PURPOSE OF SURVEY:	To conduct a walkthrough survey and document past and present worker exposure to toluene in an adhesive manufacturing facility, to assess the feasibility of a retrospective mortality study, and to determine if a detailed industrial hygiene study should be conducted.
EMPLOYER REPRESENTATIVES CONTACTED:	Jerome Gallenstein Plant Manager (606) 654-6931 James Presley Plant Engineer (606) 654-6931 Wilma Wenzel Personnel Department (606) 654-6931 Roy Bryant Assistant Plant Manager (606) 654-6931
EMPLOYEE REPRESENTATIVES CONTACTED:	David Gray International Representative Retail Clerks Union (Boot & Shoe Workers) Cincinnati, Ohio (513) 791-6083
ACKNOWLEDGEMENTS:	Chemical analysis conducted by Clarine Anderson and Ellen Boykin
STANDARD INDUSTRIAL CLASSIFICATION OF PLANT:	314

INTRODUCTION

This study was conducted by SRI International under Contract No. 210-76-0162 entitled "Investigation of Industries with Agents which are Newly Suspected as Occupational Health Hazards." The purpose of the study is to document past and present worker exposure to toluene and to assess the feasibility of a retrospective cohort mortality study.

During Task I of this effort a literature survey was conducted on toluene and personal contacts made to identify a cohort of workers exposed to pure toluene. As a result, recommendations were made to investigate toluene-based adhesive manufacturers and users. The Scholl Shoe Company in Falmouth, Kentucky is one of the six selected as a user of toluene-based adhesives. The results of a walkthrough survey of this facility are included in this report.

DESCRIPTION OF THE FACILITY

The Scholl Shoe Company in Falmouth, Kentucky is in the division of Scholl's footwear which is a division of Scholl's Inc., with headquarters at 213 West Schiller Street, Chicago, Illinois. The plant was built in 1970, and a warehouse was added in 1972. The total acreage is 20 acres, with one major building with a total of 100,000 square feet. The plant manufactures women's shoes, utilizing toluene-based adhesvies including neoprene and urethane cements. The plant was formerly located in Cincinnati at 7th Street and Central Avenue. Operation at this location began in 1946 until operations

were moved to the current location in 1970. It will be investigated whether records are available from that facility to assist in a cohort mortality study evaluation.

DESCRIPTION OF THE WORK FORCE

Four hundred and thirty-five people are presently on the payroll. Of this number, 368 are in the production area. Sixty-seven persons are in the administrative area. There is one shift from 7:00 am to 3:30 pm. There are numerous job classifications. There are approximately nine persons in maintenance, six of whom are in the production area, and three are involved in clean-up. There are no quality control personnel.

DESCRIPTION OF PROCESS

The general process flow is described in Figure A-1 in the Appendix. The process is relatively complex and is best described by department. In the cutting department the uppers of the shoes are cut and then moved to the fitting department where they are sewn. In the sole department the uppers are roughed with a wire brush and the cement applied. In the lasting department the uppers are put onto a last to shape the shoe. Then in the bottoming department soles are applied to the uppers. In the packing department the shoes are finished and are cleaned. In the heel department wooden heels are dipped in neoprene cement and leather is applied to the heels. This plant also has a sandal or arch lift department where cementing of insole and outsole and shank is done by hand, as well as other operations. Plant personnel were unsure of the content of many of their cements. Most cements are supplied by Compo Adhesive Company such as Neoprene 5156 and Urethane 4625 which contain toluene. Other adhesives are made by Hadley Adhesive Company such as 2504 pressure

adhesive. This adhesive contains 8% toluene by weight and 32% petroleum naphtha. Another adhesive used is made by Imperial (Perma-Dash Cement) which contains primarily methyl ethyl ketone (82%) and 200 ppt toluene according to the safety data sheet. Other adhesives are listed in Table A-1 in the Appendix.

DESCRIPTIONS OF PAST EXPOSURES

Toluene-based adhesives have been used in the plant since the beginning of production in 1970 and were used in the Cincinnati plant back to at least 1962 and probably beyond. The same types of adhesives have been used over the years since 1970. The types of adhesives are listed in Table A-1. The only air sampling that has been done was conducted by OSHA which has inspected the plant 3 to 4 times and sampled once. The plant is self-insured, and they believe that Compo Industries has conducted air sampling for their products. Three to four years ago urethanes were introduced into the process. Currently 65% of cements used are neoprene and 35% are urethane. There have been no major equipment changes. The only major process change was when urethanes were brought into use.

Sixty percent of the ventilation was in the plant when it was built; about 40% was added three to four years ago. At that time local exhaust systems were placed over the bottom cementer machines.

DESCRIPTION OF MEDICAL, INDUSTRIAL HYGIENE, AND SAFETY PROGRAMS

The company does not employ an industrial hygienist or an insurance carrier. They are self-insured. A physician is on call in Falmouth, Kentucky (Dr. R. McKenney). There is a full-time practical nurse on location. She conducts blood pressures at request and performs first aid. Pre-employment physicals are not conducted nor are periodic physical examinations for employees. There is no formal safety program, but the employees are instructed by a foreman on the safety precautions pertaining to their jobs. The plant manager is ultimately responsible for safety in the plant, and there are meetings every month with employees regarding safety. The frequency of lost time accidents in 1978 was nine and the severity was two. Most of these were due to tripping, falling, and lifting accidents. The only medical abnormalities known to the plant were two women who were cement operators using latex cement who developed dermatitis.

Protective equipment provided includes clothing, safety glasses, and rubber gloves. Respirators are provided for the spray booths in the fitting room. Aprons are provided, and ear muffs in the arch lift department for machines that have high frequency noise. There are no facilities for taking showers or changing clothes.

INSPECTION OF THE PLANT

Scholl's Shoe Company in Falmouth, Kentucky is a shoe manufacturing facility using toluene-based cements. The production area consists of a large room that is divided into areas designated as departments, but not separated by walls. The heel and arch lift departments are separated into another large room. A potential exposure table (Table A-2) in the Appendix describes areas where major exposures to toluene-based cement occur. However, because of the nature of the production area, which is two large rooms, most of the employees are potentially exposed to toluene and other solvents. Major areas for exposure to toluene are in the fitting room where cementing is performed (cementing uppers); in the sole department where cement is applied by machine to the uppers; in the bottoming room where cement is applied to the soles; in the heel department where heels are dipped in neoprene cements and then covered with leather; and in the sample department where additional cementing is performed. Housekeeping is generally good. The ventilation system existed at the time the plant was built except for a local exhaust system that was installed over the cementing machines three to four years ago. The ventilation system consists of Torit dust collectors. In the arch lift department there are two Torit dust collectors; in the heel department there are two bag exhaust fans that filter to the outside that service the cement dip tank. In the sole room there are three Torit dust collectors that are bag filtered, each with an 18-inch exhaust fan. In the fitting room there are two spray booths for latex cement application. And in the bottoming room there are two Torit dust collectors trapping leather dust. There are also four exhaust units over the

bottom cementers which exhaust to the roof.

DESCRIPTION OF SURVEY METHODS

A J-W TLV sniffer was used as an environmental sampling instrument along with employing Draeger toluene detector tubes, and Mylar grab sample bags for which MSA personal sampling pumps were used to draw air into the bags. TLV sniffer measurements were taken throughout the preliminary walkthrough in locations that were suspected of having high levels of toluene, i.e., near cementers and cleaners. TLV sniffer measurements showed a background level virtually everywhere in the building. Measurements ranged from 40 to 420 parts per million. In the cutting room where no cementing was being conducted, a level of 65 parts per million on the TLV sniffer was observed. In the fitting room 220 parts per million was recorded near a fitter cementing with solvent-based adhesive thought not to contain toluene. Another fitter using a toluene-based cement showed 160 parts per million. In the fitting department near a worker applying linings to uppers by machine, 300 parts per million were observed. Where a thinner was being used in the fitting department, as well as a cement containing toluene, 320 parts per million were observed. In the sole department near the cement wedge outsole and laminating operation, between 100 to 420 parts per million were observed near the workers. The lasting department showed lower levels where thermaplastic cement was in use at between 80 and 140 parts per million. In the bottoming department where a cork filler was being used, 400 parts per million were observed. Near a worker applying urethane cement with a Compo bottom cementer machine in the bottoming department, 200 parts per million were observed near the breathing zone of the worker, and 320 parts per million near the rack of soles that were drying. In the packing department where cleaning of the shoes was being performed,

between 240 and 600 parts per million were found in the breathing zone of the worker. This could be primarily methyl ethyl ketone. In the heel department where the neoprene cements were used and the wood heels were dipped into a tank of neoprene, between 80 and 100 parts per million were observed. In the arch lift department where there was cementing of the heel and sole with neoprene cement, 200 to 300 parts per million were observed. Toluene levels as determined by Draeger tubes were between 45 and 100 parts per million, with the highest in the breathing zone of the bottom cementer in the bottoming department. Seventy-five parts per million were observed in the fitting department where cementing of the counter pocket was conducted, and also 75 to 80 parts per million in the sole department near the cement wedge outsole and laminating operation. Forty-five parts per million were seen in both the heel department and the bottoming department near the heel cementing operation.

The grab bag toluene samples showed 37 mg/m^3 (10 ppm) in the fitting department near the worker applying cement to the counter pocket; 60 mg/m^3 (16 ppm) in the sole department near the cement wedge outsole and laminating operation; and 23 mg/m^3 (6 ppm) in the heel department in the breathing zone of the worker covering heels and leather.

CONCLUSIONS

Sampling results for toluene and total hydrocarbons in this facility suggest that the total hydrocarbon levels are relatively high--up to 400 parts per million were observed. Toluene is less, ranging from 40 to 100 parts per million in the cementing areas in particular. Eight hour, time-weighted averages

as obtained through personal samples may result in higher exposures than were detected through these direct reading instruments. Workers applied cement to the soles and uppers while holding the shoe about six to ten inches from their face. Thus, personal samples may show higher levels than obtained through direct reading instruments in the general area.

RECOMMENDATIONS

The above conclusions indicate levels of toluene at or below the recommended level of 100 parts per million of toluene. Approximately 368 persons are potentially exposed to the toluene. However, since the plant began operations in 1970, it is questionable whether records can be obtained from the Cincinnati facility back in 1946. It is questionable whether this plant can be included in a cohort mortality study. Further evaluation will be made upon completion of the walkthrough surveys for the study.

Appendix A.

FIGURE A-1

GENERAL PROCESS FLOW
DR. SCHOLL SHOE COMPANY
Falmouth, Kentucky

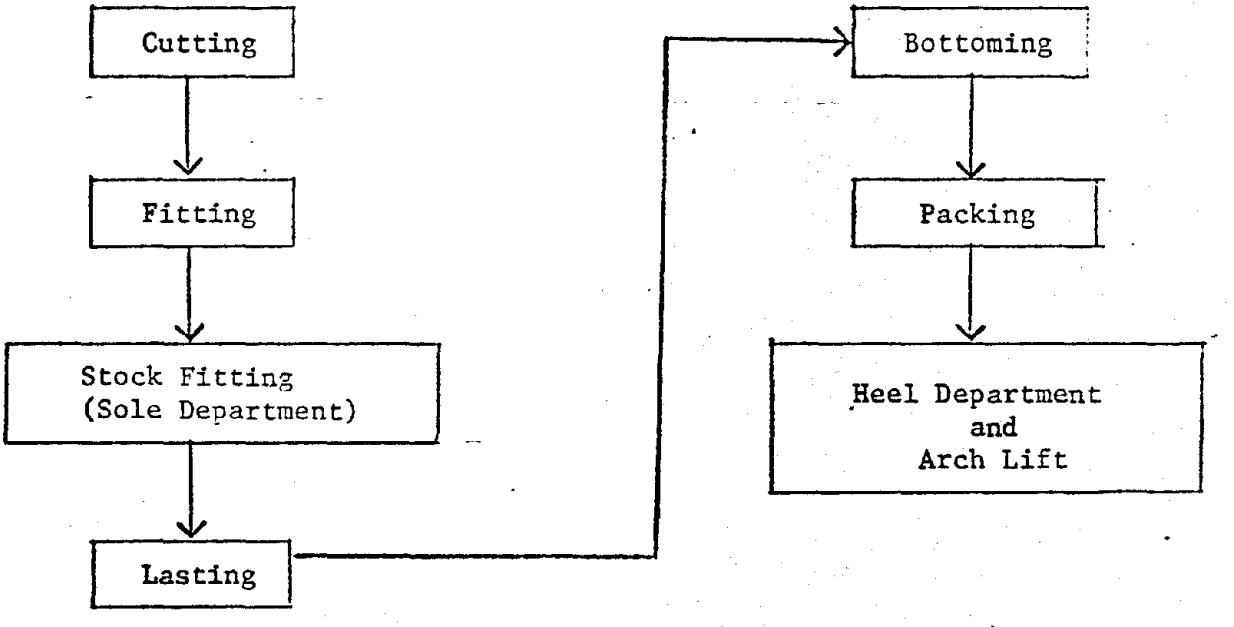

TABLE A-1

Solvent-based Adhesives, Cleaners, and Primers
Used at Dr. Scholl Shoe Company

Compo Industrial
3631 Forest Park Blvd.
St. Louis, Missouri

cements : 9650, 8027, 4625 (urethanes)
5156, 5136, 6608 (neoprenes)

cleaners: 3912, 3920

primers: 3035, 3861

Hadley Adhesive
2829 Breckenridge Industrial Park
St. Louis, Missouri 63144

cement : 1405 Had-u Tex (neoprene)

Imperial Adhesives and Chemicals
6315 Wiehe Rd.
Cincinnati, Ohio 45237

cement : 527, 063-43 heel dip (neoprene)
310 meoweld

904 leather softener

ISMC
4690 Paddock Rd.
Cincinnati, Ohio

cement : 307, 442, 136, 615 (thermoplastic)

Midwest Industrial
1504 Sublette Ave.
St. Louis, Missouri 63100

cements : 131-1416, 72-36, 1702 (latex)
5531 Vangrip adhesive (neoprene)
35M shankfiller
220 counter adhesive
30C3HH solvent thinner
#4HH Boxtoe sealer (solvent-based)

Polymer Chemical Company
Barron Drive
Cincinnati, Ohio

cement : 4184 (rubber-base solvent)

(concluded..... Solvent-based Adhesives, Cleaners, and Primers)

K. J. Quinn
195 Canal St.
Maldan, Massachusettes 02148

cleaners: 3899-61, Puritan, SA 6221-61, 4157-61, 4289-61 (solvent-based)

sprays : USA 260-11, USA 264-11, SD 511

thinner : RF 205-61

R2300-11 Protector, 4992 last slip (solvent-based)

TABLE A-2

MAJOR POTENTIAL EXPOSURE AREAS
DR. SCHOLL SHOE COMPANY
Falmouth, Kentucky

Potential Chemical Exposures	Area	Number of Workers
Toluene, methyl ethyl ketone, xylene (other solvents in urethones and neoprenes)	Fitting Department	3 (others nearby)
As above	Sole Department	4 (others nearby)
As above	Bottoming Room	11 (others nearby)
As above	Heel Department	1 (others nearby)
As above	Sandal Department	3 (others nearby)
	TOTAL	22*

*Since the production area is two large rooms essentially all production employees are potentially exposed for a total of 368 employees.

TABLE A-3

RESULTS OF ENVIRONMENTAL SAMPLING
DR. SCHOLL SHOE COMPANY
Falmouth, Kentucky

Survey conducted on December 14, 1978
Total Hydrocarbon Levels
(TLV Sniffer)

Sample Number	Location	TLV Sniffer Reading (ppm)
1	Cutting room (east end) in aisle near cutters	65
2	As in #1	80
3	Fitting room (north end) in aisle near fitters	100
4	Fitting room (south end) near water based spray and dye booths	100
5	Fitting room near fitters in action using machine to cement leather pieces with solvent-based adhesive thought not to contain toluene (cement manufactured by Midwest Chemical)	220
6	Fitting department near boxtoe sealer in action applying cement by hand	160
7	Fitting department near worker applying cement by hand for reinforced lining	120
8	Fitting department near worker applying linings to uppers by machine with Midwest Chemical cement 72-36 and thinner 30-C3H	300
9	Fitting department (south end) near supply drums of cement and thinner	100
10	Fitting department (north end)	100
11	Fitting department near worker applying cement (to cement counter podset) using thinner 30-C3H and cement containing toluene (Imperial 527, Permagrip)	320

TABLE A-3 (Continued)

Sample Number	Location	TLV Sniffer Reading (ppm)
12	Sole department - near worker cementing in sole cover using latex cement and near Torit dust collector	120
13	Sole department - near cement wedge outsole and laminating operation (cement: Compo 51-36 which contains toluene) near breathing zone of worker at Compo bottom cementer machine	100-120
14	As in 13 near another bottom cementer	400-420
15	Lasting department - near back part molding operation using thermoplastic cement (no solvent)	140
16	Lasting department - near pull over operation using thermoplastic cement	80
17	Lasting department - near worker using thermoplastic cement in Kamborian side last operation	80
18	Bottoming department near cork filler (over drum)	400
19	Bottoming department - "dip shank" operation using neoprene cement	140
20	Bottoming department - in breathing zone of bottom cementer in action using Compo neoprene cement 51-56	120
21	Bottoming department - in breathing zone of second bottom cementer using Compo neoprene cement 51-56	200
22	Bottoming department - in breathing zone of third bottom cementer using urethane 46-25	120
23	Bottoming department - near worker in primer application at spray booth	100
24	Bottoming department - near worker applying urethane cement (Compo 96-50) at Compo bottom cementer's machine with local exhaust	200

TABLE A-3 (Concluded)

Sample Number	Location	TLV Sniffer Reading (ppm)
25	Bottoming department near rack of soles drying next to Compo bottom cementer	320
26	Bottoming department near worker cementing wedges by hand (Compo 96-50)	120
27	Bottoming department - near rack of wedges as in #26	200
28	Bottoming department near operation to heat sole and upper	50
29	Bottoming department - near hand heel cementing operation using urethane 46-25 and meoprene 51-36	300
30	Packing department - near spray booth for water-based dyes	40
31	Packing department - near spray booth for Permalustre final spray (no solvents)	40
32	Packing department - in breathing zone of cleaner (primarily MEK)	240-600
33	Packing department - as in #34 in breathing zone of another cleaner	200
34	Packing department - near operation to cement vinyl soft linings (Polymer Chem 4184)	300
35	Heel department - near hood where wood heels are dipped in neoprene cement	80
36	Heel department - in breathing zone of worker covering heels with leather	80
37	Arch - lift department - near worker cementing insole - outsole and shank by hand with paint brush using neoprene 51-36	100
38	Arch - lift department - near worker cementing heel and sole with neoprene 51-36	200-300

TABLE A-4

RESULTS OF ENVIRONMENTAL SAMPLING

DR. SCHOLL SHOE COMPANY
Falmouth, Kentucky

Survey Conducted on December 14, 1978

Toluene Draeger Tube Results

Sample Number	Location	Toluene Draeger Tube Reading (ppm)
39	Fitting department - near worker applying cement (to cement counter pocket) using thinner 30-C3H and cement containing toulene (Imperial 527, Permagrip--as in sample 11)	75
40	Sole department - near cement wedge outsole and laminating operation (cement: Compo 51-36 which contains toluene) near breathing zone of worker at Compo bottom cementer machine (as in sample 13)	75-80
41	Bottoming department - in breathing zone of third bottom cementer using urethane 46-25 (as in sample 22)	100
42	Heel department in breathing zone of worker covering heels with leather (as in sample 36)	45
43	Heel department - near hood where wood heels are dipped in neoprene cement (as in sample 35)	70-75
44	Bottoming department - near heel cementing operation (as in sample 29)	45

TABLE A-4 (concluded)

Charcoal Tube Results

Sample Number	Location	Toluene (ppm)
45	Fitting department - near worker applying cement (to cement counter pocket)	10 (37 mg/m^3)
46	Sole department - near cement wedge outsole and laminating operation	16 (60 mg/m^3)
47	Heel department in breathing zone of worker covering heels with leather	6 (23 mg/m^3)