

SUMMARY OF SAFETY AND HEALTH AWARENESS PROGRAM  
FOR EMPLOYEES/EMPLOYERS -- A GCIU/OSHA  
DEVELOPMENTAL GRANT

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Abstract: The Safety and Health Awareness Program for Employees/Employers (SHAPE) was underwritten by an OSHA five-year education developmental grant for workers and management in the printing industry. That grant came to a successful conclusion on December 31, 1983. The results of the grant indicated some surprise findings of hazards and attitudes that were not generally known before. This Paper shares that information with the general industry on subjects dealing with toxic chemicals, illumination, stress, work procedures, and etc.

The recently published PolyChlorinated Biphenyls (PCB) chemical health hazard in yellow newspaper inks illustrates the strong need for occupational health and safety training in the printing and publishing industry. It was incidences similar to the PCB inks that initiated the Graphic Arts International Union's application to the United States Department of Labor for an Occupational Safety and Health Administration (OSHA) Developmental Grant. It was proposed that over a five-year period, a 21 hour training program would be developed specifically for workers and management engaged in the graphic arts industry. The proposal was approved in 1978 and the work commenced.

Our primary concern was with toxic materials; but as we delved into this field of occupational health, instead of getting answers more questions began to arise. For example, in reviewing workmen's compensation cases over a period of years, we found that the majority of claims dealt with back injuries. Also, in 1979 almost 50 percent of the reported OSHA cases dealt with some form of skin ailment.

How, exactly, illness and injuries occurred was lacking. To investigate and ascertain some of the causes,

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we made research contracts with various university departments. For toxic chemicals and noise, we contacted the Department of Environmental and Industrial Health. For physical stress and illumination problems, we contacted the Department of Industrial Engineering. We had to contact another department for mental stress. This probably illustrates why there isn't more research involvement. To do a comprehensive study in ONE workplace requires multi-professional disciplines from different university departments. Certainly this is not conducive for exacting solutions.

The following are research projects scheduled during the five-year grant period:

Illumination and Radiation Evaluations at Superior Colour Systems Corporation and Dunn Bindery in Detroit	Deborah Halper University of Michigan
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Industrial Hygiene Survey of Dunn Bindery and Superior Color Systems (Noise Evaluation)	Peter Kretzschmar, Ed Kvartek University of Michigan December 1980
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Industrial Hygiene Survey of Dunn Bindery and Superior Color Systems (Chemical Evaluation)	Peter Kretzschmar, Ed Kvartek University of Michigan December 1980
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Ergonomic Conditions in the Graphic Arts Industry: A Survey	Elizabeth Jackson University of Michigan January 1981
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Recognition and Evaluation of Hazardous Material and Work Situations in Collier Graphic Service Plant	Nagui Rizkallah New York University September 1981
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Occupational Biomechanics and Ergonomic Conditions in The Graphic Arts Industry: A Survey	Mary S. Hill New York University October 1981
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Ergonomic Conditions in the Graphic Arts Industry: Specific Investigation of Manual Material Handling Activities	Theresa M. Trecha University of Michigan December 1981
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Work Health and Satisfaction  
in the Graphic Arts Industry

Angela Haddad  
University of Michigan  
January 1982

Survey of Blue Collar Stress

Rick Silvers  
Johns Hopkins University  
-- 1982

Industrial Hygiene Evaluation  
of A Web Press Operation

Peter Bellin  
Workers Institute for  
Safety and Health (WISH)  
March 1983

You can surmise from the above list that we focused on five health areas:

Physical stress - especially dealing with torso injuries  
Occupational stress - better known as blue-collar stress  
Toxic materials - what were they, how to recognize them  
Noise - as related specifically to the printing and  
publishing industry  
Illumination and visual hazards - eye strain was a common  
complaint

In addition to these five health areas, we tried to cover as many of the different stages of the process as possible. We did one lithographic trade shop for films and plates, two bindery trade shops, one lithographic sheet-fed press operation, and one lithographic web press operation.

The Physical stress information was very detailed in an earlier (1981) TAGA Paper by Elizabeth Jackson. The most interesting finding worth repeating was that there was found to be as much, if not more, compressed pressure on the spine structure in lowering, rather than in lifting, loads. Higher average-compressed-pressure was measured consistently for lowering tasks rather than for lifting tasks -- both by female and male workers. In all bindery studies, done independently, it was recommended that mechanical lift assists be utilized.

It is ironic that the so-called light jobs of the bindery (handwork), usually done by women, may in reality be very fatiguing due to workplace design. A scientific, rationale approach to work stations and work practices would be more appropriate to proper assignment of a worker to a task, rather than a job assignment designated as

"woman's work."

The Illumination and radiation survey had three major goals: one, the establishment of proper illumination levels for all workers at all tasks; two, where ultra-violet (U.V.) hazards exist, the elimination or, where not feasible, the minimization of the hazard; and three, the elimination or minimization of hazards due to inadequate visual cues on equipment panels.

The Federal government's lighting recommendations are 50 foot candles at work stations, 30 in work areas and 10 foot candles in non-work areas. The research samplings showed that the bindery trade house generally met these requirements but in the litho print shop some light levels were found to be low due to the nature of work, namely in darkrooms.

Problems arose from three sources:

First, individuals vary in their visual characteristics and these individual characteristics change with age. The maximum sensitivity of the eyes is displaced toward the blue end of the spectrum. Apparently, this means that increasing the amount of red lighting in the darkroom will not enable the workers to see better.

Second, the mode of production requires the worker to go back and forth between the dark room and brighter lit areas. This upsets the dark adaptation of the individual. It has been shown that workers exposed to 24 foot lambert lights take approximately 17 minutes to reach a state of complete dark adaptation.

Third, all workers using these areas except one were over 45 years of age. The contrast efficiency diminishes with age. The Federal government lighting standards earlier outlined were found to be insufficient for this age group. The predominant complaint of eighteen workers was bloodshot eyes. Their second most prevalent complaint was headaches. When asked in another survey what they thought the psychological reasons for these responses might be, they produced enormous lists covering a wide range of personal and professional activities.

On Toxic materials, a few hazards were found in the bindery. One was a large, heated pot of polyethylene-based synthetic glue for bindery operations. If over-

heated, it could start decomposing, producing potentially hazardous fumes of carbon monoxide and cyanide. Another hazard suspected was the shrink wrap releasing some fumes when cut with an overly hot wire. It is critical to monitor the temperature of the hot wire cutter. There have been incidences where this was not done, resulting in complaints of headaches, nausea, and general physical discomfort.

Fumes of polyvinyl chloride (PVC) wrap have been the focus of industrial health studies. However, when our researchers pursued it with the wrap manufacturer, the manufacturer stated it was not PVC but a resin of a 100 percent long chain hydro-carbon with emissions equivalent to that of a burning candle. Our research report points out that this would be true only if it is a properly ventilated work-site. If not, irritating concentrations can, and have, built up. In this bindery operation they used a cool rod of 135 degrees centigrade, as compared with the standard hot rod of 200-300 degrees centigrade, thus substantially reducing, if not eliminating, most of the fumes.

In the lithographic trade house, there was substantial use of chemicals. Although the automated film processor eliminated much of the hazards associated with film developing, refilling the processor posed a hazardous procedure and required extreme care. Other chemicals were found to contain varying amounts of harmful agents. A lithographic film replenisher contained 25-30 percent formaldehyde. A film developer contained 5-10 percent ethanoline. In the pre-press proofing area, powder toners used represented a potential respiratory dust hazard. This has been alleviated with the introduction of automatic toners that are completely enclosed when in operation. It is evident that the manufacturer has shown concern and responded to the situation. The analyzed color toners showed metals of magnesium, zinc, copper, aluminum, and calcium. Fortunately, all are low toxicity.

In the color correction area there was a potentially hazardous condition. Potassium ferricyanide used for etching film is relatively non-toxic but if it comes in contact with an acid or intense heat, it breaks down into hydrogen cyanide -- a toxic and insidious gas. In case of fire, the report recommends immediate evacuation. The other precaution is to keep acids and the potassium ferricyanide stored separately, and to not use the ingredients even at a same work station (such as a sink).

The main concern in the web press operation was misting of isopropanol, petro distillates, and oil. With the increased speeds of the newer web models, this concern intensifies. Local ventilation removing pollutants at the ink units would minimize the requirement for make-up air that must be heated or cooled, and is usually the preferred method for controlling workplace pollutants. Make-up air can be provided to replace air pulled out by the ventilation system. This helps the system to operate efficiently and should be used year-round. In reviewing the press inks, it was noted that some of the pigments are chemically related to carcinogenic chemicals. These substances may cause cancer, but many pigments have not been tested for their toxic effects. As a safeguard, the evaluation recommended handling inks with gloves and washing off quickly in case of any skin contact.

Noise seemed the one occupational problem that everyone was aware of and had some program or action for. The most difficult noise area to control has been, and still is, the web press operations. Much new work in sound absorption building material will help, and new equipment designs will alleviate some noise damage.

Hearing impairment has been called the nation's number one non-fatal health problem. In all our studies the major contributor to graphic arts equipment noise has been poor maintenance, leading to malfunctioning and very noisy air compressors.

Blue-collar job stress and satisfaction are relatively new and are developing an area of research in social sciences. Recent studies have shown that job stress is linked to coronary heart disease, hypertension, and other health disorders. Also suggested, is that worker control over the production increases not only worker satisfaction but also worker productivity. Our study attempted to investigate some of the causes and consequences of worker stress and satisfaction in the graphic arts industry.

The data collected suggested worker satisfaction was relatively high in this particular plant. Working there was not unpleasant. Nevertheless, data indicated several relatively high stress factors:

- 1) Lack of communication and planning -- high percentage response to not having enough facts and information to get the job done well.

2) Preferential treatment of certain employees by management.

3) Down-time -- during certain slow summer periods of down-time, some workers thought they would be threatened with lay-offs if things didn't pick up, despite no previous lay-offs having occurred in the past seven years.

4) Job insecurity -- majority of workers were bothered at least some of the time, by not having anything to do, thus suggesting that not having enough work can be almost as bad as having too much work.

Of all the different training sessions, the one on job stress held the most interest and participation. It always seemed there was not enough time to explore this issue. I think it is reflective of the fast-changing character of our industry and the uncertainties that accompany it.

In 1979, we started a pilot 21 hour training program in Detroit and Washington, D.C. In each city, 25 participants representing key union and management personnel were actively engaged in the program and, at the conclusion, critiqued it. As a result, there was a fifty percent revision the first year, with it extended to eight sessions totalling 24 hours of training. Although it has remained at the 24 hour length, at least a 15-25 percent revision was made in each subsequent year. Much of the changes were contributed by the studies. It has been, and still is, an evolution process and I doubt that it will stand still. We have become involved in a community of occupational health specialists who are continually forwarding additional information relative to our industry.

The whole "SHAPE" program outline distributed here today reflects the holistic approach that was taken in regards to occupational safety and health education. It reflects many factors that contribute to the productivity of the workers and to the company's benefit. There is still a lack of awareness of many of these contributing factors and it is hoped that this Paper will increase that awareness among this TAGA group. The human factor is a vital factor in any production process and I would like to show some slides to illustrate this.

SLIDE 1 - Good illustration of general lighting in a bindery operation, but note that the woman is standing on a pallet for a comfortable working height on the machine. This is typical of many operations where the hard floor or awkward height makes it necessary to improvise with a platform for a more comfortable work station.

SLIDE 2 - Another scene -- typical bindery work, stacking finished products carefully on a skid.

SLIDE 3 - Another scene of a woman stacking.

SLIDE 4 - Same woman, but this time the pile height is higher, and look at the awkward position she has in order to carefully stack the finished stock. It is work procedures like this where the body being fully extended and bent can lead to a chronic back problem.

SLIDE 5 - Here is another no-no, where the body is bent and twisted at the same time. In personal surveys with people who have suffered severe back injuries, 3 out of 5 were lowering a load and twisting at the same time.

SLIDE 6 - A simple solution to this problem is to have your load the same height as your working height, and this can be accomplished with a tabletop that adjusts to the weight of the load, similar to your dish dispensers in cafeterias.

SLIDE 7 - Another view of the same operation, using the hydraulic tabletops.

SLIDE 8 - By the riffling of signatures before feeding the pocket in the machine, the pocket feeders inevitably develop Carpal Syndrome problems and shoulder and neck pains.

SLIDE 9 - Here illustrates glare reflecting on coated stock from the lighting on the machine. This was done with the room lighting turned off so you could see the actual glare. This will contribute to eye tiredness.

SLIDE 10 - And even the working surfaces have a tendency of reflecting glare. Another good example of glare effecting the worker.

SLIDE 11 - This improvised wood-guard was to keep eager



workers from snatching the material to close to a cutter blade on this moving belt line.

SLIDE 12 - Finally, we talk about light and dark work areas. This is a good example of some of the contrasting we mentioned earlier. I might add that all these do not typically reflect all the shops, but one or another condition will be found in practically any company.

Summary: It is evident that a healthy worker with job satisfaction is a more productive worker. The investment in improving workplace environment and equipment pays a dividend to the employer by increased productivity and to the employee with a more healthy state. It is hoped that the SHAPE program, as outlined, will contribute to a better understanding toward this end. It is a win situation for everyone concerned, with no losers. It is also hoped that when researchers devise new procedures or equipment, the human element is given more consideration than in past years.

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