trite. I pointed out that the very small reduction in total hazard from nitrite that could be achieved by eliminating its use in meat curing must be balanced against (i) the increase in hazard from botulism, should the meat continue to be handled as at present, (ii) the increase in cost if all the meat now containing nitrite were to be handled as fresh meat, and (iii) the loss of value to consumers who would be unable to purchase the cured meats they desire.

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OSHA Carcinogen Regulations

Philip H. Abelson, in his editorial "Regulating exposure to carcinogens" (13 Oct. 1978, p. 139), argues that regulations recently proposed by the Occupational Safety and Health Administration (OSHA) "invite ridicule, contempt, and noncompliance" by including laboratory workers along with production workers within their scope. "Professional scientists who have only occasional exposure to chemicals," he maintains, "must comply with rules designed for untrained workers exposed chronically."

Ignoring, for the moment, the content of the regulations to which Abelson objects, we question the validity of the position he represents. Our cumulative experience in both academic and private laboratories has demonstrated the ubiquity of chemical hazards in such environments. In one workplace of recent experience we were expected to work continuously over open containers of benzene, tetrahydrofuran, carbon tetrachloride, and other dangerous and volatile solvents. This laboratory, like most in the institution, did not have a ventilation hood that met federal requirements. Another situation involved having to work alongside a fellow employee handling explosive ethers while he smoked cigarettes. In this case management considered the employee's skills too valuable to risk taking measures to prevent his behavior. A final example is that of the increasing use of ethidium bromide in DNA research despite evidence that it is a potent animal carcinogen. We wonder who the "100,000" workers are, "whose most serious laboratory exposure is to ethyl alcohol."

Statistical studies support our view that scientific laboratories are legitimate targets for OSHA regulations. Some evidence was presented by *Science* itself in a News and Comment article of 3 November 1978. As these results, indicating elevated cancer incidence among chemists, probably can be generalized only to "principal investigators," one wonders what the incidence is among bench-workers.

This question brings up what we consider to be another fault in Abelson's argument. He seems to regard the laboratory as a temporary habitat where the highly trained principal investigator occasionally travels to test his theories. In reality, however, a research laboratory today is a production line at which teams of workers, including high school dropouts and Ph.D.'s, work under considerable pressure and supervision to "produce results" for research directors who spend a small fraction, at best, of their own time in the laboratory.

What is more, these research workers are rarely organized into unions. Frequently students in transit, sometimes Ph.D.'s who believe professionalism is incompatible with collective bargaining, they are without a means of self-protection.

We also disagree with Abelson's characterization of the specifics of the proposed OSHA rules. Quarterly monitoring of a workplace is minimal procedure when one is dealing with potential carcinogens; some facilities should be monitored hourly. Protective clothing is also a token precaution, as it does nothing to alter the unsafe environment and frequently imposes discomfort upon the worker. Since we are now all aware that some carcinogens act over a time frame of 30 years, it should not be difficult to understand the need to maintain records for 40 years.

There is no doubt that OSHA, understaffed and underfunded, is capable of producing some unacceptably crude guidelines. These are frequently promulgated as tentative, giving affected parties ample opportunity to lobby the agency. In fact, the "tentative" nature of the regulations may be viewed as a loophole designed for manufacturers' and other institutions' objections. In any case, Abelson's insinuation that, because the Secretary of Labor must approve all changes, these regulations are not in fact tentative is unfounded. Procedurally, all departmental authority is vested in the Secretary. Thus, while the *Federal Register* may refer to him as the final authority, most responsibility is delegated to his staff or agencies within the Department of Labor. This particular aspect

of regulatory "gobbledygook" is well known.

In conclusion, we object to Abelson's blatant endorsement of a position that is not in the best interest of the vast majority of the members of the AAAS, not to mention the entire practicing scientific community.

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Abelson's editorial concerning the OSHA Generic Carcinogen Standard reflects time-honored views held in many laboratories regarding safety and health. These views are not unlike those held by many industries in their resistance to changing their safety and health policies.

Abelson implies that professional scientists are somehow set apart from workers in a factory in their exposure to hazardous materials. There are few workplaces in this country that are as potentially hazardous as research establishments. Professional scientists are not routinely warned about the toxicity of materials they are working with, and they face the same problems as the untrained worker when handling many new chemicals. Hazard ratings, reporting procedures, information disbursement, and exposure control—all provided for by OSHA—are needed in laboratories. I am pleased to see that OSHA has finally made an impact on the research community.

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Abelson's editorial of 13 October struck a responsive chord in me because I am concerned with complying at this institute with OSHA's present carcinogenic regulations (OSHA 2204); with the National Institutes of Health (NIH) "Laboratory safety monograph, a supplement to the NIH guidelines for recombinant DNA research"; with the Nuclear Regulatory Commission's ALARA directives; with a preliminary draft of the NIH proposals concerning a general biohazards control; with OSHA's proposed regulations for category I carcinogens; and with the full OSHA regulations relevant to laboratory safety. All of these directives have benevolent intentions, but many of them seem to have been drawn up with no regard to efficacy or cost-benefit analysis.

For example, a wide range of commonly used organic solvents (benzene, chloroform), liquid scintillation chemicals (toluene, dioxane), and nickel and cadmium salts are designated as carcinogens. Rules now promulgated for industrial exposure may be extended to personnel in research and analytical laboratories. One such requirement is that the employer must ensure that the worker remove all clothing exposed to carcinogens at the end of the working day; the employer must also have the clothing cleaned. As there is no lower limit on exposure to carcinogens defined for this regulation, I presume that the pickup and laundry workers will, in turn, be warned of their potential exposure and will wear appropriate clothing, again to be washed, and so on.

A far more costly proposal is the requirement for medical surveillance of all workers potentially exposed to carcinogens, recombinant DNA, and bacterial or viral agents. Such surveillance has its place; it would be appropriate for every worker exposed to infectious agents to have a serum sample collected upon first being employed and to be subsequently checked after known exposure or after overt symptoms of disease appeared. However, are regular medical checks, unless very frequent, likely to coincide with the first appearance of infection or cancer? A more cost-effective program would be to require the employer to cover the cost of medical examination that the worker incurs in the belief that the symptoms relate to biohazard exposure.

From our present knowledge of radiation carcinogenesis, the only certain result we can foresee from regular surveillance would be an increased risk from that procedure itself. Without careful assessment of risks let us not mandate another expensive and dangerous program, particularly not for research laboratory workers where the hazard may come from varied agents and brief and irregular exposure.

Abelson correctly points out the practical shortcomings of these proposed regulations governing laboratory safety but does not emphasize sufficiently, in my opinion, the unnecessary cost that will be engendered if such regulations are enforced—at a time when the Office of Management and Budget is muttering threateningly about the continuing rise in overhead costs of doing research.

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