AFFIDAVIT OF DR. WILLIAM BUGG

This confidential affidavit of William Bugg is made in connection with the investigation currently in process at Purdue University. I, William Bugg, being first duly sworn on oath, state that if called upon as a witness, I would be competent to testify as to the following:

1. I am making this affidavit of my own personal knowledge. All of the facts contained in this affidavit are true.

2. I received my A.B. degree in physics in 1952 from Washington University in St. Louis and my Ph.D. in 1959 from the University of Tennessee, where I joined the faculty. From 1969 until 1996, I served as head of the Department of Physics before stepping down to resume full-time research and teaching. My research specialty is high energy physics and I began with nuclear emulsion and bubble chamber studies. Since 1974 I have been involved in the construction and operation of numerous large detector systems for experiments at Fermilab and Stanford Linear Accelerator Center ("SLAC"). I am a fellow of the American Physical Society and previously served IEEE as vice president of the NPSS Administrative Committee and as a member of the Nuclear Instruments and Detectors Committee.

3. I am presently a University user with an office at Stanford University's SLAC facility.

4. On June 6-7, 2006, I visited Dr. Rusi Taleyarkhan ("Taleyarkhan") in his lab with the intent of conducting experiments/analysis using his test cell apparatus and specifying methods used to detect neutron emission.

5. I am familiar with Taleyarkhan's sonofusion studies, and am familiar with detractors of his work, including the claim by Brian Naranjo and others that Cf-252 is causing or manipulating neutron emission data in sonofusion studies by Taleyarkhan and others.

6. I suggested to Taleyarkhan that he invite observers to monitor his experiment in his laboratory. Not having worked with him before and I found him to be cordial and open and accepting of my offer to explore sonofusion results to whatever extent I could practically and reasonably accomplish (i.e., the results of nuclear emissions during self-nucleated acoustic cavitation as reported in their group's Jan. 2006 PRL paper) in his laboratory.

7. I was interested in seeing operation of the acoustic cavitation apparatus and wished to see conduct of a full experimental cycle including a demonstration of bubble implosion and the production of neutrons in a deuterated liquid and comparison with a similar run on an undeuterated liquid sample. I was of course familiar with some of the controversy in the literature and press concerning published papers on the subject and wished to observe and critique personally the procedures used. Since my schedule precluded a long visit I requested a limited demonstration using simple well-understood techniques. Since neutron identification is crucial to interpretation of the results I was interested in use of nuclear track detectors for counting neutrons. These avoid the mastery of rather complex analysis when electronic methods are employed. While I have some experience in such analysis I felt I would not be able in my limited time to conduct the necessary calibrations and cross-checks to fully understand the results. Plastic track detectors, where individual neutron tracks are recorded permanently by etching after exposure, are used routinely by health physicists to measure exposure of individuals to neutrons. They provide a permanent record of the exposure and can be examined microscopically on a track by track basis at any time.

8. Based upon my visit, I found a statistically significant excess of neutrons over the background in the deuterated sample detectors located on the chamber and none in the

undeuterated sample. A report of my effort is contained in "Report of Activities during June 2006 Visit" sent via email attachment by me to Taleyarkhan of Purdue University

9. I am aware of an investigation by Purdue University into Taleyarkhan work but I do not know specifics about that investigation due to its confidentiality which I agree to maintain. I offered to testify in person before any committee on behalf of Taleyarkhan.

10. Authorship vs Acknowledgment and Independence Based upon my years of experience, I believe that receiving review comments from solicited review of one's manuscript does not qualify the person providing the requested assistance for co-authorship. Co-authorship normally requires substantive technical input and/or direct control of the reported work. Unlike in the past when groups of scientists were forced to set up their own apparatus and techniques from scratch, it is commonplace today for scientists to visit so-called "user-facilities" at other institutions where working apparatus and devices are available to conduct experiments controlled by visitors. In such instances, for an experimental study using someone else's apparatus as a user facility, the co-authors would be the ones deciding on how the apparatus would be used, the protocol for ensuring absence of external influences on data, what data to acquire, data processing, data analyses and drawing of conclusions for the specific work being prepared for reporting. Co-authorship is normally by invitation by the lead (corresponding author) and it is the right of the invitee to accept or decline although it is possible that a person not so invited may object if he feels he has made a substantive contribution to the experiment. Acceptance for co-authorship is a voluntary function. Acceptance for co-authorship can depend on circumstances (*e.g.*, if a participant belongs to an organization which does not wish to be revealed, as can happen in cases of national security).

11. It is commonly practiced as a duty as a professional in the field to accept to offer time and advice for reviewing manuscripts when requested by colleagues, both junior and senior. It is not uncommon for reviewers or referees to significantly mark up a manuscript (especially when written by fellow scientists from foreign countries where English is not the mother-tongue). I regularly perform such service for members of the elementary particle group at Tennessee who are of Russian origin.

12. Markups also at times may include extensive and independent evaluation and analyses of data by the reviewers; if errors are found they are pointed out and revised estimates are provided for the author's consideration. The original manuscript authors acknowledge such assistance, guidance and counsel but it is not mandatory. Furthermore, such assistance certainly does not qualify for expecting nor accepting co-authorship.

13. Soon after leaving Purdue in 2006, I wrote an email to Taleyarkhan expressing appreciation for his hospitality, and transmitted my report for use as needed by Purdue University and Taleyarkhan. That report by is mine and I am the sole author. Since then I have spoken about my experiences to the Press when contacted. I have not initiated such contact nor have I entered into any public discussion other than to respond to questions about my actions.

14. I have had only limited interaction with Taleyarkhan which started in 2001 when he, at the suggestion of the Executive Vice-President of ORNL (Lee Riedinger), asked me to offer input on the group's findings on bubble fusion (ultimately published thereafter, in 2002-*Science*) which I did. For the visit to Purdue during June, 2006, I was asked to visit and independently observe for myself if bubble fusion results as published in the 1/06 PRL journal could be confirmed and if I could note any obvious errors or flaws. This included verification

that results were obtainable without use of Cf-252. Taleyarkhan and his staff handled themselves commendably during the visit and I could find no evidence for subterfuge or lack of co-operation.

15. I received no remuneration from Purdue but I was not asked to pay for my housing. I stayed with in a motel with Colin West who paid the bill. I carefully ensured the absence of Cf-252 or other possible sources of neutrons, and oversaw the conduct of experimentation sequences, detector choice and placement for detecting any nuclear emissions from the test cell as well as to monitor for controls and background effects, detector calibrations for efficiency, data acquisition, data reporting, drawing up of conclusions, and documentation of their findings. Taleyarkhan displayed grace, openness and willingness to assist in independent group validation with available resources and to allow me to realize the results for myself with no interference whatsoever.

16. From the brief interactions I have had with Taleyarkhan and his colleagues at Purdue, and especially during the visit to Purdue, I have not witnessed any evidence of unethical conduct by Taleyarkhan or his colleagues, nor has Taleyarkhan ever advised me to do anything unethical.

17. I have indeed followed the bubble fusion controversy since 2001 and have noticed the various facets, especially the human dimension and was fully aware of the various concerns posed by various detractors and supporters of bubble fusion when I decided to go to find out for myself during June, 2006.

18. From my own personal first-hand experience and having observed science conducted world-wide for over 50 years, I believe Taleyarkhan to be a research scientist of the highest integrity and ethics. Extraordinary proof does indeed require more than ordinary

evidence, but in my opinion Taleyarkhan and co-workers have certainly crossed the mark of "ordinary" with no evidence of misconduct.

William M. Bugg

DR. WILLIAM BUGG

SUBSCRIBED AND SWORN TO
before me this 31'st day
of January, 2008.

Pamela J. Carter
Notary Public

My Commission Expires
2/3/10

PAMELA J. CARTER
STATE OF TENNESSEE NOTARY PUBLIC
KNOX COUNTY
My Commission Expires February 3, 2010