

OSHA report rekindles debate

Storms of opposition from industry and labor continue to mount against the Occupational Safety and Health Administration's recently announced proposal for regulating workplace carcinogens. In fact, the winds were blowing long before Anson Keller, the policy's chief architect, finished the groundwork for the controversial new scheme (SN: 5/20/78, p. 327).

OSHA's new policy, published in the Jan. 22 Federal Register, represents the federal government's first attempt to systematically identify and regulate carcinogens in the workplace, explains Eula Bingham, assistant secretary of OSHA. The regulatory agency will publish in the Federal Register, at least annually, a "candidate list" of substances used in the workplace that pose potential cancer threats. The substances on this list will be placed in either Category I — requiring stringent regulation — or Category II — requiring less stringent regulation. Working from the "candidate" list, or from information on petitions from other sources, OSHA will publish at least every six months two priority lists for further evaluation and possible regulation. Both the proposed criteria for categorizing substances and the subsequent regulatory action limiting workers' exposure to the substances have met with opposition.

"The approach OSHA has for identifying carcinogens will misidentify a great many things as potential carcinogens that clearly are not," says Ronald A. Lang, executive director of the American Industrial Health Council; more specifically, the AIHC objects to the high doses of suspected carcinogens used in animal tests.

Other groups believe that the high-dose testing is a necessary compensation factor. "We need the high-dose testing to overcome statistical problems, to overcome short-lifetime-of-animal problems and to overcome the homogeneity in the animal population that contrasts the diverse human population," says Marsha Silcox, an Environmental Defense Fund science associate.

But Harry B. Demopoulos of the New York University Medical Center warns that use of high-dose testing as a compensation factor can be misleading. "You can light a match and throw it into a room with a sprinkler system that will be activated and put out the fire. But if you load the room up with 100 gallons of gasoline and then throw the match in, the sprinkler system is not going to do anything for you. You're overwhelming the defense mechanism." Likewise, Demopoulos explains, high doses of carcinogens overwhelm what he believes to be nature's defense against carcinogens — anti-oxidants. To activate most carcinogens, Demopoulos says, hydroxy groups (OH) must be added

to them. Liver cells can grab hydroxy groups off of hydroperoxide groups (OOH) that form on the body's unsaturated fatty acids and then slip them to carcinogens, explains Demopoulos, whose research involving the activation reactions in carcinogenesis will appear in the March/April *JOURNAL OF ENVIRONMENTAL PATHOLOGY AND TOXICOLOGY*. Naturally occurring anti-oxidants — sulfur-containing amino acids, for example — can block the transfer of hydroxy groups to carcinogens. Since high-dose testing exhausts nature's anti-oxidant defense mechanism, the results are misleading, Demopoulos says.

"I'm not opposed to high doses — they've got a role in cancer testing," Demopoulos says. "However, if you're going to make a regulation, then you've got to employ lower-dose studies."

Bingham counters that such suggestions overlook that "Congress charged OSHA with protecting workers 'to the extent feasible.'" Once a potential carcinogen is identified, for example, the new

OSHA policy proposes that worker exposure to that carcinogen be reduced to "the lowest feasible level, primarily through engineering and work practice controls." Lang opposes this aspect of OSHA's policy, labeling it the "how-big-a-fan-can-put-in-your-plant approach." But EDF scientist Silcox maintains that although the lowest feasible level approach is based on economic and technologic considerations rather than health measures, "It's the best we can do right now."

Now it may be up to the courts to decide if OSHA's new uniform policy governing carcinogens in the workplace is indeed "the best we can do right now." At least two business groups — AIHC, for example — have filed in various federal circuit courts for a review of the policy. Nonetheless, Bingham seems confident that Keller's design can weather any storm: "I sincerely believe we are about to embark on a course that will profoundly affect the quality of life for hundreds of thousands if not millions of American workers." □

A possible four-way stretch in the universe

To cosmologists the name of Friedmann, Alexander A. Friedmann, means the same as the name of Thomas Aquinas to medieval and — as we have seen recently — some modern theologians. As Aquinas set the framework in which scholastic theologians view the universe, so Friedmann set the frame of space and time in which modern cosmologists have done their speculating. Friedmannian universes follow the rules of general relativity. They are expanding universes without the cosmological constant that Einstein felt so necessary.

Orthodox cosmologists have tended to concentrate on Friedmannian universes. It is widely believed that the actual universe is Friedmannian, that any possible universes it might be worthwhile to consider as models for reality had to be Friedmannian. Well, now maybe not. The first piece of observational evidence that the universe may not be Friedmannian was reported last week at the meeting in San Francisco of the American Astronomical Society.

The news came in a review of recent observations of the cosmic microwave background radiation, the blackbody radiation that is believed to date from the earliest moments of the Creation and to be a relict representation of the earliest qualities of the cosmos, given by Paul Boynton of the University of Washington. The work in question is not Boynton's own, but that of F. Melchiori and colleagues of the University of Florence.

Melchiori and co-workers had set out to try to confirm the dipole anisotropy in the microwave background recently found by George Smoot of the University of California at Berkeley and others (SN: 12/29/79, p. 421). The dipole anisotropy is an apparent variation in the temperature of the cosmic

blackbody in two directions, opposite along a given line. In a perfectly smooth universe the temperature should be the same in every direction. Dipole anisotropy is widely interpreted as a motion of the earth, our galaxy and our cluster of galaxies toward a spot in the constellation Virgo. Melchiori and his colleagues, working in the infrared part of the spectrum, confirmed the dipole anisotropy, but in the process they seem to have found a quadrupole anisotropy, a variation in four directions.

The amount of temperature variation in this possible quadrupole variation is extremely small, about nine-tenths of a millidegree Kelvin. (The amount of the dipole anisotropy is about three millidegrees.) Yet, as Boynton points out, "If confirmed, it is an extremely important number." And he stresses that a dipole anisotropy can be attributed to motion on the part of the observer — this is the most conservative interpretation and the one most cosmologists are taking — but a quadrupole anisotropy must have to do with the universe itself. It is, Boynton says, "a possible indication that the universe may not be Friedmannian." The universe may not be expanding isotropically. Or the quadrupole anisotropy could indicate that the photons of the background blackbody radiation participated in some decidedly un-photon-like behavior in the early moments of time, a conclusion that would be as interesting in particle physics as the overthrow of Friedmann would be in cosmology. But before any of these conclusions are drawn, Boynton cautions, the effect found by Melchiori and colleagues must be confirmed, precisely measured and thoroughly considered. Then perhaps the revolution. □