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NEW YORK ACADEMY OF SCIENCES
SCIENCE WEEK

Conference on Health Hazards of Asbestos Exposure
June 24-27, 1978

I attended this conference at the New York Hilton Hotel and participated in the workshop at the Sloan-Kettering Cancer Research Center entitled "Public Health Significance of Smoking-Asbestos Interactions." Accounts of the events of this conference as reported in the Occupational Safety and Health Reporter are attached. Basically, I came away with the impression that the conference was a carefully planned, highly biased, staged media event to politicize the asbestos health hazard issue. Selected observations and comments follow.

Dr. L.M. Irwig of Johannesburg, South Africa, reported that 10 percent of all men over 40 years of age and who had never had any known asbestos exposure, demonstrate abnormal x-ray pleural plaques. (Note: this contrasts only slightly with the 16 percent abnormalities reported by the U.S. Navy for the San Diego shipyard workers.) He also showed extensive data which showed in general that parenchymal and pleural abnormalities cannot be predicted by fiber levels and, therefore, are independent of exposure. The data indicate that these abnormalities and disease are associated with age. He also mentioned that 53 alleged cases of mesothelioma in the tumor registry have not been confirmed histologically but only via x-ray, which he considered to be less than an adequate diagnostic tool for mesothelioma.

Dr. Margaret Turner-Warwick of London, England, indicated that 17.6 to 22 percent of the x-rays showed progression of asbestosis following cessation of exposure. She observed that mesothelioma and lung cancer appear to occur primarily in lungs with the least serious x-ray changes and the lesser significant asbestos loadings or exposures.

Dr. Nickolson of Mount Sinai School of Medicine claimed that most asbestos workers die of lung cancer and mesothelioma after an average of 35 years of asbestos exposure before the age where smoking might become a cofactor. He claimed that 74 percent of the asbestos workers die before their sixtieth birthday.

Vivian Henderson indicated that 17 of the 58 mesothelioma cases, with which they (apparently Dr. Enterline and associates) were aware, had had no known asbestos exposures. It appears that mesothelioma occurs earlier than lung cancer. The available data do not indicate a relationship between exposure and fibrosis. She did report only a 269 SMR for lung cancer among their cohort of asbestos workers but a 578.9 SMR for lung cancer among cement asbestos pipe workers exposed to chrysotile and crocidolite fibers.

Dr. Ruth Lilis admitted, when discussing the results of studies of asbestosis among maintenance workers in the chemical industry, that x-rays were not read "blind." This is most understandable because almost as many maintenance workers were found to have abnormalities as were found among the insulation workers. Apparently none of the Mt. Sinai studies have been conducted in a scientifically controlled manner to assure that investigator bias does not affect the results.

Dr. Stumphius from the Netherlands claimed that of the 70 known cases of mesothelioma, 26 were in patients not known to have ever been exposed to asbestos.

Contrasting claims of lung disease prevalence were reported for shipyard workers on the west coast and San Diego. The Navy reported finding 16 percent abnormalities and Dr. Polakoff of Berkeley reported 57 percent. The latter percentage was derived from a broader population, which seems unlikely unless investigator bias was an influential factor.

Dr. Anderson of Mt. Sinai claimed that a study of x-ray changes in asbestos workers' families showed that 18 percent demonstrated abnormalities as compared to 3.4 percent for control families. Daughters appeared to be most adversely affected with 86 percent not having any obvious clinical problems.

Dr. Hammond of the American Cancer Society presented data showing that mortality patterns in the immediate neighborhood of the Patterson plant are not different from those of a control community (Riverside).

Dr. Newhouse of London presented data indicating a dose-response relationship between length of exposure and magnitude of exposure with lung cancer. The reported SMR's ranged up to 538 for the most severely exposed. She also presented data showing a group of women asbestos textile workers to have lung cancer SMR's ranging from 810 to 2592. Dr. Clark Cooper induced her to admit that these women were all heavy smokers and that the multiplicative factor for nonsmokers is far less than unity and greater than 20.9 for smoking.

Dr. Newhouse implied that she believed that asbestos was not an etiological agent in the causation of lung cancer and possibly other cancers as well. Dr. Selikoff used a leading question in an attempt to force her to admit that asbestos is the only known cause of peritoneal mesothelioma. Dr. Newhouse replied that this might be so but that nobody has ever shown her any data, evidence, or given her a suitable explanation about how airborne asbestos exposures could even be conceivably associated with peritoneal mesothelioma.

Dr. Selikoff presented, as usual, unreadable slides but did make several noteworthy comments. He admitted that they have not observed an increase in any cancer among insulation workers with less than 20 years of exposure and he would guess that their TWA exposures probably average between 3-12 fibers/cc. He openly admitted that review of histological specimens showed that many of the death certificates had been incorrectly coded and that appropriate revisions in the entries had been made.

Dr. Hammond presented the latest data on the relationship between cigarette smoking and asbestos exposure. He presented data showing 8 lung cancer deaths among the 180 nonsmokers who have died. About 14.11 lung cancer deaths would have been expected had the Dorn data on nonsmokers (smoking specific) is used as the control group. Dr. Radford challenged these control groups to which Dr. Hammond admitted that a proper control group does not exist for these highly examined and tested asbestos workers. He felt only that these figures "mean little more than asbestos exposure has an associated risk for lung cancer for both smokers and nonsmokers." He felt these data were important to attack the myth that asbestos would not hurt a worker unless he smokes cigarettes. Vivian Henderson concurred with this view in a strongly worded extemporaneous speech.

At the workshop on smoking and asbestos exposure, Mr. Seidman of the American Cancer Society presented data on the same population as Dr. Hammond (which was contradictory). He reported 8 lung cancer deaths among 180 nonsmoker deaths but claimed 8.8 deaths would have been expected had the general population been the control group and 1.2 would have been expected if based on smoking-specific statistics. He also willingly admitted that "no perfect set of control data exist."

Dr. MacDonald presented data which showed that chrysotile miners experience lung cancer SMR's of 126 after five years exposure and 150 after 20 years of exposure. He indicated that 12 cases of pleural mesothelioma have been observed among miners and 3 cases among mill workers. No cases of peritoneal mesothelioma have been reported among mine and mill workers.

Dr. Meurman from Finland reported that 44 lung cancers were found among 385 deceased anthophyllite asbestos workers. A study of smoking habits and asbestos exposure among these men indicated that "it can be concluded that smoking alone may be sufficient to explain the common occurrence of lung cancer among these asbestos workers." I discussed Dr. Meurman's findings with him and he told me that 80 percent of the asbestos workers in Finland are heavy smokers. He used 5.5 percent as the expected lung cancer rate which is far more reasonable than the 1-2 percent used by Drs. Hammond and Selikoff as their control groups. He also indicated that mesothelioma has not been associated with anthophyllite asbestos exposure in Finland.

Dr. Samuel Epstein debated Dr. Paul Kotin as to the subject "There should be no preventable exposure to a confirmed occupational human carcinogen." Taking the affirmative position, Dr. Epstein commenced by refusing to debate the assigned subject, selecting instead to support the Delaney Amendment concept. In a most strident and scornful fashion, he repeatedly accused scientists associated with industry of being "harlots," of suppressing and falsifying data, of collaborating with management to deny workers their rights, and of conspiring to continue indefinitely the genocide of American workers. He advocated total government control of industry to force compliance with all procedures required to protect worker health and the environment. He demanded that "no exposure to even potential carcinogens" be permitted on "moral" grounds despite the implication that this would require the "banning" of these materials. He pointedly asserted that there is "absolutely" no evidence suggesting a threshold and that industry deliberately offers to workers only the Faustian alternatives of jobs or cancer.

Dr. Kotin spent most of his time complaining about the names which Epstein called industry and discussing in detail the roles of various groups such as industry, government, union, etc. as he perceived them. He stated that thresholds have been shown repeatedly by dose response curves. Because a negative cannot be proved, some level of risk must be accepted. Preventable exposures are rare due to the mass exposures to numerous natural carcinogens. Industry is in a "catch 22" situation and will not accept slogans as justification for stringent regulation.

Dr. Epstein rebutted by attacking Dr. Kotin personally by referring to Dr. Kotin's change in view with regard to carcinogenesis, and indicting him as a participant in "unregulated human carnage." He further accused industry of playing games with economic statistics when control costs actually total only 0.2 percent of sales.

Dr. Kotin rebutted by stating that Dr. Epstein does everyone a great disservice by denigrating those who do not have the same opinions as he does. Smoking is the major environmental cause of disease and nothing else can approach its widespread health effects, even in combination. Dr. Kotin also said, "Sam, I wish you knew something about the mechanisms of carcinogenesis so that we could debate this subject rationally."

In summary, Dr. Kotin was the only industry scientist permitted on the agenda to defend industry's viewpoint and needs.- Pitted against scores of antagonists (definitely a stacked deck), he showed admirable courage, courtesy and candor. His last appearance on a panel was highlighted by the candid comment that "this rostrum has been used as a pulpit for the pressing of personal views."

The rest of the sessions were highly politicized. Dr. Levinson (ILO) and others demanded total government control of industry, revision of management structure, sharing of decision making powers with union committees, and the use of money to restructure all american institutions. R. Sweeney (attorney) made sweeping charges of an industrial watergate, charged that science must be cleaned up by removing all influence of industry from the realms of scientific research, and demanded that industry be stopped from continuing to force a health epidemic upon the public. Of course, TV cameras were commonplace during the most sensationalized speeches.

And finally, Barbara Franklin of the CPSC stated that the next target of the commission is asbestos cement products. It is their goal to ban totally the intentional addition of asbestos to all consumer products. The basis for the ban is the assumption that there is no safe level for exposure to a carcinogen.

Lowell D. White

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Environmental Scientist

LDW/bjs
Attach.

cc: KWNelson (w.attach)

agreed with the House and provided \$167.5 million for the Occupational Safety and Health Administration and nearly \$62 million for the National Institute for Occupational Safety and Health (Current Report, June 15, p. 64).

The Senate subcommittee disagreed with the House and did not add an amendment to the measure to prohibit OSHA from issuing any regulations which would restrict recreational hunting, fishing, or sports shooting.

But the subcommittee agreed with the House and voted to continue the restrictions on OSHA which were first included in the FY 77 budget. Those amendments to OSHA's budget exempt farms employing 10 or fewer persons from the provisions of the Occupational Safety and Health Act and prohibit civil penalties for first-instance nonserious violations of the Act, unless 10 or more violations are cited during an inspection.

When the House voted to continue those restrictions on OSHA, it decided to exclude farms which have a temporary labor camp from the exemption for farms employing 10 or fewer persons. These differences between the House and Senate versions will have to be resolved in a conference between the two houses, unless the full committee or the Senate votes to disagree with the subcommittee recommendations and to agree with the House.

Additional Inspectors

Senator Warren Magnuson (D-Wash.), chairman of the Appropriations Committee and of the Labor-HEW Subcommittee, will propose before the full committee an amendment to add \$12.5 million to the OSHA budget to hire as many as 500 more inspectors. His amendment was not offered before the subcommittee.

In a June 9 letter to Magnuson, Assistant Labor Secretary Eula Bingham wrote that OSHA "can effectively utilize the additional compliance officers." She suggested that the agency could hire 325 industrial hygienists, 125 safety specialists, and 50 persons to conduct discrimination investigations.

Bingham estimated that the 500 new inspectors would permit OSHA to conduct 8,500 additional health inspections, 10,000 additional safety inspections, and 2,500 more discrimination investigations. She explained that health inspections usually take three to four times longer than safety inspections, which would account for the expected greater increase in the number of safety inspections even though more new health specialists would be hired.

Bingham wrote Magnuson that OSHA expects the annual number of its inspections to decrease because of the U.S. Supreme Court's decision in the *Barlow's Inc.* case, but she could not give "a precise estimate of the decrease as (OSHA does) not yet have sufficient data on denial of entry cases to indicate a trend" (Current Report, May 25, p. 1923).

But Bingham commented that an increase in the number of inspectors would allow OSHA to maintain its present inspection rate and to expand its coverage in such "high-hazard industries" as construction and grain elevators.

Mine Safety

The Senate subcommittee did not approve an amendment offered by Senator Robert Byrd (D-WVa) to increase the NIOSH budget to fund certain activities mandated by the Federal Mine Safety and Health Act of 1977.

HEW previously had refused NIOSH requests for funding for certain activities required under the new mine safety law (Current Report, June 15, p. 64). The House also did not increase NIOSH's funding for these activities.

Black Lung Supplemental

The Senate passed on June 23 an increase of \$181.6 million for the Labor Department's Employment Standards Administration during the current fiscal year, which ends September 30. The increased funds, which were approved by the House on June 9, will be used to implement the black lung benefits legislation enacted by Congress earlier this year.

The Senate agreed with the amount included in the House version (HJRes 945), but the joint resolution will have to be considered by a conference committee between the two Houses because of differences in aspects of it which have nothing to do with the black lung compensation benefits program (Current Report, June 15, p. 64).

Asbestos

SHORT-EXPOSURE RISK INDICATED IN STUDY OF NEW JERSEY WORKERS, RESEARCHER SAYS

NEW YORK CITY — (By an OSHR staff correspondent) — Workers employed for only a month or two at a Patterson, N.J., asbestos plant during the period 1941-1954 showed "a clear mortality excess" from lung cancer and all forms of asbestos disease, Herbert Seidman, American Cancer Society, reported June 24.

Seidman appeared at the June 21 through June 30 International Conference on Health Hazards of Asbestos Exposure, sponsored by the New York Academy of Sciences.

In a survey of some 821 workers, Seidman reported, six deaths from lung cancer were found among those who had worked at the plant for only one month, as compared with 2.47 deaths expected based on mortality patterns for the Patterson area. There also were eight deaths from all forms of asbestos disease, including mesothelioma, as contrasted with the 4.84 deaths expected.

Seidman termed the excess "important," and added that the risk of lung cancer and asbestos disease became even greater for workers exposed to asbestos for longer periods.

For example, among workers who worked at the plant two or more years, there were 39 deaths from lung cancer rather than the 5.97 deaths expected, Seidman noted. There were 76 deaths from all asbestos diseases, as compared with the 12.41 deaths expected.

Among the workers who were exposed to asbestos for one month, adverse health effects from the exposure first were seen after 20 years. The effects were observed sooner among those with longer exposure, Seidman added.

The plant involved in the study was owned by the Nicholson File Company, and it provided asbestos for U.S. Navy ships during and after World War II. Ventilation at the plant was "poor," and "even short periods of exposure left a large number of asbestos fibers in the workers' lungs," according to the American Cancer Society researcher.

Workers at the facility were exposed only to one variety of asbestos, amosite, according to Irving Selikoff, Mt. Sinai School of Medicine, who collaborated on the study with Seidman and another American Cancer Society researcher, E. Cuyler Hammond. This determination was based on Navy specifications and on records of the products sold by the company, Selikoff explained.

In a study of 17,800 American and Canadian insulation workers whose histories were followed from 1943 to 1977, 2,270 deaths were observed compared with the 1,660 deaths expected, Selikoff also reported. Cancer was the "most important" cause of death, with 994 cases observed rather than the 320 expected.

The cancer mortalities included 175 deaths from pleural and peritoneal mesothelioma, two forms of cancer that are extremely rare in the general population, according to the Mt. Sinai researcher.

Chemical Maintenance Workers

A study of 144 chemical plant maintenance workers indicated abnormal chest X-ray findings among 48.4 percent of those with direct asbestos exposure, according to Ruth Lillis, Mt. Sinai School of Medicine. Pleural changes, including thickening and calcification of the membrane, were found in 28 percent of the total group.

Some 45.4 percent of the maintenance workers who had some asbestos exposure produced abnormal chest X-rays, while readings were abnormal for 24.2 percent of those workers who were not exposed to asbestos, Lillis added.

Chronic bronchitis rates were similar for both smokers and nonsmokers, with 23 percent of those who smoked exhibiting bronchitis, compared with 19 percent of the nonsmokers, Lillis told conference attendees.

Asbestos exposure involving maintenance workers presents a "very serious problem for the future," Selikoff commented. In many cases, employers do not realize that products in their facilities contain asbestos. The problem involves "a vast number of workers," because in many chemical plants there are as many maintenance employees as chemical workers, Selikoff commented.

Shipyard Hazards

High rates of lung cancer and cancer of the pharynx have been found in three-fourths of the U.S. southern coastal counties where shipyards operated during World War II, according to William J. Blot of the National Cancer Institute.

A study of these counties was initiated after NCI demographic research showed an "unexpected pattern" of high cancer mortality clustered along the Gulf Coast and on the U.S. southeast Atlantic coast, Blot stated. In addition to an excess of lung and pharynx cancer, high rates of bronchial, esophagus, and stomach cancer have been noted.

Lack of information on the smoking histories of cancer victims in these counties has hampered the NCI study, but "it is unlikely that smoking would account totally for the pattern," Blot commented.

Currently NCI is conducting a field study on the Georgia coast, where preliminary figures show an excess lung cancer risk among persons who worked in shipyards in Savannah and Brunswick during the Second World War, the NCI scientist announced. Some 20 percent of the 500 lung cancer victims interviewed by NCI so far reported that they had worked in shipyards during the war.

NCI is halfway through another case-control interview study in the Tidewater area of Virginia, the location of the Newport News, Va., Naval Shipyard. Results of this project "should clarify the shipyard problem," Blot commented. He added that information on exposures at the shipyard should be less difficult to gather than similar data in the Georgia study, because the Newport News facility is still in operation.

Other studies are planned in Maine, where lung cancer incidence is rising, and in Louisiana, where shipbuilding was a major industry during the war, Blot noted.

All persons who have worked in shipyards in the past, whatever their craft, face the risk of developing asbestos-related disease, according to Philip L. Polakoff, Western Institute for Occupational and Environmental Health, Berkeley, Calif. In a study involving 359 workers from shipyards at Hunter's Point and Mare Island, Calif., 59 percent of the employees were found to have pleural and parenchymal abnormalities.

The abnormalities "were distributed evenly among all occupations," including painters, sailmakers, laborers, mechanics, and carpenters, Polakoff stated.

There was a significant increase in pleural changes with advancing age, the researcher continued. A high incidence of parenchymal changes was discovered, but these changes occurred "independent of age." This discrepancy may be explained, Polakoff theorized, by the possibility that the study inadvertently used a select group of workers with abnormalities in all age groups. The changes also might have been due to factors other than asbestos, such as cigarette smoking or exposure to other toxic agents.

Groton Study

An increase in pleural and peritoneal changes corresponding to longer periods of time from first exposure to asbestos was found in a study of 1,000 workers from the Electric Boat Company shipyard at Groton, Conn., Irving Selikoff reported.

Abnormalities were found in 43 percent of the workers whose first exposure to asbestos occurred less than 20 years ago, the Mt. Sinai researcher stated. The rate increased to 50 percent among workers first exposed more than 20 years ago.

Abnormalities were found in all trades, but there were not enough workers from any one group to compare the incidence rates and thus identify any workers who might be particularly at risk, Selikoff noted.

Comparing lung cancer rates among shipyard workers with those for insulation workers not employed in shipyards, Selikoff said he found the rates "very much the same."

Some 153 out of 500 production workers at the U.S. Navy shipyard at Long Beach, Calif., have been found to have asbestosis, according to a report by Jean S. Felton, Naval Regional Medical Center. The Navy began a study of workers at the shipyard in June 1977.

X-rays have been taken for 88 percent of all the workers at the shipyard, and indicate abnormal findings for 16 percent of the workers thus far examined. The abnormalities show a linear increase by age, occurring in 34 percent of those workers employed at the facility for at least 17 years, Felton reported. The Navy hopes to take X-rays of the remaining workers during the next month, conference attendees were told.

Carcinogens

HIGH-LEVEL OFFICIALS CONCERNED OVER REGULATION COSTS, INDUSTRY SAYS

Recent controversy over the Occupational Safety and Health Administration's cotton dust standard demonstrates the concern "at the highest levels of Government" for the economic effects of regulating, OSHA's hearing on a carcinogens policy was told June 26.

Richard Zeckhauser, a witness for the American Petroleum Institute, predicted "years of delay in litigation" for the proposed policy unless OSHA attempts to analyze the costs and benefits of the proposal and tries to estimate risks to workers.

Individual firms and the American Industrial Health Council, an umbrella-group of companies and trade associations, earlier had presented the first testimony from the business sector as the hearings continued into the second month (Current Report, June 22, p. 86).

Zeckhauser, a political economist from Harvard University, referred during his testimony to President Carter's involvement in the OSHA cotton dust standard and the review

This rate, which equals one case per 895 man-years, is "not a very high incidence for an industry said to have a high incidence," Ballou maintained.

The Firestone official conceded that his company had trouble in the early 1960s with an antioxidant called IPPD, which caused an outbreak of rash among 60 workers who came into contact with it. However, once IPPD was identified as the source of the rash and replaced by other chemicals, the problem ceased, Ballou said.

A cutaneous risk does exist in the rubber industry because of the defatting properties of some solvents, skin abrasion from the use of abrasive soaps, and the existence of nonindustrial rash which could be aggravated by exposure to chemicals, Ballou noted. However, he added, the industry attempts to prevent the occurrence of disorders by providing protective creams to workers, and by conducting extensive medical surveillance programs.

The next meeting of the advisory committee is scheduled for July 26-27. Topics suggested by members for future discussion included skin hazards in agriculture and food processing, existing surveillance systems for cutaneous hazards, and skin hazards from radiation.

Workers' Compensation

ASBESTOS WORKERS' COMPENSATION BILL IS CRITICIZED AS INDUSTRY RELIEF ACT

NEW YORK CITY — (By an OSHR staff correspondent) — A measure introduced in Congress last year to provide compensation to workers who became disabled through exposure to asbestos was attacked June 29 as the "Asbestos Industry Relief From Liability Act" by Robert E. Sweeney, an attorney from Cleveland, Ohio.

Sweeney debated Dennis H. Markusson, an attorney for the Johns-Manville Corporation, during the New York Academy of Sciences International Conference on Public Controls of Environmental Health Hazards, on the role of the Government in providing compensation for occupational diseases.

Last August Congressman Edward P. Beard (D-RI) and Congresswoman Millicent Fenwick (R-NJ) introduced the proposed Asbestos Health Hazards Compensation Act to provide compensation to workers suffering from any of four diseases contracted through exposure to asbestos and asbestos coupled with the inhalation of cigarette tobacco smoke (Current Report, August 4, 1977, p. 313). The bill has made no progress in Congress.

At the time the compensation bill was introduced, Fenwick said she had received "splendid" cooperation from the asbestos industry in the preparation of the legislation. Sweeney claimed that the bill came "out of the workshop of the legal department of Johns-Manville."

Markusson noted that the Fenwick bill is supported by the International Association of Heat and Frost Insulators and Asbestos Workers.

Sweeney charged that Markusson "wants to draw down the curtain on the American tort system, to foreclose a victim's opportunity to go into a courtroom." He said it is clear industry wants "to adopt a compensation plan that would deny workers the right to stand before a jury." He explained that industry "wants to take away the victim's right to punitive damages."

Markusson countered that, under the tort system, the money goes to the insurance companies, lawyers, and the courts, but not to the victim. He noted that the National Com-

mission on State Compensation Laws criticized the tort system. Markusson argued that the Government should pay all compensation from general revenue funds.

Sweeney said this would amount to "welfare for industry," since it would pass on to taxpayers the burden for compensating workers who suffer due to asbestos inhalation.

Markusson explained that, under the first year of a compensation program similar to the one that would be established under the Fenwick bill, a minimum of \$30 million would be contributed by the asbestos industry, which is more than it is currently paying out under the tort system.

Sweeney declared that he has "no confidence" in the ability of the Federal Government to run an efficient compensation system for occupational diseases. He suggested that it would be best if the Federal Government established minimum standards for workers' compensation systems administered by the states.

Markusson said workers trying to get compensation for illnesses resulting from asbestos exposure will not get relief through the court because "the record does not prove the culpability of industry." He added that no jury would believe a claimant's statements about the state of the art of controlling asbestos exposure and therefore prove that the industry was negligent.

Markusson said Sweeney's position would make true the statement of Newark, N.J., attorney Jacob L. Balk that a worker who believes he is suffering from an occupational disease should "go to a lawyer and let a lawyer send you to a proper doctor."

Noise

LABOR DEPARTMENT SEEKS CONTRACTORS FOR RESEARCH ON COMPENSATION CRITERIA

Criteria for determining hearing impairment for compensation purposes and the relationship of such impairment to occupational noise exposure will be studied under a far reaching contract to be issued by the Labor Department.

According to a June 29 work statement included with DOL's request for proposal, the agency intends to produce a national review of issues in these controversial areas. Specifically, the studies will be linked to determining impairment for federal workers' compensation. The agency's performance in that area has been subject to congressional and General Accounting Office criticism which claims that DOL criteria have been too lenient and that they conflict with current acceptable scientific evidence (Current Report, June 8, p. 31).

The proposed contracts are scheduled to last approximately one year. They call for investigations into several areas concerning noise-induced hearing loss. Under a complicated arrangement, the agency intends to issue four contracts comprising 13 "research tasks." The 13 areas to be studied break down into the following subject areas — (1) assessing hearing impairment and examination; (2) benefit formula; (3) presbycusis, recruitment, and tinnitus; and (4) occupational noise.

The contracts are designed to provide for research to determine the most appropriate formula for compensation under the Federal Employees' Compensation Act (FECA) and the Longshoremen's and Harbor Workers' Compensation Act. The agency requested that each area of analysis include a review of specific government policy options "designed to fairly and equitably compensate injured employees with