



## Department of Energy

Office of Scientific and Technical Information

Post Office Box 62

Oak Ridge, Tennessee 37831

August 10, 2016

Re: OSTI-2016-01064-F

Dear Mr. Ravnitzky:

This is in final response to the request for information you sent to the Department of Energy (DOE), Office of Scientific and Technical Information (OSTI) under the Freedom of Information Act (FOIA), 5 U.S.C. 552 on June 22, 2016.

You requested a "copy of records, electronic, or otherwise, of each letter TO and FROM universities, companies, and organizations, from the OSTI 'cold fusion' documents collection." On July 11, 2016, you were emailed an interim response letter informing you of the need for OSTI to obtain release authorization from the Department of Energy. OSTI received notification to release the letters to you in their entirety on August 8, 2016. As a result, OSTI is releasing 72 cold fusion letters in this mailing on a CD-ROM because of the volume and file size of the PDFs.

In addition, there are approximately 13 letters that are currently being reviewed by the DOE's General Counsel Office (GC) for release or redaction. Upon receipt of guidance from GC, OSTI will release in whole or in part.

This decision, as well as the adequacy of the search, may be appealed within **90** calendar days from your receipt of this letter pursuant to 10 C.F.R. § 1004.8. Appeals should be addressed to Director, Office of Hearings and Appeals, HG-1, L'Enfant Plaza, U.S. Department of Energy, 1000 Independence Avenue, S.W., Washington, D.C. 20585-1615. The written appeal, including the envelope, must clearly indicate that a FOIA appeal is being made. You may also submit your appeal to [OHA\\_filings@hq.doe.gov](mailto:OHA_filings@hq.doe.gov), including the phrase "Freedom of Information Appeal" in the subject line. The appeal must contain all of the elements required by 10 C.F.R. § 1004.8, including a copy of the determination letter. Thereafter, judicial review will be available to you in the Federal District Court either: 1) in the district where you reside; 2) where you have your principal place of business; 3) where DOE's records are situated; or 4) in the District of Columbia.

You may contact OSTI's FOIA Public Liaison, Charlene Luther, Office of Preservation and Technology at 865.576.1138 or by mail at the Department of Energy, Office of Scientific and Technical Information, 1 Science.gov Way, Oak Ridge, TN 37830 for any further assistance and to discuss any aspect of your request. Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services they offer.

The contact information for OGIS is as follows: Office of Government Information Services, National Archives and Records Administration, 8601 Adelphi Road-OGIS, College Park, Maryland 20740-6001, e-mail at [ogis@nara.gov](mailto:ogis@nara.gov); telephone at 202-741-5770; toll free at 1-877-684-6448; or facsimile at 202-741-5769.

If you have any questions about the processing of the request or about this letter, please contact Madelyn M. Wilson at

Sincerely,



Madelyn M. Wilson  
FOIA Officer  
DOE OSTI  
1 Science.gov Way  
Oak Ridge, TN 37830

October 25, 1988

Professor Stanley Pons  
Department of Chemistry  
University of Utah  
Salt Lake City, Utah 84112

Dear Professor Pons:

The reviewers of your proposal, "The Behavior of Electrochemically Compressed Hydrogen and Deuterium," submitted their reports, copies of which are enclosed.

As you see all reviewers, except Reviewer #4, express some reservations with regard to the proposal. Do you think you can convincingly respond to their concerns?

Once you have had a chance to study the reviews, please give me a call so we can discuss any further course of action that may be appropriate.

Sincerely,

Ryszard Gajewski, Director  
Division of Advanced Energy Projects  
Office of Basic Energy Sciences, ER-16

Enclosures:  
Reviewers' reports

## **DISCLAIMER**

**Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.**

New Energy Times

REVIEW OF PROPOSAL: "The Behavior of Electrochemically Compressed Hydrogen and Deuterium", by S. Pons and M. Fleischmann

COMMENTS ON THE PROPOSAL

1) Statements such as "the resulting calculated pressure is on the order of the measured rise in chemical potential, approximately  $10^{27}$  atmospheres" (page 2) demand support: where are the calculations? In general, theoretical calculations are strikingly absent in the proposal.

2) The authors tantalizingly claim an "increase in the background radiation count in the lab" (page 6) during an experiment, suggesting the occurrence of nuclear fusion. What kind of radiation was observed? How was the radiation detected? Was the radiation consistent in type and energy with p-d or d-d fusion? These points should appropriately be addressed to permit evaluation of the merits of the proposal.

3) The proposed work includes "radiation measurements" (page 10). Unfortunately, the method of making these measurements is not discussed although it is central to the investigation, since detecting neutrons and/or gamma radiation of the proper energy would be a clean signature for fusion reactions.

4) If significant radiation is anticipated in the research, safety measures must certainly be elaborated.

5) If a paucity of theoretical justification and information on radiation is a weakness in the proposal, certainly the electrochemical/calorimetric approach is amply defined and explained. The researchers appear to be well-qualified in this area.

6) "We believe that the results we have obtained so far are a strong indication of a progressive increase in the fusion of D nuclei in the Pd-lattice with increasing chemical potential (= compression). While there are alternative explanations of the excess heating effects, their possibility does not seem to be very likely." (p. 6) Please, what are the other explanations and why are they unlikely?

7) "The experiments will take longer than our previous experiments in view of the greater thickness of the rods compared to the sheet electrodes. It will take approximately 12 months to charge a 2cm diameter rod to saturation with deuterium." (p. 7) Could not the time required be drastically reduced by heating the rod in a pressurized deuterium environment?

8) Since no references are cited, one wonders if a thorough

literature has been done. In particular, publications by C. Van Siclen and S. E. Jones (J. Phys. G, 12 (1986) 213-221) and by B. A. Mamyrin and I. N. Tolstikhin (Developments in Geochemistry 3: Helium Isotopes in Nature, New York: Elsevier, 1984) could be relevant.

In conclusion, I find the proposed research to be very intriguing and consistent with the direction of the Advanced Energy Projects Division. The personnel are evidently well-qualified and competent in electrochemical techniques. However, the proposal has a number of weak areas as delineated above that should perhaps be addressed.

New Energy Times

I have carefully studied the proposal submitted by Dr. S. Pons from the University of Utah, entitled "The Behavior of Electrochemically Compressed Hydrogen and Deuterium". I am responding as a referee specialized in Nuclear and Particle Physics, and will not comment at the matters related to electrochemical analysis. However I wish to mention that the proposal, even though it refers to pilot experiments, never does clearly commit the author to a certain result.

The proposal addresses the issue pertinent to spontaneous fusion of hydrogen isotopes placed inside a metal lattice. The method of experimental approach selected here is to study excess heat generated by fusion energy. I support in principle the study of the general issue raised in this proposal, but have very grave doubts about the method selected, in particular I am concerned, if it is sufficiently sensitive to find a new effect not formerly observed in an incidental way by nuclear detection methods (fusion neutrons etc).

Since the energy gain from fusion is  $10^7$  times greater than the chemical energy gain, this method would work if fusion rates are some good fraction, say  $10^{-10}$  of the chemical reaction rates. This implies in turn that fusion rates at the level of  $10^{-16}/s$  may be detectable by this method. What is indeed badly missing in the proposal is a more accurate back of the envelope estimate how a hypothetical fusion rate relates to the excess heat and which range of fusion rates would be accessible to measurement in the proposed set up, considering the usual uncertainties of the method. Without such a discussion of this question it is in my judgement impossible to evaluate the chances of success for the proposed work, since we do not know how the expected result would show in other physical environments.

Neither does the proposal indicate what one does if the effect one is looking for, excess heat, is actually found! One can not simply claim "eureka, fusion" . There are many other sources of energy in a complex system considered for this investigation, and there is no attempt made to identify the source of heat. I do not recommend that the funding for this project be based on the present submission. I would like to reserve my final recommendation until I see an addendum or a new proposal in which two matters are put straight:

- 1: which range of fusion rates is measurable in the proposed set up;
- 2: how will the decision be made that any energy excess is of nuclear origin.

New Energy Times



REVIEWER #3

I am sorry, but I find it very difficult to accept the preliminary findings of Pons/Fleischmann. Deuteriums in palladium are not significantly closer together than they are in solid deuterium. Thus if they are claiming fusion in Pd at the atomic length scales typical of this alloy, then they should also see similar results from pure solid deuterium. It is a rather obvious test.

The idea that the environment of palladium (as a host) is playing a role similar to the negative muon in muon catalysis of D-T is rather primitive. If the important quantity is the overlap of deuterium wave-functions, then it is not at all clear that a palladium host does any better than the molecule of deuterium.

So far as the so-called experiment is concerned, the investigators seem to have trouble in doing their energy bookkeeping and suggest that some "excesses" on the order of 10% are due to fusion. There is almost no discussion of possible heat leaks. The authors should be held to account for their statement that their experiment was "accompanied by an increase in the background radiation count in the lab of > 50%. The long term experiments were all terminated at about this time." It is scientifically irresponsible to leave things this way: what radiation? Why wasn't this followed up by the University safety people?

I don't think you should proceed with this.

Reviewer's Report to the Department of Energy  
Proposal by Prof. Stanley Pons  
University of Utah  
The Behavior of Electrochemically Compressed Hydrogen and Deuterium

This is a truly maverick proposal; it is also an outstanding one.

It proposes to study the feasibility of obtaining nuclear fusion in Deuterium by electrochemical compression in a Pd electrode.

There is some very interesting and high-class electrochemistry involved here. And, even though the probability of finding the ideal conditions of particle density / temperature / volume / lifetime is very small and the chances of success remote, the possible pay-off is so large that support in small scale to this project should be given.

Both principal investigators seem to have the necessary qualifications to carry out high-quality research and to be able to judge their results coolly and impartially.

It is a long-shot, with small probability of success. But it involves good science and the remote possibility of enormous pay-off.

Recommendation: support the research on a one-time-only basis. (No renewal unless positive results are CLEARLY obtained)

Review of the proposal, "The Behavior of Electrochemically Compressed Hydrogen and Deuterium" by Stanley Pons.

The concept is, to this reviewer's knowledge, new, and it is most intriguing. If the project were successful, it would constitute one of the most important inventions of the 20th century. The investigators should be encouraged to pursue it.

The project appears to be an extreme limiting case of the high-payoff, high-risk type that AEP funds. The payoff approaches infinity and the probability of success unknown and could be small. The product,  $0 < (\text{payoff})(\text{success probability}) < \infty$ , is quite indeterminate at this point in time.

On the other hand, this reviewer has serious questions about the reported experiment with  $D_2O$  and the process itself.

1. Agreed that 0.8 eV could theoretically produce  $10^{27}$  atmospheres equivalent for  $D_2$ , but what if the reaction,  $2(D^+ + e^-) \rightarrow D_2$  nucleates at imperfections like grain boundaries. Since the tensile strength of Pd is only 2000 atm., the material could blow apart mechanically.  $Pd_2D$  supersaturated with D probably has a lower tensile strength.
2. Agreed on the method of the thermal balance but not convinced that there are not valid alternative explanations for the excess heating effect. The investigators case would be stronger if they repeated the experiment in  $H_2O$  and found no excess heating effect.
3. The alleged increase in radiation count in the lab should be elaborated. Where measured? Is it definitive? Is it attributed to tritium from Reaction 1 at the top of page 2? A more quantitative treatment and correlation with excess heating effect would be in order.
4. Is it possible to get a runaway thermonuclear reaction? A 2 cm diameter, 10 cm long Pd rod converted to  $Pd_2D$  could produce an order-of-magnitude 0.1 kiloton explosion by Reaction 1 if detonated. The investigators are proposing to tread in an unknown region. To quote them, "In our view, calculations (such as nuclear force: quantum: molecular dynamic simulations) would be difficult and ambiguous (indeed perhaps impossible at this stage). In these circumstances it is best to resort to experiment." It would be a shame to lose Pons and Fleischmann as well as the University of Utah campus.