ECS Analysis of Potential Environmental, Health and Safety Issues Related to the Use of Pureflow Silver Recovery Cartridges

October 31, 2005

1. Human Health

Thiram is less toxic than many compounds in daily use in the home, but is moderately toxic. In the work place, thiram is not considered toxic, but an irritant and a sensitizer.

For example, the acute toxicity of thiram (LD50 oral, rat =620-1900 mg)[1] is lower than that of the active ingredient in Tylenol®[2] (LD50 mouse = 338mg/kg[3]) and comparable to that of aspirin (LD50 oral, mouse =1,100 mg/kg[4]). A recent study reports that thiram, in high doses, causes developmental effects in rats and mice, although the data suggests that reproductive effects occur at high doses not likely to be experienced by humans[5]. Thiram is reported to be used in a very wide variety of products and applications, and has a 60-year history of use.

The OSHA Health Guidelines website[6] reports that human volunteers given thiram doses of 0.5 grams/day for several weeks showed no adverse effects[7]. OSHA regulates thiram as an irritant and a sensitizer, not as a toxic compound.

In over three (3) years of use, and over 2000 installations, ECS has never received a report of a Pureflow cartridge rupturing, either before or during use. In the very unlikely event that this should occur in the future, it is unlikely that any thiram would be released, because it is held in an inner container within the Cartridge. If some should spill, it should be cleaned up, following the guidance found on the MSDS, using a wet cloth by personnel wearing rubber gloves and safety glasses, the same precautions that should be taken in cleaning up a spill of photochemical solution. The only additional recommended precaution is to avoid the generation of dust during the clean-up.

---

[1] EXTOXNET http://ace.orst.edu/info/extoxnet/pips/thiram.htm
[2] Tylenol is a registered trademark of McNeil-PPC, Inc.
[3] The Merck Index, 12th Edition
[4] The Merck Index, 12th Edition
[5] EXTOXNET http://ace.orst.edu/info/extoxnet/pips/thiram.htm
[6] (www.osha.gov/SLTC/healthguidelines/thiram/recognition.html)
[7] Reference: IARC 1976, Vol.12, p 231.

2. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) does not regulate use of Thiram in Pureflow Silver Recovery Cartridges.

Where thiram is not used as a "pesticide," it is not regulated by FIFRA. Our conversations with US EPA confirm this conclusion.

The definition of products regulated by USEPA under FIFRA is structured to consider the use of the product as a pesticide rather than by the chemical formulation of the product. See 7 U.S.C. §136(u), defining "pesticide" as "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest."

Case law interpreting the "intended for" provision has adopted a "totality of the circumstances" approach focusing on whether the substance in the application in question "can or should be used as a pesticide," whether the substance has "no commercially valuable use" in any form other than as a pesticide, and whether the distributor has knowledge that the substance will be used or is intended to be used for pesticidal purposes. *Turner v. U.S. EPA,* 848 F. Supp. 711 (S.D. Miss. 1994), analyzing FIFRA, 7 U.S.C. Section 136(u). Since thiram is not being used by ECS as a pesticide and clearly has a commercially valuable use other than as a pesticide, it falls outside the coverage of FIFRA regulation.

There are, in fact, many compounds that are both EPA registered pesticides and also used in non-pesticide applications which are not regulated under FIFRA. The following are some examples of chemicals that are all EPA registered pesticides[8] that are also used in applications which are not regulated by FIFRA:

- Photo chemical constituents:
  - Silver Nitrate
  - Sodium Silver Thiosulfate
  - Sodium Bisulfate
  - Acetic Acid

- Foods
  - Canola Oil
  - Soybean Oil
  - Black Pepper oil
  - Mint Oil
  - Wintergreen Oil
  - Orange Oil
  - Garlic Oil
  - Red Pepper
  - Thyme Oil

- Atmospheric Components
  - Carbon Dioxide
  - Nitrogen (Liquid)

[8] (See (http://www.epa.gov/pesticides/biopesticides/product_lists/bppd-prods-5-12-04.pdf)).

Thiram is used as a pharmaceutical (Antabuse) for the treatment of alcoholics, and as an accelerator in the manufacture of rubber products (with human food contact approval), as well as in a number of registered pesticides. None of these chemicals is regulated under FIFRA for their non-pesticide uses. In fact, our thiram supplier does not sell any thiram which is regulated under FIFRA.

3. The Toxic Substances Control Act does Not Regulate Thiram.

No Premanufacturing Notification (PMN) or Significant New Use Notification (SNUR) under TSCA is required for thiram in Pureflow Silver Recovery Cartridges. Premanufacturing Notices are only required for new chemical compounds. Thiram has been used for 60 years.

A SNUR is only required for new uses of compounds for which EPA has passed specific regulations requiring them. No such regulation for thiram has been promulgated.

Section 5(a)(1) of TSCA requires ONLY that persons notify EPA at least 90 days before they manufacture or import a new chemical substance for commercial purposes. For the purposes of TSCA, a new chemical substance is one that is not listed in the Master File of the TSCA Chemical Substance Inventory compiled under TSCA section 8(b). Thiram is on the Master File (TSCA Inventory) and therefore no PMN or SNUR is required under TSCA.

4. The Clean Water Act does not require Pureflow Customers to do anything not required of users of Standard Metal Recovery Cartridges.

Prohibited Discharges: The sections of the Clean Water Act, and the regulations promulgated thereunder that are relevant to the use of Pureflow cartridges are those dealing with indirect discharges, because silver and photo chemicals in the discharge from all silver recovery cartridges would preclude the direct discharge of these wastewaters into waterways. In particular, applicable regulations prohibit the indirect discharge of pollutants in amounts which would cause "pass through" or "interference".

According to EPA Guidance Documents[9] *"Pass through means a discharge that causes a violation of any requirement of the POTW's NPDES permit." "Interference refers to a discharge that inhibits or disrupts the POTW, its treatment process or operations, or its sludge processes and that leads to a violation of the NPDES permits or any applicable federal, State, or local regulation."* **The use of thiram in Pureflow Silver Recovery Cartridges does not create "pass through" or Interference" issues for users.**

Pass through and interference (as defined above) are related to both the specific materials being discharged and their concentration in the discharge. Both ECS and The Photo Marketing Association's Office of Regulatory Affairs have commissioned analyses for thiram in the discharge from Pureflow cartridges in commercial use at different locations and different times. The results were the same; thiram was not detectable at a detection limit of 25 parts per billion in the discharge.

[9] Local Limits Development Guidance, July, 2004, EPA 833-R-04-002A, page 1-2.

As explained below, these independent findings mean that there are no “pass through” or “interference issues for our customers. Moreover, there is no potential significant impact on the aquatic environment.

The LC50 for the most sensitive aquatic species (Mysid shrimp, Americamysis bahia) is 3.6 parts per billion. POTW’s in this type of situation normally apply a factor of 100 in order to be conservative, so that demonstrating that a maximum of 0.036 parts per billion at the headworks to the POTW is sufficient to confirm that the organisms in the treatment process and the receiving stream will be unaffected by discharges of thiram from Pureflow Silver Recovery Cartridges.

A typical 1-hour photo processing installation discharges approximately 1 gallon per hour over a 12 hour day. Even if thiram were present at the detection limit of <0.5 ppb, this would mean that only 0.023 milligrams (0.00000005 Lb) per day of thiram would be discharged.

The dilution of thiram in the sewer system required to ensure that the concentration is below 0.036 parts per billion at the Headworks of the POTW is a factor of (0.5/.036) or 13.9. Therefore any POTW with a daily flow rate equal to or greater than 166 gallons per day (12 X 13.9) would be assured that thiram from the Pureflow installation would pose no threat to POTW's treatment process or to its receiving stream, with a safety factor of 100.

The smallest POTW’s in the United States have daily flow rates of approximately 1,000,000 gallons per day, and the discharge from Pureflow cartridges would be diluted by at least a factor of 83,000 (1,000,000/12) in them. This would result in a maximum concentration of thiram from a Pureflow installation at the headworks of the smallest POTW’s of <0.000006 parts per billion, far too low to represent any threat to the POTW’s biological treatment process, or to aquatic organisms in the POTW’s receiving stream.

This conclusion is true **without** considering the degradation of thiram in the sewer system or treatment in the POTW. Thiram is quite biodegradable in water (which contains limited concentrations of oxygen), as noted in the 2004 EPA Registration Eligibility Decision for Thiram[10], “*Aerobic aquatic data indicate rapid degradation in water*.” An activated sludge biological treatment system is orders of magnitude more aggressive in oxidizing biodegradable trace organic compounds than water in aquatic environments. These treatment systems will have no trouble treating <0.000006 parts per billion, or 0.023 milligrams per day, of thiram in the discharge from Pureflow silver recovery cartridges.

Notification:

The Clean Water Act does not require customers to notify POTW’s of discharges from Pureflow Silver Recovery Cartridges, nor should local industrial user or pretreatment ordinances.

Federal regulations governing industrial pretreatment users require notification to the POTW **ONLY** where the discharge creates a potential to cause a problem. 40 CFR

[10] Registration Eligibility Decision for Thiram, September, 2004, EPA 738-R-04-012, Page 20.

403.12(f) As stated above, conservative analysis shows that the presence of thiram in the discharge from Pureflow Silver Recovery Cartridges cannot cause a problem to a POTW. Most states have adopted this regulatory language verbatim. See, e.g., Ohio Administrative Code 3745-3-04, -05 and -06.

Even the EPA Model Pretreatment Ordinance that POTW's may adopt should not require Pureflow customers to notify their POTW when they switch to Pureflow cartridges. Section 6.5 of the Model Ordinance requires notification of only "significant changes" where they might alter the quality, nature or volume of the discharge. Because at least 5 lab analyses of discharges from Pureflow Silver Recovery Cartridges show that thiram is not even detectable at the point of discharge from the customer, there is no significant risk that there will be a change to the "quality, nature, or volume" of the discharge.

Of course, POTW's may adopt ordinances different from the Model Ordinance. Pureflow customers are encouraged to check their own POTW if they have a concern about the need for notification.

5. Department of Transportation Hazardous Materials Transportation Act Regulations do not regulate Thiram in this Application.

The Department of Transportation regulations promulgated under this act regulate "Hazardous Materials", as defined in 49 CFR 172.101. In order to be considered a Hazardous Material, a material must either be listed in Table 1 of this regulation, or be shipped in packages which contain more than the "Reportable Quantity" under rules promulgated by the US Environmental Protection Agency under the Comprehensive Environmental Response, Compensation, and Liability Act at 40 CFR 302.4, Table 302.4.

Thiram is not listed in Table 1 of 49 CFR 172.101, and the quantities of thiram in Pureflow cartridges are substantially below the Reportable Quantity in Table 302.4 of 40 CFR 302.4. Pureflow cartridges are not a Hazardous Material and these regulations do not apply to them.

6. Occupational Safety and Health Act Application.

The only OSHA Regulations that apply to the use of Pureflow cartridges are the Hazard Communication Standard. 29 CFR 1910.1200. Since thiram in Pureflow cartridges is sealed inside the cartridges, the presence of Pureflow cartridges would not, in and of itself, require the implementation of a Hazards Communication Program, only that an MSDS be available to employees in the store in the event of a spill. However, most, if not all photo processing establishments have a Hazards Communication Program because of the photo chemicals used. The presence of thiram in Pureflow cartridges, and procedures for response to any spills of thiram, should therefore be included in their Hazards Communication Training Program as well.