GEORGIA TECH RESEARCH INSTITUTE
ENVIRONMENTAL SCIENCE AND TECHNOLOGY LABORATORY
POLLUTION PREVENTION PROJECT.

Company: Dow Chemical U.S.&
1468 Prosser Drive, S.E.
Dalton, Georgia 30720

Contact: Joe Seyer
Waste Reduction Manager

Primary Products: Styrofoam^{TM} and styrene/butadiene latex

Process Description:

Polystyrene pellets are heated, mixed with an HCFC blowing agent, and molded into insulation boards of varying sizes using a proprietary production process. The boards are cured, cut, imprinted, and wrapped for storage.

In styrene/butadiene latex production, monomers, modifiers, and emulsifier catalyst are mixed together in a steel, glass-lined reaction vessel. The reactor is equipped with an agitator, external jacket, and internal coils for exchange fluids to effect temperature control. The latex is further processed to remove residual unpolymerized monomers and stabilized through the addition of antioxidant.

Waste Generated:

1. The latex process generates 80,000 pounds per month of "recycle oil" which is shipped by a hazardous waste carrier to another Dow facility for incineration. The recycle oil consists of the following:

Constituent	Weight %
Styrene	65.0
1,l Dichloroethylene	6.0
Ethylbenzene	6.0
1,3 Butadiene	3.0
4 Vinylcyclohexane	10.0
Isopropylbenzene	3.8
Butenes	4.6
N-Propylbenzene	1.5

2. The “white water” from the styrene/butadiene latex operation is sent to an on-site wastewater treatment facility. The skimmings from the dissolved air flotation (DAF) tank consist of 15% solids by weight. Dow produces an average of 92,000 pounds per month of solids on a dry basis.

Efforts to Reduce Waste:

1. Raw material conversion rates in the latex production process have been improved to reduce the process vent stream volume (recycle oil) to treatment systems. Reuse options for the recycle oil is under investigation at other Dow facilities.

2. A process water reuse project has been implemented which: reduces the organic load on the treatment system and secondary emissions; reduces effluent volume to the outfall by 3.6 million gallons/year; and decreases the need to consume fresh city water by the same volume.

3. Containment in the raw material storage area and latex raw material and product rail car loading areas has reduced the impact of spills on the soil and groundwater.

4. Open trenches have been eliminated, thus preventing the mixing of storm water and process waste water. The process wastewater is transferred via closed pipe.

5. A number of white water reduction projects have been initiated, including: reuse of heals in returning railcars; modification of final product filters to allow rinsing of solid waste prior to disposal; replacement of hose stations with hard piped headers; conversion of all latex handling pumps to double mechanical seals; modification of methods used to prepare equipment for maintenance activities; and improvements in computer process controls which result in greater yields of prime product allowing complete reuse of white water back in the product.

Recommendations:

<u>Recycle Oil</u>

The recycle oil is a complex mixture which would be impossible to separate. This, as Dow is well aware, limits its value for reuse. We hope that Dow will be able to reuse the material at another Dow facility. Another option, already initiated by Dow, is to market the material through a waste exchange. We have enclosed catalogs from two waste exchanges for your use.

Dow Chemical USA
Dalton, Georgia

References:

Resource Exchange & News: Exchanging Waste. Information & Technology International& Waste Systems Institute of Michigan, Inc., Vol. 6, No. 3, May/June 1990.

SWIX: The Southern Waste Information Exchange Clearinghouse, Tallahassee, Florida, Vol. 9, No. 3, October 1990.

White Water DAF Skimmings

Mr. M.E. Sikorski of the School of Textile Engineering at Georgia Tech has supplied the following description of his research. He may be reached at (404) 894-2541.

> In order to reuse rubber from carpet backing, which was applied as styrene-butadiene latex, dissolution in selected gases is proposed.
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> Solubilities of polymers in gases appear to be sufficiently large so that gaseous solutions can be used for transport and fabrication (reuse) of polymers. The polymers are soluble at temperatures close to or above the softening or melting temperatures. For example, styrene can be dissolved in carbon dioxide and ethane at temperatures above 100^0C, and in butane at 155°C and higher.
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> Usually, extrusion of polymers is carried out at temperatures substantially above softening or melting points of polymers in order to lower viscosities into workable ranges. The gaseous solutions of polymers are attractive as transport and fabrication media since they can be -manipulated at substantially lower temperatures (as much as 100°C). Gaseous solutions could be used for applications involving spraying or coating, for example.
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> Excessive amounts of water present in carpet backing may be deleterious to the process since gases such as carbon dioxide dissolve in water. Precipitation of styrene rather than its gaseous dissolution might take place, thus negating the expected result.
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> Initial investigations directed toward the reuse of carpet backing material can be conducted in a batch process. However, eventually a continuous process can be devised leading to direct application of the recovered material.