PRELIMINARY SURVEY REPORT:

CONTROL OF METHYLENE CHLORIDE IN FURNITURE STRIPPING

AT

Strip-Ease Co. of Cincinnati
Cincinnati, Ohio

REPORT WRITTEN BY:
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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Division of Physical Sciences and Engineering
Engineering Control Technology Branch
4676 Columbia Parkway, R-5
Cincinnati, Ohio 45226-1998

PLANT SURVEYED:	Strip-Ease Co. of Cincinnati 6802 Montgomery Road Cincinnati, Ohio 45236
SIC CODE:	7641
SURVEY DATE:	July 18, 1988
SURVEY CONDUCTED BY:	Paul A. Jensen William F. Todd, P.E. Eugene M. White
EMPLOYER REPRESENTATIVES CONTACTED:	George Gall, Co-owner
EMPLOYEE REPRESENTATIVES CONTACTED:	None (non-union)

DISCLAIMER

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH) is the primary Federal agency engaged in occupational safety and health research. Located in the Department of Health and Human Services (formerly DHEW), it was established by the Occupational Safety and Health Act of 1970. This legislation mandated NIOSH to conduct a number of research and education programs separate from the standard setting and enforcement functions carried out by the Occupational Safety and Health Administration (OSHA) in the Department of Labor. An important area of NIOSH research deals with methods for controlling occupational exposure to potential chemical and physical hazards. The Engineering Control Technology Branch (ECTB) of the Division of Physical Sciences and Engineering (DPSE) has been given the lead within NIOSH to study the engineering aspects of health hazard prevention and control.

Since 1976, ECTB has conducted a number of assessments of health hazard control technology on the basis of industry, common industrial process, or specific control techniques. Examples of these completed studies include the foundry industry; various chemical manufacturing or processing operations; spray painting, biotechnology processes, and the recirculation of exhaust air. The objective of each of these studies has been to document and evaluate effective control techniques for potential health hazards in the industry or process of interest, and to create a more general awareness of the need for or availability of an effective system of hazard control measures.

These studies involve a number of steps or phases. Initially, a series of walk-through surveys is conducted to select plants or processes with effective and potentially transferable control concepts or techniques. Next, in-depth surveys are conducted to determine both the control parameters and the effectiveness of these controls. The reports from these in-depth surveys are then used as a basis for preparing technical reports and journal articles on effective hazard control measures. Ultimately, the information from these research activities builds the data base of publicly available information on hazard control techniques for use by health professional who are responsible for preventing occupational illness and injury.

This particular research effort (the subject of this walk-through survey) was prompted by the growing concern of the hazards of methylene chloride and the need for technical advice to furniture strippers. For years, methylene chloride and methanol have been the primary constituents in paint stripping solutions. Methylene chloride provides the furniture stripper with an effective and efficient paint remover. This study will evaluate the technology available for the control of hazardous substances in furniture stripping applications, particularly methylene chloride vapors.

This report contains results of this preliminary study, conclusions, and recommendations relevant to the operations at the Strip-Ease Company of Cincinnati.

PLANT AND PROCESS DESCRIPTION

PLANT DESCRIPTION

The Strip-Ease Company of Cincinnati (Strip-Ease) was founded in 1983 by George Gall and Bill McKaig.

Strip-Ease employs three full-time workers, inclusive of the co-owners.

Strip-Ease operates one-half of a single-story cement block retail store. The actual furniture stripping area consists of approximately 800 square feet (see Figure 1). The other half of the building is operated by a dry cleaner.

PROCESS DESCRIPTION

Many strippers purchase pre-formulated solutions that are merely transferred to their process equipment by pouring or pumping. Some strippers, in order to save money or make money (through sales) buy the raw materials and mix their own stripping solutions.

Paint is stripped by dipping the object in an open tank containing the stripper, by spraying or brushing recycled stripper on the surface of the furniture in a large open tank (Flow-Over®, system), or by a combination of the two methods. There is little standardization in industry due to the diversity in size, construction, and finish of items to be stripped and type of stripping solution.

In this facility, varnish and lacquer finishes are normally stripped using Kwick Kleen®, Paint Remover 125 (Kwick Kleen, Vincennes, Indiana) in either a flow-over system or the dip tank. Figure 2 is a diagram of the flow-over system. On occasion, pieces will be hand stripped in order to prevent damage to veneers and glued laminates. Paint Remover 125 contains approximately 70% methylene chloride, 25% methanol, 1% sodium hydroxide, and 4% unspecified materials (see Appendix 4). Paints, on the other hand, are normally stripped in one of the caustic tanks.

POTENTIAL HAZARDS

Potential chemical hazards in the furniture stripping industry are found primarily during the actual handling and stripping of the furniture. Other exposure sources may include the mixing or transferring of stripping solution and the buildup of vapors within the building due to the evaporation of solution out of the stripping tanks or from the evaporation of solution off furniture after stripping. The major routes of entry include inhalation and absorption through the skin. The severity of the hazard depends on the formulation of the stripping solution, type of operation (i.e., dip tank, flow-over system, hand stripping), work practices, duration of exposure, temperature, ventilation (i.e., type of system, location relative to worker, air patterns, and flow rates), and general work station design.

Health effect studies of methylene chloride exposure have been focused on three primary areas: effects on the central nervous system, effects on cardiovascular morbidity and mortality, and induction of cancer in exposed workers. Most recently, research has shown methylene chloride as a possible reproductive toxicant. In addition, solvents are known to affect liver function, and some studies suggest that this effect occurs secondary to methylene chloride exposure. Repeated skin contact with methylene chloride may cause dry, scaly and cracked skin. At high airborne concentrations, vapors are irritating to the eyes and upper respiratory tract. Direct contact with the liquid can cause skin burns. Methylene chloride is a mild narcotic. Effects from intoxication include headache, giddiness, stupor, irritability, numbness, and tingling in the arms and legs. The odor threshold ranges from 25-350 ppm.[4]

Methanol has very similar central nervous system effects to methylene chloride. Breathing very high concentrations may produce headache, weakness, drowsiness, light-headedness, nausea, vomiting, drunkenness, and irritation of the eyes, blurred vision, blindness, and even death. Methanol may also cause liver and kidney damage.[4]

ENVIRONMENTAL CRITERIA

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a preexisting medical condition, and/or a hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH recommended exposure limits (REL's), 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV's), and 3) the U.S. Department of Labor (OSHA) permissible exposure limits (PEL's). Often, the NIOSH REL's and ACGIH TLV's are lower than the corresponding OSHA PEL's. Both NIOSH REL's and ACGIH TLV's usually are based on more recent information than are the OSHA PEL's. The OSHA PEL's also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH REL's, by contrast, are based primarily on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is legally required to meet only those levels specified by an OSHA PEL's.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposures.

EXPOSURE LIMITS

The current Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for methylene chloride (29 CFR 1910.1000 Table Z-2) is an 8-hour time-weighted average (TWA) concentration of 500 parts per million (ppm), with a ceiling concentration of 1000 ppm, and a maximum peak concentration of 2000 ppm for no more than 5 minutes within any 2 hours. This PEL was derived from a standard recommended by the American Standards Institute (ANSI) and adopted in 1971 without rulemaking.[1] In 1986, OSHA published an Advanced Notice of Proposed Rulemaking and is expected to publish the Notice of Proposed Rulemaking to reduce the PEL in late 1988.[5]

In 1976, the NIOSH Recommended Exposure Limit (REL) for methylene chloride was 75 ppm, as a TWA for up to 10 hours per day, 40 hours per week, with a 500 ppm peak exposure as determined over any 15-minute sampling period during the workday. This REL was based on the need to prevent significant reduction in the oxygen carrying capacity of the blood which affects the central nervous system.[2] In 1986, NIOSH recommended that methylene chloride be regarded as a "potential occupational carcinogen." NIOSH further recommends that occupational exposure to methylene chloride be controlled to the lowest feasible limit. This new recommendation was based on the observation of cancers and tumors in both rats and mice exposed to methylene chloride in air.[3]

The 8-hour TWA Threshold Limit Value (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) is 100 ppm with a 500 ppm Short Term Exposure Limit (STEL). This TLV is based on experimental data obtained from male, nonsmoking subjects at rest. The ACGIH stated that the blood of workers who were exposed at 100 ppm of methylene chloride would have carboxyhemoglobin levels below 5% in their blood. Normal carboxyhemoglobin saturation ranges from 0.4-0.7% for nonsmokers and 4-20% for smokers. The ACGIH further cautioned that "concurrent exposures to other sources of carbon monoxide or physical activity will require assessment of the overall exposure and adjustment for the combined effect." ACGIH has included methylene chloride in its Notice of Intended Changes. ACGIH intends to reduce the TLV to 50 ppm, remove the STEL, and classify it as a Suspected Human Carcinogen[6].

The current Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for methanol (29 CFR 1910.1000 Table Z-1) is an 8-hour TWA concentration of 200 ppm. The NIOSH REL for methanol is 200 ppm, as a TWA for up to 10 hours per day, 40 hours per week, with a ceiling of 800 ppm averaged over a 15-minute period. The 8-hour TWA-TLV established by ACGIH is 200 ppm, with a 500 ppm STEL.[6]

CONTROLS

PRINCIPLES OF CONTROL

Occupational exposure can be controlled by the application of a number of well-known principles, including engineering measures, work practices, personal protection, and monitoring. These principles may be applied at or near the hazard source, to the general workplace environment, or at the point of occupational exposure to individuals. Controls applied at the source of the hazard, including engineering measures (material substitution, process or equipment modification, isolation or automation, local ventilation) and work practices are generally the preferred and most effective means of control both in terms of occupational and environmental concerns. Controls which may be applied to hazards that have escaped into the workplace environment include dilution ventilation, dust suppression, and housekeeping. Control measures may also be applied near individual workers, including the use of remote control rooms, isolation booths, supplied-air cabs, work practices, and personal protective equipment.

In general, a system comprised of the above control measures is required to provide worker protection under normal operating conditions as well as under conditions of process upset, failure, and/or maintenance. Process and workplace monitoring devices, personal exposure monitoring, and medical monitoring are important mechanisms for providing feedback concerning effectiveness of the controls in use. Ongoing monitoring and maintenance of controls to insure proper use and operating conditions, and the education and commitment of both workers and management to occupational health are also important ingredients of a complete, effective, and durable control system.

These principles of control apply to all situations, but their optimum application varies from case to case. The application of these principles are discussed below.

ENGINEERING CONTROLS

Engineering controls in this furniture stripping operation have no basic design or pattern. An open door (6 feet wide) at the rear of the stripping room provides the main supply/exchange of air and benefits the area adjacent to it. Further inside the stripping room, some air mixing is generated by comfort fans which can mix stripping solution fumes with fresh air. There is no apparent plan to use these fans for other than comfort so any benefit from dilution ventilation would not be consistent. The location of and the air direction from these fans can not be assumed constant since these can be changed at will.

The owners have provided ventilation ducts located near the two caustic soak tanks on the east side of the stripping room. These ducts have no fans and depend upon exhaust air venting from the chimney effect. This effect will depend upon differences in indoor and outdoor air temperatures but is also affected by pressure differences within and outside the building caused by exhaust and supply air fans. The results of this type of ventilation are haphazard and measurement at any one time are of no value in predicting future effectiveness. The benefit of locating an exhaust air inlet below and behind a tank will be realized only if the air velocity induced across the liquid surface is significantly higher than ambient room air currents. This becomes a difficult problem when comfort fans produce high air velocities and unpredictable eddy currents. The effectiveness of the vent ducts behind the caustic soak tanks are probably negligible. Therefore the flow through the vent ducts was not measured.

There is a small local exhaust ventilation system in the methylene chloride flow-over tank. This tank functions as a drain tray when an item is sprayed with methylene chloride-containing stripping solution; the methylene chloride-containing slop then drains into a collecting vessel. The elevated front right corner of this tank seems to have the purpose of checking the escape of methylene chloride vapors. The exhaust fan pulls air from the lower right rear corner to exhaust methylene chloride vapors. This blower capacity was not measured because it was not running. There were no specifications available for the blower.

This concept of collecting "heavy" methylene chloride vapors from the bottom of the tank may be valid in concept but the factors that interfere with this process such as ambient air currents and the very local collection pattern of a ventilation inlet have not been evaluated on this type of tank. No information has been found on the origin of this "low gravity" concept or of its claimed effectiveness. It is our opinion that the collection and control of vapors based upon a specific gravity difference will work only when the vapors are at maximum density (very close to the liquid surface) and the ventilation area is screened from ambient air currents which can induce mixing of room air and solvent vapors.

WORK PRACTICES

No stripping was observed during this survey. All materials are manually handled and personal protective equipment is normally worn by the worker.

ENVIRONMENTAL MONITORING

No environmental monitoring has been conducted in last five years.

Limited qualitative grab sampling was conducted using a Photovac TIP®, II. Because of the extremely hot weather, most stripping had stopped prior to our afternoon survey. The only stripping observed was the hand stripping of a bookcase. No other organics or solvents were being used. Since no charcoal tubes were collected, it was not possible to determine the amount of methylene chloride in the air. Paint Remover 125 contains both methylene chloride and methanol. The TIP II will detect both chemicals, but cannot differentiate between the two. The concentration of total organics in air, expressed as parts per million methylene chloride, is shown below:

Location	% Full Scale	Concentration as Methylene Chloride
Outside of building by front door.	0%	Not Detected
Office area.	0%	Not Detected
Flow-Over(R) system area.	10%	300 ppm
Hand Stripping area.	13%	400 ppm
Soak tank area.	48%	1500 ppm
Ambient air near gloves.	7%	200 ppm
Inside gloves. A	31%	1000 ppm
B	12%	400 ppm

With the exception of the sampling in and around the gloves, the sampling was conducted in the approximate height of the operator's breathing zone. The instrument was post calibrated to several known concentrations of methylene chloride in the NIOSH laboratory.

PERSONAL PROTECTIVE EQUIPMENT

While using the flow-over system or the dip tank, we were told that the workers wear a Survivair®, full-facepiece respirator with acid/organic cartridges. These cartridges are changed once a month or when the odor breaks through. In addition, aprons and neoprene gloves are worn by the workers. The only work being done during this survey was the hand stripping of an old bookcase. No personal protective equipment was worn.

OTHER OBSERVATIONS

Scraped paint is disposed as ordinary municipal refuse. Furthermore, waste stripping solution evaporates, and therefore none had been disposed of to date. Several plastic drums of the stripping solution (55 gallons each) were found in the stripping area

The work area appeared quite cluttered. Furniture was stacked in the areas between the caustic tanks and the methylene chloride tanks because there was little storage room in this building.

CONCLUSION AND RECOMMENDATIONS

In general, furniture strippers are exposed to high levels of methylene chloride. Air levels were not quantitatively documented during a work shift and we are unable to determine to what extend Strip-Ease employees are exposed. It is recommended that Strip-Ease contact the Industrial Commission of Ohio, Division of Safety and Hygiene (791-4935) in order that an in-depth assessment of worker exposure may be documented.

In operations where splashing, spilling, spraying or skin and eye contact with methylene chloride may occur, employees should wear protective solvent-impermeable gloves (long enough to cover the forearms), aprons, shoe coverings and chemical splash goggles. Neoprene (currently used), butyl rubber, nitrile rubber or polyvinyl chloride (PVC) provide limited protection against methylene chloride and should be used with caution for short-term contact with this solvent. Whenever swelling or softening of the gloves or seepage of methylene chloride into the glove is observed, dispose of the gloves immediately and replace with new ones.[7]

Positive-pressure supplied air respirators or self-contained breathing apparatus are recommended whenever respirators are required. A study conducted at NIOSH, Morgantown, WV demonstrated that full shift use of chemical cartridges are not efficient for removing methylene chloride, since cartridge breakthrough time is approximately forty minutes for a methylene chloride challenge of fifteen parts per million. Because the odor threshold of methylene chloride is near the PEL, you will not smell methylene chloride until you have already had significant breakthrough. Though not recommended, respirators with organic vapor cartridges are not generally recommended, they may be used for short-term exposure to low levels of methylene chloride provided the cartridges are changed prior to breakthrough (every 15-30 minutes, depending of room concentrations). Where employees must wear respirators, an appropriate respiratory protection program in accordance with 29 CFR 1910.134 must be instituted.[7]

Some research is currently being conducted to develop non-methylene chloride based strippers which include N-Methyl-2-Pyrrolidone (NMP) blends and DiBasic Esters (DBE) blends. Thus far, data indicate that these blends require two to three times more stripping time than methylene chloride and cost approximately fifty percent more. Another substitute that has been on the market for many years is a blend of flammable solvents including acetone, methanol, toluene and xylene. In addition, two manufacturers of methylene chloride are developing an additive for paint stripping solutions to reduce the emissions of methylene chloride vapors.

Local exhaust ventilation at the source of methylene chloride is the best primary control of vapors short of using a non-methylene chloride product. The appropriate form of local exhaust will depend on the application method. The local exhaust in the flow-over system may not be performing as expected by the owners and they would benefit from further research in evaluating its efficiency. The dip tank will also need some type of local ventilation. Industrial Ventilation recommends the use of a slotted exhaust hood for the removal of vapors from dip tanks (see Appendix 3).[8] This type of local ventilation can also be applied to the flow over system The Industrial Commission of Ohio could help in the design of a local ventilation system. General room ventilation must also be considered as a necessary secondary control method. Vapors in the building will build up if there is not air movement or exchange.

Good work practices can significantly reduce worker exposure. Keeping the worker's head as far as possible from the stripping solution and the furniture will lower the exposure. Keep all wet cloths, brushes or tools in a ventilated area or in an air tight container. Paint scrapings contain substantial amount of methylene chloride vapors and should be stored in air tight containers until properly disposed. Any clothing that becomes soaked with stripping solution should be immediately removed and the exposure area thoroughly washed. Soiled clothing should not be taken home and washed with other clothes.

An effective employee education and training program can also reduce potential for exposure to methylene chloride and is required under OSHA's hazard communication standard (29 CFR 1910.1200). The program should contain the following elements:

The hazards of methylene chloride exposure and methods which can be used to prevent respiratory, skin or eye contact;

Use, care and limitations of respirators and other personal protective equipment;

Safe handling of methylene chloride and other relevant work practices;

Effective housekeeping procedures;

First aid and emergency procedures; and

Relevant personal hygiene aspects for controlling methylene chloride exposure.[7]

REFERENCES

1. Code of Federal Regulations. U.S. Department of Labor. Occupational Safety and Health Administration. 29 CFR 1910.1000, Rev. July 1, 1986.

2. Criteria for a Recommended Standard . . . Occupational Exposure to Methylene Chloride. U.S. Department of Health, Education, and Welfare, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, 1976; DHEW (NIOSH) Publication No. 76-138.

3. Current Intelligence Bulletin 46: Methylene Chloride. U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, Cincinnati, Ohio, 1986; DHHS (NIOSH) Publication No. 86-114.

4. Occupational Diseases, A Guide To Their Recognition, Revised Edition, DHEW (NIOSH) Publication No. 77-181, June 1977.

5. Occupational Safety and Health Administration, U.S. Department of Labor. Occupational Exposure to Methylene Chloride, Advance Notice of Proposed Rulemaking. 51 Federal Register 42257, November 24, 1986.

6. Threshold Limit Values and Biological Exposure Indices for 1987-88. American Conference of Governmental Industrial Hygienists, Inc., Cincinnati, Ohio, 1987.

7. OSHA Instruction PUB 8-1.2A, "Guideline for Controlling Exposure to Methylene Chloride," U.S. Department of Labor, Occupational Safety and Health Administration, Washington, DC, August 11, 1986.

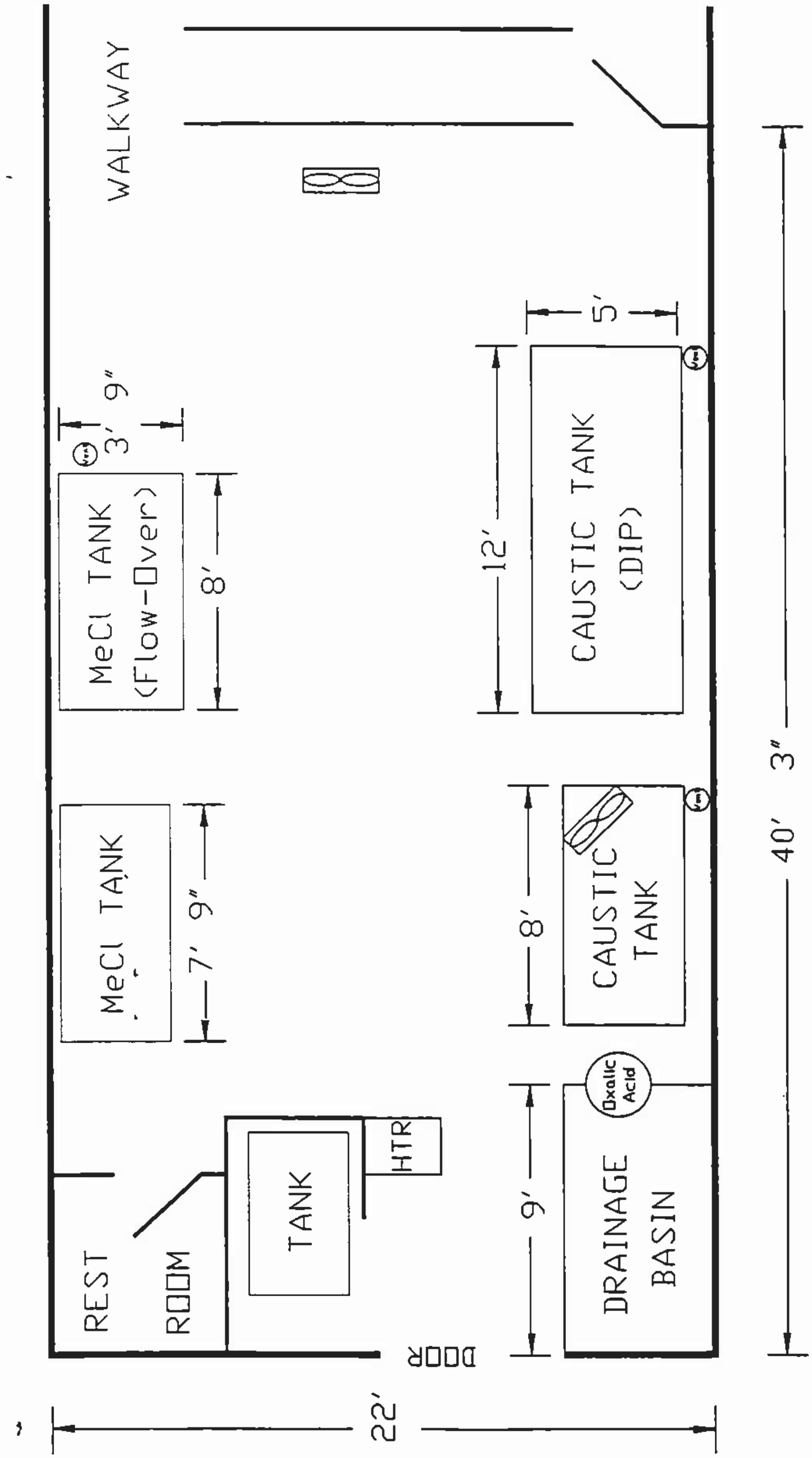
8. Industrial Ventilation - A Manual of Recommended Practice, 19th Ed, Committee on Industrial Ventilation American Conference of Governmental Industrial Hygienists, Edwards Brothers, Inc., Ann Arbor, Michigan, 1986.

APPENDICES

1. Diagram of the work area.
2. Diagram of Flow-Over®, system.
3. Industrial Ventilation Diagram VS-502.
4. MSDS.

APPENDIX 1

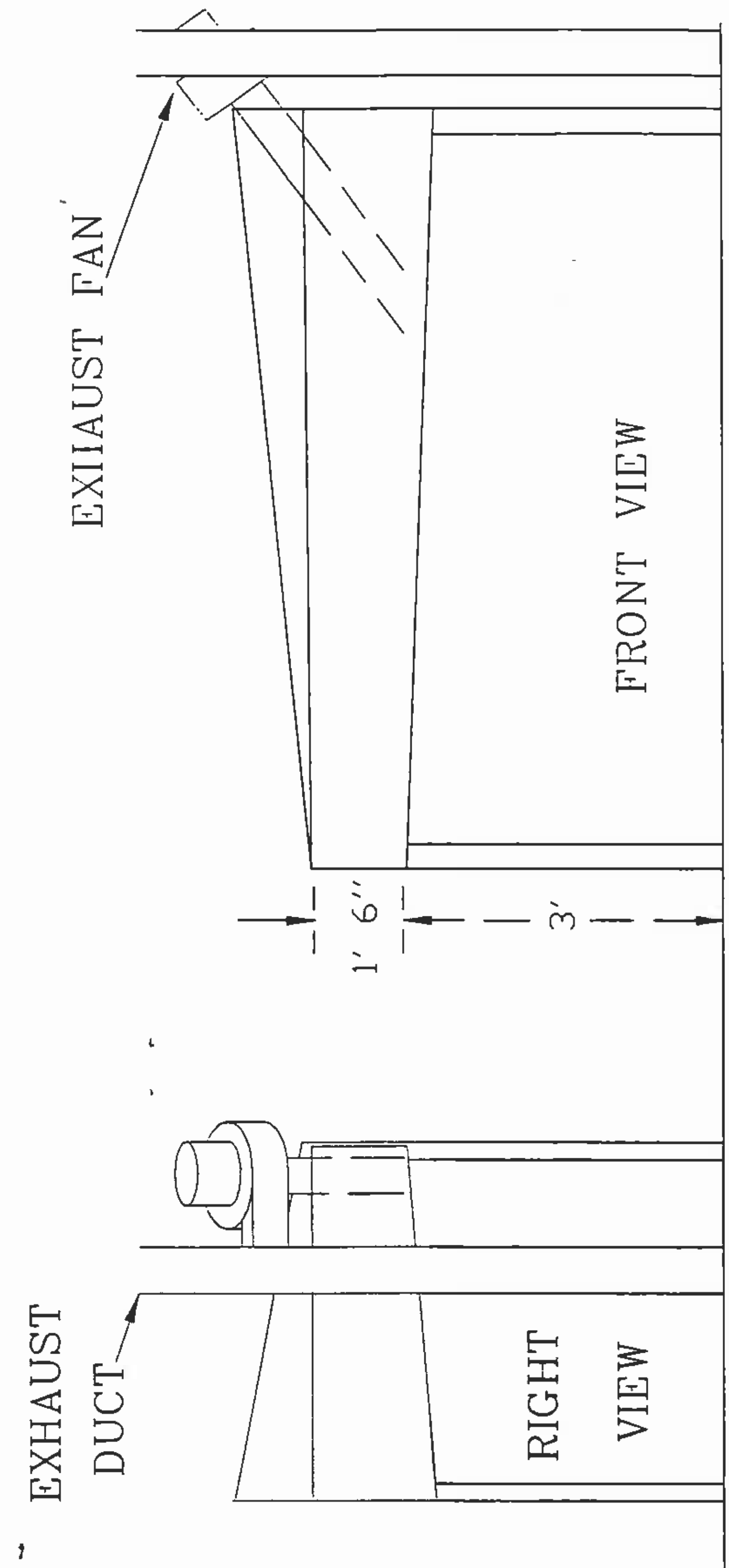
STRIP-EASE COMPANY OF CINCINNATI



PLANT LAY-OUT

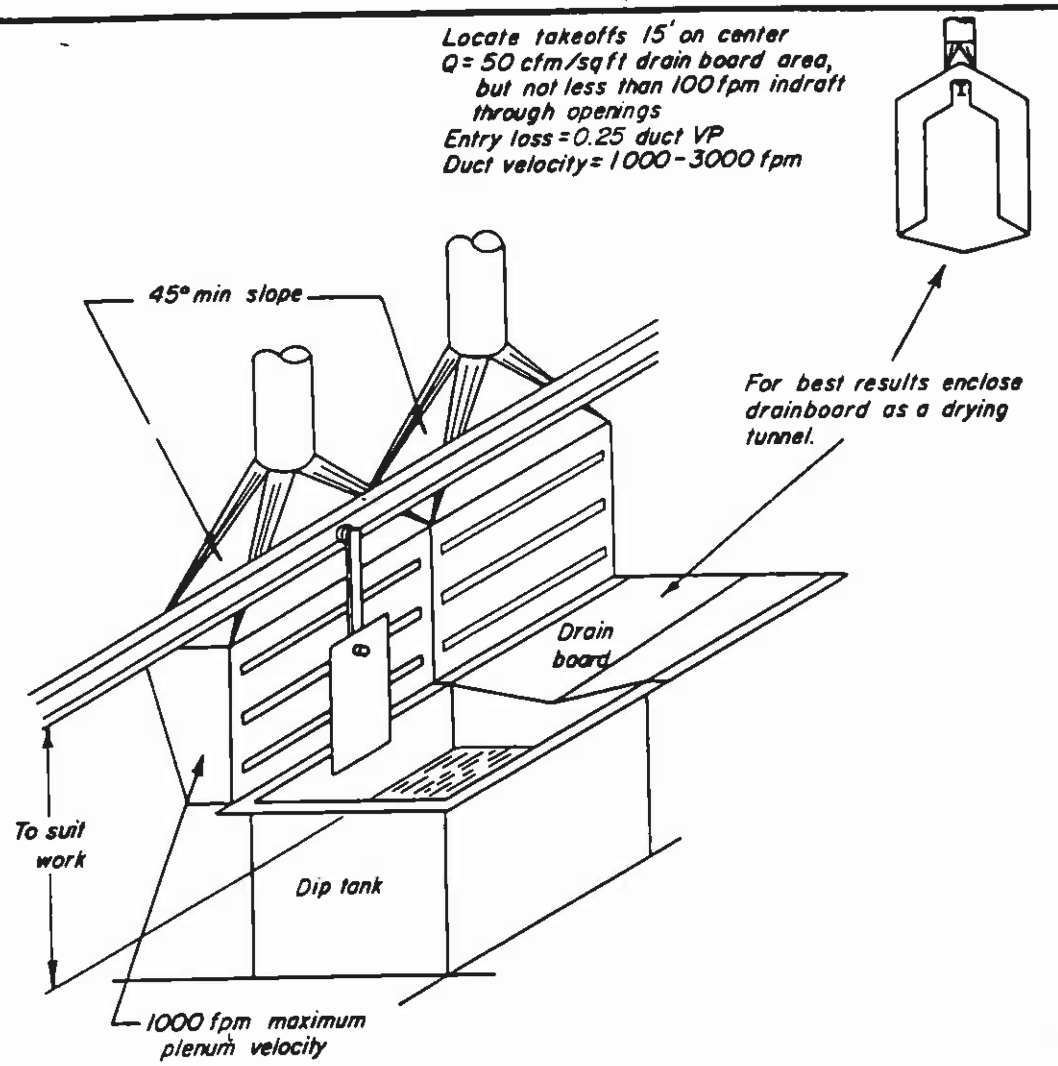
Figure 1

STRIP-EASE COMPANY



FLOW-OVER TANK

Figure 2



Q = 125 cfm/sq ft of tank and drainboard area
Slot velocity = 2000 fpm
Entry loss = 1.78 slot VP + 0.25 duct VP
Duct velocity = 1000-3000 fpm
NOTE: For details on drying oven, See VS-602

For air drying in a room or enclosure, see Section 2 for dilution ventilation required.

For construction and safety, consult NFPA.[113]

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS	
DIP TANK	
DATE 1-78	VS-502

MATERIAL SAFETY DATA SHEET

Manufacturer: Kwick Kleen Industrial Solvents
Address: 1202 Barnett PO Box 905
Vincennes, Indiana 47591
Emergency Telephone Number 812-882-3987

HMIS HAZARD RATING:
4=Extreme Health.......2
3=High Flammability.1
2=Moderate Reactivity...1
1=Slight Personal Protection
0=Very low goggles,gloves apron

Section I - Product Identity

Product Name (same as on label): KWICK KLEEN PAINT REMOVER 125
Product Class: Halogenated Hydrocarbon, Alcohol blend

Section II - Hazardous Ingredients

Ingredient (CAS No.)	% Vol	Occupational Exposure Limit	Vap Pres.
Methylene Chloride (75-09-2)	70	OSHA 8 hr. TWA 500 ppm ceiling 1000 ppm 2000 ppm peak for 5 min. in avg. 2 hrs. ACGIH 8 hr TLV 100 ppm	350 mm 68° F
Methanol (67-56-1)	25	OSHA 8 hr. TWA/TLV 200 ppm	100 mm 68°
Sodium Hydroxide (1310-73-2)	1	OSHA 8 hr, TWA 2 mg/m^3 ACGIH ceiling 2 mg/m^3	not reported

Section III - Physical Data

Boiling range of solvents: 103-149°F

Vapor Density: _x_ Heavier than air ____ Lighter than air

Evaporation rate: ____ Faster than ether _x_ Slower than ether

% Volatile by weight: 96.6%

Weight per gallon: 10.17

Flash point (PMCCO): none at boiling point

Appearance and odor: light yellow and aromatic, sweet

Specific Gravity: 1.18 at 72°F

Section IV - Fire and Explosion

Flammability classification: OSHA, Nonflammable
DOT, not regulated
Extinguishing media: Dry chemical, CO_2, water fog. Do not use water stream.

Unusual fire and explosion hazards: Concentrated vapors may burn but will not ignite readily. Decomposition produces hydrogen chloride and phosgene gas.

Special fire fighting procedures: Self contained breathing apparatus should be used. Remove container from fire area if it can be done safely. If not, keep container cool with water.

Section V - Reactivity Data

Stability: _X_ stable ____ unstable
Hazardous polymerization: NO
Hazardous decomposition products: Carbon Monoxide, Hydrogen Chloride, Formic acid
Conditions to avoid: Strong oxidizing materials, heat, sparks, open flame.

Section VI - Health Hazard Data:

Effect of acute overexposure unless noted as chronic.

a. inhalation: Irritation of mucous membrane, dizziness, headache, vertigo, drowsiness, blurred vision, nausea. Severe symptoms may be delayed 12 to 18 hrs. Chronic poisoning may cause visual impairment or blindness. Elevated carboxyhemaglobin.

b. skin: Prolonged exposure my cause burning sensation, scaling and eventual defatting of skin. May be absorbed through skin.

c. ingestion: Vomiting may result. Shock and acidosis may result. Chronic exposure may cause serious damage to CNS, liver and vision.

d. eyes: Painful irritation and possible damage to eye.

Medical conditions generally aggravated by exposure: Persons with known allergies, diabetes, heart or respiratory problems should observe extra care.

Chemical listed as carcinogen:

NTP	____ yes	_X_ No
IARC monographs	____ yes	_X_ no
OSHA	____ yes	_X_ no

First aid and emergency procedures:

a. inhalation: Remove patient to fresh air and assist with respiration if necessary. Obtain medical attention. Careful attention to acidosis and possible ethanol therapy.

b. skin: Remove contaminated clothes and flush with water for 15 min. If irritation persists, get medical attention.

c. ingestion: Get medical attention. Do not induce vomiting. If spontaneous vomiting occurs, keep head below hips to avoid aspiration of liquid into lungs. May cause severe burns to mouth, throat and stomach. Physican may use 1-2% sodium bicarbonate lavage. Blood methanol levels over 50 mg/100 ml indicates hemodialysis.

d. eyes: Wash with large amounts of water for 15 minutes lifting lids occasionally for complete washing. Get medical attention. May cause tissue destruction leading to permanent eye damage.

NOTE TO PHYSICIAN: Adrenalin should not be given to persons overexposed to methylene chloride.

CHRONIC TOXICITY

Chronic overexposures to methylene chloride have caused liver and kidney disease in experimental animals.
Carcinogenicity: Methylene chloride has been evaluated for possible concern causing effects in laboratory animals. Inhalation studies at concentrations of 2,000 and 4,000 ppm increased the incidence of malignant liver and lung tumors in mice. Three inhalation studies of rats have shown increased incidence of benign mammary gland rumors in female rats at concentrations of 500 ppm and above and increases in benign mammary gland tumors in males at concentrations of 1,500 ppm and above. Rats exposed to 50 and 200 ppm via inhalation showed no increased incidence of tumors. Mice and rats exposed by ingestion at levels up to 250 mg/kg/day lifetime and hamsters exposed via inhalation to concentrations up to 3,500 ppm lifetime did not show an increased incidence of tumors.

The International Agency for Cancer Research considers liver and lung tumors in mice as limited evidence of animal carcinogenicity. The significance of benign mammary gland tumors is unknown.

Epidemiology studies of 751 humans chronically exposed to methylene chloride in the workplace for a minimum of 20 years did not demonstrate any increase in deaths caused by cancer or cardiac problems. A second study of 2,227 workers confirmed these results.

Methylene chloride has been identified as an an animal carcinogen by NTP, but is not on the IARC or OSHA lists, as of October 31, 1985.

Reproductive Toxicity: Reproductive toxicity tests have been conducted to evaluate the adverse effects methylene chloride may have on reproduction and offspring of laboratory animals. The results indicate that methylene chloride does not cause birth defects in laboratory animals.

Section VII - Special Protection

a. inhalation: None if used in ventilation that keeps vapor concentration less than 100 ppm(TWA). Use is not recommended in lesser ventilation.

b. skin: Rubber gloves, apron and boots should be worn. Wash with soap and water after use.

c. ingestion: Do not eat, drink, or smoke in the work area. Wash thoroughly before eating, or drinking.

d. eyes: Safety goggles should be worn. Contact lenses should not be worn. Eye wash should be available.

Section VIII - Spill or Leak Procedure

Steps to be taken in case material is released or spilled:
Remove all sources of ignition and provide ventilation.
Small spills-take up with absorbent material and place in a non-leaking container. Evacuate and ventilate the area.
Large spills-Evacuate the area. Wear the appropriate respiration equipment. Stop source of leak if possible. Dike and contain. Knock down vapor cloud with water bag. Clean up with vacuum truck. Flush area with water.

Waste disposal method:
Recovered material should be sent to licensed reclaimer or incinerated.

Section IX - Special Precautions

Precautions to be taken in handling and storage: Avoid contact with skin and eyes. Avoid breathing vapors. Wash with soap and water before eating, drinking or smoking. Launder contaminated clothes before reuse.

Other precautions: Keep out of reach of children. Do not transfer contents to bottles or other unlabeled containers for storage. All warranties void if repackaged. Close container after each use. Store in cool, dry place. Do not store in direct sun light. Keep container cool. Open container slowly to allow venting. DO NOT USE NEAR HEAT, FLAME OR SPARKS. VAPORS MAY IGNITE OR EXPLODE. Fumes are heavier than air and will collect near the floor. Air movement can cause fumes to travel among rooms and fall to lower levels. Use in area equipped according to local building codes and/or as outlined in the Kwick Kleen Operations Manual. For on site use: TURN OFF all gas appliances, stoves, water heaters, furnaces, and pilot lights. VENTILATE area until all odor of fumes are gone before turning on electric and gas service. DO NOT smoke while in use. Vapors may produce toxic gas when in contact with hot surfaces. Destroy rags, newspapers or drop cloths after use to prevent spontaneous combustion.

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Notice: Kwick Kleen Industrial Solvents, Inc. believes that the information contained on this Material Safety Data Sheet is accurate. The suggested procedures are based on experience and best material at the date of publication. They are not necessarily all-inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with nor followed in violation of applicable laws, regulations, rules, or insurance requirements. NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE IS MADE.

TO: Gail A. Grooms

FROM: Engineering Control Technology Branch

RE: Report Number ECTB 170-11a

The following are keywords for inclusion in DIDS:

Company Name: Strip Ease Company of Cincinnati

Alternate Company Names: (such as parent company) None

SIC Code: 7641

Processes and/or Equipment Studied: Furniture Stripping

Materials Sampled For:

Additional Keywords: Methylene Chloride, Control Technology