nuclear activity turn themselves "on" and "off" and may last from a few minutes to several days. The effect is not as yet understood.

Summary

The above list is long, but all of these observations are either well documented or are being prepared for peer review and publication. In most cases, the scientists cited are continuing their investigations, and therefore, the name should be used in any literature research. To those scientists working in the new and exciting field of cold fusion, these are the facts that they have observed. These scientists are rapidly expanding the facts about cold fusion and relation phenomena.

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Experiments show anomalies occurring

The remarks excerpted below were delivered at a press conference following a workshop on Anomalous Effects in Deuterated Materials sponsored by the National Science Foundation and the Electric Power Research Institute on Oct. 18, 1989 in Washington, D.C.

Dr. Paul Werbos, National Science Foundation. The idea for this workshop originated in some conversations between EPRI and NSF months ago and then we decided we needed some very highly credible people, who were balanced, to chair the panel. We were very delighted that John Appleby and Paul Chu from Texas A&M and from the University of Houston agreed to serve as the chairmen. You probably have all heard of Paul Chu's work in high-temperature superconductivity, and you've probably heard of John Appleby's work in fuel cells, [which] is internationally known and very well recognized. It was their responsibility to lead the technical members of this workshop to produce conclusions we would find useful. The session was not very widely publicized in advance, for a number of reasons. First, we were not seeking publicity. Our goal was just to have a small, little research planning session—the kind of thing NSF does every day of the week, and the goal was to try to assess the general state of the field. Even more importantly, to figure out what kinds of new research might or might not be justified in this area. This workshop was not intended to be an endorsement of cold fusion. It was not intended to be a debate about the reality of cold fusion. NSF does not have an official position of whether cold fusion is or is not real. . . . The statement was written jointly by John Appleby and Paul Chu. . . .

Dr. Thomas Schneider, Electric Power Research Institute. [W]e were not asking participants to address questions about practical usefulness of the phenomena. Indeed, meaningful speculation on that topic is just not appropriate at this point. We do not have enough information to really pursue that topic. In fact, the phenomena reflect a lack of understanding about aspects of both electrochemistry and physics which

are in themselves important questions. The focus of the meeting is to address these phenomena and seek and understand what is happening and provide some suggestions for directions for future work.

Statement of the workshop, presented by Dr. Paul Chu, Texas Center for Superconductivity, University of Houston. The anomalous effects reported in the metal-deuterium system are interesting. NSF and EPRI decided to hold this workshop in the last two and a half days to invite scientists who have direct and related experience in the research to assess the experimental status, to identify the experimental issues, and to determine possible future research needed to clarify these issues. In this respect, the meeting has been very successful.

New, positive results in excess heat production and nuclear product generation have been presented and reviewed in a logical, frank, open, and orderly manner. Based on the information that we have, these effects cannot be explained as a result of artifacts, equipment, or human errors. However, the predictability and reproducibility of the occurrence of these effects and possible correlations among the various effects, which are common for the accepted, established scientific facts, are still lacking. Given the potential significance of the problem, further research is definitively desirable to improve the reproducibility of the effects and to unravel the mystery of the observations.

We would like to point out that a large volume of experimental data has been presented and various models proposed. Although a brief summary has been made as you will hear later directly from Dr. George Miley, our subcommittee chairman, it would take time to determine specific detail steps needed to improve the overall understanding of the effects. The co-chairmen and the subcommittee chairmen will work closely with scientists in the field in the next few weeks to prepare a formal report of this workshop to address the charge that NSF and EPRI have given to the workshop.

Dr. John Appleby, Texas A&M. It was very gratifying to have the presence of Dr. Edward Teller, the dean of nuclear physics, at this meeting [the workshop] and to get some of his reactions to the data that were presented. . . .

I would like to point out that the use of the expression "cold fusion" has caused a great deal of confusion in the press and elsewhere. The reason for that is that cold fusion is really a fairly well-known phenomenon, involving normally the fusion of two deuterium nuclei catalyzed by heavy negative particles called muons. For that, the theoretical basis is relatively well-known. That is clearly not what is perhaps happening in the case of the experiments on palladium and deuterium in the presence of lithium. We don't know what it is. We are not sure if it is a chemical or a physical phenomenon. One could argue, perhaps, either way, and there are people who participated in the workshop who are definitely still sitting on the fence. I prepared a few short statements of my own. . . . These are my basic conclusions.

I said already that we are happy that our results are showing that there is something strange going on, and we have found that other people have confirmed those results, and those of Fleischmann and Pons. . . . There is evidence that the appearance of high levels of tritium, which has been noted definitely by two groups, may not be an artifact. . . . I would like to point out that if tritium turns out not to be an artifact in this system, that means that nuclear phenomenon are involved. There is no other explanation. Notice, I did not say fusion phenomenon.

Future work requires more understanding to make knowledge of the process systematic. That will require energy and product balances, and it must also determine the precise significance of palladium and its surface conditions, of lithium and of deuterium. We want to know if other things are involved, if any changes take place. There is no evidence that any process taking place can serve in energy devices at the present time. However, that of course, is based on our present and very limited knowledge.

If confirmed, the events are of great scientific interest and they are difficult to account for by the present state of chemical or physical knowledge, which, of course, is disconcerting, and quite clearly, if we have to explain anything, we would prefer to stay within the framework represented by present knowledge of chemistry and physics. We do not want to rebuild the whole system, or even attempt to do so, based on phenomenon that are not yet understood. Those broadly, were the conclusions of the meeting.

Statement of Dr. Edward Teller, read to the press conference. Numerous interesting and partially contradictory results on cold fusion are in disagreement with the solidly established nuclear theory of fusion. There is a possibility to reconcile the results with the theory, assuming that the deuterons act as neutron donors with various materials (other deuterons, or lithium, or palladium) acting as neutron acceptors. The neutron transfer by direct exchange is prohibited by the Gamow penetration factor, but a catalytic transfer of neutrons might be possible. It is conceivable that the catalyst could be an as-yet-undiscovered neutral particle.

It is proposed that U-235 be tried as a neutron acceptor because of its great energy release and of its characteristic response to neutron absorption. One may also try to replace deuteron in its role as neutron donor by beryllium nuclei.

It is recommended, in recognition of the high-class work that yielded surprising results, that the effort be supported in order to obtain clarification, whether the results are due to sophisticated difficulties in the experiments, or whether a new phenomenon is involved. An example of such a new phenomenon has been proposed above without claiming that this indeed is the explanation of the results.