July 3, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	
THE DETROIT EDISON COMPANY		Docket No. 52-033-COL
(Fermi Nuclear Power Plant, Unit 3)	)	
	)	
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APPENDIX 2, PROCEEDINGS OF JOINT CONGRESSIONAL COMMITTEE ON ATOMIC ENERGY, SECOND SESSION, ON THE STATUS OF NUCLEAR REACTOR SAFETY, ATTACHMENT TO INTERVENORS' MOTION FOR ADMISSION OF CONTENTION NO. 25

NUCLEAR REACTOR SAFETY

HEARINGS

BEFORE THE

JOINT COMMITTEE ON ATOMIC ENERGY
CONGRESS OF THE UNITED STATES

NINETY-THIRD CONGRESS

SECOND SESSION

ON

THE STATUS OF NUCLEAR REACTOR SAFETY

JANUARY 22, 23, 24, AND 28, 1974

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PART 2: VOLUME I

Phase IIb and Phase III Hearings

I just want to mention I think that other means include conservation. Mr. McCormack yesterday said that "OK, you can introduce conservation, you are on a rising curve, it just brings the curve down once and then you have had it, you can't get any more out of it."

I submit if you were on a rising exponential curve and then we bring it down, say, 60 percent, as I think one can do with reasonable conservation—and that doesn't interfere much with the American standard of living or way of life—and then go on from there with an exponential, then for the indefinite future you are 60 percent below where you would have been, and that is a long term gain.

By the way, if we should come down by that 60 percent, this is much more, considerably more, than what nuclear will be contributing by the year 2000. I think by conservation we can do more to meet the crisis than we can with nuclear.

NUCLEAR WORTH QUESTIONED

In view of the various other reasons for seeing some question about the wisdom of nuclear, particularly the proliferation problem as well as biological problems, I feel we should ask is nuclear worth it, and I come to the answer for the present, no. I believe that we should be learning what the technique holds for us with a very small scale of deployment. I am not sure that alternative sources will be enough for the next century. I think between now and then we should have a very modest program which is almost all research and just a little deployment. It might include a continuation with one or two water reactors of different types, with breeder reactors, one of each of the plausible types and not just the LMFBR.

Beyond that I would like to see as nearly as is politically and economically practical scrapping the entire program. I would like to see no more new starts. I doubt that it is practical to attempt more than that because of commitments made to the people who already have permission to go ahead and who have broken ground. So I would advocate no more new starts except for those very few which are to test a new idea when a new idea comes up a few years from now.

I have been asked today to represent Friends of the Earth, and their policy is to go a little further than that. They call for a complete moratorium now. The difference is not great. I think that my view and the Friends of the Earth policy are not far apart and that the testimony I have given today provides good reason for their stand too.

OTHER ENERGY TECHNOLOGIES PREFERABLE

In advocating a crash program, a real crash program like Mr. Humphries $600 million in the next 5 years for alternative sources, I want to point out how much better it would be in the national interest if we were in a position to export our solar technology, wind power technology and ocean thermal power technology rather than a nuclear power technology which will put every little nation in the world in the business of making dangerous nuclear materials. Dr. Lapp said this morning that he believes that the plants are safe but he thinks we need more of a cushion. I believe they are unsafe and I believe we need more of a cushion. For that reason I favor putting them underground. I believe that there can be a gain going underground because one can get much more than 67 psi containment. I think there is a gain going underground because of the sabotage problem. I do not believe it solves all the problems but it gives us enough of an added safety factor that it is well worth the cost.

Then with the pleas that we should make up for lost time with a crash program for alternatives, and slow down on the nuclear effort which you men have spent so long promoting I will close my remarks.

Representative HOLIFIELD. We are sorry that we don't have more time and that there are not more present but I am sure you will have an opportunity to come before us maybe after the Rasmussen study and give us your thoughts on that.

I might say that I have a task here which has been imposed upon me by the Chairman Price, who had to leave. He asked me to express apologies to all the other scheduled witnesses who could not be heard today. I understand Mr. John West, vice president of Nuclear Power for Combustion Engineering, Inc., has a commitment in New York tomorrow.

Mr. West, are you present?

Mr. NEWMAN. No, Mr. Chairman, he had to leave.

Representative HOLIFIELD. We are sorry that we were unable to receive his testimony orally in light of the outstanding reputation he has in his professional field. Would you like to request the committee that we include his statement in the record and we will read it and send him any questions that we might want to ask him on it.

Mr. NEWMAN. Yes, sir. If I may, I will identify myself. I am Jack Newman of the law firm of Newman, Reis & Axelrod and represent Combustion Engineering. We would appreciate very, very much having Mr. West's testimony included in the testimony as though read.

Representative HOLIFIELD. It is so ordered.

[The prepared statements of Professor Inglis and Mr. West follow:]

PREPARED STATEMENT OF PROFESSOR DAVID R. INGLIS

[My name is David R. Inglis. I am a professor of Physics in the University of Massachusetts. In 1935 I switched from atomic physics to nuclear physics. During the war years I worked at Los Alamos on the first atomic bomb.]My first experience with judging the safety of large nuclear installations was in early 1945 when the highly secret knowledge of the critical mass of U-235 was almost confined to Los Alamos and two of us were sent from there to Oak Ridge to assess the explosive accident potential of the gaseous diffusion plant. From 1949 to 1969 I was a senior physicist at the Argonne National Laboratory. During the first of those years, in addition to my experimental and theoretical nuclear physics, I did some calculations in connection with the development of the boiling water reactor. During all those years I was associated with people developing reactors and know of their hopes and problems. In the early years I fully shared the infectious enthusiasm of the whole laboratory for the future of nuclear generation of electricity. We felt confident in our ability to overcome the obvious difficulties. It was appreciated then, as it must be now, that an efficient nuclear power reactor is an intrinsically dangerous machine, that the long-lived radioactivity it contains before a fuel change is

equivalent to that produced by many atom bombs, ten or a hundred then and a thousand atomic bombs with the larger reactors of today. The potential hazard is far in excess of that from any other industrial installation and it is proportionately far more important that safety be engineered into it as nearly perfectly as possible. A Tacoma bridge might collapse, a vast power grid might fail completely and blackout the Northeast, without disastrous consequences. Not so for a nuclear reactor. It is natural for the designers and users of sophisticated safety equipment to appreciate its quality and to develop confidence.

LIKELIHOOD OF SERIOUS ACCIDENT

Let me explain how my confidence has since been so shaken that I now urge that no further commercial power reactors should be built at the present stage of development and need. One has always tried to imagine every possible combination of circumstances that might lead to a serious accident and to prevent it. A maximum credible accident was formulated, an accident so nearly impossible that one need not protect against it. While there had been lesser malfunctions and indications of insufficient caution, confidence was greatly shaken in 1966 by the Fermi Breeder Reactor accident, more serious than had been declared the maximum credible. For me the piercing impression of this event was second only to seeing the first atomic fireball at Alamagordo. Some people find confidence in the fact that the partial melt-down was contained and the back-up scram system worked just in time to prevent the unpredictable consequences of fast criticality. Others are concerned that the partial melt-down could occur at all in a reactor operating luckily at only one-tenth of full power. While detailed analysis of the accident may be useful, what impresses me most is that a completely unexpected accident, more serious than the maximum credible, can happen and indeed already has happened, this time in a unique part of the U.S. industrial nuclear energy program, through faulty construction despite the usual careful engineering and regulation. This is only the most severe, to date, of many instances demonstrating how various combinations of human and mechanical error can upset the delicate balancing act involved in keeping a reactor running at a steady level.

In view of the radioactive catastrophe that could ensue from failure of pressure systems, it is disquieting also that a plant could be put into operation after its welds had been competently questioned and that in it a failure of a pressure system did occur, fortunately not involving radioactivity and only killing two workers.

While redundency is built into control systems with admirable care so that if one component fails another should perform its function, one worrisome possibility of cataclysmic accident is what is known as common-mode failure. This means failure of all parallel elements of a redundant system at once because of some unsuspected common dependence on a single circumstance. Common-mode failures have occurred, fortunately not where they had serious consequences.

Though the pathologic and genetic consequences of almost routine releases from various parts of the fuel cycle are not trivial, the main fear is of that hopefully rare accident that might release a large portion, and at least the gaseous fraction, of the radioactive burden of a reactor core, either by melting through the bottom containment in a water-moderated reactor or with dispersal in the low atmosphere by some perhaps autocatalytic explosive mechanism such as evades complete analysis in the case of the LMFBR. The likelihood of such an accident cannot be assessed with confidence and some estimates that have been given, such as one such accident in a million or even in ten billion reactor years, are based, I submit, not on experience or even reason but on mere hope coupled with a determination to proceed. The track record of the industry to date makes it unlikely that the correct figure is as great as one such accident per hundred reactor years of operation, or several such accidents per year with the many reactors projected by the year 2000, but it proves no more than that. In the light of the modes of possible failure here mentioned I suggest that the arbitrary figure of one per thousand reactor years would be a reasonable basis for value judgements.

As data and some limited experience have accumulated during the years, a growing awareness of this danger, of the biological and indeed environmental consequences of fairly low levels of radiation, of the difficulty of providing adequate safeguards against proliferation and of the frequency of terrorist

acts all have led me to urge you to institute an immediate moratorium on the construction of nuclear power reactors. This is also a tenet of the organization "Friends of the Earth" for which I speak here.

UNDERGROUND SITING

I appreciate that this calls for a rather drastic change of course of this important committee and there is some chance that my recommendation might not be followed. In the event that, despite my urging, authorization of further reactors should continue, I earnestly plead that in the interest of the strength of the nation and the safety of its people these reactors be authorized only deep underground. While a seemingly drastic alteration of present practice, this is a worthwhile and entirely feasible requirement. Reactors have been built underground in Scandanavia and in Switzerland. Underground installation of the turbogenerator component is a common practice in this country in hydroelectric and pumped storage facilities. In 1957 at Argonne Dr. G. R. Ringo and I tried to convince the AEC to make this requirement then when industry was just entering the field. We wrote an internal discussion paper "Underground Construction of Power Reactors", ANL–5652, pointing out some of the advantages and including our estimate that this would not increase the cost of a nuclear power plant by more than about five percent. There was some interest at AEC headquarters and Dr. Christian Beck there followed up our paper with an engineering study on underground construction of an existing power reactor, AECU–3779. His cost estimate agreed with ours. However, this was just when the AEC was seeking to induce industry to enter the field. It was the year of the Price-Anderson Act that had this purpose. In retrospect it seems likely that this was an important reason contributing to the AEC decision not to require underground construction. That was tactically a bad time to introduce an additional requirement.

By contrast the present is a good time for it. Industry is "sold" on nuclear. The added safety achieved becomes much more vital as the number of reactors is rapidly increasing.

The last line of defense against catastrophic accident in an above-ground reactor is the steel and concrete outer shell. Underground construction provides much stronger containment both against pressure surges and against projectiles from a bursting pressure vessel. In the event of a meltdown penetrating the bottom the containment of a surface reactor, gaseous fission products seep a short distance into the atmosphere. In a reactor deep underground, the seepage would be greatly reduced, and besides allow more time for short-lived fission product delay. In 1957 we argued that an underground reactor surviving a relatively limited nuclear war would be a great help to an economy trying to rise from the ashes. Today it is more relevant that an underground reactor is less susceptible to cataclysmic sabotage by terrorist groups.

ALTERNATIVE SOURCES

The present energy situation demonstrates the folly of becoming overly dependent on a single vulnerable power source. Unexpected troubles in the present reactor program show that nuclear energy is not the simple trouble-free source we once hoped. Its unassessable potential for cataclysmic accident means that it is vulnerable. One wonders what we would do with other reactors if there were such an accident in one. While it could be a long-term source if the breeder pans out, which is not assured because of its additional accident potential, nuclear energy without the breeder is only intermediate-term. Fusion is a challenging gamble and might be the long-term solution. Unexpected troubles with fission reactors make one wonder about future fusion performance even if it does achieve technical feasibility.

We have been very remiss these last two decades in not developing solar power, wind power, ocean-thermal power and geothermal power in parallel with nuclear power. They have great promise and must at least be part of the ultimate long-term solution. If pursued with a crash program now, I have confidence that at least one of them would be making substantial contributions to our power needs in less time than it takes to acquire a new nuclear reactor. The estimate of thirty years claimed by some depricators is unrealistic unless one assumes recent low levels of support. The technology for large-scale windpower is ready to go. The first-generation pilot plant fed over a megawatt into the power grid of central Vermont in 1945. As a demonstration it was a success, eventually failing because of wartime material shortage. That was just