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COMMENTS ON REACTOR SAFETY FROM LEADERS OF THE MANHATTAN PROJECT

In 1979, Los Alamos National Laboratory began interviewing scientists who were part of Project Y, the Los Alamos effort to produce the first atomic weapons. The interviews form the basis of the Laboratory's Historical Perspective Film Series. Excerpted here are comments from eight interviews, all apropos of the subject of this issue—reactor safety and the accident at Three Mile Island. The producer and interviewer for the films is the Laboratory's Mario Balibrera.

"No accident is beneficial. Three Mile Island was a tragedy. I think the report of the Kemeny Commission has been a very important contribution in trying to run down the real reasons for it. . .The equipment operated better than the people. If they'd left the plant alone, it appears that the accident probably never would have happened. . .No one was hurt and no one got an overdose of radiation, that is true, but it still was a tragedy in the sense that the people there had great psychological difficulties. For the next 10 or 20 years we are going to depend on nuclear energy in very considerable measure. . .I think we'll need the breeder, but not until after the turn of the century. . ."

Robert F. Bacher, Emeritus Professor of Physics
California Institute of Technology

Bacher directed the Experimental Physics Division and, later, the Bomb Physics Division of Project Y.

"Nuclear power is a necessity for all industrial countries. Safety, of course, is tremendously important, and we have to learn from our mistakes. In fact, I don't believe that one can improve safety without having some minor accidents because they will tell you what's wrong, what has to be improved. The Three Mile Island accident was very unfortunate, but we can learn a great deal from it. . .Operators have to be much better trained. . .The controls have to be changed. . .Edward Teller has some other very important suggestions that I think should be incorporated. . .As for the waste, there are many ways to dispose of it, and I am happy that in the last few years, this has received much more attention than it did before. . .Sweden has, in fact, adopted a very reasonable plan. . ."

Hans A. Bethe, John Wendell Anderson Professor of Physics
Cornell University

Nobel laureate Bethe was head of the Laboratory Theoretical Physics Division during the Manhattan Project.

"I'm not an activist, so in principle I'm not in favor of movements for anything. I think public opinion should be expressed through more knowledgeable channels than organized movements. On the other hand, I'm not a proponent of nuclear power. I think there are very real hazards in large-scale development of nuclear energy, the greatest being the matter of proliferation, which maybe we can't stop, anyhow, but I think it's so important that one should try to slow it down. I'm not antinuclear, but I'm not in favor of crash programs or rapid development. The hazards are real, and the thing has to be approached carefully. There are other hazards. . than proliferation. . .Anything man makes has failed sometimes. . .There's Murphy's Law, which hasn't been repealed yet, as far as I know. The other hazard is waste disposal; there doesn't seem to be a good solution to that yet, so I think there are several reasons why one should use some caution, much as we need power. . ."

Edwin M. McMillan, former Director
Lawrence Berkeley Laboratory

Nobel laureate McMillan was a prominent participant in planning and recruiting for the Los Alamos Project.

"I'm astonished that so much attention—to the point of conflict and mass demonstrations—has gone on around a few reactors when there are 30,000 bombs which nobody seems to want to talk about. ..I find that a curious disparity. . .Three Mile Island was sloppily done. . .I hope there are more severe and sensible licensing and operational procedures in the future. . .I think there will be. My own view is that (the reactors) should be operated on a Federal basis, like airports. . ."

Philip Morrison, Institute Professor
Massachusetts Institute of Technology

Morrison was a group leader in experimental physics at Los Alamos from 1944 to 1946.

"All I can say about the antinukes is that I'm flabbergasted because here you have a technology which has a marvelous (safety) record compared to any other technology, whether it's steam engines, railroads, or airplanes. . .It's the safest so far, but the public imagination has been caught by it. The remarkable thing is that in spite of the mistakes made at Three Mile Island, nothing happened, except that the company lost millions of dollars and there was a great show (that was) wonderful for television and the newspapers. My own feeling is that if people don't want nuclear energy, they don't have to have it. . .We can shut down the nuclear plants, and about 10 to 15 years from now, when we miss them, all will not be lost: we can buy plants from France, from Japan, Germany, England. . .It'll cost us more but look at the pleasure we'll have had in not having nuclear energy. . ."

I. I. Rabi, Emeritus University Professor
Columbia University

Nobel laureate Rabi sewed as a consultant to the Los Alamos portion of the Manhattan Project.

"One of the major problems of nuclear power is to get the public to understand the

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situation. My own idea is that we need some substitute source of power and that nuclear power is the only one we have at present that is accessible in a finite time and that one can do. I'm not enthusiastic about nuclear power, but on the other hand, I see absolutely absurd things—people willing to take risks that are a thousand times as big as the risks that nuclear power offers and they don't bat an eye about it; they are very happy about it. But if something has to do with radiation, then everything is unacceptable. . . Because you don't smell it, you don't see it, you don't taste it, so it is a bad thing. People should really be afraid and scared of atomic bombs, which are in the tens of thousands in the armament of the United States, Russia, and in sizeable numbers in many other countries. Now that is a really terrible danger for mankind, of major proportions, and to tell you the truth, to see people being afraid of a nuclear plant when they have ten thousand bombs around in all of these countries. . .It's a little strange. . ."

Emilio Segre, Emeritus Professor of Physics
University of California, Berkeley

Nobel laureate Segre' was a group leader at Los Alamos from 1943 to 1946 and was in charge of measuring the spontaneous fission of uranium and plutonium.

"Nuclear energy is not the whole answer to the energy question, but it's part of the answer if the developing world is to develop. Those who try to tell us that it is too dangerous don't know what they are talking about. They don't happen to know that the big regulated reactors have not cost a single human life. That's a better safety record than that of any other energy-producing industry. We need all of the energy sources if we don't want the Arabs to dominate our economy, and we don't want to be at the mercy of the Russians, when, as it easily may happen, the Russians gain influence and "Finlandize" the countries around the Persian Gulf. . ."

Edward Teller, Senior Research Fellow
Hoover Institution on War, Revolution and Peace

Teller has been and is engaged in advanced work on nuclear weapons and nuclear energy, including the critical period of the Manhattan Project.

"I'm happy that so many people are concerned (about the antinuclear movement). Right after the war I joined the group that set up the Association of Los Alamos Scientists, that then integrated with the Federation of American Scientists. Our first concern was to raise money and then get the attention of other people about this terrible nuclear threat. Now, although I'm pleased to see so many people so passionately interested, I'm a little disheartened at the level of our concern. They don't seem to know as much as I would like them to know and it seems to me that their criticism is, in many cases, hysterical and unthinking in terms of nuclear reactors and nuclear energy, which I believe we need. . .The dangers of that, compared to other dangers, seems to be emphasized out of all proportion. I suppose it was a good thing that Three Mile Island happened. . .It was magnified out of all proportion to what actually went on there, but it showed up psychological problems about the use of nuclear energy that are very real. . ."

Robert R. Wilson, former Director
Fermi National Accelerator Laboratory

Wilson was group leader in cyclotron reseach at the Laboratory in 1943.

ON PETER CARRUTHERS IN OUR LAST ISSUE

I just finished reading the interview of Peter Carruthers and I am all fired up. I was strongly moved by Mr. Carruthers' statements, for that most elementary of reasons—strong agreement. I have experienced a few of the many situations described by Mr. Carruthers, but I have not yet left the Cloistered Academic Halls. Like Carruthers, I see relatively few alternatives in Academia for a doer and a shaker, and the private turf syndrome appears to grow ever more compartmentalized year by year.

Nevertheless, I am still fighting the good fight against the institutionalized inertia, but as Mr. Carruthers has observed, the only significant satisfaction comes from the students. The only way I have ever achieved even a modicum of success in changing Academic Structure, involves that simplest of strategies—just do it. Propose it. Write it up. Make a motion. Prepare a new curriculum. Propose a new division. Most people, I believe, follow simple physical or metaphysical laws. They take the path of least resistance, they minimize their particular work function, they conserve energy. Consequently, by expending a little energy, by doing a little extra work, even Academia can be changed. I know. I have changed a little bit of it. The nagging question is—is it worth the effort? I dream of research and instead I write memos, or papers, or curriculums, or programs, or standards, or books. It is tine for the ego, except for the same nagging doubt. I usually just forget about that doubt, until I read something like Mr. Carruthers' interview, and then I start to think of focusing electron beams utilizing unstable interactions stabilized by adaptive control techniques. Or, I start to devise systems to locate stolen cars. Or, I just start to daydream. Please send me an application to Los Alamos. I'll put it in my future tile to await the next nagging doubt.

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Your comments on articles appearing in Los Alamos Science are welcome. Please address c/o The Editor, Los Alamos Science, Los Alamos National Laboratory, Mail Stop 708, Los Alamos, NM 87545.