoroisobutylene (PFIB) at > 1 mg/kg. (I believe the exposure limit to PFIB is 10 PPB). Note: The logic here is that the waste would lose the toxic component at a rate that would not cause the TLV to be exceeded. If there are doubts about the TLV being exceeded, measurement of emission rates would be necessary.

Eric

==========

3M Internal Correspondence

To: Thomas G. Ashenmacher/ET-ET&S/3M/US

cc:

From: Eric A. Reiner/ET-ET&S/3M/US
Date: 10/25/96 12:48 PM

Subject: Re: Subpart CC Regulations

Tom,

I don't think we should pursue getting an exemption for volatile fluorochemicals.

I have started working on the draft 3M fluorochemical waste criteria. My first recommendation was that, even if exempt, 3M consider volatile fluorochemicals as contributing to VO. I made this recommendation because of 3M's product stewardship commitment to minimize perfluorochemical air emissions. The criteria are in an early draft stage, but I have attached a copy for your information.

Eric
- - - - - -
3M Internal Correspondence

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This is an update on Dana's memo dated 10/18 relative to the EPA/Industry Negotiations on Subpart CC "constituent specific correction factors" that provide for the elimination or concentration adjustment of non-regulated VOC's from the value measured for a waste.

3M testing has shown that when using the Method 25D analysis there are a number of fluorinated compounds measured that are not considered volatile compounds under other EPA regulations.
The thought that was by making this correction and subtracting these from the total measured we could potentially eliminate many of the wastes from falling under the Subpart CC rules.

I spoke with Ken Kastner a lawyer in Washington who has been working with the EPA and CMA on the Subpart CC rules. According to Ken the EPA does not use the same definition of VOC's that are found in other regulations. As outlined in the Subpart CC regulations a compound is considered a volatile organic if the Henry's law constant for the compound is greater than 1.8 X 10-6 atmospheres/gram-mole/m3. Most of the fluorinated products and waste constituents measured to date have values higher than this, therefore they will be considered volatile under Subpart CC and cannot be subtracted from the total volatiles measured for the waste.

However the regulations do allow for specific exemptions of volatile compounds. Compound specific adjustment factors can be obtained by contacting the Office of Air Quality and Planning in Research Triangle Park NC. However as with most exemption requests to the EPA this would require extensive documentation and a lot of work on the part of plant and laboratory personnel, ET&S, and Ken Kastner in Washington. In light of the fact that the cost for meeting Subpart CC requirements will not increase, and may actually decrease the cost of waste disposal, I don't think it's worth the time and money it would cost to get the exceptions.

If anyone has any questions or would like me to pursue this any further please let me know.

TGA

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3M Internal Correspondence

To: Scott B. Strand/ET-ET&S/3M/US
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cc: James D. Johnson/ET-ET&S/3M/US
DANA M. SCHNOBRICH[ALLIN1.US239951] @ HOSTMAIL

From: Eric A. Reiner/ET-ET&S/3M/US
Date: 12/02/96 05:28 PM

Subject: 12/2/96 Draft Fluorochemical Waste Disposal Guidance

Dave, Scott, Robert,

Below, I have made some additions and changes to the draft guidelines.

Please bring these guidelines with you with your comments for our Wednesday December 4 meeting from 8-10 AM.

At our meeting we need to also consider:

1. Developing more detailed guidelines for risk assessment;

2. Other fluorochemical properties that need to be considered and included in these criteria;

3. The cost of this policy and how to calculate it.

Eric

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Guideline Objectives:

The objective of this Fluorochemical Waste Disposal Guidance is to reduce risks to people and the environment. Risks will be reduced by selecting disposal options that minimize human or environmental exposure to fluorochemicals, to hazardous fluorochemical transformation products, and to other hazardous components of the waste stream. We have tried to make this guidance consistent with current regulatory requirements, but that is not the purpose of the guidance. Those persons disposing of the waste will retain responsibility for regulatory compliance.

DRAFT Fluorochemical Waste Disposal Guidance.

In order to use these guidelines, the user must first characterize the fluorochemical waste. This is done by a thorough review of the waste generating process and its chemistries. When significant doubt exists about the presence or concentration of components with potential health or environmental effects, this characterization should include chemical analysis of the waste. If waste stream composition is likely to be variable, do chemical analysis on a sufficient number of samples to be sure that the range of possible compositions is understood. This characterization should also include and evaluation of the need to sample and analyze wastes from each process contributing to the waste stream. Understanding the composition of waste streams and their variability will allow the user to select appropriate reuse, recovery, treatment or disposal options. Finding ways to minimize waste generation should be a first priority.

These criteria apply to wastes as they are finally disposed of. Thus, if a waste stream is stabilized or pretreated prior to disposal, the user should characterize the pretreated or stabilized waste, so the nature of the waste actually disposed of is known.

Disposal criteria:

First, comply with RCRA and other applicable regulatory requirements for storing, treating, classifying, recovering and disposing of fluorochemical wastes.

Then, either perform a risk assessment, or comply with the numbered criteria listed below.

Risk Assessment:

If performed, a risk assessment determines the probability of adverse effects to health and the environment. The assessment task can be formidable. It requires a full characterization of the chemical composition and the variability of the waste stream. "Risk" determination requires an understanding of both the probability of "exposure" and the "hazards" of the waste. That is, if the treatment process prevents exposure, or if the waste presents no health or environmental hazards, no risk exists.

The risk assessment should evaluate exposure pathways through groundwater, air, leachate treatment systems, etc., at the actual selected treatment, storage, or disposal facilities. It should consider both the probability of immediate effects and exposures and of future risks occurring over time. Future risks depends on the potential for waste stream component and degradation products to move from the disposal facility into the environment, and the new hazards presented by degradation products.

Select an alternative disposal approach or facility if the risk is deemed unacceptable.

Alternative Selection Criteria:

Before using these criteria one must make certain that there will be no unaddressed safety hazards to workers handling the waste.

Note: The following waste disposal selection criteria are arbitrary but are considered by our professional judgment to reduce risk to acceptable levels. One should note that the criteria used by EPA in setting universal treatment standards

(UTSs) are also arbitrary. EPA standards are based on performance of a treatment technology rather than an assessment of risk to human health and the environment.

Do not landfill:

1. Wastes with volatile organic (VO) concentrations, including volatile fluorochemicals, greater than 500 mg/kg . Note: This 500 mg/kg cutoff was selected because under 40 CFR, Part 265, Subpart Cc, treatment, storage, or disposal facilities which stabilize wastes in tanks must provide vapor emission controls if the VO concentrations exceed 500 ppm. There is some question whether the October, 1996 update of Subpart Cc includes all volatile fluorochemicals in the "VO" concentration because EPA exempts some volatile fluorochemicals from the definition of "VOC." Even if EPA also excludes these VOC-exempt fluorochemicals from the definition of VO, this criterion says that 3M will nevertheless treat all fluorochemicals measured by Method 25D or which have vapor pressures > 0.1 Torr, as contributing to the VO concentration of a waste stream.

2. Wastes that in the TCLP test, or an equivalent leaching test, leach a specific fluorochemical at a concentration greater than the lowest reliable LC50 of the fluorochemical to aquatic organisms. Note: This LC50 is arbitrary but not too inconsistent with some EPA TCLP levels.

(Other factors that we should be considering in setting criteria for wastes with leachable fluorochemicals are: toxicity to mammals; bioconcentration potential; and persistence of the leached fluorochemicals.)

3. Wastes that leach several specific fluorochemicals if the sum of their leached concentrations is greater than the LC50 of the leached fluorochemical mixture calculated assuming additive toxicity. [Toxicity of the product can be estimated using the lowest LC50, EC50, or IC50 for each component and its concentration in the product. The equation used is: (1/Product LC50, EC50, or IC50) = SUM (fi/li) from i = 1 to i = n for fi = fraction of component i in the product and li = LC50, EC50, or IC50 of component i and n = number of components in product. This calculation does not take into account any synergistic or antagonistic effects that may be present.]

4. Wastes that In the TCLP test, or an equivalent leaching test, leach organic fluorine at > 30 mg/kg. Note: this criterion is for use when simpler analytical procedures that do not identify specific fluorochemicals or when no toxicity information is available for the leached fluorochemicals.

5. Wastes that contain a volatile fluorochemical at concentrations greater than 100 times its exposure limit, e.g., perfluoroisobutylene (PFIB) at > 1 mg/kg. (I believe the exposure limit to PFIB is 10 PPB). Note: The logic here is that the waste would lose the toxic component at a rate that would not cause the TLV to be exceeded. If there are doubts about the TLV being exceeded, measurement of emission rates would be necessary.

Do not Incinerate:

1. If toxic metals are present in the waste (e.g., Hg, Pb, Cd, Cr) and the incinerator selected does not have appropriate pollution control to prevent their emission.

2. In incinerators that do not have adequate pollution control to prevent HF emissions.

3. In incinerators that do not have an adequate combustion environment to prevent the formation of hazardous products of incomplete combustion (PICs).

Eric

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3M Internal Correspondence

To: Scott B. Strand/ET-ET&S/3M/US
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cc: DANA M. SCHNOBRICH[ALLIN1.US239951] @ HOSTMAIL
James D. Johnson/ET-ET&S/3M/US

From: Eric A. Reiner/ET-ET&S/3M/US
Date: 12/03/96 01:02 PM

Subject: Fluorochemical Waste Disposal Guidance

Dave, Scott, Robert,

At our 8-10 AM Wednesday, December 4 meeting, Mike Santoro suggested that we add Fluorochemical Waste Pre-Treatment Alternatives to the items we consider.

Meeting Topics:

1. Developing more detailed guidelines for risk assessment;

2. Other fluorochemical properties that need to be considered and included in these criteria;

3. The cost of this policy and how to calculate it;

4. Pre-disposal treatment alternatives for fluorochemicals.

Eric
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3M Internal Correspondence

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cc: Dale L. Bacon/ET-ET&S/3M/US
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James D. Johnson/ET-ET&S/3M/US

From: Eric A. Reiner/ET-ET&S/3M/US
Date: 12/05/96 10:11 AM

Subject: Meeting on Fluorochemical Waste Disposal Guidance

Mardi, Dana, Dave, Ken, and Scott,

Please look over the following review of our meeting on Wednesday 12/4/96, and let me know if I need to include any additional goals or action items.

Here are a couple other things that I think it would be useful for this group to do:

1) Please consider, list, and send to the group any additional components needed for a process to ensure that fluorochemical wastes are disposed of properly. (At our meeting we noted that the process should include making sure

fluorochemical waste properties are adequately communicated to those selecting disposal facilities. We noted the process should also include use of the disposal guidelines we are developing.)

2) Please send me copies of your comments and suggestions for editorial or substantive changes to the draft guidelines that I submitted. (At our meeting we did not review your suggestions on these guidelines. I will include your suggestions or arrange them for discussion at an upcoming meeting.)

I have asked a few other questions in the minutes, please respond to these as well.

Thanks,

Eric

=========

MINUTES OF 12/4/96 MEETING ON
FLUOROCHEMICAL WASTE DISPOSAL GUIDANCE

ATTENDEES:

Scott Strand - ES&A Group, ET&SS
Ken Goebel - Chem Film & Allied Group Compliance
Dave Termont - Chem Film & Allied Group Compliance
Dana Schnobrich - Env. Operations Group, ET&SS
Mardi Jacobsen - Cottage Grove
Eric Reiner - ES&A Group, ET&SS

BACKGROUND:

Dana gave the following background:

Fluorochemical incineration costs ~ $800/drum, landfill costs < $100/drum. Incineration of highly fluorinated wastes unstabilizes the incinerator pH control. Fluorochemical incineration increases waste volume from 1 lb. to 4 lbs, and the calcium fluoride sludge formed in the incinerator scrubbers must be handled as hazardous waste. Burning fluorochemicals can damage the refractory lining of the incinerator, although adding silica to keep a liquid slag can reduce this damage. An incident occurred in which discotherm (spelling?) wastes from Cordova reacted with kiln dust and ignited. Injury from exposure to the resulting fumes sent several landfill workers to the hospital. (Discotherm is a treatment process that boils off volatile components of fluorochemical wastes, e.g. for 8 hr at 300¡ to 400¡. Off gases are passed through a scrubber.) Arsenic (As), Ni, and Cr are metals that can be present in fluorochemical wastes and may make these wastes hazardous .

GOALS:

To develop a proactive "process" to ensure that fluorochemical wastes are disposed of properly and to ensure that they will not cause future problems.

To make reasonable fluorochemical disposal guidelines for plant operators and waste coordinators to follow as part of this process.

After guidelines are developed, to make certain that they are consistent with (not more stringent than) MSDS recommendations we give to our customers.

These guidelines should show how to characterize a fluorochemical waste, and should include guidance questions to help make sure users consider relevant health and environmental concerns.

Provide those classifying waste streams with access to all needed data sets while protecting against release of confidential information outside the company.

Have proposed process with it's fluorochemical waste disposal guidelines ready for submission for management approval by end or third quarter 1997.

Develop a database to store information on properties of waste stream components that have been characterized.

DISCUSSION ITEMS:

A need exists to develop a "process" to ensure that these fluorochemical waste streams are disposed of safely. This process should lay out all the steps that must be taken. Among other things, this process should ensure that disposal facilities (landfills) are selected that use appropriate technology to minimize risk, and that there is communication between people familiar with the waste stream characteristics and those selecting the disposal facilities.

A significant need exist for information characterizing fluorochemical wastes.

This need includes characterization of waste streams from all fluorochemical processes including electrochemical fluorination cells and downstream fluorochemical-using processes.

Currently many fluorochemical waste stream profiles are vague. This makes it easy to place a fluorochemical waste into a waste stream profile, but the hazards of the waste and risks during and after disposal may vary significantly.

One reason for this is that internal MSDS descriptions are equally vague.

There is a need for consistency in developing waste stream profiles from all fluorochemical manufacturing facilities. Cottage Grove has a new waste stream profile system that is linked to Corporate Data Bases. Mardi will be presenting this system to waste coordinators at Cordova and Decatur.

While there are more than 100 fluorochemical waste stream profiles, currently a few profiles (probably <20 %) account for most fluorochemical waste (probably >85 %).

DSC (Differential Scanning Calorimetry) is a test that could be used to evaluate potential reactivity and also whether the waste could change state at possible ambient temperatures.

Many laboratory and management people probably are not aware that most fluorochemical waste streams are landfilled and not incinerated.

Subpart CC defined VO levels may be exceeded in many fluorochemical waste streams. Of 8 fluorochemical samples evaluated according to 40 CFR, Part 265, Subpart CC, 5 failed because of VO > 500 ppmw.

The characterization of a waste stream should list: 1) what we know about a waste stream in terms of its thermal stability, its stability overtime, its chemical and physical properties, and its hazardous properties; and 2) what remains to be known that is relevant to potential health and environmental impacts.

Waste streams may include hazardous components, e.g. solvents, other than fluorochemicals.

We need to develop criteria for when a waste stream is a "fluorochemical waste."

Pat Sheller is Waste Coordinator at Cordova, Ray Davis @ Decatur. (Is this DAVIS, PHORNICE R.?)

Are Volatile Fluorochemicals VO?

Dana noted that revisions to the standards known colloquially as the "Subpart CC" were recently published in the Federal Register (Monday, November 25, 1996, pages 59932 to 59997). My understanding of what Dana said was that as revised, Subpart CC only considered specifically listed compounds as VO. At the meeting, I thought that fluorochemicals would probably not be listed and would not be included as VO.

For clarification, after the meeting I reviewed Subpart CC. My review showed that this understanding was not accurate. The confusion seems to have resulted from the fact that Subpart CC now allows certain analytical procedures as alternatives to using Method 25D for direct measurement of VO concentration in a hazardous waste. Without further verification, these newly added analytical alternatives can only be used for specifically listed compounds. But on page 59942 in the section titled "F. Waste Determination Procedures" It also states the following:

"Further, for the purpose of a waste determination, the owner or operator must evaluate the mass of all VO compounds in a waste that have a Henry's Law value above the 0.1 Y/X cutoff (0.1 mole-fraction-in-the-gas-phase/mole- fraction-in-the-liquid-phase). Therefore, the owner or operator is responsible for determining that the analytical method being used for a waste determination is sufficient to evaluate all of the applicable organic compounds that are contained in the waste."

And on page 59943:

" The main point that must be reemphasized regarding direct measurement of VO concentration is that, although the EPA is amending the rule to allow various test methods other than Method 25D to be used in a waste determination, the owner or operator must use a test method(s) that is appropriate for the compounds contained in the waste. The method(s) used for the waste determination must be suitable for and must reflect or account for all compounds in the waste with a Henry's Law constant equal to or greater than 0.1 Y/X at 25 degrees Celsius."

Thus is appears that Subpart CC includes ALL organic compounds with unitless Henry's law constants at 25 C of > 0.1, including partially or fully fluorinated compounds, as VO.

GUIDANCE QUESTIONS (for those evaluating fluorochemical waste streams):

What types of treatment should be avoided with this specific waste stream?

Is it reactive?

Could this waste stream react dangerously with materials that may be used for waste treatment? e.g., Kiln dust, fly ash, lime, (Should other materials be added to this list?)

How much HF does it contain?

How much PFIB does it contain?

What is the stability of the waste stream components?

What are potential degradation products of unstable components, and how fast could they form in a disposal site environment?

How variable is this waste stream? Is it the same each time the process is run?

(Please add additional guidance questions that might be valuable.)

ACTION ITEMS:

As a pilot project, MARDI JACOBSEN will: Identify each fluorochemical process waste; Estimate the (annual) volume of each fluorochemical waste: Work with process engineers to list what may be contained in each waste; Sort wastes into related categories.

Eric Reiner will conduct a literature search for review articles covering treatment technologies for halogenated organic materials.

Dana will schedule next meeting, and results of actions should be reported to Dana.

EAR

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3M Internal Correspondence

To: KATHY JURSIK[VAXMAIL.US251952] @ HOSTMAIL

cc: DANA M. SCHNOBRICH[ALLIN1.US239951] @ HOSTMAIL

From: Eric A. Reiner/ET-ET&S/3M/US
Date: 12/05/96 10:44 AM

Subject: Search for Haloorganic Waste Treatment Methods

Kathy,

Please do the following literature search for me.

Try to find review articles on methods that can be used to treat, pre-treat, destroy or recover resources from halo-orgnic wastes or discarded halo-organic products. Halo-orgnic wastes are wastes that contain organic compounds with covalently bound halogens. The most common halogens are fluorine (F) chlorine (Cl), and bromine (Br). I am primarily interested in treatment or disposal alternatives for halogenated wastes to standard incineration or landfill practice. My primary interest is fluoro-organics, but because of environmental concerns many more relevant papers are likely to be available on treatment alternatives for compounds such as PCBs (polychlorinated biphenyls), CFCs (chlorofluorocarbons), or for furan or dioxin contaminated wastes.

If you need further information to help develop this search, please call me on 8-5079.

Thanks,

Eric

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Hi Eric. I looked at this search request and thought it best if I passed it on to someone in the 201 Technical Library who has more chemical background than I do. Mary Hansen (you may have worked with her in the past) has agreed to

complete this request for you, and she will probably be contacting you for further information. Her number is 3-1748 if you would like to give her a call. I am sure she will do an excellent job for you.

IIope this is okay.

Kathy Jursik
==========
3M Internal Correspondence

To: DANA SCHNOBRICH[ALLIN1.US239951] @ Hostmail

cc: See Below
From: Eric A. Reiner/ET-ET&S/3M/US
Date: 12/12/96 03:49 PM

Subject: RE: Meeting on Fluorochemical Waste Disposal Guidance

Dana,

I have looked through the regulatory sections that you point out in your memo attached below. It now appears to me that you were, at least for electrochemical fluorination cell wastes, correct all along. Sorry!

You are right, electrochemical fluorination wastes would not contain any organic materials listed in the Sec. 268.40 table: "Treatment Standards for Hazardous Wastes." In fact, I searched that table electronically for "fluoro" and found no compounds that would be in electrochemical fluorination cell wastes.

But, other fluorochemical wastes, those formed from reacting cell products with other organic materials or formulating cell products with other organic materials, could contain compounds listed in this Sec. 268.40 table. We would have to check for this possibility on a case by case basis.

I could not find reference to the UTS table in Subpart CC. (The UTS table is in Sec. 268.48.) Thus, I don't understand why you referred to "UTS organics" in your final paragraph. I also searched this table for "fluoro." This table also does not contain any components that would be present in electrochemical fluoroination cell waste.

Eric
- - - - - -
Eric,

This E-mail discusses the exemption of fluorochemicals from the "500 ppmv standard". Section 265.1083 Standards:General paragraph (c) states "A tank, surface impoundment, or container is exempt from standards specified in 265.1085 through 265.1088 of this Subpart, as applicable, provided that the waste management unit is one of the following:" Section (c)(4)(i) of that part states that "A tank, surface impoundment, or container for which all hazardous waste placed in the unit either (i) Meets the numerical concentration limits for organic hazardous constituents, applicable to the hazardous waste, as specified in 40 CFR part 268 - Land Disposal Restrictions under Table "Treatment Standards for Hazardous Waste" in 40 CFR 268.40....."

The preamble states that, "it is EPA's finding here that units receiving wastes that satisfy these standards for organics need not be controlled further, since the organics in the wastes are already reduced to levels where threats posed by release of the organics has been minimized."

It is my belief that fluorochemical wastes do not contain the UTS organics and for this reason they are exempt from the rule even though the VO content may be quite high. Again, because of the uniqueness of FC chemistry(s) our wastes do not fit neatly into the rules. This may all be academic, depending upon how we incorporate the 500 ppmv limit into 3M's policy.

cc: Mardi Jacobsen/US-Corporate/3M/US
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James D. Johnson/ET-ET&S/3M/US

Disposal of Spent Scotchgard Treatment Solution

3M recommends minimizing discharge of spent Scotchgard™ treatment solutions.*

As practical, efforts to reduce wastewater discharge could include:

- preparing only as much treatment solution as necessary for a production run;
- storing treatment solution remaining from a run for use in another application;
- using water from washing lines carrying the Scotchgard product to make the next Scotchgard treatment solution;
- using physical/chemical wastewater treatment methods to remove Scotchgard solids from residual treatment solution, disposing the solids by incineration or in an appropriate landfill#, and discharging pretreated wastewater to a wastewater treatment system;
- using Scotchgard containing wastewater as make-up water for Scotchgard spray or baths;
- minimizing overspray or carryover and subsequent drainage during application.

*Some Scotchgard products may degrade in treatment systems and in receiving aquatic systems or sediments to a persistent material with a potential for bioaccumulation.

[#]Incineration is the preferred mode of disposal for solid or concentrated Scotchgard wastes as it destroys the persistent materials. Incinerate only at facilities designed to safely incinerate halogenated waste because off-gases include hydrogen fluoride. If landfill disposed, a lined landfill with leachate collection and treatment is preferred.