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IN THE UNITED STATES DISTRICT COURT

DISTRICT OF HAWAII

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LUIS SANCHO, et al.,)	Civil No. CV08-00136 HG
)	
Plaintiffs,)	AFFIDAVIT OF WALTER L.
)	WAGNER IN SUPPORT OF
vs.)	OPPOSITION TO “COMBINED
)	MOTION TO DISMISS AND FOR
US DEPARTMENT OF ENERGY,)	SUMMARY JUDGMENT”
et al.,)	
)	Date: Sept. 2, 2008
Defendants.)	Time: 10:00 A.M.
_____)	Court: Hon. Helen Gillmor

AFFIDAVIT OF WALTER L. WAGNER IN SUPPORT OF OPPOSITION TO
“COMBINED MOTION TO DISMISS AND FOR SUMMARY JUDGMENT”

I, Walter L. Wagner, after first being duly sworn, affirm, state and declare under penalty of perjury of the laws of the State of Hawaii as follows:

1. I recall and repeat all of my prior affidavits, including my affidavit in support of entry of a default injunction against CERN, my affidavit in opposition to the alleged “*amicī*” obtaining leave to file and brief as *Amicus Curiae*, my affidavit filed concurrently with the complaint and in support thereof, and hereby incorporate same as if they were set forth in full herein.

2. Contrary to the false assertions¹ of the alleged “*amicī*” who seek leave to file an amended *Amicus Curiae* brief, my associates and I have educated ourselves about the extensive analysis that has been done by defendant CERN, and the published literature widely available on the subject. Some of that scientific literature was incorporated in my prior

¹ On page 7 of their original, clerical-rejected brief, attached as Exhibit “D” to my prior affidavit, and on page 8 of its *Amended Brief* it falsely reads: “But the revival of the concern [of planetary destruction] by the Plaintiffs in this case is not well-founded, or even legitimate, because they have, apparently, not educated themselves about the extensive analysis that has been done and the published literature widely available on the subject.” In fact, Plaintiffs and their associates have read all of that literature, and more, and find extensive faults therein, as detailed by other scientists, which criticisms are also included as Exhibits in my prior affidavit.

affidavit as attachments and refutes the literature published by defendant CERN and the unverified claims of the alleged *amici*.

3. In addition to the issues pertaining to the possible production of disastrous strangelets or microblackholes, I have recently had it brought to my attention that an errant beam at the LHC could possibly generate a fusion potential for either the Carbon of the beam-dump, or liquid Nitrogen that is in copious quantity at the LHC, or even the liquid Helium coolant. To review that potential hazard from a beam accident, I have reviewed the literature² and calculations prepared by Dr. Edward Teller, et al.

4. I also attach herewith my Exhibit "A" which is an accident report for the Fermilab accelerator beam for one of its beam accidents in which the errant beam blasted through a length of metal before the beam was dumped. That beam operated at about 1/1,000th the operational energy of the proposed LHC Lead beam, which would easily penetrate into surrounding materials in the event of a serious accident. Additionally attached is my Exhibit "B" which summarizes a radiation hazard analysis from such errant beams. It is included not to show the radiation hazards to personnel [which are minimal, and for which plaintiffs herein would have no

legal standing to complain of], but to show that errant beams and beam quenches are routine occurrences³ at the much lower energy beams of Fermilab, and that one could expect similar magnet quenches, beam loss, and burning of holes through metal into regions of fusible materials at the LHC, particularly during the early commissioning stages.

5. In essence, the conclusion of Dr. Teller in the Konopinski report was that our atmosphere is too thin to engage in a runaway fusion reaction of its Nitrogen if ignition were attempted by a nuclear blast. The rate of the loss of temperature from expansion and cooling of an initiating fireball would be faster than the rate of new energy release from the Nitrogen fusion could raise the temperature, and thus even with the highest of ignition temperatures, such a runaway fusion reaction of fusing Nitrogen nuclei could not take place in our relatively thin atmosphere.

6. Liquid Nitrogen, however, is quite a different story. Liquid Nitrogen is roughly 1,000 times thicker than our atmosphere [density roughly 1,000 times higher], and the safety margin that was present at even

² Konopinski Report, entitled "Ignition of the Atmosphere with Nuclear Bombs", attached as my Exhibit "B" to my prior affidavit.

³ Page 12, Section 4 of the Exhibit: "Occurrence of Beam Accidents in Tevatron"

the highest of ignition temperatures [“safety factor”⁴ of 1.6 for highest temperature ignitions] for ignition of our atmosphere is completely eliminated for Nitrogen in liquid form, since the spacing of the nuclei in liquid form yields a density roughly 1,000 times greater than for the spacing of gaseous Nitrogen in our atmosphere.

7. The “safety factor” is also shown on page 10 of the Konopinski report, top of the page, in which it is shown to be directly proportional to the rate of energy release, and is discussed as plotted in Figure 3, attached as a graph of the “safety factor” versus the ignition temperature, to the Konopinski report.

8. The rate of fusion energy release [dE/dt; or change in Energy over time] is shown to be directly proportional to the spacing of the atomic nuclei [i.e. the density, or thickness of the air] on page 5 of the report, and reads:

“The rate at which the nuclear reactions will produce energy is:

$$dE/dt = N/2 \times d\text{-V-bar} \times Q$$

⁴ This is the “Figure 3” attached as an appendix to the Konopinski report. The curve shows that as the ignition temperature is increased, the “safety factor” diminishes, such that beyond an ignition temperature of 10 Million electron-volts (10 MeV on the graph), the “safety factor” approaches a minimum of 1.6

in energy units per second per nitrogen nucleus. N is the atomic density of nitrogen in air, $N = 4E19$ nuclei/cc.⁵ ...”

9. Because the atomic spacing of Nitrogen in a vat of liquid Nitrogen is about 1,000 times denser, or thicker, than for gaseous nitrogen, the Figure-3 graph of the Konopinski report is skewed by that factor as well, and one can conclude that any temperature high enough to overcome the Coulomb barrier [lowest fusion-ignition temperature, as determined by the repulsion of the nuclei by their positive electric charges] would initiate a self-propagating fusion reaction in such liquid. It is believed⁶ that an errant beam at the LHC [or elsewhere] would easily be able to obtain that temperature if it were to strike those objects. Other types of materials, such as steel [made of Iron] or other heavier metals have no fusion potential, and would simply be melted/vaporized by an errant beam, but not detonated as would be the fusible materials.

⁵ I have converted this to the more standard scientific notation in use nowadays; and changed cubic centimeters to cc; and used the equal sign instead of “approximately equal to” symbolic notation used by Dr. Teller.

⁶ Lawrence Berkeley Laboratories does successful ion-beam fusion studies using energies some one billion times less than the LHC Lead beam, at a few MeV for the ions, compared to the 1,000,000 GeV [1 GeV = 1,000 MeV] of the LHC Lead ion beams.

10. The analysis of the safety hazard of errant beams striking small cylinders⁷ of Nitrogen [each of which cylinders, when full, contain the fusion energy equivalent of approximately a standard 20 Kiloton fission bomb] has not been analyzed by defendants. Likewise, the fusion of Carbon is quite similar to the fusion of Nitrogen, and the safety hazard of an errant beam that is not properly diverged when it strikes the Carbon beam-dump has also not been analyzed by defendants. The Carbon of the beam-dump is roughly 100 times larger than a cylinder of liquid Nitrogen, and the resultant fusion energy release would likewise be some 100-fold greater, in the Megaton range. An inadvertent thermonuclear detonation of either Nitrogen or Carbon, or possibly even the Helium used as coolant for the magnets, would not only destroy the LHC, but also much of Geneva and the surrounding countryside.

11. In educating myself about the hazards of the LHC referenced in the Complaint, I communicated my findings to defendant CERN last year, and received the reply that my concerns were being addressed in a new safety study. That new safety study, the LSAG Report, was only recently

⁷ Standard liquid nitrogen cylinders of typical one foot diameter by four feet in height, usually found chained to walls in racks at hospitals, industrial sites, etc.

released [June, 2008], and agreed that my analysis that concluded that the prior safety reports were faulty was a correct analysis on my part, and attempted to set forth a different line of reasoning to establish safety.

12. The LSAG Report has been seriously undermined by the publications of other scientists⁸, notably by Dr. Roessler, Dr. Plaga, and myself, which show that there are alternative interpretations of existent data which negate the conclusions reached. Consequently, it remains an open question as to whether the LHC will produce dangerous products. The alleged *amici* refuse to educate themselves about the falsifications made of the LSAG Report by noted scientists.

13. The fusion potential of abnormal strangelets, which would utilize the same “strong force” for nuclear binding as for the fusion of two normal Nitrogen atoms to make a normal Silicon atom, discussed above, is greater than the fusion potential of normal atoms such as Nitrogen, Carbon, etc. Consequently, the energy release is greater, and the resultant larger strangelet nucleus becomes more stable than its predecessor nucleus.

⁸ Many other persons who would be properly characterized as trained in science, but technologists, are also in agreement with Dr. Plaga, Dr. Roessler, et al.

14. In normal atoms, fusion of low-mass atoms into larger ones is feasible because the resultant product weighs slightly less than the two atoms from which it is made. The difference in mass ["mass defect"] is what is released in the form of energy [Einstein's formula relating mass and energy]. Such fusion reactions can proceed with small atoms fusing to form larger ones until an Iron or Nickel nucleus is formed. Thereafter, in order to fuse atoms together, an input of energy is required, and the resultant atom weighs more than the two atoms used to make it. That is because the protons of the nucleus repel each other, and with enough protons present, the repelling force overcomes the "strong force" [which equilibrium takes place at about 25-26 protons], making the atom less stable. That means that atoms heavier than Iron or Nickel will instead tend to split apart, or fission, thereby releasing energy; while atoms lighter than Iron or Nickel will tend to fuse together, thereby releasing energy.

15. In an abnormal strangelet atom, standard strangelet theory simply has a strangelet atom becoming ever more stable as it gets larger [because of the stabilizing influence⁹ of the strange quarks], exactly opposite from normal atoms which can only grow to a certain maximum

size¹⁰, whereupon they spontaneously will split, or fission. Accordingly, a strangelet atom, once fusion is initiated, would simply keep on fusing more and more normal atoms to itself, converting it into a larger version of itself, releasing energy, and growing ever larger in a non-stop process.

16. One of the alleged “*amici*”, Frank Wilczek, in the July, 1999 issue of *Scientific American*, argued in response to my Letter to the Editor¹¹ that it was theoretically impossible to create microblackholes. He’s been eating his words ever since, and has now changed his stance, admitting that numerous theorists [myself included] have suggested that a microblackhole is a conceivable theoretical product of the LHC. In that original Letter, I suggested that microblackholes would, according to standard theory, rapidly evaporate via “*Hawking Radiation*”, but I queried whether such theory was correct, stating I was uncertain. I still remain uncertain, as there is presently no experimental evidence to support it.

⁹ The theory is complex, and involves the lower Fermi energy of three types of quarks being present instead of two types of quarks in normal atoms

¹⁰ Uranium-sized nuclei are the largest naturally occurring nuclei.

¹¹ Both Frank Wilczek’s Letter and my Letter were published side-by-side in Scientific American, July, 1999. Dr. Wilczek argued that microblackholes were a scientific impossibility, while I suggested they were possible, but would likely rapidly evaporate via *Hawking Radiation*, but that I was uncertain of their evaporative nature.

17. Presently the GLAST satellite is on a quest to detect “*Hawking Radiation*” from the Galactic Halo. Other methods could be developed to search for and detect *Hawking Radiation*. If *Hawking Radiation* could be established to exist, it would establish safety with respect to microblackholes. If it cannot be established to exist, the safety of the LHC likewise cannot be established.

18. Presently the AMS-2 satellite has been built (at a cost of approximately \$1 Billion), and is scheduled for launch in 2009. It is designed to detect strangelets in the cosmic ray background that impinges on our planet. If it were to detect strangelets, that would establish the safety of the LHC with respect to strangelets. Likewise, other types of detectors could be built and established in space, on the moon, or in our atmosphere for detection of strangelets. If strangelets are not detected in nature, it would be foolhardy to attempt to create them at the LHC [as presently planned] on the mistaken belief that theory proves them to be benign and unable to grow. Theory makes no such proof, and the LSAG Report is likewise faulty on that issue, as discussed in my prior affidavit.

19. The “vacuum instability” theory raised by the alleged “*amici*”, and discussed at great length by them and then dismissed, is not a theory

which is of concern to myself, and I will assume it is disproved, or at least of much lesser concern than the concerns raised herein.

20. The alleged “*amici*” make frequent reference to a lower-energy collider, the RHIC [Relativistic Heavy Ion Collider] at Brookhaven, which attempted to, but was unable to make strangelets, because it did not have enough energy to make enough strange quarks. The failure of the RHIC to create strangelets in no way would preclude the much higher energy LHC from creating enough strange quarks to make strangelets. To argue that because we didn’t make them before at a much lower energy collider, that therefore when we enter into uncharted territory we won’t make them again, is analogous to saying we’ve had 130+ safe launches of the Shuttles and therefore we don’t need to continue doing safety review. Their ‘argument’ is entirely speculative, subjective theory as to what would happen at higher energies, not supportable by physical experiment, and contradicted by other valid theory.

21. The strangelet disaster scenario is not disproved when theorists

such as the alleged *amici* simply assert that it is “unlikely”¹² that they will be formed, or “unlikely” that they will be stable. Those likelihoods are not quantifiable, and are simply the subjective opinions of some theorists that can change [in the same manner that Wilczek’s opinion regarding the possible formation of microblackholes changed] as new information is acquired, or greater awareness of other theories is obtained.

22. While the alleged *amici* expect this Court to rely upon their expertise in certain areas of physics to sway this Court with their allegations of fact, their brief reads much like a promotion of the RHIC [with whom they are strongly affiliated] over the LHC. While the Amended Brief does correct many of the glaring factual inaccuracies of the prior submission, the conclusionary allegations of safety remain unsubstantiated and merely conjecture and opinion.

23. Further, they still falsely assert in their revised brief that the LHC is in many ways much simpler than the RHIC because “The LHC primarily

¹² Page 11 of the “Amended Brief *Amicus Curiae*”, bottom of the page, in which they link what they believe are 3 “unlikely” scenarios required to form dangerous strangelets. They conclude that 3 such “unlikely” scenarios are ostensibly “very unlikely”, without ever attempting to quantify what they mean by unlikely. Two or three unlikely scenarios do not an impossibility make. It was, after all, very unlikely that the cold weather would destroy the Challenger, and very unlikely that the safety tests being performed at Chernobyl would destroy the reactor – almost all parties involved knew that.

accelerates and causes the collision of elementary particles – protons. Only a small proportion of its use involves collision of nuclei.”¹³ In fact, the LHC is essentially almost identical to the RHIC, only much bigger. They both utilize the same type of superconducting magnets chilled with liquid Helium to curve the high-energy ion beams. They both have the ability to accelerate protons [Hydrogen nuclei]. They both have the ability to accelerate heavy nuclei [Gold nuclei at the RHIC, Lead nuclei at the LHC]. They both have the ability to collide those nuclei head-on into each other, which is their sole purpose. The difference is that because the LHC is much larger [longer], it is able to accelerate the nuclei to higher speeds [even closer to the speed of light, giving it higher energy]. That is the sole fundamental difference, the higher energy. What uses are made of the machines are determined entirely by the persons who seek to do experiments – either with protons [light ions], or with heavy ions like Lead.

24. In concluding their comparison between the lower-energy RHIC and the LHC, they assert that “although the LHC operates at a much higher energy level than the RHIC, the likelihood of any of the postulated catastrophes envisaged by the most imaginative physicists is *likely* to be

¹³ Page 12, “Amended Brief *Amicus Curiae*”

no greater than with a nuclear collider.” Again, they use the weasel word “likely” to indicate that they don’t know whether the LHC will be potentially hazardous. This cavalier attitude towards risk is exactly what the plaintiffs are complaining about. They don’t know whether or not the LHC is hazardous, and they simply hope it is “unlikely” to produce dangerous materials such as strangelets or microblackholes.

25. Such wishful, childish thinking, while creative for developing novel theories of physics, has no place in a serious study of safety. One of the alleged *amici*¹⁴, when queried regarding the safety of colliders, responded that it was easy for him to make such assertions of safety, because if he were wrong, oh well, while shrugging his shoulders and laughing, because there would be no survivors to make accusations against him.

26. In conclusion, it is well-established that the LHC would potentially be able to create new kinds of matter, namely strangelets and microblackholes, never before seen on earth. It is also well-established that there is a valid scientific dispute as to whether those new kinds of

¹⁴ Frank Wilczek, in a MIT video conference given circa 2005 that I watched last week, and which is available for repeated review on the internet and elsewhere.

particles would be dangerous, with the persons who draw their livelihood from operation of the LHC arguing that they would likely be safe to make, and other scientists arguing that they might not be safe, with some suggesting that there is a very strong likelihood [50% or greater] that they would be disastrous. Still further, it is well established that risks associated with errant beams and their fusion potential to detonate vats of Nitrogen, or blocks of Carbon, or liquid Helium, have not been analyzed or discussed by any of the defendants.

27. We live in an increasingly dangerous world. We are confronted with global situations of Georgia's recent invasion, and Russia's counter-invasion, of a Georgian breakaway province; of war in Iraq; of war in Afghanistan; of Uranium-235 enrichment by Iran; of Plutonium-239 detonations by North Korea; and the list goes on and on. All of those global risks pale in comparison to the risk of the LHC and its potentiality for global destruction, and this issue deserves serious review through appropriate channels, including NEPA hearings, etc. as requested by plaintiffs, and not simply an internal CERN review by biased parties.

28. It is to be noted that the "Amended Brief *Amicus Curiae*" sought to be filed by the alleged *amici* does not have any affidavits prepared by

the alleged *amici* attached as support for any of the allegations of fact in the body upon which the alleged *amici* seek to rely for their ‘argument’, and does not address the issue before the Court as to whether NEPA hearings, etc. were properly performed.

29. Accordingly, it is respectfully requested that this Court deny the combined motion for summary judgment and to dismiss, and instead enter a preliminary injunction as requested in the complaint against answering defendants.

29. Further, your affiant sayeth naught.

Dated: August 25, 2008

Walter L. Wagner

Subscribed and sworn to before me
this 25th day of August, 2008

Notary Public, State of Hawaii

EXHIBIT "A"
Fermilab Beam Accident Tunneling Through Metal

EXHIBIT "B"
Fermilab Beam Accident Frequency