

20.—PRACTICAL PROBLEMS OF IMPLEMENTATION
OF THE NIOSH PROPOSED STANDARD
FOR OCCUPATIONAL EXPOSURE TO HOT WORK
ENVIRONMENTS

F.L. Peacock

My job is Safety and Loss Prevention Manager for the Texas Division of Dow Chemical. As such, I'm not an industrial hygienist, a physician, nor a physiologist. Consequently, I'm probably the only true layman you will hear from at this symposium. I hope to make my remarks meaningful by talking about the practical aspects of applying a heat stress standard to an industrial situation.

The chemical companies, particularly those of us with plants located in the South, are concerned with the development of a feasible and practical heat standard. We have recognized heat as a potential health hazard for some time, and we are concerned with a standard for two reasons.

1.) We want to insure ourselves that we are not exposing our employees to a work environment injurious to their health.

2.) When the standard becomes law, we are expected to comply with it, and we want to comply with the law, if we can understand what's required.

One important question that is unanswered — "When a Compliance Officer inspects your plant for heat stress, on what basis can he find you in violation?"

If industry appears overly concerned about citations, it's because we have experience with

other aspects of OSHA. The citations that bother us are those for such things as having guard rails 2 inches too short or too tall, having lids on the garbage cans, and having partitions too short or too tall between toilets.

Along the Gulf Coast, ambient temperatures add to the heat sources of the process itself a great deal of the time. Most of our chemical plants are open and not closed in, and weather is an important heat source. We have accumulated heat data for a number of years, but not on the sophisticated basis of the studies conducted in the laboratories that we saw yesterday, nor as sophisticated as the studies sponsored by the Industrial Health Foundation that you have just heard.

Last summer, following the issuance of the NIOSH Criteria Document, Dow conducted some studies in our Texas plant to see how well we conformed to the recommendations. Following our studies, we met with 19 other companies in Houston, Texas, in early December to exchange information and discuss the NIOSH Criteria Document. After consulting with our Chairman, Dr. Belding, we decided not to try to present further data at this meeting. Instead what I want to present to you is a consensus of opinions of the 19 companies who participated

in the Houston meeting concerning the practical impact of a heat standard if the NIOSH recommendations were to be adopted as law.

A number of recommendations in the NIOSH Criteria Document, of course, are basic to any workable permanent standard. Industry should accept the facts of environmental measurements, medical surveillance, and the principle of acclimatization to hot environments and engineering improvements to remove heat hazards and reduce exposure to heat.

However, prior to the NIOSH Criteria Document, there was a limited amount of industrial data available to NIOSH. Fortunately, there will be a lot more. Of course, the laboratory-type studies that were presented yesterday were conducted by a number of highly qualified people. However, as Dr. Lind pointed out yesterday, there is a real problem in extrapolation of laboratory data to the practical industrial situation. Our conclusions at Houston are that an interim standard should be adopted until such time as further industrial data is available to warrant a permanent standard. Otherwise, Southern industry will face a high cost to strictly adhere to the work practices recommended and the other requirements of the recommended standard.

1.) The Criteria Document itself purports to be a performance standard rather than establishing environmental conditions which cannot be exceeded without a violation being incurred. This approach is realistic in that ambient heat load for external situations is uncontrollable and some production processes by their nature require extremely high temperatures. However, the environmental numerical values which the Criteria Document establishes as parameters to initiate restrictive work practices are too low when the ambient temperatures alone exceed these limits.

79 F WBGT environmental condition is established as a "hot work environment." Assuming that dry bulb temperature equals globe temperature, a combination of 90 F and 50 percent relative humidity produces a WBGT of 79 F+. One set of weather data shows that this level is exceeded 81 days out of 122 during June, July, August, and September, over a 10-year average at Houston, Texas, even without radiant heat load. This means that restrictive work practices would be required about two-thirds of the time during the summer months

unless the work locations can be mechanically cooled. We have days exceeding the limits 9 months out of the year. While cooling is both possible and practical for office buildings, control rooms, rest areas, and some laboratories, it is highly impractical in most process situations and impossible for external working conditions.

2.) The Criteria Document would require that signs be posted warning of "Heat Stress Area" whenever the environmental conditions exceed 86 F WBGT. Without dwelling on the point of ambient temperatures, at this level almost every employer would be required to display such signs at his place of employment for a substantial number of days during the summer months unless the work place can be mechanically cooled. High heat is readily apparent to almost any human being, even one casually passing by a heat source. The Criteria Document also requires employees who work regularly in a hot environment be advised and trained in measures to avoid heat illness. Therefore, it is apparent that posting of high heat areas does very little to warn those who may be subject to heat stress and certainly does nothing to actually reduce any hazards. Consequently, the requirement of posting is ineffectual at best and should not be incorporated into any standard.

3.) Most companies have developed some methods of acclimatizing employees who work in hot environments. Individuals are not required to stay in heat beyond what they feel they can handle. However, the NIOSH recommendation established rigid limits of both work load and exposure to heat. The standard would limit new (to heat) employees to 50 percent the first day, 60 percent the second, 70 percent the third, 80 percent the fourth, 90 percent the fifth, and not until the sixth day could an employee be exposed 100 percent of the time, or handle the full time and scope of the job. Any lesser schedule would violate the standard and be cause for a citation possibly. Employers would be faced with the choice of paying for time not worked or finding cooler work for the employee. Such work is not always readily available, particularly for smaller companies. In addition, the employer would have to replace the employee absent due to acclimatization limitations, and he would most likely have to pay the replacement at premium costs. It's

common practice to cover absences with overtime. This means some other fellow works 12-hour shifts, therefore increasing his exposure. The proposed standard doesn't cover this. Another alternative would be to send the employee home without pay, but this would hardly be acceptable to a labor union.

The same objections hold for employees returning from 4 days sick leave or 9 days of other leave, although the acclimatization period would be shortened to 4 days. Since most vacations are taken during the summer months, the replacement costs due to absence for reacclimatization would be quite costly. In the Southwest climate, an individual does not necessarily lose his acclimatization if he spends 2 weeks' vacation outside fishing or putting a new roof on his house. There's something to be said for the natural acclimatization which occurs by just living in the Gulf Coast area. If I understood Dr. Henschel yesterday, you must acclimatize for the differential between the living environment and the working environment. In that case there is natural acclimatization in the South for some temperatures above 79 F WBGT. This raises the question if the records of the National Weather Bureau will suffice as records of acclimatization.

Industry accepts the principle of acclimatization, but objects to the rigid limits established and the detailed record keeping which would be required under the NIOSH proposal.

The only purpose detailed records of every acclimatization could serve would be to prove the employer did follow the rigid exposure restrictions. In the absence of any one record, the employer would be subject to citation. I understood yesterday that acclimatization is an optional method that the employer can select as one of his work practices to insure core temperatures do not exceed 100.4 F. With the high cost of using this method, industry may abandon acclimatization in favor of one of the less costly work practices. This would be a shame, because acclimatization is an accepted practice to reduce the possibility of heat strain.

The recommended standard also does not allow for other factors which we feel should be included in any permanent standard.

a.) If proper protective clothing (not necessarily impermeable) and protective equipment (i.e., full face shields) are provided, an employee can withstand

far more heat than if the individual is measured semi-nude and without protective equipment. Under the recommendation, the same limits are imposed regardless of measures taken to cool the employee. Industry doesn't get any points for providing protective clothing.

- b.) We question that the time-weighted average WBGT at the heat source is an accurate measure of the actual exposure to the employee. Mr. Stevenson covered the difficulties of using a time-weighted average very thoroughly yesterday. An employee may actually be exposed for 15 seconds or 5 minutes to the hottest part of the environment. For example, he may move close to a furnace to perform a brief operation and then promptly move back. Calculation of the time-weighted average of exposure using the WBGT index assumes the man comes into equilibrium with his environment.
- c.) The proposed standard initiates work practices at 79 F WBGT without regard to the nature of the work performed and the resulting metabolic rate of heat generation. Would it be more equitable to industry to initiate work practices at some percentage point below the ULPZ?
- d.) The recommended standard states employees cannot work in "high heat stress levels without protective observation." "High" heat stress is not defined, but could be presumed to be either 79 F WBGT or 86 F WBGT. Protective observation is also undefined. Does it require periodic checks on the man or can he be left alone at all? In either case, the recommendation would virtually eliminate employees working alone. In actual practice, in automated industries, there are employees who frequently work alone as operators or on single-man maintenance tasks. Adherence to this principle would be very costly to industry, but undoubtedly popular with those who favor a "buddy system."

e.) The term "work place" is undefined in the recommended standard. Environmental measurements are required for "each work place," at least once per year during July and August. If work place means each small geographic area where some work is performed, then a medium or large work location would require literally hundreds or thousands of measurements during a 60-day period in the year. In my own location, we probably have 5000 work places. This is obviously a burdensome requirement. Where do we get that many industrial hygienists? Since some areas do not change in temperature (other than ambient changes), it would be more practical for the employer to establish the areas where measurements should be taken. These areas could be selected as possible "hot locations" where employees are required to spend a substantial amount of time.

4.) The requirement for periodic medical examination for those who work in hot work environments would mean, at least for companies in the Southwest, that virtually all employees would have to undergo extensive physical examinations each year. The only exceptions are those employees who work in mechanically cooled areas (offices, laboratories, etc.). Dr. Grant expressed industry's view on this eloquently yesterday, so I won't dwell on

this subject further.

5.) The proposed standard requires that work practices be utilized to insure an employee's deep body temperature does not exceed 100.4 F. I was pleased to hear Dr. Dukes-Dobos state that industry would not be responsible for monitoring deep body temperature. I might point out that the measuring method is not only socially unacceptable to employees, but also unacceptable to employee representatives. Being an ex-labor relations man, I can't imagine a union representative passing up the opportunity to suggest to management a better place to put that probe.

These are the main comments that were stated at our Houston meeting and these are the objections of larger companies who have a medical staff and trained industrial hygienists. The problems and objections of smaller companies would be a separate subject. There are real problems in the practical application of a heat standard in the South. At Houston, we did not attempt to develop an alternate standard.

Dr. Dukes-Dobos expressed the hope yesterday to have more evidence to establish the validity of the proposed standard by obtaining more industrial data. We agree and for this reason, we feel an interim standard is in order, and one which would not contain the restrictions enumerated previously. I think we could buy the unofficial off-the-cuff suggestion of Dr. Belding — that is, educate the worker on heat stress and how to protect himself, educate the foreman on the same things, provide medical surveillance, and let it go at that.

STANDARDS FOR OCCUPATIONAL EXPOSURES TO HOT ENVIRONMENTS

PROCEEDINGS OF SYMPOSIUM

February 27–28, 1973

Pittsburgh, Pennsylvania

Steven M. Horvath, Editor-in-Chief
Director and Professor
Institute of Environmental Stress
University of California
Santa Barbara, California

and

Roger C. Jensen, Editor
National Institute for Occupational Safety
and Health
Cincinnati, Ohio

Sponsored by
Industrial Health Foundation
and
Graduate School of Public Health
University of Pittsburgh

Supported by
NIOSH Grant No. 1 R 13 OH 00382–01 SOH

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health
Division of Biomedical and Behavioral Science

Cincinnati, Ohio 45202

January 1976

For sale by the Superintendent of Documents, U.S. Government
Printing Office, Washington, D.C. 20402

These proceedings are reproduced essentially as received from grantee. Opinions, findings, and conclusions expressed are those of the authors and not necessarily those of the National Institute for Occupational Safety and Health. Mention of trade names or commercial products is for information only and does not constitute endorsement or recommendation for use by the National Institute for Occupational Safety and Health.

HEW Publication Number (NIOSH) — 76-100