

3M Internal Correspondence

Date: 25-Oct-1996 11:47am CTZ
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CC: SCHNOBRICH, DANA M.@A1@ORION
CC: JOHNSON, JAMES D.@LANMAIL@SSWMB@HERMES

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

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To: Scott B. Strand/ET-ET&S/3M/US
Robert D. Howell/ET-ET&S/3M/US
DAVE TERMONT[USSP01.US097573] @ HOSTMAIL

**Exhibit
1460**

State of Minnesota v. 3M Co.,
Court File No. 27-CV-10-28862

3MA10051796

1460.0001

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: $(1/\text{Product LC50, EC50, or IC50}) = \text{SUM } (f_i/l_i)$ from $i = 1$ to $i = n$ for f_i = fraction of component i in the product and l_i = 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

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