

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 75-187-329

CINCINNATI ENQUIRER
CINCINNATI, OHIO 45202
SEPTEMBER 1976

I. TOXICITY DETERMINATION

NIOSH environmental and medical survey teams conducted a joint investigation on January 13, 14 and 21, 1976. Additional medical interviews were accomplished on February 17 and 21, 1976. Medical examinations were given to selected employees on March 16. It has been determined that exposures to solvents, cleansers, and fungal organisms observed on the above dates do not present a toxic hazard to the majority of the workers under the observed conditions of use. There were, however, indications that skin dermatitis had previously been a problem in several cases prior to the use of impermeable gloves and in conjunction with excessive use of harsh skin cleaners. There are some cases of dermatitis which demonstrate an individual susceptibility. The fungal infections observed while not caused by a unique work environment are normally stimulated to heightened activity during times of high heat and humidity. There was no higher incidence of fungal skin disease than would be expected in the population at large.

This determination is based on environmental survey findings including measurements of breathing zone and area exposure to airborne concentrations of stoddard solvents and 1,1,1-trichloroethane, observations of work practices, laboratory analysis of cleaning agents, and medical evaluations of clinical evidence of fungal and other skin diseases and cultures of wipe samples from shower rooms.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are available upon request from the NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226.

Copies have been sent to:

- a. Cincinnati Enquirer
- b. Authorized representative of employees
- c. U.S. Department of Labor - Region V
- d. NIOSH - Region V

For the purpose of informing the approximately 130 employees working in the pressroom, reel room, and maintenance areas the employer will promptly "post" the Determination Report for a period of 30 calendar days in a prominent place near where affected employees work.

INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669 (a)(6) authorizes the Secretary of Health, Education and Welfare, following receipt of a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The National Institute for Occupational Safety and Health (NIOSH) received such a request from the Cincinnati Enquirer regarding employee exposures to stoddard cleaning solvents and contagious fungus in shower rooms. The request was precipitated by employee absenteeism due to dermatitis.

IV. HEALTH HAZARD EVALUATION

A. Description of Process

The Cincinnati Enquirer is a daily newspaper with an average circulation of 185,000 papers on week days and 273,000 on Sunday. This survey was conducted in the pressroom which contains three presses, the reel room where bulk paper stock is fed into the presses, the ink mixing room, and the maintenance shop. In addition five employee locker and washroom facilities were evaluated. Approximately 130 employees work in these areas with job categories, age distribution, and average length of employment as shown in Table I.

The normal shift of these workers varies with daily workload. There is a normal pattern with peak activity on Tuesdays and Saturdays. The Tuesday peak is due to a Wednesday food supplement. On other workdays only two presses are run on operating shifts which vary from 8 to 12 hours. The seven press wipers' daytime workload is proportional to the previous night's press utilization. They clean the ink mist deposits from presses and surrounding surfaces. About 7 pressmen, 7 wipers, 4 paper handlers, and 3 janitors work on the day shift in preparation for the night run. The night press run requires 20 to 30 pressmen, one wiper, and 4 paper handlers. During the larger runs all the presses are operated. On the Saturday run the presses are operated for three consecutive shifts utilizing 70 pressmen, 10 wipers, and 10 paper handlers. In this case employees work extended hours and double shifts. Fifty-three of the pressmen including the foreman and assistant are regular Enquirer employees. The remaining 30 are part-time workers from the local Union Hall. This group works for both of the Cincinnati daily papers on an as-needed basis.

Specifications of the three presses are given in Table II. The presses are identified by letters "A", "B", and "D". "A" and "B" presses are operated nightly while "D" press is used primarily for Sunday papers. Each press has a number of units which run in series. Each color is applied separately, commonly using the upper deck rollers. Ink is applied to the press by a

roller which is in an ink fountain. The number of units used and therefore the number of fountains to be cleaned is dependent upon the size of the paper and the number of colors being used. Black printing ink is piped directly from bulk storage tanks to permanently installed ink fountains. Colored inks are supplied to portable fountains by hand carried buckets. Fountains are cleaned with a stoddard solvent. Portable fountains are cleaned in a 50 gallon tank in the ink room. The number of fixed fountains that are cleaned varies from 30 to 70 per week. Portable fountain usage is dependent on the number of colors used. Fountain cleaning duties are reportedly rotated on a voluntary basis. The apprentice pressman cleans ink pails daily in a solvent tank. Colored inks are stored in 50 gallon drums and dispensed by gravity flow into measuring buckets. Mixing is accomplished in cut off drums.

The reel room is located on the lower floor level directly below the pressroom. Paper is fed into the presses, which extend down through the ceiling, from large reels. The leading edge of the new paper roll is glued onto the tailing end of the used roll by pressmen. About 10 gallons of Daubert DC-2001 red glue manufactured by Carbon Laboratories, Inc. are consumed per week. From 80 to 115 rolls of paper are used per night. To prevent any contamination of the newspaper it is necessary to use great care in the application and handling of the glue. Therefore hand contact is minimized and cleaning is necessary when contact does occur.

The shower and locker facilities are put to good use since the soil of printers ink and solvents are unavoidable during daily activities in the pressroom. Press wipers are particularly subject to heavy contamination of clothing and skin. This is inherent in their activity wiping off ink mist from inside, under, and around large presses with solvent soaked rags. Pressmen are exposed to a lesser degree when servicing ink fountains.

Maintenance personnel are exposed less frequently to inks and stoddard solvents when making press repairs and are additionally exposed to a Safety-Kleen 106 solvent used in their parts cleaning tank located in the maintenance shop. This is an infrequent intermittent exposure. 1,1,1-Tri-chloroethane is used by pressmen and maintenance personnel to clean newly installed rollers. This activity was not observed during our survey although a new roller was installed. There are numerous other activities in the maintenance shops. Welding and servicing of air conditioning filters were noted to be areas of worker concern. The vapors from unidentified filter cleaning solvents are most offensive to all workers in the vicinity. The local exhaust system originally intended for welding fumes control has not been completely functional due to lack of or inadequacy of filtration units intended to purify the recirculating exhaust fumes. These activities were not directly related to our survey and were not observed during our visit.

B. Evaluation Design

1. Environmental

Monitoring of workers' exposure to airborne solvent vapors was accomplished by sampling the personal breathing zone air for 8 press wipers, 4 pressmen, 2 paper handlers, 3 maintenance men, and 2 janitors. Area air samples were taken in the press room, break room, press upper level, reel room, and ink room. A high volume (1 liter per minute) bulk air sample was collected directly over the maintenance solvent tank for laboratory identification purposes rather than exposure measurements. All air samples were taken during a normal daytime preparation shift when heavy use of solvents would be expected.

Bulk samples were taken of the two solvents in use, also of soaps used for personal hygiene, and also of the 11 most commonly used inks. Estimates of utilization rates and Material Safety Data Sheets were obtained.

Exposures to oil and ink mists, Benzidine Yellow, and paper dust were not evaluated. A discussion of these factors is included in Section IV E of this report.

2. Medical

The first day of the survey, Drs. Lucas and Thoburn, NIOSH physicians, participated in a tour of the work area and discussed the general health of the workers with management and labor representatives. The OSHA Log Form 102 was reviewed and copies of two medical case reports were obtained. The next day specimens were collected for culture from the following locker room and shower locations:

a. Press Locker Room - shower mat (1); shower room entry floor (1); and shower room wall tile grouting (1).

b. Old Shower Room - shower mat (1); shower entry floor (1); and shower walls (1).

c. Reel Room Locker - shower room mats (2) and locker room floor (2).

A screening questionnaire (Appendix A) was designed to identify workers with problems needing closer attention. These were administered by NIOSH industrial hygienists to the wiper crew. Dr. Thoburn screened the remaining workers in two sessions, in most cases allowing the men to self-administer the questionnaire, but remaining available to answer questions. In all, 84 screening questionnaires were obtained. Of these 21 appeared to require further study.

Drs. Lucas and Thoburn visited the plant on March 16 and examined 19 of the 21 workers. At this time an additional questionnaire (Appendix B) was

administered. Skin lesions were examined and a few lesions were photographed, scraped for microscopic examination, or both. Table I gives details on position, age and length of service of the workers interviewed.

C. Evaluation Methods

1. Environmental

a. Air sampling for solvents was accomplished with MSA charcoal tubes. Area samples were taken at 1 lpm with MSA Model G pumps. Personnel samples were taken at 50 and 100 cc/min. with Sipin pumps. Personnel were sampled for a full shift. Tubes were changed at mid shift for press wipers and janitors. Area samples were collected for a half shift with the exception of the break room, press room and ink room where shorter sampling periods were used.

b. Bulk samples of solvents, inks, and soaps were collected in 25 ml glass vials. Bulk liquid solvent samples were analyzed for metal content by andplacing approximately 0.1 ml of sample on a pure graphite electrode, drying and arcing at 10 amps on the emission spectrograph. The result is a semi-quantitative qualitative scan of all metals present. Bulk soap samples were prepared in one percent solution. The initial PH was measured by glass electrode. Each soap solution was titrated to Ph7 and Ph4 by a standard solution of HCL.

2. Medical

Fungal cultures collected from either shower room surfaces or from worker's skin were streaked immediately on Mycosel^R agar, cultivated at room temperature, and observed frequently for fungal growth over the next 30 days.

Slides for microscopic examination were prepared by scraping some material from the skin onto a slide at the time of examination. At the time of the microscopic examination the material was moistened with potassium hydroxide (KOH).

D. Evaluation Criteria

1. The best criteria for evaluation of workroom exposures to stoddard solvents, in the opinion of the investigators, is the Threshold Limit Value (TLV) promulgated by the American Conference of Governmental Industrial Hygienists. The most recent edition of TLV for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes¹ contains a proposed 50% reduction of the TLV for stoddard solvent from the present value of 200 parts per million by volume (ppm) or 1150 mg/M³ (milligrams per cubic meter of air) time weighted average (TWA) to a lower level of 100 ppm or 575 mg/M³. From a review of the literature and TLV documentation² it appears that this more conservative value is based on a consideration of the wide variability of composition of "Stoddard Solvent", in particular the percent aromatic hydrocarbons which on the average is around 15%. The TLV for stoddard solvent is intended to prevent narcotic and irritant responses for nearly all workers who are exposed to this Time-Weighted Average air concentration for 7 to 8 hours per day and 40 hours per week.

The following guidance is extracted from Reference 1. TLV's should be used as guides in the control of health hazards and should not be used as a fine line between safe and dangerous concentrations. Because of a wide variation in individual susceptibility a small percentage of workers may experience discomfort from concentration at or below the TLV. A smaller percentage may be affected more seriously. In spite of the fact that serious injury is not believed likely as a result of exposure to the threshold limit concentrations the best practice is to maintain concentrations of all atmospheric contaminants as low as is practical.

2. Biological criteria are based on the observable health effects of exposure to the work environment usually in reference to a biologically normal condition. Exposures include not only the breathing concentrations but also direct skin contact with solvents and cleaning agents.

a. Stoddard's solvent is a relatively high boiling petroleum oil. Repeated or prolonged contact with the skin may lead to a dermatitis. Solvents dissolve the natural protective oils from the skin resulting in a loss of skin hydration. This leads to redness, drying, and cracking of the skin. Once the skin barrier is broken it is easily infected by common bacteria normally incapable of invading intact skin. Persons with dry, senile or sensitive skin are particularly prone to solvent actions. The other major toxic effect from this solvent would be lightheadedness, headache, and possibly some incoordination from breathing excessive amounts of the vapors. These symptoms of intoxication may be intensified or first noted at the moment of entry into an uncontaminated atmosphere after a solvent overexposure.³

b. Several hand cleansers were in use, one a granular powder for heavy duty cleaning, and two different waterless cleaners. Besides removing soil from the hands, these cleansers can be expected to remove a certain amount of the natural protective oils from the skin. Thus the cleaning process can also cause the hands to become dry, cracked and irritated. The cleansers' ability to clean effectively depends on their alkalinity which allows them to soapify the oil which can then be washed away. Thus the more alkaline a cleanser is, the more effectively it can remove the oil grime from the hands, but also the more likely it is to be irritating to the hands by removing the natural oils from the skin. Additionally, if the alkalinity is well buffered so that the cleanser will remain alkaline, it will both clean better and be more likely to cause skin problems. The alkalinity is measured by the pH of cleanser and the buffering is measured by the amount of acid which is needed to reduce the pH to neutral (pH 7). The pH of normal skin is variable but usually between 4.5 and 5.5 (slightly acid).

c. Fungus infections are most common on the feet. On occasion lesions can be found on the hands at the same time as lesions are present on the feet, but the foot lesion remains the primary lesion. Numerous studies have failed to indicate that fungus infections are transmitted via contamination of shared bathing facilities, swimming pools, etc. Fungi which result in skin infection (dermatophytes) apparently are transmissible only in situations of prolonged rather intimate contact as commonly occurs in households. This is not to suggest that transmission never occurs from shower facilities, etc., but only that such spread is very unlikely. A majority of adults harbor potential clinical disease causing fungi on their feet.

In most people the fungi cause no apparent signs or symptoms of fungus infection. However, symptoms are more likely to develop under conditions of increased humidity and temperature. These conditions commonly result from heavy occlusive footwear or environmental conditions similarly conducive to increase fungal growth.

E. Evaluation Results and Discussion

1. Environmental

a. Environmental findings are presented in Table III Ink Metals Analysis, Table IV, Stoddard Solvent Air Exposures and Table V Alkalinity of Hand Cleansers. The findings of bulk solvents aromatic hydrocarbons analysis for benzene, toluene and xylene are as follows:

| Lab No. | Field No. | mg Benzene per ml Solvent | mg Toluene per ml Solvent | mg Xylene per ml Solvent |
|---------|--------------------------------|------------------------------|------------------------------|-----------------------------|
| 085818 | Stoddard Solvent R-66 No. 7 | 1.4 | 1.5 | 2.3 |
| 085819 | Safety-Kleen 105 No. 8 | 1.4 | 1.5 | 2.3 |

The minimum detectable quantities were:

Benzene: about 1.4 milligrams per milliliter solvent
 Toluene: about 1.5 milligrams per milliliter solvent
 Xylene: about 2.3 milligrams per milliliter solvent

This analysis of stoddard solvent and Safety Kleen 105 show them to be qualitatively the same. Both were found to be low in aromatic hydrocarbon content. Therefore the TLV is considered to be conservative, in that it is intended to protect workers from stoddard solvent with 15% aromatic content. The workers exposures to solvent were found to be well below even the ACGIH recommended reduced TLV of 100 ppm or 575 mg/M³.

b. Due to a reference made by a worker to the occasional use of trichloroethane when cleaning rollers the charcoal tube solvent vapor samples were analyzed for 1,1,1-trichloroethane as well as stoddard solvent. A peak with about the same retention time as 1,1,1-trichloroethane was observed in many of the samples. It was not possible to determine whether or not this compound was 1,1,1-trichloroethane or a hydrocarbon. A standard of 1,1,1-trichloroethane was prepared and its peak area compared with that of the questioned peak in the samples. This peak, if 1,1,1-trichloroethane, was found to be below the TLV in all of the samples. The highest sample level contained only 1.62 mg which would be a maximum concentration of only 320 mg/M³ for the smallest sample volume taken which was 514 liters. Therefore none of these samples approached the TLV¹ of 350 ppm or 1900 mg/M³ for 1,1,1-trichloroethane.

2. Medical

a. Screening Questionnaires

In all 84 workers filled out the screening questionnaire as detailed in Table I. Although the NIOSH administered questionnaires usually contained a little more detail than the self-administered ones, they did not seem to uncover any additional referrals. (A few workers filled out the questionnaire twice, once self-administered and once NIOSH administered.) Actually, several workers would probably not have been seen on the follow-up if the extra detail had been available.

Twenty-one (21) questionnaires (25%) indicated skin problems thought to be possibly related to work. Of these, 15 were seen for follow-up; 2 were unavailable for follow-up; and in 4 the skin problems were not currently active. Additionally, one worker with a currently active dermatitis not believed to relate to his work was seen in follow-up. Of the 4 currently inactive problems one related it to Stoddard solvent and three to the hand soap.

Nine (9) questionnaires (11%) indicated hearing loss. These were not evaluated.

Twelve (12) questionnaires (14%) indicated some other health problem believed to be job-related, often old injuries. Two of these workers with complaints other than injuries were seen in follow-up because of the complaint. An additional worker was followed-up for what was felt to be a non-job related complaint.

Forty-nine (49) questionnaires (58%) indicated no job-related health problem or other problems prompting follow-up. Some of these questionnaires did indicate health problems not related to the job. Several workers not relating current problems indicated that Stoddard's solvent had bothered their hands until they started wearing gloves. Others indicated that Hellcat Cleaner had proved too harsh for the brief time it was in use.

b. Follow-up Examination

On March 16, 1976, a total of 19 Enquirer employees who had expressed various health complaints on a screening questionnaire were interviewed and in most instances received a brief, limited cutaneous examination. The group ranged in age from 20 to 62 and had an average of 37. All workers examined were male. All but one was white, the other being black. The average duration of employment with the Enquirer was 12 years. Two worked as electricians, two as wipers, one as a custodian, and the rest as pressmen.

The following dermatologic diagnoses were made at the time of examination:

| <u>Condition</u> | <u>Number of Cases</u> <u>Cases</u> | <u>Occupational</u> <u>Relevance</u> |
|-------------------------|--|---|
| Nevoid atrophy (thigh) | 1 | None |
| Tinea versicolor | 1 | None |
| Insect bites (probable) | 1 | None |
| Tinea pedis | 2 | Unlikely |
| Seborrhic dermatitis | 1 | None |
| Nummular eczema | 1 | Unlikely |
| Hand dermatitis | 2 | Probable |
| Deodorant dermatitis | 1 | None |
| Probable parapsoriasis | 1 | None |

Four men, who had no current evidence of dermatitis, related histories of the following probable dermatoses: miliaria, oil acne, staphylococcal infection, and hand eczema (solvent dermatitis). Another two men gave rather non-specific histories of skin problems for which no specific diagnosis seemed appropriate. All but one of these men had mentioned a skin problem on their screening questionnaires.

Several men mentioned other health conditions including, multiple sclerosis, sinus conditions, diabetes, and bronchitis. In none of these instances was the condition thought to be work related.

As anticipated in a survey of this design numerous non-occupationally related conditions were encountered. Two cases of Tinea pedis (athlete's foot) were noted. This is not thought to be an unusual number in view of the sex and age of the group. It is unlikely that either case resulted from use of the common shower and locker room facilities at the Enquirer. Nor, is it felt that these men are likely to prove a source of infection to other workers. As discussed earlier, a majority of adults harbor potential clinical disease causing fungi on their feet. Symptoms are more likely to develop under conditions of increased humidity and temperature. Such conditions probably occur in the pressroom during the hot, humid summer months and it seems likely that new cases of athlete's foot might manifest themselves at such times. Thus, any relationship to occupation is a tenuous and indirect one at best.

Two cases of hand eczema were noted and felt to be definitely related to the prolonged and/or frequent contact with solvent (Stoddard solvent) used in degreasing and in cleaning fountains. This substance and related solvents dissolved the natural protective lipid skin barrier and render the skin susceptible to excessive drying, redness, fissuring (cracking), and secondary infection.

Once hand dermatitis from solvents or other agents develops the skin is slow to redevelop its natural resistance to irritants and relatively minor exposures may result in a flare-up of the condition. Nummular eczema, while not caused by solvents, may be aggravated by exposure to them and to soaps and detergents used in cleaning the skin.

c. Analysis of Hand Cleaners

Table V presents the tests of alkalinity of the three hand cleansers in use. The granular PAR-LANO-SAV is the most alkaline of the three (highest pH) and by far the most buffered of the three (requires the most H^+ to reduce the alkalinity). It should clean quite well, but also will be quite hard on the hands. The two waterless hand cleaners are fairly comparable in alkalinity and buffering to neutrality. The Whisk has more buffering between pH 7.0 and pH 4.0 and so might prove to be a more efficient cleaner without too much increased risk of skin problems.

To some extent there is a trade-off between effectiveness to remove oil and grime and mildness to the hands. Gloves, besides providing direct protection from the solvents, also keep the hands cleaner so less harsh cleaning is required at the end of work. To some extent it will be necessary to leave the worker some leeway as to how strong a hand cleaner is needed under any particular set of circumstances.

3. General

a. The observed presence of oil and ink mist led to a review of the literature to determine the nature of this problem. The environmental and epidemiological studies^{5,6} conducted in the pressrooms of a major newspaper documented exposures two to four times the 5 mg/M^3 TLV for oil mists and no ill effects. The fact that efforts to control oil mists by electrostatic precipitation have been terminated by the Cincinnati Enquirer indicates that the problem is recognized but not considered a serious health hazard. While there is some evidence to support this view and a lack of clinical evidence of respiratory distress in the pressroom workers, it is not good practice to allow continued exposures to uncontrolled oil and ink mist. As noted in the general guidance on exposure control included in Section IV D of this report, it is good practice to minimize all atmospheric contamination. The above cited study⁵ shows that reducing pressroom oil mist by 80% is feasible.

b. During review of the literature⁶ it was noted that in cases where inks containing hazardous metals were applied to paper the subsequent dust from use of this paper could present a health hazard. To evaluate the potential for this a metals analysis of the inks most commonly used by the Enquirer was obtained. Based on the minimal quantity of toxic materials in the inks tested, it was not deemed necessary to conduct a toxic paper dust survey.

c. Some red, yellow, and orange inks in use throughout the printing industry contain benzidine yellows also known as diarylide yellows. These pigments are diazotized from the suspect carcinogen 3,3'dichlorobenzidine which has been shown to cause bladder cancer in animals.⁷ While benzidine yellows have not been shown to be carcinogenic^{8,9}, it has been claimed¹⁰ that when ingested, benzidine yellow is broken down by metabolic processes in the body to its original 3,3'dichlorobenzidine. Studies on related azo dyes have shown that benzidine based dyes are metabolized by Rhesus monkeys¹¹ into their aromatic components. There is some evidence from mortality data on record¹² that newspaper pressmen experience an unusual incidence of cancer of the buccal cavity and pharynx which is experienced in the early and middle working years. These studies did not find bladder cancer to be a significant factor. It would appear from the animal studies⁹ that ingestion of diarylide

yellows might prove to be hazardous, but the mortality data on printers suggest that for practical purposes this is not a problem. There was no observed problem with ingestion of colored inks during our survey. However, it is appropriate to emphasize the need for hand washing and good personal hygiene to avoid such occurrences.

F. Conclusions

1. There were at least two current occupationally related skin problems found on examination in the form of hand dermatitis caused by a combination of the Stoddard solvent and the hand cleansers. There is individual variation in susceptibility to this sort of problem.

2. The use of gloves to prevent skin exposure to the solvents has proved effective in reducing or preventing skin problems in many cases as related by the workers interviewed.

3. The fungal skin infections do not appear to be occupationally related in that clinically they are a common sort not readily transmissible by casual contact in shower rooms, and also because cultures of the shower rooms failed to grow out pathogenic fungi.

4. No excessive airborne exposures to Stoddard solvent or 1,1,1-trichloroethane were measured during the period of this survey.

G. Recommendations

1. Direct skin contact with the Stoddard solvent should be avoided wherever possible. Gloves should be of adequate size and length to prevent the solvent from entering at the cuff, and should have some sort of washable and changeable lining to prevent excessive moisture buildup inside from sweat.

2. The waterless hand cleaners should prove much less harsh than the granular cleanser. The granular cleanser should only be used when exceptionally heavy cleaning is needed, and then as infrequently as possible.

3. Barrier creams may afford some protection to the hands from the action of the solvents and cleansers and are worth a trial. Appendix C lists three barrier creams which may prove helpful. Equivalent barrier creams could also be tried.

4. It would probably prove valuable to have hand cream available for use after cleaning up for the day to return oils to the skin. Eucerin or its equivalent is a non-medicated, non-prescription hand cream available through drug stores. Cold cream, Vaseline Intensive Care Lotion, Noxema, or any of several other commercially available formulations would also be suitable.

5. The use of cleaning solvents for whatever purpose should be carefully controlled. From the apparent discomfort expressed by the maintenance personnel concerning the use of an unknown solvent used in cleaning air filters, it is recommended that the future choice of cleaning solvents and their method of use be carefully chosen to avoid exposures to personnel.

6. It is generally considered good practice not to recirculate air exhausted from processes emitting toxic materials.^{13,14} The general welding operation as described to this investigator is varied and is potentially a source of toxic materials. The degree of toxicity is dependent upon type of materials used in welding rods and fluxes as well as the composition of the metal being welded upon and any contaminants present on the metal or in the atmosphere. It is therefore recommended that the adequacy and suitability of the existing venting system be reviewed and appropriate measures taken to conform to the ventilation design criteria as stated in Reference 14. In particular note chapter 7 page 17 regarding recirculation requirements.

7. The advantages of electrostatic suppressors and local exhaust systems for effective ink mist control should be reviewed keeping in mind the discussion in paragraph E3a. An 80% reduction in ink mist generation would eliminate most of the nuisance and surface fallout problems associated with newspaper production. The additional long and short term benefits in morale and possible long term health benefits are less easily defined in tangible terms. However the continuing trend toward lower and lower accepted exposure limits demonstrates the need for a conservative approach toward minimizing exposure levels where possible as previously discussed in Section IVD.

8. Workers who frequently come in contact with the colored inks should be cautioned and instructed in proper hygienic practices. Emphasis should be placed on the thorough washing of hands before smoking or eating. Under no circumstances should food, drink, or cigarettes be stored or consumed in the work room. The workers should be reminded that such habits as nail biting are not acceptable behavior on the job.

9. There is a general lack of specific information on the metabolic product of diarylide yellows. In view of their widespread use and of the reported unusual mortality experience in printing pressmen it is recommended that ongoing long term NIOSH studies of the printing industry include these materials.

V. AUTHORSHIP AND ACKNOWLEDGMENTS

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WORKERS SEEN BY TYPE OF QUESTIONNAIRE, AGE AND LENGTH OF SERVICE*
CINCINNATI ENQUIRER, CINCINNATI, OHIO, JANUARY-MARCH 1976

| JOB CATEGORY | TOTAL | | SCREENING QUESTIONNAIRE | | Detailed Questionnaire and Examination | Average Age | | Average Length of Service* | |
|-----------------------------------|-----------------------------|-----------------|-------------------------|-----------------------|---|----------------|------------------------------|-------------------------------|-----------------|
| | Employed | Interviewed | Self- Administered | NIOSH Administered | | Total | Interviewed | Total | Interviewed |
| Assistant Foreman of Pressroom | 2 | 1 | 0 | 1 | 0 | # | # | | |
| Pressmen | 50 Regulars 30 Part time | 41 | 40 | 1 | 12 ⁺ | (20's-69's) | 36.8 [@] (23-59) | (12-15) | 12.0 (1-29) |
| Apprentice Pressmen and Flymen | | 6 | 5 | 1 | 2 | | 22.3 (20-24) | | 3.1 (1.5-5) |
| Presswipers | 8 | 8 | 0 | 8 | 2 | (19-55) | 31.0 (19-54) | 4.5 | 4.3 (0.5-9) |
| Paperhandlers | 12 | 10 | 7 | 3 | 0 | (19-54) | 36.3 (19-56) | 12 | 8.2 (1.5-20) |
| Janitors | 5 | 2 | 0 | 0 | 1 | (26-63) | # | 8 | # |
| Electricians | 11 | 7 | 1 | 6 | 2 | (31-64) | 39.1 (31-50) | 10 | 9.6 (3-21) |
| Machinist | 11 | 9 | 2 | 7 | 0 | | 45.4 (36-64) | | 8.2 (1.5-16) |
| Totals | 129 | 85 ⁺ | 55 | 29 | 19 ⁺⁺ | | 36.6 [@] (19-64) | | 9.6 (0.5-29) |

* Length of Service refers to years working for the Cincinnati Enquirer, not necessarily at the current job.

@ The age is missing for one of the workers so the average is figured on one less than the total seen.

Omitted because of the small numbers, but ages and lengths of service are included in the calculations for the totals column.

+ One worker was seen individually but the detailed questionnaire seemed unnecessary.

++All workers were male.

TABLE II
PRESS SPECIFICATIONS

CINCINNATI ENQUIRER, CINCINNATI, OHIO - JANUARY 1976

| PRESS I.D. | A (SN 2338) | B (SN 2090, 2091 & 2092) | D |
|---------------------------------------|----------------------------|---|-----------|
| Capacity (papers/hr) | 52,000 | 56,000 | 52,000 |
| Combined Hp | 522 | 858 | |
| No. of Units and Date Installed | 8 in Sep 58 1 in Mar 71 | 4 in Feb 49 2 in Aug 58 1 in Sep 71 | 8 in 1948 |
| Utilization | Daily | Daily | Saturday |

TABLE III

INK METALS ANALYSIS
TABLE OF RESULTS
CINCINNATI ENQUIRER, CINCINNATI, OHIO
JANUARY 1976

| Field # | #9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|
| Aluminum | M | P | M | ND | T | T | M | P | P | P | P | ND |
| Magnesium | T | T | T | T | T | T | T | T | T | T | T | T |
| Manganese | T | ND | T | ND | ND | ND | T | T | ND | ND | ND | ND |
| Lead | M | T | T | ND | T | P | T | ND | M | P | M | ND |
| Chromium | M | T | T | ND | T | ND | P | ND | M | T | P | ND |
| Tin | T | ND | T | T | ND | ND |
| Barium | ND | ND | P | P | P | ND | P | ND | T | ND | ND | ND |
| Iron | T | ND | P | T | T | ND | P | T | T | T | ND | ND |
| Molybdenum | T | T | T | ND | ND | ND | P | T | ND | ND | ND | ND |
| Vanadium | P | ND | P | ND | ND | ND | T | T | T | T | T | ND |
| Copper | T | T | P | P | P | ND | M | T | T | T | T | ND |
| Zinc | T | ND | ND | ND | ND | ND | ND | T | ND | ND | ND | ND |
| Calcium | P | P | M | M | P | P | M | P | P | P | P | T |
| Sodium | T | ND | ND | ND | ND | ND | P | ND | T | ND | P | ND |
| Silicon | P | ND | M | ND | T | ND | P | T | T | P | P | ND |
| Titanium | P | ND | T | ND | T | ND | T | M | ND | M | P | ND |

M = Major Constituent; P = Present; T = Trace; ND = Not Detected

Elements not detected in any samples:

| | | | |
|-----------|-----------|------------|-----------|
| Arsenic | Cadmium | Indium | Platinum |
| Antimony | Cobalt | Lithium | Silver |
| Beryllium | Gallium | Nickel | Tantalum |
| Bismuth | Germanium | Osmium | Tellurium |
| Boron | Hafnium | Phosphorus | Tungsten |

INK UTILIZATION ESTIMATE* (55 GAL. DRUMS/MONTH)

| Field # | Name | Quantity | Field # | Name | Quantity |
|---------|-----------------------------------|----------|---------|--|----------|
| 9 | Flint/ROP #4 (Primrose yellow) | 1/3 | 15 | US/ROP 41 (Process Blue) | 4-5 |
| 10 | Flint/43 (Process yellow) | 4-5 | 16 | Flint/40 (Mixed white) | 3 |
| 11 | Flint/46 (Deep red) | 1/2 | 17 | Flint/C-10 (Red) | 4 |
| 12 | Flint/44 (Medium red) | 3-4 | 18 | US/C-11 (Red) | 4 |
| 13 | Flint/45 (Bright red) | 10-12 | 19 | Flint/C-12 (Red) | 4 |
| 14 | Flint/42 (Process red) | 4-5 | 20 | Flint/Arrowhead Black - Supplied in bulk, 120,325 lbs. in Feb. 75 Representative of a low use month. - 139,310 lbs. in Dec. 75 Representative of a high use month. | |

*Estimates provided by Mr. Bern Volkering, Press Room Superintendent

TABLE IV

STODDARD SOLVENT VAPORS
CINCINNATI ENQUIRER, CINCINNATI, OHIO - JANUARY 1976

| <u>Type of Worker or Work Area</u> | <u>Sample No.</u> | <u>Period (Hrs)</u> | <u>Volume Liters</u> | <u>mg Solvent</u> | <u>mg/M³</u> |
|--|-----------------------|-------------------------|--------------------------|-----------------------|-------------------------|
| Pressmen | | | | | |
| #1 | SV-23 | 5.78 | 15.01 | 1.37 | 91.2 |
| #2 | SV-26 | 3.6 | 10.75 | 1.58 | 146.9 |
| #3 | SV-25 | 3.68 | 42.10 | 3.89 | 92.3 |
| #4 | SV-12 | 1.5 | 6.37 | .67 | 105.1 |
| | SV-24 | 1.6 | 6.47 | .62 | 95.8 |
| Paper Handlers | | | | | |
| #1 | SV-33 | 3.25* | 19.36 | .96 | 49.5 |
| #2 | SV-19 | 3.25* | 17.55 | .58 | 33.0 |
| Maintenance | | | | | |
| #1 | SV-36 | 5.9 | 128.44 | .46 | .004 |
| #2 | SV-38 | 7.2 | 96.31 | 4.02 | 41.7 |
| #3 | SV-37 | 6.3 | 21.31 | 1.27 | 59.5 |
| Janitors | | | | | |
| #1 | SV-5 | 3.25 | 15.27 | .48 | 31.4 |
| | SV-21 | 2.3 | 53.47 | .71 | 13.2 |
| #2 | SV-3 | 3.15 | 10.13 | .14 | 13.8 |
| | SV-22 | 2.43 | 7.96 | .30 | 37.6 |
| Press Wipers | | | | | |
| #1 | SV-8 | 3.66 | 10.96 | 1.2 | 109.4 |
| | SV-15 | 1.7 | 5.14 | .74 | 143.9 |
| #2 | SV-9 | 3.5 | 10.27 | 1.25 | 121.7 |
| | SV-16 | 2.2 | 6.45 | .78 | 120.9 |
| #3 | SV-7 | 3.25 | 9.00 | .29 | 32.2 |
| | SV-35 | 2.9 | 8.40 | .58 | 69.0 |
| #4 | SV-2 | 3.05 | 7.56 | .49 | 64.8 |
| | SV-32 | 2.95 | 11.16 | .84 | 75.2 |
| #5 | SV-14 | 3.9 | 11.95 | .38 | 31.7 |
| | SV-34 | 2.0 | 6.41 | .50 | 78.0 |
| #6 | SV-10 | 2.75 | 10.32 | 1.05 | 101.7 |
| | SV-18 | 2.15 | 6.26 | 1.99 | 319.4 |
| #7 | SV-6 | 3.05 | 10.67 | .88 | 82.4 |
| | SV-17 | 2.4 | 8.47 | .62 | 73.1 |
| #8 | SV-4 | 2.7 | 9.81 | 1.10 | 112.1 |
| | SV-20 | 2.5 | 7.53 | 1.16 | 154.0 |
| | | | | | RECOMMENDED CRITERIA |
| | | | | | 575.0 |

*times not recorded therefore estimated from volume sampled.

TABLE IV

STODDARD SOLVENT VAPORS (CONTINUED)
 CINCINNATI ENQUIRER, CINCINNATI, OHIO - JANUARY 1976

| <u>Type of Worker or Work Area</u> | <u>Sample No.</u> | <u>Period Hours</u> | <u>Volume liters</u> | <u>mg Solvent</u> | <u>mg/M³</u> |
|--|-----------------------|-------------------------|--------------------------|-----------------------|-------------------------|
| Press Room Floor Level | SV-11 | 3.0 | 180 | 15.1 | 83.8 |
| | SV-27 | 1.38 | 82.8 | 22.7 | 274.1 |
| Press Room Break Area | SV-1 | 1.66 | 99.6 | 6.28 | 63.0 |
| Ink Mixing Room | SV-13 | 1 | 60 | 10.3 | 171.16 |
| | SV-28 | 2.25 | 135 | 28.6 | 211.8 |
| Press Room Upper Level | SV-31 | 4.5 | 270 | 23.6 | 87.4 |
| Reel Room | SV-30 | 4.8 | 288 | 14.1 | 48.9 |
| Maintenance Shop Bulk Air | SV-29** | 5.0 | 300 | 33.2** | 110.6** (overloaded) |

**NOTE: This sample taken directly over the open solvent tank.

TABLE V

ALKALINITY OF HAND CLEANSERS

CINCINNATI ENQUIRER, CINCINNATI, OHIO - JANUARY 1976

| Cleanser | Initial pH | Titrated To | Titrated To |
|--|---------------|--|---|
| | | pH 7.0 (neutral) mEqH ⁺ | pH 4.0 (limit of acidity of normal skin) mEqH ⁺ |
| PAR-LANO-SAV* Heavy duty skin cleanser | 9.6 | 2.13 | 3.05 |
| Whisk Waterless Hand Cleanser ⁺ | 9.4 | 0.27 | 0.27 |
| M-30 Waterless Hand [#] Cleaner With Lanolin | 9.2 | 0.26 | 1.65 |

*Calgon Corp., St. Louis, Mo.

+Metalife Co., Wentzville, Mo.

#Martin Labs., Owensboro, Ky.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45202

CONFIDENTIAL HEALTH QUESTIONNAIRE
NIOSH STUDY 75-187
CINCINNATI ENQUIRER

NAME _____ AGE _____
LAST FIRST MIDDLE

JOB CLASSIFICATION _____

How long have you worked in this position? _____

How long have you worked for the Cincinnati Enquirer? _____

Do you have any other jobs at this time? _____ Yes _____ No

If yes, what are they? _____

Do you have any health problems or sickness which you think might be due to your work?

_____ Yes _____ No If yes, what is it? _____

Do you have any skin problems at this time which you feel may be due to your work?

_____ Yes _____ No If yes:

Does it involve your hands or arms? _____ Yes _____ No

Does it involve your feet? _____ Yes _____ No

Is it elsewhere? _____ Yes _____ No

Where? _____

Are you seeing a doctor for the skin condition? _____ Yes _____ No

Do you have any other medical problems or sickness? ___ Yes ___ No

If yes, what? _____

Are you under a doctor's care at this time? ___ Yes ___ No

Do you take any drugs or medicines regularly? ___ Yes ___ No

If yes, what? _____

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
522 POST OFFICE BUILDING
CINCINNATI, OHIO 45202

CONSENT

I voluntarily agree to participate in a study conducted by the Public Health Service to evaluate health effects from employment in the Pressroom and associated areas of the Cincinnati Enquirer (RHE 75-187). I understand that the medical evaluation will consist of my answering questions about my health and a limited physical examination, primarily of my skin. The doctors may take photographs of my skin to illustrate physical findings.

I understand that my participation in this study is voluntary and that all information obtained will be considered confidential in accordance with U.S. Public Health Service Regulation (42 CFR Part 1). The information will be utilized statistically, but I will not be identified as an individual without my expressed consent. If any photographs are taken, they may be used both in this study and for teaching and other scientific purposes, but in no case will they be released in a manner in which I can be identified as an individual without my express consent.

DATE _____

SIGNATURE _____

AUTHORITY TO GIVE MEDICAL REPORT

In addition to notifying me whether my tests are normal or need further study, I agree to allow the Public Health Service to inform:

A. My Personal Physician Yes _____ No _____

NAME _____

ADDRESS _____

CITY _____

Signature

B. Company Physician Yes _____ No _____

ADDRESS _____

CITY _____

Signature

of any significant results of this study.

Information obtained in this study will be kept confidential in accordance with U.S. Public Health Service Regulation (42 CFR Part 1).

Handwritten initials/signature

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45202

DATE _____

1. NAME _____
Last First Middle

2. CURRENT ADDRESS: (Number, Street or Rural Route, City or Town, County,
State, Zip Code)

3. PHONE NUMBER _____

4. SOCIAL SECURITY NO. _____

5. BIRTHDAY (Month, Day, Year) _____

6. AGE LAST BIRTHDAY _____

7. SEX: Male _____ Female _____

8. RACE: White _____ Black _____ Other _____

Detailed Questionnaire

Date _____

1. Name _____

PAST JOBS (back to time of being a full time student)

| | INDUSTRY & LOCATION | YRS OF EMPLOY. | | SPECIFIC JOB | ANY MEDICAL PROBLEM RESULTING FROM THE JOB |
|----|---------------------|----------------|----|--------------|---|
| | | From | To | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |

EMPLOYEE'S OWN HEALTH APPRAISAL

10. HOW WOULD YOU DESCRIBE YOUR GENERAL HEALTH:

_____ Good _____ Fair _____ Poor

11. DO YOU HAVE ANY HEALTH PROBLEMS WHICH YOU BELIEVE ARE RELATED TO YOUR WORK?

If so, describe. _____

12. DO YOU HAVE ANY OTHER HEALTH PROBLEMS?

If so, describe. _____

