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January 8, 1976

Mr. William A. Anders, Chairman,
and Members,
Nuclear Regulatory Commission
Washington, D.C. 20555

re.
Docket Nos. 50-483
and 50-486

Gentlemen:

Enclosed please find an article from the January, 1976, Progressive magazine that I believe you will find of interest.

Many people have expressed concern about the dangers inherent in nuclear power plants because of the fallibility of man.(*) However, the possibility of exhausting the supply of unirradiated, experienced welders for repairs to the far-too-frequent leaks in pipes and boilers is a new, equally unsettling concern.

I hope the Nuclear Regulatory Commission will assist Missouri's consumers by requiring that Union Electric disclose the information it has declared to be "proprietary" concerning its ability to finance the proposed Calloway County nuclear plants before making any further decisions about construction. Otherwise, it seems quite likely that the State of Missouri or the federal government will end up having to bale out Union Electric just as the Power Authority of the State of New York is having to come to the aid of the overextended Consolidated Edison Company.

(*) e.g., choosing a candle.

Sincerely,
Kay Drey

enclosure

The Nuclear Energy Game: Genetic Roulette

H.W. IBSER

Hibakusha they are called in Japan; the bombed ones. They are the people who survived the nuclear bombings of Hiroshima and Nagasaki. Many have suffered from leukemia and other forms of cancer, typically occurring years after their exposure to the radiation from the bombs. The time lapse is different fc different kinds of cancers.

The *hibakusha* have another sort of problem, too: Even those showing no sign of harm from the bombs are victims of the prejudice of their countrymen, who fear the genetic damage suffered by the *hibakusha*, and do not wish to marry them or their descendants. *Hibakusha* who have moved from the bombed cities keep their background secret—especially those with marriageable children, lest their children be avoided by possible marriage partners.

The *hibakusha* have been studied by the Atomic Bomb Casualty Commission (ABCC) since shortly after the American occupation of Japan at the end of World War II. Much has been learned from them about the effects of nuclear radiation—the invisible, penetrating rays produced by nuclear bombs and also by materials produced in nuclear power reactors.

The plight of the *hibakusha* contrasts with the American people's lack of concern for radiation exposure taking place in our nuclear industry. The public, with no bomb to attract its attention, seems generally unaware of radiation exposure conditions within the nuclear establishment. To some extent, perhaps, our attention has been diverted by debate over potential hazards posed by nuclear reactor accidents. Whether or not such debate is justified, current conditions in the nuclear industry are such that, if they were generally known and their genetic implications understood, nuclear workers might well become the victims of social prejudice like that against the *hibakusha*.

The occupational exposure situation in the United States is quite out of harmony with the nuclear establishment's picture of "safe, clean, nuclear energy." Before describing it, and in order to make its significance more clear, let us consider the background of the regulations governing exposure to nuclear radiation.

Nobel prize-winning geneticist H.J. Muller's pioneering experiments in the 1920s showed that nuclear radiation (then available only from naturally occurring radioactive materials) does genetic damage, which becomes apparent in descendants of those exposed to the radiation. The International Commission on Radiological Protection (ICRP), in proposing the allowable limits to radiation exposure which have been adopted by the nuclear establishment, stated that the genetic

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hazard was "of greatest concern." Indeed, that hazard was taken as the determining factor in the ICRP considerations.

The ICRP standards stipulate that except for medical purposes, members of the general public should not be exposed, on the average, to more that 0.17 rem of ionizing radiation (X-rays or nuclear radiation) per capita per year. The rem is a unit of exposure; it is a measure of the biological damage caused by radiation.

Persons unfamiliar with the ICRP's reports, including workers in the nuclear industry and their families, commonly assume that ICRP recommendations, as adopted by Federal agencies, represent safe levels of exposure—in the sense that such exposures cause no significant damage. But this was not the point of view of the ICRP when it proposed the limits.

According to the *Recommendations* of the ICRP, Document 2, 1966: "This limitation necessarily involves a compromise between deleterious effects and social benefits. . . . The Commission is aware of the fact that a proper balance between risks and benefits cannot yet be made, since it requires a more quantitative appraisal of the probable biological damage and the probable benefits than is presently possible. . . . However, recommendations in quantitative terms are needed in the design of power plants and other radiation installations and particularly in making plans for disposal of radioactive waste products. . . . It is felt that

Uninformed Opinion

Ebasco Services, a New York-based corporation which furnishes consultation, engineering, and construction services to the utility industry, recently commissioned Louis Harris and Associates to conduct "A Survey of Public and Leadership Attitudes Toward Nuclear Power Development in the United States." Results of the poll were published in August 1975.

The questions included in the poll made no reference to the genetic damage expected to occur as a result of radiation exposures permitted under present exposure limitation standards. When it proposed these standards, the International Commission on Radiological Protection considered them tolerable only because development of the nuclear industry required as much exposure as they allowed. ICRP documents make it clear that the ICRP considered the genetic *quid pro quo* to be of greatest concern in establishing the nuclear energy industry. Current practice, therefore, involves deliberate genetic damage to the population.

My inquiry as to the reason for lack of reference to this important matter by the poll elicited a candid response from Louis Harris and Associates Senior Vice President Carolyn E.Setlow:

"You have presumed in your letter that the Harris firm made a decision to omit reference to this matter in our nuclear energy survey. Unfortunately, this was not a decision but rather an oversight on our part. We built into our survey instrument, however, open-ended questioning which would allow for the expression of concerns that we had not listed in our closed-ended questioning. I have reviewed the results and learned that there was no mention by the public of concern for exposure of the human gene pool to damaging radiation levels. This seems to be an area in which the public, like those of us involved in the survey design, have received little education. . . . You can be sure that any future research we do in the area of nuclear energy will make reference to the problem of genetic damage from radiation exposure."

I compliment Carolyn Setlow for her forthright letter. But I consider it remarkable that the genetic price of nuclear energy should have been so successfully hidden from the public that even a major, experienced surveyor of public opinion, acting, as I believe, in good faith, should have conducted a detailed poll (the summary alone of the survey results is twenty-nine pages long) of public opinion regarding nuclear energy without realizing that the original promulgators of the radiation exposure standards we are using considered genetic damage "of greatest concern" in evaluating the benefits of nuclear energy.

The nuclear industry has apparently managed to bring about the acceptance of regulation expected—by those who proposed them—to lead to serious damage of the human gene pool. The public has utterly failed to comprehend the facts about these regulations, partly because of their esoteric nature, but mostly because of failure of responsible authorities to publicize them. Under such circumstances only the unscrupulous and the ignorant can urge the expansion of the nuclear energy industry on the grounds of public acceptability. —*H. W. L.*

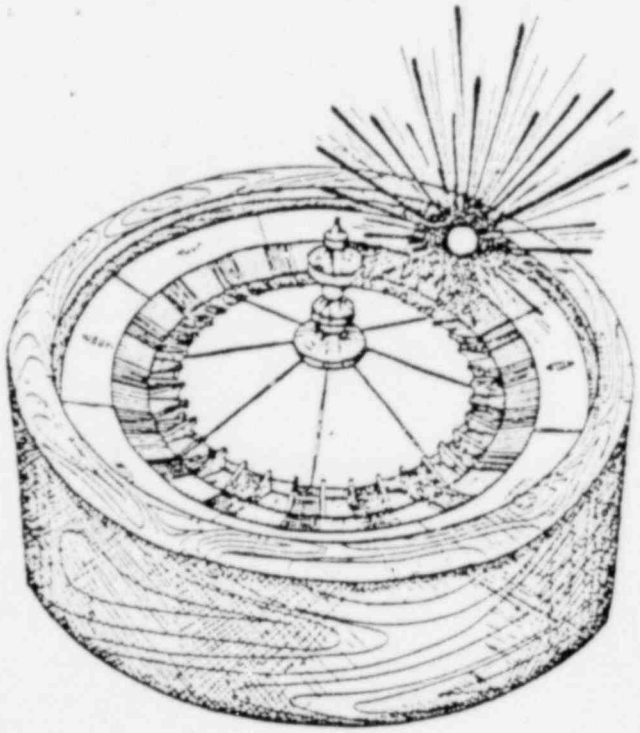
this level provides reasonable latitude for the expansion of atomic energy programs in the foreseeable future. It should be emphasized that the limit may not in fact represent the proper balance between possible harm and probable benefit. . . ."

Some scientists have urged—unsuccessfully, so far—that the exposure limits should be greatly reduced; notable in this regard is John W. Gofman, formerly engaged for years in research for the U.S. Atomic Energy Commission on the effects of radiation.

Workers occupationally exposed to radiation are allowed to receive thirty times as much radiation as the general population limit—up to five rems per year, as much as three rems in a single quarter (thirteen consecutive weeks). The ICRP's explanation: "Genetic effects manifest themselves in the descendants of exposed individuals. The injury, when it appears, may be of any degree of severity from inconspicuous to lethal. A slight injury will tend to occur in the descendants for many generations, whereas a severe injury will be eliminated rapidly through the early death of the individual carrying the defective gene [biological unit of genetic transmissal]. Thus the sum total of the effect caused by a defective gene until it is eliminated may be considered to be roughly the same [that is, the same as that of any other]. The main consideration in the control of genetic damage [apart from aspects of individual misfortune] is the burden to society in future generations imposed by an increase in the proportion of individuals with deleterious mutations [genetic damage]. From this point of view, it is immaterial in the long run whether the defective genes are introduced into the general pool by a few individuals who have received large doses of radiation, or by many individuals in whom smaller doses have produced correspondingly few mutations. . . ."

Not all of the 0.17 rem per year accepted as the maximum tolerable average radiation dose for the general population is to be taken in person by the layman; some of it must be reserved for use by our proxies in the nuclear industry. The ICRP is quite explicit about this, even giving as an example a sample calculation illustrating this pooling of genetic damage. The mathematical precision of the calculation contrasts with the admission of a lack of any adequate knowledge of the biological damage to be expected from a given amount of exposure to nuclear radiation.

Thus, the relatively large radiation dose allowed nuclear industry workers is justified by the assumption that their genetic damage will be shared—diluted to "reasonable" levels by matings with the general population. But even this accommodation is not sufficient to enable the nuclear establishment to get its work done with its regular employes only. An article in the October 11, 1974, issue of *Science*, "Transient Nuclear Workers: A Special Case for Standards," reviews the "common and longstanding practice in the nuclear industry" which is that industry's "solution" to its problem. Robert Gillette of *Science* points out that the Federal agency regulating the industry "has long condoned the use of virtually untrained supplemental or 'transient' workers in potentially hazardous radiation jobs, as long as they received some instruction in safety procedures and close supervision. . . ."



Reviewing, as an example, the conditions at Nuclear Fuel Services (NFS), a currently shut down nuclear reactor fuel reprocessing plant in West Valley, New York, the prestigious journal of the American Association for the Advancement of Science tells of "workers . . . as young as eighteen and others . . . alleged to have been recruited from bars for an afternoon's work. . . . Some reached legal exposure limits within minutes and were promptly paid off—half a day's pay (at about $3 an hour)—and replaced, in the derisive phrase of a former fulltime employe, by 'fresh bodies.' "

Science asks, "Should there be no limits on the extent to which nuclear facilities may spread the burden of occupational exposure?" but points out that "any sharp restrictions on temporary employment would no doubt cause considerable anguish in the nuclear industry, for indications are that transient workers comprise a large portion of the industry's labor force. . . ."

Typically, a rather rapid succession of workers may replace one another, as each reaches his dose limit for the quarter in turn. The NFS plant manager is reported to have used six men to remove one nut from a bolt.

According to a former NFS employe (who reached his exposure limit and the end of his job in three days), "I

don't recall a lecture about safety procedures as such. Mainly someone told us about the tools we would be using, that we had to remove some particles from the walls and they didn't want to burn out their technicians on the job. "We worked in a team, rotating one at a time. . . . You'd be all alone in there. The technician was outside, on the other side of an airlock and around a corner. . . . I don't know how much supervision is necessary, but I trusted them. I guess I was too dumb to be frightened."

A former NFS laboratory technician recalled, "The prevalent feeling was that these people were nuts for going in there and doing what they did." Said a former laboratory supervisor, "Some were really afraid, and they'd ask a lot of questions. I just tried to talk them into going home, but they wanted the money."

Bernard J. Verna, in the September 1975 issue of the journal of the American Nuclear Society, *Nuclear News*, expresses concern lest within a few years the nuclear industry "run into serious roadblocks due to a lack of available maintenance personnel." He describes a recent episode at Indian Point 1, a reactor owned by Consolidated Edison, New York City's electric utility company. About 1,500 men were used to locate, make welding repairs to, and cover with insulation six four-and-one-half inch hot-water pipes, parts of the plant's steam generator system. Men worked in radiation fields of up to fifteen rems per hour. Even using the maximum lead shielding possible, the welding was done in a six-rems-per-hour radiation field, allowing only about fifteen minutes of actual work per man. Verna points out that supervisors find, not surprisingly, that under such conditions work is done with extremely low efficiency and many errors. Supervision is accomplished largely by means of closed-circuit television.

Almost every union welder in the New York-Westchester area was used on the Indian Point job, after which more were imported. The repair took six months, and cost almost $2 million.

Rancho Seco, the Sacramento Municipal Utility District reactor near Sacramento, California, had budgeted up to $100,000 for the current year for "radiation protection support personnel," to be supplied through a "unit price contract" by Nuclear Plant Services, a national corporation. When SMUD directors approved the contract, they asked their chief engineer whether the competence of all the temporary employes he thought he might need for plant maintenance could be assured, and whether the regular employes' union might not object to all the temporary hirings. The chief engineer merely assured them that those matters would not be problems. He did not explain that the primary qualification for the work was a previously unirradiated body.

We have invested many billions of dollars in a nuclear industry whose maintenance depends on the availability of the services of increasingly large numbers of people whom the industry has not found it convenient, apparently, to inform fully of the peculiar nature of the hazard they incur. It is not clear that the industry would be able to continue if it were actually forced to give its employes a complete explanation of the risks.

The general public is unaware that it is playing genetic roulette by proxy. If it is to be fully and promptly informed of all the terms of the nuclear energy bargain, a substantial educational effort will be required—an effort quite out of harmony with the recently accelerated public relations campaigns of the Atomic Industrial Forum and the American Nuclear Society.

What would be the effect of calling to the attention of the public the fine print in the nuclear energy bargain that has been struck "on its behalf" by agencies composed largely of persons having professional interests in the development of nuclear energy? Knowing that part of the price of nuclear energy is genetic, would people continue willingly to cooperate in exposing themselves to radiation so as to spare regular plant employes—given the availability of other employment? Are we willing to buy nuclear energy with a "reasonable" number of defective children?

Would young, intelligent, well-informed people take temporary jobs exposing them to many times their safe level of radiation? If not, what sort of people would be doing the maintenance work around nuclear reactors, claimed by their proponents to be operated with the most meticulous care used in any industry? What sort of wages should be considered equitable for such work?

Would nuclear industry workers be avoided as marriage partners, as the *hibakusha* have been in Japan? Unlike much social discrimination, such stigmatization would have a rational basis.

The reaction of the public to a candid exposition of the genetic hazards posed by the nuclear industry can only be a matter of speculation at this time. Perhaps most people would share the attitude suggested by Dr. Frank K. Pittman when, as director of waste management and transportation for the Atomic Energy Commission and hence in charge of the disposal of radioactive materials produced by nuclear reactors, he appeared before the Subcommittee on State Energy Policy of the California Assembly in March 1973. Chairman Charles Warren asked whether Pittman would ". . . as a human being feel better about life on earth if we could develop other means of producing electricity than, say, nuclear?" Pittman responded, as recorded in the hearing transcript: "No, I don't think I'd feel any better, and I guess I have to look at this from a strictly personal viewpoint, and that is that for the time I have to remain on earth, it probably won't affect me personally, and so from that standpoint I don't think that nuclear energy—having it or not having it—is going to make any difference. . . ."

One wonders whether humanity has evolved as strong an instinct for the preservation of the species as is needed for its survival in a technological age. □