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C.I. 77-2818-77-2821

PLAINTIFF'S EXHIBIT

NSC-297

VOLUME 2

Aerospace; Air Transport

1976 National Safety Congress Transactions

National Safety Council
444 North Michigan Avenue
Chicago, Illinois 60611

77 2813

Aerospace Sessions

NIOSH — THE IMPOSSIBLE DREAM

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The criteria documents which have been generated as the product of NIOSH's research and literature search are good work. They are well organized, readable, and historically valuable. The bibliography is invaluable and is indicative of the thoughtful literature search that went into the drafting process.

In format, the meat of these recommended standards establishes nine major points:

1. They set environmental limits for workroom air (a threshold limit). I will not discuss whether or not those limits are correct industrial hygiene decisions. The OSHA people already know that they will have to fend off pressure from industry, labor, and other governmental units in defense of every number established.

The problem I do see here is inflexibility. The majority of the standards are going to be difficult to change as new data becomes available. The American Conference of Governmental Industrial Hygienists recognized the need for changeable limits and established an annual review to accomplish it. New data may very well leave these limits behind. Trying to catch up may not be all that easy, considering the difficulty in getting the standards enacted in the first place.

2. They define exposure and establish exposure criteria. This could easily launch into a discussion of the Action Level concept, but I will try to avoid that. For the sake of discussion, let us say that the threshold limit for a substance is set at 100 ppm as a time weighted average exposure. NIOSH then establishes an action level of 50 ppm. If your exposure does not exceed this lower level, they say that the full weight of the standard does not apply. You are still required to do employee training and sampling, but pre-placement physical and repeat examinations are not required.

Most of the hygienists with whom I have discussed the action level concept agree that this approach functionally reduces your working threshold limit by 50 per cent. If your goal is to avoid the monumental, expensive task of scheduling physical examinations, establishing restricted areas, etc., your operating TLV is equal to action level minus one per million or milligram per cubic meter.

3. Prescribe medical management.

4. Set sampling schedules, analytical methods, and record keeping requirements. There probably isn't too much impact here except for formalizing record keeping procedures and record retention, and this will be enough impact for most of us.

5. Describe labeling requirements. In my company this is a particularly hot issue. The Department of Transportation stipulates a labeling method which is mandatory for chemicals which are transported. The local authorities, in some localities, have written such labeling standards as NFPA 704M into local codes or city ordinances. The Food and Drug Administration has one labeling standard; the Consumer Product Safety Commission another. The Manufacturing Chemists Association has a standard that is not mandatory, and the Environmental Protection Agency has one

that is. Even the United Nations published an international system in 1966. Labels are either going to have to have very small print, or we are going to have to go to larger containers to satisfy all the labeling regulations of the various federal and local agencies. Surely, there is some system upon which all parties can agree.

6. Establish some ground rules for protective clothing or devices such as respirators. In my opinion, there seems to be a movement toward federal approvals for protective clothing. It might be wise to define some terms before we leap headlong into a semantic maze. In microelectronic assembly, we use a protective latex finger cot to keep body oil off the sensitive electronic surfaces. This same type of thing can be seen throughout the aerospace industry—white rooms abound. Is that protective clothing? Before we get embroiled in approval-itis, somebody had better define just exactly what is meant by the term "protective clothing."

7. Determine who must be told what under an "appraisal" section. The overall appraisal section will probably not be too terrifying to most. I suspect that to one degree or another, employee training programs in the area of safety are rather well entrenched. The addition of health training should not be too overwhelming. The prospect, however, of hanging signs all over the place which read, Caution—Cancer Producing Agent is more than a little unnerving. It may, often as not, cause an uproar not only amongst employees, but among customers as well. It may open the door to a whole host of new difficulties in union contract negotiations and arbitrations.

8. Set work practices requirements.

9. Prescribe sanitation measures. Communications is probably the key in both of these areas. Inserting these requirements into the work document, (S.O.P., Spec., procedure, or whatever your company calls that piece of paper to which a workman refers when he wants to know what is to be done next) is probably the fastest way to communicate the requirements. This type of arrangement may not hold for a laboratory or research operation where control documents are frequently written after the work is done, or not at all. The so called administrative controls of both the hot environments and noise documents offer the alternative of scheduling work to control exposures. If you apply administrative controls to an aircraft wing riveting operation, you may be facing a four-on and four-off situation. If plants or operations are separated, you get into transportation problems, or "make work" jobs, or cross-training situations and time cards with half-a-dozen punches the average. Administrative controls in the aerospace industries offer only marginal alternatives in limited applications.

If one views each of the criteria documents from the vantage point of the manufacturer of a particular substance, that is one thing. If you see them from the user standpoint where the regulated chemical is one of several, or several of several hundred used, that is quite another. My particular production process uses well over 200 chemical substances, of which some 20-25 are covered by existing or proposed standards. It appears to me that the thrust of the criteria documents and standards is with the original manufacturer in mind, rather than the user. The users must wallow through a morass of regulations and struggle with their collective application.

A manufacturer of PVC sheet stock, rod, pipe, or wire insulation makes his product using a polymerization process involving vinyl chloride. When the vinyl chloride standard was published via the emergency route, there was a great roar from the industry. There were outcries on all sides. Labor demanded an immediate reduction of the exposure limit. Spokesmen for the plastic industry cried "Foul," and said 700,000 jobs would go down the drain and maybe the industry as well. The standard was published and the pot still boils over the cost of compliance.

In the clamor raised between NIOSH, OSHA, labor and the plastics industry, one could hardly hear the question being asked by the users of PVC products. "What about supplemental users—do we have an exposure problem?" "How far does the new standard extend?" One could get opinions from everybody, but answers from nobody.

When PVC welding rod is heated by a welder to build a plastic cabinet or chemical hood, is vinyl chloride released? When two sections of PVC pipe are joined by a heat weld, is vinyl chloride released? How do you begin to control exposures of people fabricating pipe sections in the field or soldering PVC-coated wire deep in the bowels of an aircraft or spacecraft? No help at all.

Suppose you hire an employee who is scheduled to work with trichloroethylene. The pre-placement physical examination consists of a "comprehensive" medical history with particular emphasis on eye, mucous membrane, and skin irritation. The examination shall emphasize cardiac, pulmonary, liver, and kidney examinations. Sometime later, that same employee is moved to an operation involving another chemical. Since we have been discussing vinyl chloride, let that be it. Now, is it time for a new preplacement physical? I suspect so, for the two physical examinations are very different. This latter one, under 29 CFR1910.1017, requires a general physical examination with specific attention to detecting enlargement of the liver, spleen, or kidneys or dysfunction of these organs, and for abnormalities of the skin and pulmonary system. A medical history shall be taken which shall include the following topics: alcoholic intake, past history of hepatitis, work history, and past exposure to potential hepatotoxic agents including drugs and chemicals. Some serological tests are also required.

At this point we have established a second baseline physical examination. Now, let us transfer this guy again. This time to a beryllium exposure or an asbestos exposure, or mercury, arsenic, chromic acid, etc. You can see where I am going. The point is, that in the aerospace industry, exposures are not singular. Some changes of exposure will result from transfers of employees for whatever reason. Others, as a result of process changes; and still others as a result of the changing task at hand. A project engineer, for instance, may follow a job from start to finish through a myriad of potential exposures.

I can cite best from my own microelectronics industry. An employee may be hired into an assembly operation which we call "Mechanical Test." Here, the potential exposures are xylene, acetone, trichloroethylene, and fluorinated solvents. Because this employee finds she can make far more money in the the photolithography section, she transfers. Now she uses methanol, nitric acid, chrome, and works with ultraviolet light sources. Three or four such transfers per person per year are not uncommon in that industry. That is a lot of physical examinations to go through. That is a lot of employee movement to keep up with. That is a mountain of paperwork to file. Maybe NIOSH could come up with a "comprehensive" physical examination, a sort of shotgun physical. But, can you imagine the cost of such a physical or the multiple physicals required?

As I indicated earlier, we use over 200 different chemicals in our operations. Keeping track of employee transfers in a fairly large organization is not going to be any small task, either.

Let us take a short look at another standard—29 CFR 1910.1010 covers benzidine, a suspected carcinogen. If you manufacture, process, use, repackage, release, handle, or store benzidine, you must establish a regulated area to control and restrict access to the area.

The standard prohibits open vessel operations, opting instead for an isolated

system or closed system approach. Again, one gets the impression that NIOSH and/or OSHA must have had the manufacturer in mind at the time. It describes the opening criteria for either system with laborious instructions on what parts of the employee's body are to be washed after completion of the work. Clothes changes and washing are required before leaving the regulated area, and showers before leaving for the day. Employees must sign in and out on a log which must be kept for 20 years. Signs on the doors must announce, "Cancer-Suspect Agent. Authorized Personnel Only." OSHA must be notified, in writing, of the location of regulated areas, the names of chemicals containing benzidine, number of employees in regulated areas, and the manner in which the chemical is handled. Incident reports are required by OSHA, and another set of preplacement physical examinations are prescribed.

We had a quarter-pound bottle of benzidine dihydrochloride in our analytical chemistry laboratory, used to make a reagent for colorimetric chlorine test. When my lab manager read the regulations, he nearly had a fit! The regulations prompted reaction—we no longer use benzidine in the lab for that purpose. Now we use O-Toluidine, which has been a bladder tumor suspect for years, but is currently unregulated.

Did NIOSH or OSHA really intend that the benzidine regulations should reach into the laboratory? This same question must be asked, in turn, regarding each one of the standards. Perhaps there should have been two standards for each chemical or three. One for manufacturing, another for major users, and a third for small or incidental users like labs or R & D operations.

One cannot help but get the impression from reading the toxic substances section of the regulations or the NIOSH criteria documents that something is wrong. To be the manufacturer of a product like trichloroethylene, asbestos, polyvinyl chloride, lead, benzidine, moca, and so forth, is one thing, but to subject a laboratory to the same regulations is quite another. Regulated areas, physical examinations, closed systems, notification procedures, signs, clothes change and shower facilities is a little much to ask of a laboratory technician who performs a chlorine test once a week or makes up reagent once a month. I, for one, cannot fathom the thinking that forces me to defend, to my management, major investments in facilities for such infinitesimal returns.

In summary, one might say that the aerospace industry will undoubtedly comply with the health standards as they are published by OSHA. The language in which the standards are cloaked leaves little room for interpretation, or anything else. This is a little disturbing to me. To so tightly regulate an industry whose safety programs are as state-of-the-art as the industry they serve, is primeval. This industry's safety movement gave birth to fault-tree analysis, failure mode and effect analysis, and other highly sophisticated safety technologies that helped man to walk on the moon—safely; pick up and analyze Martian soil samples—safely; go faster than and farther than even we conceived 75 years ago and do it—safely.

Give us the data. We will apply it intelligently, honorably, and conservatively. We will maintain that state-of-the-art safety movement. If you hamstring our safety programs with a mountain of regulations, you will only succeed in generating technological stagnation. Do not over-regulate us until we cannot keep our safety programs a vital part of the industry we serve.

If the standards had been written as performance standards, they would receive greater acceptance. It is infinitely preferrable to have a standard which limits exposure to a certain level rather than one directed toward equipment design, construction, location and installation, specifying protective clothing requirements, sampling schedules and procedures, medical management, labeling, etc. Items in the standards should be general, allowing for special designs, new technologies, laboratory or research applications or state-of-the-art systems unless a specific design is absolute.

Is the action level concept here to stay? I suspect so. We will even swallow that pill, as Mr. Forbes recently called it. Let that be the new TLV, but do not regulate the industry to death in the process. Give us the limit, we will figure out how to get there. Getting from point A to point B can be challenging, even exciting, if one is not restricted on his mode of travel. Leave that middle road, that choice of travel open to creative, intelligent, inventive minds. Enhance the development of state-of-the-art safety. Without this freedom of choice, the safety movement will strangle and the industry we serve will stagnate.

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