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NIOSH Comments to DOL

NIOSH Comments on OSHA
Coal Tar Pitch Volatiles Proposal Rule;
Notice of Intention to Modify Interpretation
26 August, 1982

NIOSH has reviewed the Occupational Safety and Health Administration's proposed rule on Occupational Exposure to Coal Tar Pitch Volatiles; Notice of Intention to Modify Interpretation (47 FR 23482) and recommends against adopting the language "coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal."

The position of NIOSH is that the proposed language is too restrictive and would seriously diminish worker protection for the reasons given below.

1. We are concerned that the proposed OSHA definition of coal tar pitch volatiles is too narrow. The 1968 TLV, which was adopted as the 1910.1000 standard had used coal tar pitch volatiles (CTPV) as a traditional descriptor for groups of polycyclic aromatic hydrocarbons (PAH's). A list of such PAH's (anthracene, BaP, phenanthrene, acridine, chrysene and pyrene) was included in the 1968 TLV list and in the 1910.1000 standard. In the TLV documentation (ACGIH, 1966) for CTPV the PAH's mentioned included naphthalene, fluorene, anthracene, acridine, and phenanthrene as examples of lower molecular weight types and benzo(a)pyrene as an example of higher molecular weight PAH's. The ACGIH Documentation states that "(P)olycyclic hydrocarbons known to be carcinogenic are of this large molecular type."

   The most recent of the 16 references cited in the 1966 ACGIH Documentation of the TLV's was dated 1964. These references were supplemented by 6 new references in the 1980 Documentation of the TLV's, two of which were referenced to NIOSH Criteria Documents. None of these new references cited the reported carcinogenicity of some of the lower molecular weight PAH's.

   Examples of evidence for the carcinogenicity of lower molecular PAH's with the identified reference are:

   benz(a)anthracene - Bock and King, 1959; Klein, 1963; Bingham and Falk, 1969; Graffi et al., 1953; and Homburger and Treger, 1970;

   chrysene - Wynder and Hoffmann, 1959; Van Duuren, et. al., 1966; Barry and Cook 1934.

   The potential carcinogenicity of some lower molecular weight PAH's is also recognized in the EPA Consent Decree (Kingsbury and White, 1979) in which benz(a)anthracene, benzo(a)pyrene, 3,4-benzofluoranthene, benzo(k)fluoranthene, chrysene, acenaphthalene, benzo(g,h,i)perylene, fluorene, phenanthrene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene) are considered as a group to be potential carcinogens.

NIOSH regards the presence of any PAH's in CTPV as indicative of potential carcinogenic activity under any work situation. In the past OSHA has agreed. The Associate Assistant Secretary for Regional Programs, USDOL, OSHA wrote to the Dallas Assistant Regional Director, July 22, 1974 stating that the coal tar pitch volatiles standard is very much like the cotton dust standard in that these regulated substances are indicators of exposure and that the coal tar pitch standard can be utilized for situations away from coke ovens.

NIOSH assumes that the term "volatilize" as used in the current standard does not include only those work situations where aerosols or dusts may be responsible for or a component of the exposure. NIOSH offers the following in support.

OSHRC Judge Edwin L. Stuller affirmed a citation in Secretary (DOL) V. Northwest Marine Iron Works (OSHRC Docket No. 78-144, January 25, 1979) that the CTPV standard applied to exposures from coal tar pitch contained in an epoxy spray paint used in repairing a ship's cargo tank. In this decision, it was determined that heat (distillation) was not necessary to volatilize the carcinogens and that exposures in excess of the standard did present a carcinogenic hazard by both the inhalation and cutaneous routes of exposure.

2. We are concerned that many workers would lose protection against PAH's if the proposed regulation is adopted. In 1972, OSHA interpreted coal tar pitch volatiles (37FR2474, now 29 CFR 1910.1002) to include coverage to all exposures to PAH's. There are numerous working populations now covered by OSHA's previous interpretation who would lose coverage under this proposal. Under the current proposal, for example, petroleum pitch, which is highly carcinogenic (Darling, 1981 and Bingham et al., 1980), would be removed from regulation under this proposal. Workers who use petroleum pitch would therefore not be protected against PAH's.

   Similarly, occupations where elevated cancer risks as a result of exposure to PAH's are documented, or suspect, would be removed from regulation under this proposal. Examples are foundry workers, petroleum workers, roofers, machinists, road pavers, aluminum reduction workers, synthetic fuel workers, shale oil workers, charcoal manufacturers, etc. Recent information from Sweden (Ekstrom, 1982) has reemphasized the classical target occupation presenting exposure to PAH's, chimney sweeps. Their exposure to the combustion products of coal and wood have been known to cause increased cancer risks for over 200 years. It is therefore reasonable to protect workers in other occupations for which there is consequential exposure to PAH's.

3. We are concerned that the proposed regulations are at variance with recent scientific findings. As background, NIOSH has previously submitted three Criteria Documents to OSHA that are relevant to the control of PAH's. These include Coke Oven Emissions in 1973, Coal Tar Products in 1977 and Asphalt Fumes in 1977. The NIOSH Criteria Document on Asphalt Fumes, while recommending a higher (5.0 mg/cu m) permissible exposure limit for asphalt fumes than the OSHA Standard for coal tar pitch volatiles (0.2 mg/cu m), expressed concern that future investigations may suggest a greater occupational hazard from asphalt fumes than is currently documented in the literature.

   More recently, studies by NIOSH and others since the issuance of the 1977 Asphalt Fumes Criteria Document have indicated carcinogenicity of the several PAH-containing complex mixtures and polycyclic organic matter (POM) generally. For example, asphalt fumes, while containing a lower percentage of PAH's than coal tar pitch volatiles present a potential hazard to workers from the PAH's present (Thayer et al., 1981). A recent study by OSHA reported (Sepcon et al., 1982) the PAH concentrations contained in various asphalt materials and fumes including paving, roofing and Gilsonite (natural) types.

   Coal and shale conversion constitute new sources of PAH's while PAH's have been previously identified in petroleum oils and products, natural crude oils and various stationary and mobile emission sources (Guerin, 1978). NIOSH has recently characterized PAH concentrations in various occupational settings including coal gasification plants (Cubit and Tanita, 1982) petroleum refineries (Futagaki, 1981), coal liquifaction plants (Cubit and Tanita, 1982), foundries (Moorman et al., 1981) coke oven plants (Schulte et al., 1974), and aluminum reduction plants (Bloom 1981). Others have also recently identified PAH's in the working environment of aluminum reduction plants (Bjorseth, 1979), foundries (Schirmberg et al., 1978), Soderberg paste plant (Bjorseth & Lunde, 1977), roofing operations (Hammond et al., 1976), and metal machining (Thony et al., 1976).

4. NIOSH believes a productive approach to the PAH problem would be to better define the carcinogenic, syncarcinogenic (Arcos et al., 1978) and cocarcinogenic/promoting agents as well as mechanisms and interactions of PAH's.

   Recent information on nitrogen-heterocyclics and amino and nitro-derivatives of PAHs indicate that these could be a part of this carcinogenic risk. Virtually nothing is known about the carcinogenicity of oxygen and sulfur containing heterocyclics or the identity of promoters/cocarcinogens present in these complex mixtures. This information could permit the identification of an indexing substance or substances to better measure the hazard.

As Fouts (1978) has emphasized, in addition to identifying the sources of hydrocarbons, we need to know whether certain mixtures are more harmful than others. At present, we are just beginning to understand differences in carcinogenic potency of certain single polycylic hydrocarbons. Activities in attempting to understand mixtures are very limited. Digiovanni and Slaga (1981) have summarized our limited knowledge in this area of interactions. The study of these interactions has not progressed much beyond the point of 2-member combinations, e.g. pyrene, benzo(e)pyrene or fluoranthene in combination with benzo(a)pyrene enhances the carcinogenicity where perylene, chrysene and benzo(k)fluoranthene inhibit the effect.

Little is known about the identity of materials other than PAH's in the working environment, such as inorganic particulates and long-chain alphatic hydrocarbons, and how these combinations may affect carcinogenic risk in workers. Experimental studies suggest dramatic interactions leading to increased carcinogenic risk. Mouse dermal bioassay remains the most widely accepted measure of carcinogenicity.

NIOSH plans to continue research in this area. By the end of FY83, attempts at correlating CTPV with components of these complex mixtures including phenol, cresol and PAH's will be completed for coal liquifaction and gasification plants, coke ovens and oil refineries. Research is planned to further define the cocarcinogenic/promoting activity of asphalt fumes in order to develop a better indicator(s) of exposure. Studies are also planned to investigate the etiology of newsprint workers cancer involving exposure to complex mixtures of petroleum products. Investigations are nearing completion on the cocarcinogenicity of silica sand substitutes used in foundries and on the carcinogenicity of complex mixtures collected as pyrolysis effluents from various foundry mold sand binders.

Findings from the aforementioned NIOSH research projects, together with those from other research groups, will ultimately provide the information on which to base future regulatory actions. In the interim, these new studies emphasize the need for a broad application of the CTPV Standard, not a more narrow approach as proposed, and reinforce the previous OSHA and NIOSH positions. OSHA's reinterpretation of the standard is not based on sound or current scientific principles. We therefore recommend that OSHA not adopt the proposed language interpreting the 1910.1000 standard for Coal Tar Pitch Volatiles.

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15. Supplementary Notes

16. Abstract (Limit: 200 words) This testimony concerned the proposed rule of OSHA on occupational exposure to coal-tar-pitch volatiles. (NIOSH) is recommending against the adoption of the language which would define coal-tar-pitch volatiles as fused polycyclic hydrocarbons which volatilize from the distillation residues of coal. The concern was that this definition of too narrow, as evidence of carcinogenicity from lower molecular polycyclic aromatic hydrocarbons has been presented. Concern was also expressed that many workers would lose protection against polycyclic aromatic hydrocarbons (PAHs) if the proposed regulation were to be adopted. Occupations where elevated cancer risks as a result of exposure to PAHs are documented, or suspected, would be removed from regulation under this proposal. Examples of these would include foundry workers, petroleum workers, roofers, machinists, road pavers, aluminum reduction workers, synthetic fuel workers, shale oil workers, charcoal manufacturers, and others. NIOSH also expressed concern that the proposed regulations were at variance with recent scientific findings. NIOSH suggested that a productive approach to the PAH problem would be to better define the carcinogenic, syncarcinogenic, and cocarcinogenic/promoting agents as well as mechanisms and interactions of PAHs.

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