

**Paint Waste Reduction
and Disposal Options:
Executive Summary**

University of Illinois



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**Paint Waste Reduction
and
Disposal Options**

Executive Summary

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ILLINOIS WASTE PAINT EXECUTIVE SUMMARY

Paint Manufacturing in Illinois

- Ranked among top 5 paint manufacturing states, accounting for 10-12 percent of total national paint revenues.
- In 1989, 114 Illinois paint manufacturers produced approximately 130 million gallons of paint and related products worth \$981.7 million.
- Over 33,000 tons of waste was generated by paint manufacturers, with approximately 1.6 million pounds of toxic chemicals released into the environment.

Recommendations

- Develop a research program to identify and evaluate suitable waste reduction technologies and techniques; develop an education program to include information on these technologies and on regulatory requirements.
- Aid manufacturers in developing and implementing pollution prevention program and technologies.

Possible Funding Sources

- Fee on emissions of toxic chemicals.
- Increase fees levied for the disposal of special and hazardous waste.
- Apportion part of the funds generated by Clean Air Act to research and educational programs.

Paint Users in Illinois

Original Equipment Manufacturers

- Includes approximately 4,400 facilities in Illinois.
- Greatest potential for waste reduction is improving paint transfer efficiency.
- Also need to control, reuse or recycle surface preparation wastes.

Recommendations

- An education program including technology demonstrations, distribution of vendor lists, publication of successful efforts through documentation.
- Provide information on costs of paint-related waste generation and the potential savings from adopting pollution prevention options.

Possible Funding Sources

- Fees on paint purchases.
 - Increase fees for disposal of special and hazardous waste.
-

Auto Body Repair Shops

- Approximately 3,400 licensed auto body shops operate in Illinois.
- Volatile organic compounds are the primary wastes generated from paint curing, paint overspray, and equipment clean-up.
- Liquid and solid waste also result from paint removal, application, and equipment clean-up.

Recommendations

- Develop a public education campaign for auto body repair shops through trade journals, paint vendors, regional meetings, and specific workshops.
- Encourage waste reduction with technical and financial information, onsite technical assistance, background on alternative materials and increase familiarity with recycling opportunities.

Possible Funding Sources

- Increase licensing fees or place a fee on automotive paint purchases.

Household Painting Contractors

- Contractors use approximately 7.3 million gallons of paint per year.
- Many contractors have the perception that little or no waste of any consequence is generated.

Households

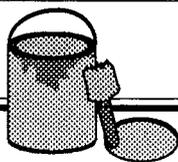
- Illinois households use an estimated 12.7 million gallons of paint per year.
- Residential paint use generates waste from equipment cleaning, VOC emissions, empty containers, and leftover paint.

Recommendations

- Develop educational materials that include guidelines on reducing household paint waste generation and specific instructions for proper disposal.
- Ban liquid paints and paint-related wastes from disposal in municipal landfills and investigate alternative methods of disposal.
- Study the possibility of establishing a household paint and paint waste recycling program.

Possible Funding Sources

- A material fee on paint purchases which varies on the type of paint purchased.
-



Waste Paint Executive Summary

INTRODUCTION

The manufacture and use of paints and coatings is an important part of the Illinois economy. Illinois is among the top five states in the production of paints and coatings. Paint products are also used in the state's many manufacturing industries and small businesses such as automobile body shops. Households and residential/commercial painting contractors are other consumers of large quantities of paint.

In 1989, the Illinois General Assembly amended the Solid Waste Management Act, directing the Department of Energy and Natural Resources (ENR) to:

- “conduct a study to develop cost-effective, environmentally sound, and technically feasible waste paint disposal options for small businesses, including at least painting contractors, auto body shops, and households;” and

- “[develop] an effective public education program to inform small businesses and households about the best available waste paint reduction and management options.” (Public Act 86-1026)

The study looked at all aspects of the waste paint problem, from its manufacture to its use by households and autobody shops. As part of this project, a mail survey of Illinois' paint manufacturers and industrial users was conducted. In addition, site visits were made to gather information regarding paint related wastes from industries, small businesses and waste recyclers within the state.

This text summarizes the report prepared to meet the obligations to the Governor and General Assembly. The complete report has been printed in two volumes, *Paint Waste Reduction and Disposal Options: Volume I*, and *Paint Waste Reduction and*

Disposal Options: Volume II - Site Visits which are available from the Hazardous Waste Research and Information Center.

A PRIMER ON PAINT

Paint is composed of a mixture of four basic components: pigment, binder, solvent and additives. Pigments are small particles of solid materials that give the paint its color and opacity. The pigments can be composed of toxic compounds such as cadmium and lead. Binders are composed of resins and give the thin layer of paint film its continuity and adhesion to the material being painted. They are the primary components that remain after the paint has cured. Most binders are nontoxic and insoluble in water.

Solvents, including water, are volatile liquids added to paints in order to disperse or dissolve the binder and to modify the viscosity of the coating. Many application techniques require the paint to have a narrow range of solvent-controlled physical and electrical properties. In these cases, it is common practice to blend two or more solvents. Organic chemicals are used as solvents in paint. Generally, these chemicals are classified as hazardous due to toxicity, ignitability or both. Organic solvents are highly mobile in the environment and present a potential for groundwater contamination if they are disposed in a landfill. Most organic solvents can be recovered and recycled. Others can be blended for fuel or simply disposed by incineration.

Solvents used in paints are released to the environment through evaporation in limited quantities during paint manufacturing and in larger quantities by design when paint dries or cures. The Clean Air Act Amendments of 1990 will require paint formulations with reduced amounts of many common organic solvents because they produce volatile organic compounds (VOCs) that contribute to the

generation of atmospheric ozone. In Illinois, this is primarily of concern in the Chicago area.

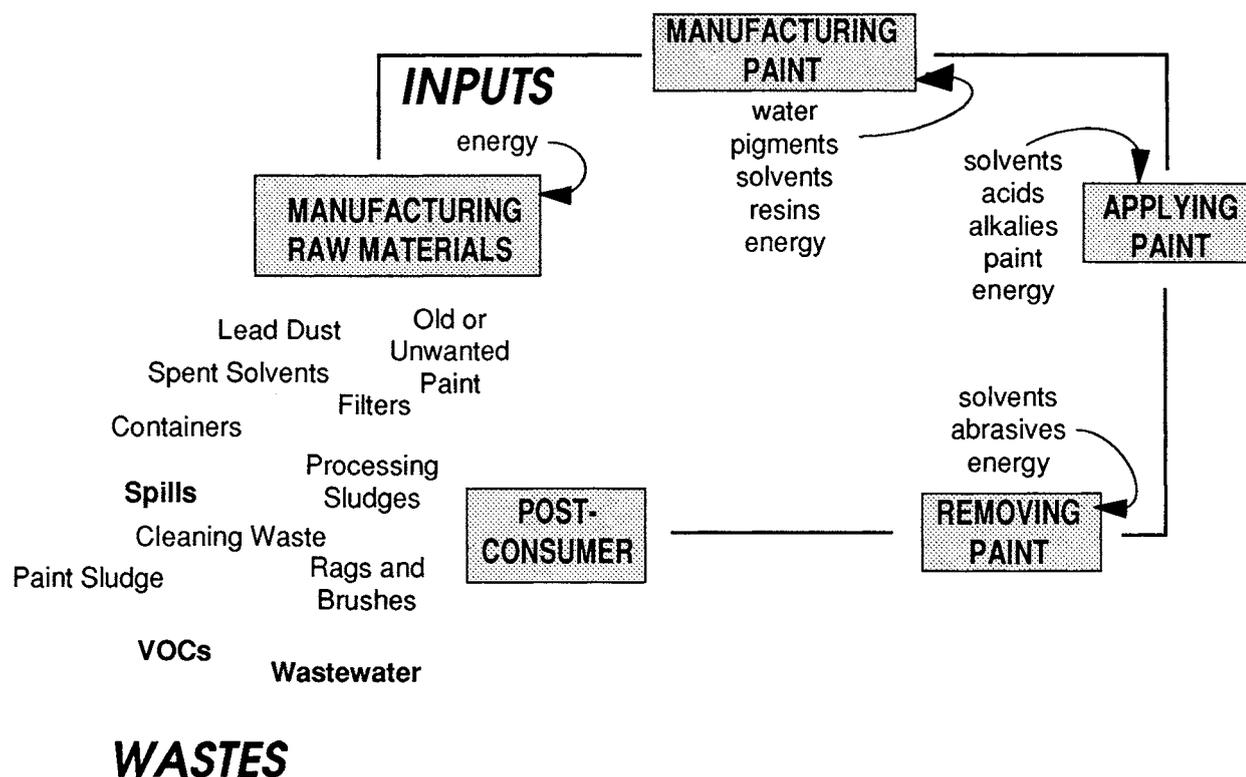
Paints are classified based on the primary type of solvent they contain—waterborne or organic solvent-borne. Although waterborne paints are not entirely free of organic solvents, they do generate fewer VOCs during paint application, eliminate the need for organic solvents for thinning, and reduce the use of organic solvents during clean-up.

Paints are grouped into three distinct uses: architectural coatings, original equipment manufacturers (OEM) product coatings, and special purpose coatings. Architectural coatings make up the largest segment of the paint industry and include consumer, professional, and commercial/industrial paints for buildings. OEM product coatings, the second largest industry segment, includes a large variety of industries which paint their products somewhere in the production process. Special purpose coatings are formulated for special application methods or envi-

ronments and include: coatings for refinishing machinery and automobiles; traffic markings; marine and offshore construction; pool maintenance; and specialties such as metallic, multicolored or fire retardant paints.

An option to both waterborne and solvent-borne paints is powder coating. Powder coating is a dry process that uses heat to promote a chemical reaction that changes the "dry" powder to a film. The process is primarily employed in industrial settings such as original equipment manufacturers (OEM). Although not technically a paint, it is discussed in this report because it can be an excellent substitute for paint in many industrial coating operations, such as metal finishing. With powder coating, first pass efficiency is high, overspray can be recovered and recycled, and wastes are small and considered non-hazardous thus presenting fewer disposal problems and lower costs. The disadvantages of this process include the heat curing and the type of finish

PAINT LIFE CYCLE AND ASSOCIATED WASTES



produced which may not always meet customer expectations.

Both the manufacture and the use of paint result in the generation of significant quantities of waste. These wastes occur in solid, liquid, and gaseous form and, because of the nature of paint, they may be hazardous or toxic. Paint has impacts on the environment at all stages of its life cycle including: manufacture of the raw materials used to make paint; manufacture of the paint itself; application of the paint; and removal of the paint, if required.

The majority of "conventional" paints contain organic solvents. The amount of organic solvent present by volume varies depending on the type and use of the paint. For example, some varnishes and clear coats are 80 percent organic solvents while other paints called high-solids are over 60 percent solids (less than 40 percent organic solvent) (Rauch 1990). Powder coatings are 100 percent solid with no organic solvents but are now limited in use due to their application procedure and the need to apply heat for the powder to melt. However, powder coatings are considered to be a growing market.

By their nature, organic solvent-borne coatings contain significant amounts of VOCs. Wastes from organic solvent-borne paints are generally hazardous due to toxicity, flammability, or both. However, the relative ease of solvent recycling and the high BTU content of organic solvent wastes provide several possible avenues for waste recycling or reuse.

PAINT MANUFACTURING IN ILLINOIS

Based on sales revenues, Illinois ranked among the top five states in paint manufacturing in 1990, accounting for between 10 and 12 percent of total national revenues. Direct data on the quantity of paint manufactured in Illinois could not be identified. Assuming a direct relationship between sales dollars and gallons manufactured, we estimate that in 1989 Illinois manufactured 130 million gallons of paint. This is based on a total production in the US

of 1,183.9 million gallons of paint. In 1987, the 114 paint and allied products manufacturers in Illinois shipped goods worth \$981.7 million (Rauch 1990). About half of the 59 companies listed in the Paint Red Book (Palmer 1990) employ 50 or fewer employees, yet manufacture a variety of paint types.

Also based on sales revenues, 49 percent of the paints manufactured in Illinois in 1990 were architectural coatings, 39 percent were product coatings, and 12 percent were special purpose coatings. A 1990 market study projected that of the paint manufactured in Illinois in 1991, 43 percent would be water-borne, 54.3 percent would be organic solvent-borne, and 2.7 percent would be powder (Beels 1990).

Table 1 provides preliminary estimates of quantities of waste generated by Illinois paint manufacturers. These values were compiled from Generator Survey and Toxic Release Inventory (TRI) data and from preliminary site visits with three Illinois manufacturers.

Waste Type	Quantity (tons)
VOCs emitted to the air	786
Solvents	17,025
Aqueous Waste	9,102
Paint Sludge	2,590
Waste Paint	2,235
Other	1,681

Table 1. *Estimates of the types and quantities of paint wastes produced annually by Illinois paint manufacturers.*

Air releases from paint manufacturing and use include releases of VOCs which contribute to ozone generation; heavy metal dust from pigments; biocides, such as mercury, used in paint formulations; and, atomized paint from spray applications. The Clean Air Act of 1990 will have a major impact on paint manufacturing and use. Currently, the Clean Air Act imposes regulations on major sources of VOC emissions (facilities that release over 100 tons

per year). This regulation has motivated large paint users to use less paint and to switch to paints formulated with lower VOC content. The Clean Air Act amendments lower thresholds for VOC emissions, making additional facilities subject to permitting provisions and control technologies. The act requires annual reporting of VOC emissions, mandatory regulations for VOC emissions, and, in severe and extreme nonattainment areas, annual fees of \$5,000/ton of VOC emitted by a source in excess of the acceptable baseline amount.

Many of the chemicals used in paint manufacturing are considered toxic under Title III of the Superfund Amendment and Reauthorization Act (SARA). These include heavy metals and organic solvents. In 1989, Illinois paint manufacturers released over 1.5 million pounds of SARA toxic chemicals to the air (USEPA 1991).

Paint-related wastewaters can contain organic solvents, heavy metals, and other toxic materials used in paint formulation and equipment cleaning. Under the Clean Water Act, paint manufacturers are required to obtain a permit to discharge to waterways and pretreatment of wastewater before discharge is generally necessary.

In 1986, according to the USEPA, an estimated 65 Illinois paint manufacturers were large quantity generators (LQGs) of RCRA hazardous waste. They generated an estimated 32,733 tons of hazardous waste, less than 1 percent of the total quantity of hazardous waste generated by all Illinois LQGs in 1986. Over 1/2 of the paint-manufacturing hazardous waste contained solvents (USEPA 1990).

Equipment cleaning wastes comprise 65 percent of all hazardous waste generated by paint manufacturers that are LQGs. Seventy-one percent of hazardous paint waste (29,000 tons) was sent offsite for management. Solvent recovery, waste reuse as fuel, and incineration were the most common offsite waste management activities.

Paint manufacturers have generally incorporated waste reduction techniques in their processes. Their motivation includes regulatory compliance, maximized production, and environmental protection. Most paint-related wastes from industry do not reach the environment untreated. These wastes are either treated in-house or handled by a solvent recycler or fuel blender. However, even very progressive facilities could benefit from additional waste reduction.

Recommendations – Paint Manufacturers

The greatest incentive to reduce waste generation for paint manufacturers has been increased profits resulting from reduced materials costs and product losses or failures. An education program for paint manufacturers could include information on technologies to reduce VOC emissions and on regulatory requirements under the new Clean Air Act amendments. In addition, paint manufacturers could identify profitable waste reduction opportunities by implementing full-cost accounting and materials accounting as part of a pollution prevention program.

Paint manufacturers can play an important role in waste reduction and recycling of wastes generated from using paint. For example, reducing the VOC content of paint reduces VOC emissions at the manufacturing facility and during paint application and curing. Paint manufacturers should also be encouraged to participate in household paint waste recycling programs. We recommend that the state of Illinois solicit the participation of local paint manufacturers in a study of recycling programs for paint collected in household collection drives. We also recommend that development of any materials occur in partnership with the Illinois Paint Council.

Implementation of further research and any education program requires a funding source. For paint manufacturers and other manufacturers that use paint such as original equipment manufacturers (OEM), one funding option is a fee on emissions of toxic chemicals reported in the TRI. Many paint-related wastes are subject to TRI reporting. If this fee

Description	Illinois Facilities
Painting and paper hanging	2,315
Wood products	477
Fabricated Metal Products	1044
Paint manufacturing	114
Machinery and equipment	192
Appliances – Commercial and Residential	86
Motor vehicles	237
Railroad equipment	35
Auto body repair shops	3,187

Table 2. Type and number of Illinois facilities that routinely use paint.

were related to the amount of emissions, a financial incentive for Illinois firms to reduce their paint-related wastes would exist. A second option is to increase the fees already levied for the disposal of special and hazardous wastes. A third option is to apportion some of the funds generated by the Clean Air Act fee to research and educational programs.

PAINT USERS IN ILLINOIS

We were unable to estimate paint consumption by the manufacturing industry in Illinois with existing data as sales and/or purchase information is confidential. However, information from the site visits, the literature, and discussions with industry representatives was sufficient to identify the major waste management problems encountered by paint users and to suggest possible ways to reduce waste generation. We concentrated on paint use by large and medium industries (OEMs), small businesses (autobody shops and painting contractors) and households. Table 2 lists the type and number of Illinois facilities in which paint is routinely used. This list is compiled from *American Business Information*, 1991.



ORIGINAL EQUIPMENT MANUFACTURERS (OEM)

The area that offers the greatest potential for waste reduction for OEMs is improving paint transfer efficiency. Transfer efficiency is the amount of paint applied to the object being painted, divided by the amount of paint used. Because low rates of transfer are a large source of solid, liquid, and air emissions and a source of paint loss, improving them provides a financial incentive. Low paint transfer efficiencies can be the largest source of waste from paint application. In addition, techniques or methods of controlling, reusing or recycling surface preparation wastes would be beneficial. Paint users also should be introduced to new surface preparation techniques designed to reduce wastes and save money.

We also identified a problem with the disposal of solid paint-related wastes such as dried paint and cleaning rags which are often thrown in a dumpster and ultimately into a municipal landfill. Generally, these wastes are subject to Illinois special waste regulations and should be transported by a licensed special waste hauler to landfills licensed to accept the

waste. Failure to dispose of these items correctly seems to be the result of a lack of information on special waste regulations and the funds and personnel needed to enforce these regulations.

Recommendations – Industrial Users of Paint

Providing information to OEMs on technologies to improve paint transfer efficiency is a first step to waste reduction. We recommend an education program that includes: technology demonstrations, distribution of vendor lists, a tax credit for capital expenditures that result in waste reduction, publication of successful efforts through documentation of case studies, and news releases on new technologies. An education program, in partnership with the Illinois Manufacturers Association and the Illinois State Chamber of Commerce, would also include information on the costs of paint-related waste generation and the potential savings from adopting waste reduction options such as solvent and aqueous waste recycling opportunities. Additional information on special waste regulations and steps to enforce the regulations should also be included in an education program for OEM manufacturers.



AUTO BODY REPAIR SHOPS

Approximately 3,400 licensed auto body shops operate in Illinois. An unknown number of unlicensed facilities also exist. Sizes range from 1 to several hundred employees, while most have less than 10 employees and are not regulated. Auto body shops use special purpose coatings – with auto and truck refinishing the largest user. Nationally, 32 million gallons of paint were used in auto body shops in 1989. Using this figure, the estimated Illinois consumption based on population would be 1.5 million gallons. This does not include organic solvents used to thin paint for spray application.

VOCs from paint curing, paint overspray, and equipment clean-up are the primary wastes. With an assumed average paint transfer efficiency of 60% and a VOC content of 4.8 lbs/gal., approxi-

mately 600,000 gallons or 1,410 tons per year of waste from overspray are generated; 3,600 tons/year of VOCs are emitted from paint curing; and 948,000 gallons of mixed solvent and paint waste are generated for disposal in landfills. Other wastes include dried paint from overspray and paint removal, contaminated solids such as rags, discarded painted parts, and left over paint and cans.

Recommendations – Auto Body Repair Shops

Challenges to a state waste reduction program for auto body shops are: 1) how to contact the facilities that haven't implemented waste reduction and, 2) how to motivate all facilities to implement waste reduction. A public education campaign for auto body shops can be established through trade journals and paint vendors' brochures, as well as by regional meetings and specific workshops publicized by direct mail and the trade groups. Waste reduction would be encouraged by providing auto body shops with technical and financial information, onsite technical assistance, background on alternative materials, and through increasing their familiarity with recycling opportunities. We recommend that Illinois encourage the improvement of paint transfer efficiencies by relating information on benefits possible through the latest technologies and techniques in paint application. Support for research to evaluate the technologies and other pollution prevention techniques is essential. Also, educational materials on environmental awareness could be incorporated into the curriculum at junior colleges and trade schools that offer automotive courses. Any education program must include information on regulations to ensure proper disposal of wastes. To develop these educational materials ENR should work together with the Automotive Wholesalers of Illinois, the Automotive Services Association of Illinois, and the Illinois EPA. Funds are also needed for educational materials and to continue research on the prevention of waste and the recycling of wastethat cannot be reduced.

Funding for implementing the above research and education programs could come from several

sources. Auto body shops are not subject to TRI reporting requirements and therefore would not be subject to a fee on TRI emissions. Options to finance an education program targeted at this industry might include a fee on paint purchases, with the amount of the fee related to the VOC content of the paint, or an increase in licensing fees. A fee on paint purchases has the added benefit of increasing the financial incentive to use paint more efficiently. A disadvantage of increasing licensing fees is that these fees are paid only by the licensed members of the industry; thus, the properly licensed shops would be financing education and technical assistance for non-licensed shops which is not equitable.



HOUSEHOLD PAINTING CONTRACTORS



In Illinois, contractors use approximately 7.3 million gallons of paint per year. This study suggests that household painting contractors generate paint waste and manage their wastes in the same manner as household users. Therefore, the education materials recommended for households (listed below) are also applicable to painting contractors. Currently, liquid and solid paint wastes from household painting contractors are generally disposed in municipal landfills.

The paint survey suggests that one major obstacle to waste reduction by small companies is a perception that little or no waste of any consequence is generated. This is an especially common perception among painting contractors.

Recommendations – Painting Contractors

An educational program that provides painting contractors with information on waste generation and proper disposal would be beneficial. The following comment from one painting contractor responding to the paint survey illustrates this need: “I work in private homes and clean up my equipment as most homeowners would do. Brushes and rollers are washed out in the sink and anything else is thrown out in the garbage. If things like old paints or solvents are to be treated and disposed of separate from regular

garbage then that information needs to be more available to us because I have never seen any regulations on it.”

An effective means of educating painting contractors would be through paint retailers. Education materials would be similar to those for household users, except we recommend exempting latex paint from special waste regulations to allow contractors to participate in a latex paint recycling program.

Waste reduction programs targeting household paint contractors and household users could be financed through a material fee on paint purchases. The fee could vary by the type of paint purchased, with a larger fee for paints containing organic solvents or specialty paints. These types of paint may be more toxic and may generate more waste. They are more difficult to recycle and are thus more expensive to dispose. Such a fee would provide a financial incentive to use paint more efficiently, buy only as much paint as needed, store paint properly to prolong its shelf life, and purchase the least toxic or waste-generating type of paint. This fee would not be effective at reducing paint waste from paint contractors because the clients bear all the costs of paint purchased by contractors.

A second funding option for programs related to household painting contractors as well as household users of paint is a drop-off fee for household hazardous waste collections. The disadvantage of this funding option is that it discourages proper disposal of household hazardous wastes. To be effective, such a fee would have to be accompanied by a ban on the disposal of household hazardous wastes and paint products in municipal landfills that included an enforcement component.

HOUSEHOLDS



Residential paint use generates waste from equipment cleaning, VOC emissions, empty containers, and leftover paint. Estimates of total household paint consumption for Illinois can be deter-

mined from the totals for the U.S. Illinois households use around 12.7 million gallons of paint per year. The VOC emissions from this amount of paint use are estimated to be 26.67 million pounds/year. The estimated liquid waste from this paint is 1.4 million gallons/year or about 4,890 tons/year. Of the total waste generated, about 64 percent, or 3,150 tons/year is landfilled.

Under federal and state law, household wastes are exempt from hazardous waste regulation and can be disposed in municipal solid waste landfills. In Illinois, paint and related wastes can be legally disposed in solid waste landfills, although some local solid waste haulers and municipal landfills in the state do not accept paint products.

Paint and related products can contain toxic or hazardous components that may contribute to groundwater contamination if improperly discarded. Reliable data on the contribution of these products to environmental contamination are not available. Discharging paint into municipal sewage without pretreatment is illegal in Illinois. Nonetheless, small quantities of paint are routinely released into municipal sewage when rinsing paint brushes and other equipment. Reliable data on the quantities of these paint wastewaters are not available. At least 14 million paint containers are disposed in landfills each year taking up about 70,000 cubic yards of landfill space. In Illinois, the estimated 1991 solid waste landfilled totalled 41.6 million cubic yards, with a remaining landfill capacity of 360.9 million cubic yards. This space is estimated to last, at current disposal volumes and capacity, for 8 to 10 more years (IEPA 1991). Removing paint waste such as empty cans from landfills could add to the life of existing landfills.

Recommendations – Household Users of Paint

Educational materials such as brochures and posters displayed at paint retailers could include guidelines on how to reduce household paint waste generation and would provide specific instructions for proper disposal of paint-related wastes. Manufacturers should be given the option to develop and

distribute these materials. In addition, material on paint for school children detailing environmental hazards and safe handling and disposal practices are desirable. This creates environmental awareness and concern at an early age and provides a means to disseminate information to the household.

Because of their mobility in the soil, we recommend that liquid paints and paint-related wastes be banned from disposal in municipal landfills. Some communities recommend allowing paint-related wastes to dry before disposing of them in municipal landfills. For organic solvent-borne paints and thinners, the evaporation of VOC's during drying contributes to air pollution. Therefore, we do not recommend that the state of Illinois advocate this method of disposing of wastes containing organic solvents. Instead, we recommend that these wastes be collected through household hazardous waste collection programs and sent to a solvent recycler for proper management. Other options include encouraging retailers to sell smaller quantities of paint for prices proportional to larger quantities and to require dealers to accept unopened cans for resale.

To reduce the quantities of household hazardous waste disposed in solid waste landfills, communities across the country have established household hazardous waste collections. In general, about 50% of the waste collected is paint waste. Organic solvent-borne paints collected at waste collections are generally treated as a hazardous waste; most are burned for energy recovery. Latex paint waste collected is reused as paint whenever possible.

IEPA annually sponsors six to ten local household hazardous waste collections. IEPA pays for the cost of waste collection, packaging, transportation, and disposal, while the sponsoring community handles all publicity and promotion. During their 1988 household hazardous waste collection, Champaign County collected 5,628 containers of hazardous materials; approximately 20 percent of these containers were organic solvent-borne paints. Container size and content varied; the actual volume of paint waste collected was not determined.

Problems exist with household hazardous waste collections. Participation rates are low on average, as low as one or two percent of households (Meiorin and Purin, 1989). The portion of hazardous materials actually diverted from the solid waste landfills is unknown. Disposal of the hazardous substances collected is very costly for the sponsoring agency (Spencer 1989). Some communities recycle the hazardous wastes collected to help offset these disposal costs. The cost for the Champaign collection in 1988 was approximately \$80,000.

In two pilot projects, Seattle tested reprocessing organic solvent-borne and latex paints for potential sale to residents or public agencies. All paints were initially screened for hazardous components. The resultant solvent-borne paints were low-quality and determined not to be sufficiently marketable. In the latex paint pilot project, lab tests demonstrated that the recycled paint was of medium quality. Seattle recommended a permanent latex paint recycling program with the resultant paint sold to public agencies in the area. It was determined that these agencies provide a sufficient market for current quantities of recycled paint; eventually, residential markets could be developed to allow for increases of the quantities produced. This program would also support city and state procurement practices that favor recycled products. Seattle estimates that recycling 45 percent of the latex paint collected will cut latex paint disposal costs by 25 percent (Seattle Solid Waste Utility 1990).

We recommend that Illinois study the possibility of establishing a household latex paint recycling program, in conjunction with county governments and local paint manufacturers. Prior to initiating such a program, Illinois must secure a viable market for the rebled paints. Illinois should explore the possibility of the state purchasing the recycled paint for use as a basecoat on state painting projects. Paint cans collected at a household paint collection may also be recycled. Further study is needed to identify potential metal recyclers and markets for the recycled product. Other states have

established steel can recycling programs that can serve as models.

In Illinois, McHenry County is developing a pilot household paint recycling project (Fisher 1991). With a one-day collection period at three sites in the county, both solvent and latex paints will be accepted. A local paint manufacturer will test for contaminants, toxic metals, quality, and then rebled the paints. In a similar study, the Association of Bay Area Governments (ABAG) in Oakland, California identified several barriers to paint recycling: a steady, high volume of paint is required to make the recycling practical; manufacturers or retailers have little incentive to participate; hazardous waste permits may be required for storage and licenses for haulers may be needed; there is a potential liability for contaminants in the paint, and testing every drum for a variety of potential contaminants is costly; and latex paints may contain mercury, solvents, or PCBs.



EDUCATIONAL MATERIALS

All educational materials should be developed in cooperation with the appropriate trade associations. The educational materials can be grouped into three categories which include:

- 1) reinforcement material for those already aware of the need for effective paint-related waste management methods and who would benefit from guidance and support from those in their industry. This includes items such as news releases, trade journal articles, and brief presentations at trade association meetings that will recognize specific companies and individuals responsible for developing these practices.

- 2) training material for those employees and supervisors in industries whose attention to this area is currently limited. These materials will be for both employees and supervisors: a great deal of emphasis will be placed on the role that first-line supervisors play in training and in reinforcing sound paint use and disposal habits.

- 3) public information items designed to inform and potentially influence some modest change

in public practice including items designed for household users that could be put on paint cans, distributed by paint and hardware stores, or distributed by the schools. These items should be developed in cooperation with paint manufacturers and retailers.

CONCLUSIONS

The major barriers to implementing paint waste reduction options are a lack of technical information and the perception that waste generation is not a problem. New technologies generally do not need to be developed, but information on their availability and assistance to implement them needs to be encouraged. The research and education programs recommended in this report are designed to develop and provide technical information on waste reduction and to educate users about the effects of waste generation, including the financial costs.

Through the course of this study, we found that paint manufacturers are generally more knowledgeable about reducing waste generation than paint users. Paint manufacturers are motivated to reduce paint-related wastes to maximize production of their finished product. Tax credits for both paint manufacturers and OEMs who upgrade their equipment may act as a further incentive.

Paint users, however, generally do not regard painting as their primary business, and painting is usually just a small fraction of the cost of goods sold. Because paint users are less motivated to reduce the volume of paint-related wastes, our study recommendations focusing on paint users.

The results of this study suggest that most paint-related liquid wastes from industry do not reach the environment untreated. These wastes are either treated in-house or handled by a solvent recycler or fuel blender. The study indicates that a viable liquid waste handling industry in Illinois recycles liquid paint-related wastes from both small and large industry paint users. We recommend enforcing efforts to educate firms on options for recycling liquid paint-related wastes.

Additional research is needed to determine the extent of environmental hazard due to land disposal of paint-related wastes, in particular, the leachate hazard of disposing of paint products in municipal landfills is unknown. Ensuring proper disposal of these wastes may require enhanced enforcement of special waste regulations for industry and commercial operations and financial support for conducting additional household hazardous waste collection campaigns. Proper disposal may also be achieved by increasing available sources of information on existing regulations and acceptable disposal methods.

Paint manufacturers and users are open to suggestions that will reduce waste and ultimately, expenses. Development of research programs to identify and evaluate paint waste reduction techniques and educational programs to promote good pollution prevention practices are essential to the development of proper waste management practices by manufacturers and users alike. This will only be possible with industry and state financial support. Possible sources of this funding include: fees on emissions; increases in current tipping fees for disposal; and fees on paint sales. With additional funding, ENR could answer the questions regarding potential environmental damage that might result from land disposal, develop educational materials to encourage waste reduction practices, and expand its technical assistance program to help paint manufacturers and users develop sound waste management practices.

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