

FUSION facts

A Monthly Newsletter Providing Factual Reports On Cold Fusion Developments

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FUSION FACTS

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A. DRAMATIC COLD FUSION DEMONSTRATION SEEN BY HOT FUSION SCIENTISTS

By Hal Fox

This demonstration of a "new hydrogen energy" device was **not** a 10% excess heat device with small temperatures differences and subject to questions of accurate calorimetry. This was a demonstration where the output temperature of the flow of electrolyte was several degrees Centigrade higher than the input temperature. For example, during the demonstration, where I checked the data, the flow rates of the electrolyte through the cold fusion reactor was 19.98 milliliters per minute. The inlet temperature was 33.9 C and the outlet temperature was 37.2 C. This calculates to be about 4.26 watts of thermal power being produced. The input electrical potential was 2.98 volts and the current was 0.02 amperes giving a wattage input of almost 0.06 watts. **The ratio of output thermal power to input electrical power was over 70, not 70 percent but 70 times!**

This editor was thrilled with such a cold fusion accomplishment. Often during the past six years criticisms have been ladled onto this publication and the staff for our continued optimistic forecasts for the progress of the new science of cold fusion. Many discussions have been held with scientists who could not, or would not, acknowledge that there really are scientists in thirty countries who have achieved experimental successes in cold fusion experiments. "Bad equipment", "contamination", "improper procedures", "artifacts", "bad science" were the type of demeaning words and phrases flung against this new science. **At present the only thing that all scientists agree upon is that we don't understand, as yet, the theory behind this anomalous excess heat production.** We have a wonderful opportunity to learn more about the real inner world of matter and to find the source of this anomalous thermal power. If there are only **chemical or nuclear** reactions that can possibly explain this scientific marvel, nearly all of those skilled in the art insist that **it cannot be only chemical processes. That leaves nuclear reactions.** What an exciting trail of discovery lies before us!

COMMERCIALIZATION OF NUCLEAR POWER NOW!

This special issue honors all those scientists, engineers, and educators who have labored to solve the world's energy problems. We give special recognition to Dr. James Patterson for his Patterson Power Cell™. We urge all readers to get involved in this new energy development. Funding is available.

This advanced cold fusion demonstration was a part of the exhibits shown at the SOFE '95 (Symposium on Fusion Engineering) held at the Chancellor Convention Center in Champaign, Illinois. Dr. Dennis Cravens has been retained by Clean Energy Technologies, Inc. (CETI) of Dallas, Texas, to work closely with faculty and students of the Fusion Studies Laboratory, Nuclear Energy Program, at the University of Illinois at Champaign-Urbana. This department of the U/Illinois has special equipment for sputtering selected metals onto various other materials, in this case onto small spheres. The spheres were plated with layers of palladium and nickel. The preparation and use of these spheres are a part of the patented invention of Dr. James Patterson, now known as the Patterson Power Cell™. The Patterson Power Cell™ originated from the pioneering cold fusion invention of Drs. Pons and Fleischmann, the exclusive rights of which belong to ENECO, Inc., of Salt Lake City. It is this Patterson invention which has been developed into the demonstration unit provided by the joint efforts of CETI and the University of Illinois. CETI now has five patents covering this system and the methodology for their device and the metal coated spheres.

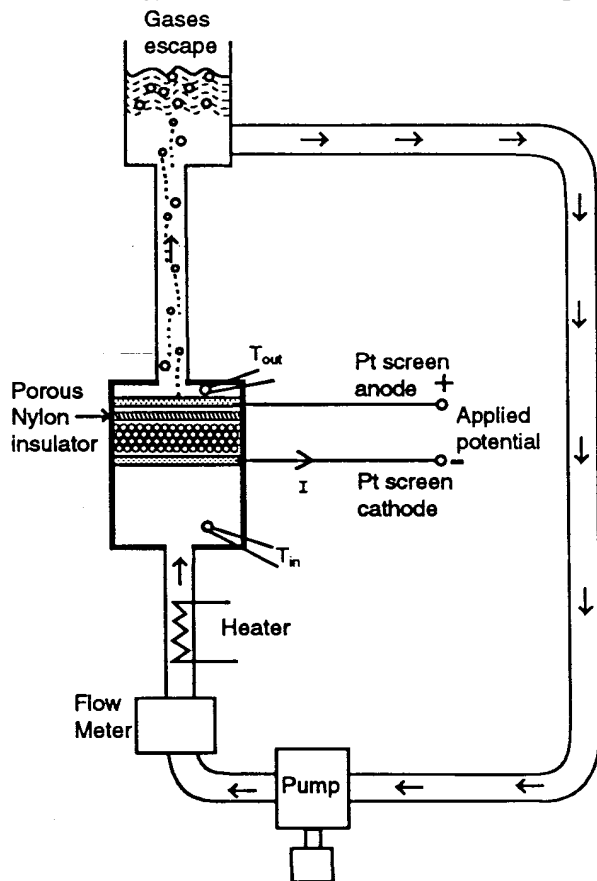


Fig. 1. Patterson Power Cell™ System

In the demonstration, the reactor (the electrochemical cell) used is about four inches long and less than two inches in diameter. In the interior of the cell is a layer of less than one-half inch of metal-plated tiny spheres. Refer to Fig. 1. The electrolyte (about 1 molar lithium sulfate in distilled water) is pumped through the reactor and through the bed of plated beads. A pre-heater is used to control the input temperature of the electrolyte, especially during startup of the cell. The preheated electrolyte moves through the bed of metal-coated spheres. The spheres touch each other and carry the electrical potential from the platinum screen through the whole bed of coated spheres. Thus the cathode of this electrochemical cell is the platinum screen **and the plated spheres**.

The anode of the cell is also a platinum screen separated from the bed of beads by a porous Nylon insulator. Without the insulator, the metal-plated beads would short the cathode to the anode. During operation, the application of an electrical potential and the resulting electric current causes the electrolyte to be disassociated into hydrogen and oxygen. Some of the hydrogen ions (protons) enter into the nickel metal layer **and also, presumably, into the underlying palladium layer**. In Fig. 1 the electrical flow is shown as **current flow**. By definition, **current** flows from the positive pole of the battery (or power supply) through the external circuit and back to the negative terminal. Hydrogen ions and Li ions, being positively charged, flow in the direction of the electrical **current**. The **electron** flow is in the opposite direction. Therefore, electrons flow out of the beads, into the electrolyte, to the anode, and carry the negatively charged oxygen ions and sulfate ions toward the anode of the electrochemical cell.

The nuclear reaction (presumed) on or near the surface of the plated beads, forms heat and that heat is conducted into the electrolyte which flows upward in this diagram. The oxygen and unused hydrogen is allowed to escape from the electrolyte into the atmosphere. The electrolyte, which contains lithium sulfate in about a 1 molar solution, circulates back through the pump, through a flow meter, and through the pre-heater back to the reactor. Thermocouples (K type or standard mercury thermometers) can be used to measure the inlet and outlet temperatures to the reactor. These are shown in this diagram as T_{IN} and T_{OUT} thermocouples.

In discussions with Dr. Cravens during the demonstration, the following information was obtained: When the reactor is first turned on, it takes from a few minutes to a few hours before excess heat is produced. Refer to Fig. 2. If the current is slowly raised (by increasing the voltage, for example), the excess thermal power output soon exceeds the input power (potential times current). As the current is slowly increased, a point is reached where the current is optimal in terms of achieving a maximum Power Amplification Factor. Power Amplification Factor is merely the ratio of thermal power

(calculated in watts) to input electrical power. Typically

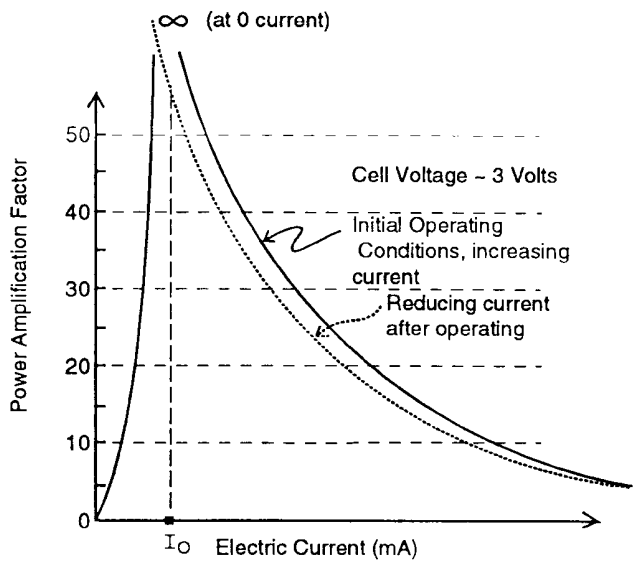


Fig. 2. P.A.F. versus Current

(dependent on many parameters), this type of electrolytic cell ranges from 10 to over 400 in terms of the power amplification factor. One would expect that if the input electrical power is increased that the output thermal power should increase. There seems to be a limit in that the reactor bed of plated spheres can only use so many hydrogen ions. If more current is used, the hydrogen bubbles up and escapes, **therefore, as shown in Fig. 2, the power amplification factor gradually decreases with an increase in cell current.**

Continuing with Fig. 2, if the cell has been operated for some time at high current levels and the current is decreased, the power amplification factor (PAF) can go to very large values. The explanation is that the protons "loaded" into the surface platings of the spheres will continue to supply protons for the nuclear reaction, **even after the current applied reaches zero.** Obviously, if any thermal power is being produced with zero current, by definition the PAF can become increasingly large (dividing by zero). It will take a lot of operating data before this residual thermal power production is fully delimited. Some of the experimental parameters will probably involve the ratio of the thickness of the underlying palladium layer to the overlaid nickel plating. One would hypothesize that a thicker palladium layer would take longer to load (initially) but would sustain the production of residual power for longer time periods. As a matter of experimental data, this residual power production has continued for minutes and hours. It is not a short-lived effect. Also, after resumption of current flow, the cell is soon operating at optimal levels.

If one desires to design a light-water, lithium-electrolyte, cold-fusion, electrochemical reactor that will produce more thermal power, what are the design parameters? This question cannot be fully answered, as yet. However, as shown in Fig. 3, one of the obvious changes is to make a reactor with a larger diameter to increase the size of the bed of plated spheres. It is quite obvious that one would expect the power production to increase with the square of the reactor diameter (within reason). As shown in Fig. 3, this is the type of power output curve versus cell diameter that one would expect. Obviously, the cell current will increase. However, the current per unit area of the spherical surfaces would be expected to remain a constant. If nothing else in the cell design were changed, one would expect to get essentially the same increase in electrolyte temperature through the cell (but an overall increase in volumetric flow and the transporting of more heat power).

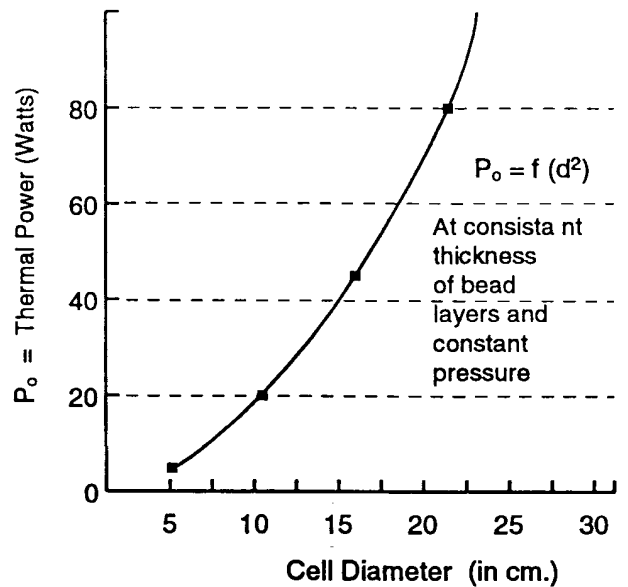


Fig. 3. Power output versus cell size

The next concept concerns the production of a higher thermal power output. Just raising the temperature of the electrolyte by a few degrees is not the answer to commercialization of this product. As shown in Fig. 4, it has been determined (but not fully explored) that the power amplification factor also increases with an increase in the temperature of the electrolyte. If we are fortunate, we would get a linear (straight line) increase in power output as we increase the temperature of the cell operation. Temperature is defined as the root mean square of the random motion of the molecules. Therefore, higher temperature means a more energetic motion of the electrolyte, including in the vicinity of the cathode of nickel-plated spheres. If the reaction is a process where nuclear reactions are catalyzed, one would not be surprised to find an increasing effect with increasing temperature.

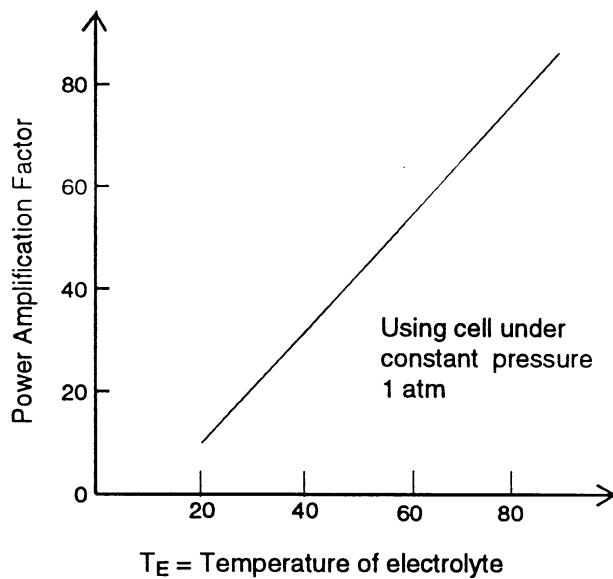


Fig. 4. P.A. F. versus Temperature

Another concept to be considered is the effect of having the cell operate under increasing pressure. If the effect is a catalysis of nuclear reactions, then we know that a small electrical potential has an enormous effect on the diffusion of protons into a metal lattice (provided the lattice is not opaque to proton diffusion). As a first approximation, we would expect that the power amplification factor would not be much changed by an increase in pressure. **However, we do know that by increasing the pressure, we can increase the temperature at which the electrolyte boils. Therefore, we can operate at higher temperatures, within limits.** This function has been verified up to 150° C. The limit is probably the stage at which there is no longer a liquid-vapor interface. At a critical temperature of about 700 degrees F for water, we have only hot steam. As a result, we would expect that the temperature, and therefore the pressure, would be limited by this critical pressure/temperature relationship. However, at 700 degrees F, we have achieved operating temperatures that have many commercial applications such as distilling, sterilizing, cooking, and space heating.

Obviously, there are many cell parameters to be explored before we fully understand the limitations and the capabilities of the Patterson Power Cell™. There will be many technical papers written about this advanced cold fusion or "new hydrogen energy" patented device.

WHAT ARE THE SUPPOSED NUCLEAR REACTIONS?

As yet, we do not fully understand the precise nature of the supposed nuclear reactions. One hypothesis is that the protons (hydrogen ions) combine with the lithium under some type of

nuclear catalysis. For example, $p + \text{Lithium-7}$ could produce Beryllium-8 which is highly unstable and splits into two alpha particles (Helium-4 ions). This is a highly energetic nuclear reaction and would produce considerable heat.

Some may expect that high-energy gammas would be produced. However, it has been shown that gammas are not permitted, by classical physics, under certain conditions found in or near a metal lattice. The allowed event is somewhat similar to a Mossbauer effect in that the gamma becomes a shower of phonons which are taken up by the entire local lattice. The energy of the phonons increase the temperature of the metal lattice. Thus the only measurable "nuclear ash" is the increasing amount of helium-4, which may be difficult to measure due to the potentially contaminating presence of helium-4 in the atmosphere. However, for commercial development to be achieved, **we don't have to understand the details of the nuclear reactions.** In the interest of science, we must learn to understand what is going on in this very real, and very practical "new hydrogen energy" device.

EDITOR'S NOTE: Companies interested in developing and/or commercializing cold fusion devices should investigate the licensing requirements. ENECO'S pioneering Pons-Fleischmann patents broadly cover devices that use "isotopic hydrogen in a lattice material to produce excess energy."

Call Fred Jaeger, President of ENECO at 801/583-2000 or Fax 801/583-6245. Additional licensing requirements may be required from other entities. For Patterson Power Cell™, contact Jim Reding at 214/459-7620 or Fax 214/458-7690.

B. AN OPEN LETTER TO THERMONUCLEAR SPECIALISTS

Dear Energy Expert,

We do not rejoice that the budget for further thermonuclear work has been halved. We do offer you an alternative: Your help is needed in the continuing effort to solve the world's energy problems. Historically, from wood to coal to natural gas and even electric furnaces, we have solved the problems of heating our homes. You know, far better than the average citizen, that we must now move from the use of fossil fuels to new energy sources. You are an expert who does not need convincing of that fact. We must either solve the energy problems or pollute the world. **Over 300 million dollars is being committed to this task by private investment groups. It is our judgement that by the end of 1996 there will be considerably more funds being spent on cold fusion than on all of the thermonuclear projects.**

This letter is a testimony to you that there is a real alternative energy system and that your skills are needed to commercialize one or more new energy products. Over the past six and one-half years I have read and reviewed more than 2,500 papers on cold fusion and related topics. Over 600 papers, either peer-reviewed or presented to peers at technical conferences, report on the measurement of one or more nuclear byproducts (neutrons, tritium, helium, gammas, x-rays, and heat) from low-energy nuclear reactions. Some of the best scientists in 30 countries are included in the list of authors of these papers. Over 200 laboratories have been successful. **I have personally visited laboratories in Russia, Belarus, and in the United States and have witnessed (and have sometimes reproduced in our own laboratory) several methods of producing nuclear reactions in relatively low-energy systems.**

At the recent SOFE '95 exhibit hall, you saw (or could have seen) a working cold fusion device that was producing thermal power equal to more than seventy times the input electrical power. **My engineering calculations show that a 20 megawatt plant would be about the size of two basketball courts and about two stories high, if designed around this new technology.**

However, I'm not sure that this is the direction that we ought to go. You are aware that we produce fewer main-frame computers -- we now have distributed data processing. Almost every professional has a personal computer. **I believe that the next step could be distributed energy systems with every home owner having the choice to replace his/her natural gas- or oil-fired furnace with a non-polluting, heat-producing cold fusion furnace.** We don't have all of the answers yet, but it appears that a commercial system can be designed so that maintenance will only have to be done on an annual basis. The fuel is probably lithium and hydrogen. (${}^7\text{Li} + p = {}^8\text{Be}^* = 2 {}^4\text{He} + \text{thermal energy}$. Phonons, not gammas, couple energy to the metal lattice).

WE NEED YOUR HELP.

In addition to a lot of parametric studies, which are now being funded by several American corporations, we need a great deal of engineering testing and designs. Here are some systems that need engineering design:

- Sewage sterilization.
- Water purification.
- Greenhouse heating and air conditioning systems.
- Distillation apparatus.
- Heaters for steam jackets for cookers.
- Heaters for commercial fryers.
- Hot air heaters for homes, offices, industry, and vehicles.
- Water heaters.
- Snow removal systems.
- Steam generators, etc.

THE MARKET SIZE FOR NEW ENERGY SYSTEMS IS \$5 TRILLION ANNUALLY.

The market for new energy systems is far greater than the total electronic industry! There will rapidly be an enormous need for educated scientists, engineers, inventors, and technicians to support the design, manufacturing, marketing, and installation of these systems. Again, we need your help. **You, who attended the SOFE '95 conference already have much of the background knowledge that is required for this important new energy development.**

The Fusion Information Center is establishing a database of persons and institutions that can further the development of this energy technology. At the present time there is only one college or university (known to me) that teaches any cold fusion topics. There are only seven colleges or universities in the U.S. that are doing any cold fusion research. There is no database of businesses and personnel who have qualifications in this enormously important technology. By contrast, in Japan there are over 90 colleges, universities, and research groups working on cold fusion! **As the world's leading fusion information center, we cannot fill the requests that we are receiving and will be receiving for qualified companies and personnel!**

If you can serve as either an employee or a consultant please send us your resume as a scientist, educator, engineer, technician, inventor, designer, business entity, etc. All data will be kept confidential except enough to target your expertise. Inquiries will be sent directly to you for your response, unless you instruct us otherwise.

Hal Fox, President of FIC

C. THE SOCIOLOGY OF SCIENCE

Courtesy of Professor C.E. Singer

Clifford E. Singer (Nuclear Engineer Dept., Univ. Illinois), "Comments on the Low Temperature Fusion Session at the 16th Symposium on Fusion Engineering," personal communication.

AUTHOR'S PAPER - [EDITOR'S COMMENTS]

[Professor Signer's paper was distributed at SOFE'95 after the Monday evening, October 2, 1995 panel discussion on cold fusion by Drs. Edmund Storms, Dennis Cravens, Yeong Kim, and Howard Birnbaum (the token cold fusion opponent).]

As technical program chair, I resisted inviting people who had made strong attacks on cold fusion advocates to this session. Instead, I invited a sociologist well versed in this area in the hopes of shedding more light than heat on the topic, but my

confirmation of the time slot came after he had another commitment. I agreed to the scheduling of this session in part because the research I've done for an upcoming paper on scientific methodology in controlled fusion research suggested that the entire field might have something to learn from the cold fusion controversy.

While I'm not a career expert in the sociology of science, I have been deeply involved enough in methodological problems related to hypothesis testing and fusion commercialization that I thought I might be able to partly make up for our missing speaker.

There are basically two hypotheses concerning why over 2,000 research works have reportedly been produced on the cold fusion question. [FIC has collected, read, and published reviews on over 2,000 cold fusion papers.] One [hypothesis] is essentially physical--that observable effects of nuclear reactions have been measured by at least one of these authors. [The number of papers reporting measurements of "observable effects of nuclear reactions" is over 600.] The other [hypothesis] is sociological--that many papers have been published despite the absence of nuclear reactions with observable physical effects.

Some of the problems with the former hypothesis are being described at this meeting. [For example, see Storms' paper and the Fox & Bass paper.] The essential difficulty, I believe, is the question of whether an independently reproducible prescription for the preparation of catalytic substrate was made available early enough in the controversy for standard mechanisms of what Thomas Kuhn called normal science to be applied to it. In the view of many people, this did not occur. [For those who have read the cold fusion literature, they will understand that the preparation of palladium or palladium alloys that will "work" in a Pons-Fleischmann cell **is still not fully understood.**] As a result, there has been concern that cold fusion advocates have resorted to what are called "conventionalism stratagems" to make the theory "unfalsifiable," in the language of Karl Popper's classic work, *The Logic of Scientific Discovery*. [Falsifiable is defined as "capable of being proved false". Before the day of space travel, the concept that the moon was made of green cheese could have been considered unfalsifiable.]

To understand how and why this might have happened, it is useful to look beyond Popper and Kuhn to the work of modern sociologists of science, such as Barnes and Picketing. A significant conclusion about scientific methodology in complex systems such as controlled fusion devices is that the concerns that some in this school have had about the role of what they have called "interests" in determining what we call scientific truth can be addressed by more careful attention to how one constructs tests of hypotheses concerning a system whose

properties can not currently be deduced solely from an understanding of the interactions between elementary particles. [Typical "interests" are the strong understanding that gas-plasma physics is applicable to metal-lattice physics and possibly the \$500 million per year previously allocated to the study of hot fusion by the DOE.]

Here, however, I would like to stick to a more qualitative analysis of the role of these so-called "interests" in determining how various people view scientific truth, and what we may learn about both cold and thermonuclear fusion research in the process. So let us formulate a clearer statement of a sociological hypothesis about cold fusion, and see whether it tells us anything about thermonuclear fusion research. Here is such a hypothesis in a nutshell.

First, billions of dollars and decades of work have been invested by refugees from nuclear weapons research and others in the idea that nuclear fusion might be made into a practical energy source. However, we have discovered that tokamak fusion power reactors are expensive. This has led to a strong interest in alternative approaches, but none of these has definitively been shown to have a high confidence of producing economically competitive fusion power production. [Until now.] The idea that fusion could be accomplished on a table top has obvious appeal to people with an interest in this question. [Intellectual and scientific curiosity appeared to be the "strong interest" Pons and Fleischmann exhibited when they began studies in Pons' garage. Previously Fleischmann had published over 100 papers, 50 of which were coauthored with Pons, many of which dealt with hydrogen and metal lattices.]

Second, there were scores of laboratories with an interest in this question that had the capability [but not the expertise] of trying to reproduce the original reported experiment. When I was a wet-behind-the-ears freshman here at the University, I asked my Psychology 101 instructor what was the use of the usual 95% confidence criterion for publication if 20 people tried the same experiment. It was a good, if naive, question. I don't expect that chance selection of positive results from random measurement errors is the complete answer to the cold fusion controversy. But chance selection out of a sample with variance of calibration procedures may have played a significant role in the publication of some of the results. [Good papers avoid this type of criticism because the authors provide experimental procedures and error bars on measurements made.] Had each negative experiment cost \$20 million, we might have expected that pressures to justify what people do with so much money might have led to publication of more results falsifying the original claim, but this was not the case. [New scientific breakthroughs often involve the change of scientific models and are not falsifiable by negative results, especially when the experimental falsification is

attempted by experimenters not skilled in the art of the discoverer. At the time of the Wright Brothers' first flight at Kittyhawk, there were dedicated scientists who could prove that you could not fly such an aircraft. The history of science is replete with the statement of then-famous scientists who explained why it couldn't be done.]

Random selection events can work not only among a population of scientific instruments, but also among a population of scientists who run them. With such a large population of people interested and capable of doing cold fusion experiments, there is also clearly the possibility that selection of a sub-population with inadequate experimental technique and even peer review could occur. [True, but this philosophy is immediately rejected by skilled scientists who have achieved dramatic positive results in cold fusion experiments.]

The idea that a sizable number of positive reports must contain at least one grain of scientific truth ignores the type of selection effects I have just described. A perfectly adequate sociological hypothesis is that it is just these selection effects, and nothing more, which has produced the clearly observable phenomenon of the publication of papers reporting the observation of cold fusion effects. [One positive experiment can advance scientific knowledge far beyond one thousand failures.]

So what can the rest of us learn from this? The basic message, I suggest, is that controlled fusion research needs to be based on more than wishful thinking. [And on more than outdated models of nuclear reactions.] People in our Congress and elsewhere are asking serious questions about this. [Controlled fusion research.] It is easy to dismiss these people [Congresspersons] as being ignorant, short-sighted, or ill intentioned, just as some cold fusion advocates might dismiss their critics. But these are serious questions, and they deserve serious answers. The lesson of cold fusion for thermonuclear fusion research is that we must pay careful attention to methodology in controlled fusion physics and engineering research if our answers are to be taken seriously in the long run.

[Another strong message is: When some world-class, honorable specialists (in the case of cold fusion, the electrochemists) immediately replicate cold fusion, then don't condemn the work because it does not fit standard models. The concept that nuclear reactions on or within a metal lattice **must be consistent with high-temperature gas-plasma physics is falsifiable**. A further strong message is that scientists should not become political lobbyists and attack new discoveries. A further message is that scientists should read the literature that impacts on their own areas of specialization. An excellent definition of a scientific fact is "the close

agreement of a series of observations of the same phenomena." Although "close agreement" may be subject to opinion or definition, low-energy nuclear reactions are now a scientific fact!]

D. LEST WE FORGET!

Courtesy of the Intermountain Soc. of Inventors and Designers newsletter.

DID YOU KNOW ...

◆ that Albert Einstein was considered retarded, Isaac Newton was thought to be a slow learner, Joseph Priestly (the discoverer of oxygen) never took a science course, and Louis Pasteur got a C in chemistry.

◆ that in 1876 when G.G. Hubbard learned of his future son-in-law's invention, he called it "only a toy." This daughter was engaged to a young man named Alexander Graham Bell.

◆ that in 1969 the New York Times published an apology for once printing derisive comments about an inventor's theory. Robert Goddard was on the receiving end of the Times criticism of his contention that rockets could operate in outer space. The apology was printed the day after Apollo 11 left earth orbit for the moon.

◆ that in the early 1940's a GE engineer was charged with a task of utmost importance to the war effort: develop a cheap substitute for rubber that could be used to produce tires, gas masks, and a whole host of military gear. James Wright tackled the task diligently -- and wound up inventing Silly Putty. Good thing he didn't work on the artificial heart.

◆ that neither Wilber nor Orville Wright graduated from high school. However, they were both avid readers.

◆ that Darryl F. Zanuck of 20th Century Fox thought TV was just a passing fancy. In 1946 he said, "Video won't be able to hold any market after the first six months. People will soon get tired of staring at a plywood box every night."

◆ that in the fall of 1989 the Cold Fusion panel of the Energy Research Advisory Board to the DOE concluded, "The panel recommends against special funding for the investigation of phenomena attributed to cold fusion." [Added by Ed.]

E. NEWS FROM THE U.S.

UNCLE SAM, THE POLLUTER

Needed: Education of Low-Energy Nuclear Reactions

Ken Miller (Gannett News Service), "Meet Uncle Sam, the Worst Polluter," *Salt Lake Tribune*, 17 Sept. 1995, pp A-1, A-11.

EDITOR'S COMMENTS

In the year 1994, after years of studying the problem, the Department of Defense finally spent more money on cleanup than on studies. The DOD has 868 sites that are listed as on EPA's Hazardous Waste Compliance Docket. Of these 342 are Army, 265 Air Force, and 261 Navy. Some are radioactive waste sites. The DOE has 90 sites listed on the EPA's docket, however, many of these sites are among the most contaminated sites in the world. Ordered to make an estimate for clean up costs, the DOE came up with \$230 billion.

Every year, the estimates for the cost of clean up are increased **and the time it will take for the clean up also increases.** Now the estimates extend to the year 2070 with an expenditure of over one-quarter of a trillion dollars. **We desperately need to recognize that the radioactive sites must be stabilized and not just buried.**

The traditional scientist using last generation's model of the atom will not even admit that there is any chance of stabilizing radioactive elements except by high-energy bombardment. The experimental history of cold fusion provides hints that radioactive materials can be stabilized! There are over 600 papers reporting on cold fusion experiments in which evidence of nuclear reactions have been measured.

The experimental history of cold fusion provides hints that radioactive materials can be stabilized!

Under current technical understanding, the only two ways to take care of radioactive waste is to store it or bury it for a few hundred years, while the radioactivity subsides. Now that it is well known that nuclear reactions can be produced and controlled at relatively low energies, **we must learn more about this technology and apply it to the stabilization of radioactive wastes.**

Here is a summary of what we have learned from which we can build our low-energy nuclear reaction foundation of knowledge:

1. Cathode materials have been found to exhibit isotopic changes after operating in a cold fusion reactor cell.
 2. Tritium has been measured in both electrodes and in electrolytes.
 3. Neutrons have been detected but not at sufficient numbers to agree with current scientific models.
 4. New theory papers show that under some circumstances, one can expect that it is more probable for protons and deuterons to fuse with elements of high atomic mass compared to elements of low atomic mass.
 5. Thermal power is a byproduct of nuclear reactions and is now being produced repeatedly at ten times the input electrical power in selected cold fusion reactors.
- [See lead article, page 1.]

WHAT MUST BE DONE

The original Cold Fusion Committee of the Energy Research Advisory Board in the fall of 1989 advised that no research funds be spent on cold fusion. Now that some forms of cold fusion reactors are being commercialized, it is strongly evident that the 1989 ERAB report was ill-founded and ill-advised. **No new and costly investigation into cold fusion using government funds is required.** A simple witnessing of working demonstrations of cold fusion reactors is sufficient to establish the reality of low-energy nuclear reactions. **Existing levels of research funds are more than adequate for the task. What is required is reallocation of funds from non-productive research to specific investigation by those having demonstrated skills to support the discoveries in the stabilization of radioactive elements.**

Note: For further information see Proceedings of the Low-Energy Nuclear Reaction Conference, edited by Hal Fox and available from Fusion Information Center.

CALIFORNIA - SRI FUNDED BY JAPAN

"Briefs," *Infinite Energy*, vol 1, no 3, Jul-Aug 1995, p 42.

SRI Cold Fusion Work Now Funded by Japan's NEDO

The top-notch cold fusion research program at SRI International in Menlo Park, CA, formerly funded by EPRI of Palo Alto, CA, is now reportedly funded at a level of \$700,000 for the first year by Japan's New Energy Development Organization (NEDO). The funding shift was caused by cross-the-board cutbacks in many of EPRI's research projects. Dr. Tom Passell is still assigned to cold fusion R&D at SRI International.

MASSACHUSETTS - COUPLING MECHANISMS

Peter L. Hagelstein (Massachusetts Inst. of Tech., Cambridge, MA) "New Lattice-Nucleus Coupling Mechanisms and Possible Energy Production," SOFE '95 Seeking a New Energy Era, Book of Abstracts, 16th IEEE/NPSS, Symposium on Fusion Engineering, Sept. 30-Oct. 5, 1995, p 217.

AUTHOR'S ABSTRACT

We have recently found and studied a new mechanism that is capable in principle of mediating anomalous energy transfer between a lattice and its constituents. Vibrational energy transfer can occur through the creation or destruction of phonons, which has been well studied and produces no anomalies; vibrational energy transfer can also occur through the frequency shifting of phonon modes, which has not been well studied and appears to be capable of anomalous energy transfer.

The basic idea is that a phonon mode can jump across a phonon band gap upon the modification of the lattice at a single site, and the associated energy transfer ΔE can be

$$\Delta E = N\hbar\delta\omega$$

where $\delta\omega$ is the phonon frequency shift and N is the number of phonons. If the phonon mode is initially a continuum mode, then it is possible for N to be very large in principle (this can be true for a strongly driven phonon mode, or if a phonon laser is operating on the mode). Alpha and beta decay rates are predicted to increase in the presence of anomalous energy transfer.

We have also found another interesting new physical mechanism that involves nuclei and lattice interactions. While the phenomenon of electron hopping in crystals is well known, the analogous effect for neutrons is presently unknown. As neutrons are tightly bound, there is no first order overlap with nuclear wavefunctions at neighboring sites. But the bound neutron orbitals at the different sites mix with a common set of continuum orbitals (this is known as configuration interaction), leading to a second order coupling between orbitals at neighboring sites. A neutron mixed valence model (in analogy with electron mixed valence models) has been developed, and used to study thermally-induced neutron hopping in crystals.

We have explored the possibility that these two effects together might lead to a new route to energy production in the solid state.

MASSACHUSETTS - ELECTRIC CARS PROVEN TWICE AS EFFICIENT AS GASOLINE MODELS AT NESEA'S 1995 AMERICAN TOUR DE SOL

Electrifying Times, vol 3, no 2, Fall Edition, 1995, pg 9.

NESEA-GREENFIELD, Mass. For the first time, gasoline and electric-powered cars have been run side-by-side in real-world conditions - the electric cars ran away with the efficiency prize. The week-long series of tests found EVs twice as energy efficient as their gasoline powered counterparts.

NEW MEXICO - COLD FUSION FUTURE

Edmund Storms (ENECO), "Chemically Assisted Nuclear Reactions," SOFE '95 Seeking a New Energy Era, Book of Abstracts, 16th IEEE/NPSS, Symposium on Fusion Engineering, Sept. 30-Oct. 5, 1995, p 218.

AUTHOR'S ABSTRACT

More than six years have passed since the modern era of "cold fusion" was started by Profs. Stanley Pons and Martin Fleischmann (then at the University of Utah). Their claims for being able to produce nonpolluting energy from a renewable source using a simple apparatus created great initial excitement. However, difficulties in repeating the work combined with the absence of any acceptable explanation caused most scientists to conclude that the claims were based on delusion. Nevertheless, some people continued to explore the possibilities. Criticisms made by skeptics were taken seriously, errors have been reduced or eliminated, and a wide variety of studies have been done using very modern equipment in many countries. The early problem of reproducing the effect has been largely eliminated, nuclear byproducts have been found, and theoretical explanations abound. The problem now is more psychological than scientific. In spite of this new and improved information, general skepticism about the effect continues within the scientific community and general rejection by the U.S. and many other governments remains unchanged.

Nine international conferences have been held and several professional societies have included sessions about cold fusion, the most recent being the American Chemical Society. The literature on the subject has grown to over 1300 publications, many peer reviewed by major scientific journals. A magazine called "Cold Fusion" is struggling to survive and *21st Century Science and Technology* has regular articles. Non-technical readers can also obtain information from "*Fusion Facts*," "*Cold Fusion Times*," "*Cold Fusion/New Energy Technology*," "*The Cold Fusion Newsletter*" and "*Infinite Energy*." Occasionally,

the print and TV Media have acknowledged continued interest, sometimes with objectivity and sometimes not.

The field has expanded from claims of d-d fusion being produced in palladium using electrolysis to at least ten different method-environment combinations. These environments include normal hydrogen as well as deuterium. Evidence for d-d fusion, p-(K,Rb) transmutation, and (p,d)-Pd transmutation has been presented. A variety of nuclear products have been detected. Sufficient energy has been observed to encourage commercial development.

The present status of the field will be summarized with respect to what has been discovered, where work is being done, and how this new field is expected to affect conventional thinking.

NEW MEXICO - TRIODE CF CELL

"Briefs," *Infinite Energy*, vol 1, no 3, Jul-Aug 1995, p 42.

An announcement of a possible new direction in cold fusion electrochemical cells was received 7 August 1995:

STATEMENT

Cravens Laboratories in Cloudcroft, New Mexico, has recently run preliminary evaluation tests on a three-electrode (triode) Pons-Fleischmann type nuclear fusion cell. Evan Ragland, the inventor of the triode cell, believes the third electrode affords a degree of control of the cell loading and fusion rate. Results of initial tests are positively encouraging and provide new insight into cell characteristics. Confirmation experiments and new exploratory experiments are planned to be conducted. The present work plan is to: 1) Confirm initial experimental results; 2) Evaluate some heretofore unobserved phenomena; 3) Conduct experiments on improved cathode embodiments, and 4) Design and test new electronic control circuits.

From: Evan Ragland Company, 6640 Ahecolo Circle, Diamondhead, MS 39525-3461.

TENNESSEE - HOT FUSION CHAUVINSIM - A History Note

Courtesy of Dana Rotegard

Prof J.R. Roth [well known hot fusion advocate] (Dept. Electr. & Comp. Engr., U. of Tenn.), "On D-T (deuterium-tritium) Chauvinism in Physics," from "Comments of Draft Panel Report," Lunar Helium-3 and Fusion Power, proceedings of a workshop held at NASA Lewis Res. Ctr., March 1988, NASA Conference Pub. 10018, p 221.

EXCERPTS

In the worldwide fusion community, there is a widespread mindset which one can characterize as "D-T chauvinism", according to which it is considered disloyal to the national fusion program, or even a disservice to the entire subject of fusion energy, to point out any of the very real engineering or safety disadvantages of using the D-T reaction. I have personally encountered this mindset while advocating advanced fusion reactions;

- A feeling that the world fusion effort is so deeply committed to the D-T reaction that they are technically beyond the point of no return;

- That it is not useful to consider any other fusion reaction regardless of technical merits for political reasons;

- A feeling that any questioning of the D-T reaction strengthens the position of the critics of nuclear and fusion energy;

- That it is somehow politically unproductive to compare D-T to other fusion reactions, lest the existence of some disadvantages be used to the detriment of fusion energy as a whole.

I think that most of the members of this workshop are well aware of this D-T chauvinism, and this form of technical inertia will probably be the single worst obstacle to adoption of D-3He or any fusion reaction other than (hot) D-T." [Probably including cold fusion. Ed.]

WASHINGTON - SECOND LAW PARTIALLY INDEFINITE

Courtesy of author

Donald S. Ross (Bremerton, WA), "Experimental Indications that the Second Law of Thermodynamics, as does Law of the Simple Gravity Pendulum, May Have Fringes of Indefiniteness."

Brownian motion and heat pumps very temptingly invite efforts to harness molecular energy which seems largely traceable to the sun but, being indirect, is merely diminished by nightfalls and clouds.

Such harnessing is widely deemed energy-losing or even impossible, and Artificial Intelligence pioneer Thomas Ross (*Scientific American*, April 1933, etc.) agrees with most other physicists that any embodiment of Professor Maxwell's "demon" toward that harnessing would almost surely be more operational energy-demanding than energy-delivering; faintest

criticism of that great scientist's genius not intended, for his "demon" concept was never presented as a possible path to an energy revolution. Physicist Ross's agreement with mainstream scientists is against a background of having created and co-created supposedly impossible maze-learners which were successfully demonstrated at Yale University and the University of Washington, respectively, so "demon" creation possibilities were not casually dismissed. His entirely different "molecular check-valve" approach merits, he feels, investigation instead of encountering mental blocks caused by impracticalities of other approaches.

Toward testing that different approach, circa 1953, an ordinary-looking little "squeeze-tube" of dry graphite lock lubricant from a neighborhood hardware store was fastened upright, the stopper removed, and a steel sphere about 1.5 mm diameter was placed atop the nozzle. Almost immediately when a tiny air-admitting pinhole was punched near the tube's bottom, the little sphere began moving and re-seating several cycles per minute; my memory is uncertain concerning frequency, likely within six to 10 cpm range. Hour-after-hour consistency and ambient temperature stability seemingly ruled out the Charles's Law explanation [gas expands when heated. Ed.]. Several hours later, likely due to nozzle blockage, the tube emitted a "puff" of graphite dust that blackened a surface several inches distant, indicating significant pressure.

Apparently, as had been theorized might happen, air molecules entering the pinhole pushed their way upward more readily than they could return, somewhat as a literally "pushy" person might force passage through a dense crowd toward an open field more readily than returning toward a high brick wall, due to interacting opposition.

Had statistically astounding preciousness of that casually purchased graphite dust been suspected in time to have prevented loss, its analysis might have led to economical production in bulk, perhaps to cause cheap spinning of turbines turning electric generators, or that analysis might have led to more effective molecular check-valve approach better than the use of graphite flakes. Some unusual ratio of particle sizes, as from start or ending of a production run at the factory, may have accounted for the "Lost Chord" self-compression of air.

Unusual circumstances providing opportunity to experiment having largely ended, pursuit of possibilities went "back burner" except that for several years thereafter, until breaking of glass tubes in a move, much larger amounts of readily obtained graphite dust in much more sophisticated apparatus, consistently produced extremely weak pressure build-ups. Glass tubes four feet long of one-inch inside diameter, about 10 in number, had ends heat-flared for proper reception of rubber stoppers with short lengths of about eighth-inch glass tubes through their centers. Supported in a round wooden

rack, the large glass tubes were filled with about-half-inch-separated "cells" of graphite dust about two inches deep, on filter disks prevented from sliding downward by friction of slightly broken "Os" of flat TV lead-in. Connected in closed-circuit series by short lengths of rubber tubing and slender four-foot glass tubes, the cells had a very sensitive but unfortunately not calibrated pressure-differential indicator in that closed circuit. A glass valve shunted the indicator. If memory serves correctly, very gentle air pressure was applied, prior to closing of the circuit to exclude room air, to help "accustom" the graphite flakes to upward passage of air molecules. For those several years whenever the shunting valve was opened the indicator needle would fall back to show no pressure differential. Closing the valve was followed by very slow needle movement ending in about 10 minutes with great consistency.

Only atmospheric pressures, except for the conditioning pressure, were employed. Pressures above or below atmospheric should probably be tried in closed-circuit apparatus. Gases with molecules heavier than air offers fascinating possibilities. Finely ground mica flakes instead of graphite flakes might be well-worth trying, suggests experimenter Ross to this experiments-assisting and now experiments-reporting brother. Possibly worth trying would be metallic flakes so finely ground that atmosphere without oxygen would be needed to prevent combustion.

Whether the impossibility of the practical harnessing of a molecular energy dike has actually leaked, and whether just a leak or the forerunner of an environmentally benign energy revolution, it seemingly merits investigation no less than does cold fusion.

Donald S. Ross, Bremerton, Washington
August 30, 1994

F. NEWS FROM ABROAD

BRITAIN - 'EUREKA' - AN ENERGY ECHO FROM A CATHODE?

By Harold Aspden, Received 28 Sept. 1995

In the September 1995 issue of *IEE REVIEW*, the monthly Journal of the Institute of Electrical Engineers in U.K., there is the story of the success of Professor Alec Broers who, after a career in research with IBM in U.S.A., returned to U.K. as Professor of Electrical Engineering at Cambridge, became Master of his old college, Trinity, and has now become Vice Chancellor of the University.

The account includes the following text: "In 1965 he moved to IBM's Thomas J. Watson research laboratories at Yorktown to

work on the development of the world's first gigabit [sic] read-only memory... The huge data sets involved - mainly results from tests from Los Alamos - required that the system should operate 24 hours a day, 7 days a week. Unfortunately, the tungsten cathodes had the habit of burning out after little more than 20 hours. A sustained development effort increased the tungsten lifetime to 80 hours. However, this figure was soon to be shattered by Broer's development of the first practical cathode using lanthanum hexaboride, which, in its initial test, ran for over 1,000 hours with no visible physical deterioration. 'A real eureka achievement' according to Broers. Lanthanum hexaboride remains in use as an electron microscope cathode material to this day."

I was interested in this story because the main part of my career was with IBM and I had also been a research student at Trinity College, Cambridge, my Ph.D. being also in electrical engineering. That caused me to read the above text rather closely, whereupon my attention was arrested by the reference to 'lanthanum hexaboride.' Having recently, in *New Energy News* (at p 1 and p 15 of the August 1995 issue and at p 1 of the September, 1995 issue), pointed out how warm superconductors and magnets share a common feature in their molecular compositions, based on a near-to-102 atomic mass unit quantity, I just wondered if cooling involving heat conversion to electricity in the predicted 'supergraviton' resonance occurs also in that cathode material discovered by Broers. Maybe that could explain why the lanthanum hexaboride cathode is so durable.

I had never heard of that substance before, but I rushed to check its molecular mass as noted in chemical reference data. I found that lanthanum hexaboride LaB_6 is listed as having a molecular mass of 203.78, which is twice 101.89. That caused me to exclaim "Eureka!"

As more and more evidence of this kind comes to light, this must add to the suspicion that this mass-resonance property is a way of defeating the second law of thermodynamics. Surely, therefore, we can hope that some corporate venture such as IBM might direct effort at the clean energy challenge of generating electrical power from ambient heat by asking a new generation of 'Broers' to eschew this particular problem.

ENGLAND - THE NUCLEAR SUN IS WANING

Courtesy of Steven Roen

Staff writer, "At the going down of the nuclear sun," *The Economist*, Science & Technology section, Sept 16, 1995, pp 93-96, illus.

EDITOR'S SUMMARY

The nuclear sun, as designed by hot fusion scientists, has culminated in a 1985 joint proposal for the International Thermonuclear Experiment Reactor (ITER). The U.S., Russia, Japan, and Western Europe have subscribed to the concept, and preliminary designs of the required super-strong magnetic confinement "bottle" have been advanced. **Further development of the ITER is now dependent on governments who desire to fund big science.** The article states, "In the industrial countries little effort is going into the development of new forms of fission..."

The ITER proposes to use deuterium and tritium as fuel. Deuterium is plentiful in the world's water and tritium can be made in a reactor by hitting lithium with neutrons to split the lithium into two tritium atoms. The alternative to the ITER project is inertial confinement fusion (ICF) where laser beams are proposed to blast deuterium and tritium into fusion. Both France and the U.S. have ICF experiments costing over a billion dollars. The ITER project is designed to advance hot fusion beyond the achievements of the tokamak (huge donut-shaped reactors) as developed by U.S., Japan, and the Joint European Torus in Britain. These reactors are not large enough to produce self-sustaining fusion. The ITER will supposedly be big enough for "ignition". But big is expensive. The proposed superconducting magnets would cost about 40% of the multi-billion dollar ITER budget.

There are budget problems ahead. In the U.S., the President's Committee on Science and Technology has recommended an increase in the fusion budget to \$645 million a year between 1995 and 2005, but will settle for \$320 million per year. Even a proposed smaller ITER will cost an estimated \$4 billion and would not be sufficient to achieve "ignition". **The proposed \$320 million annual budget has been cut to a proposed \$229 million for 1996 which would leave no funds for contribution to an international ITER. Without American dollars, the ITER will probably not be built.**

The alternative to fusion is nuclear fission. Italy has no fission power plants and none are planned. U.S. has 109 fission power plants that provide 20% of the U.S. electrical power. [But at enormous future costs for clean up of radioactive wastes. Ed.] The neutrons from proposed fission plants make the containment structure radioactive. Each plant, it is estimated, will require replacement of these structures every two years and will produce hundreds of tons of radioactive wastes with each replacement. In addition lithium is proposed to be used to trap the neutron flux. **The result is the production of a tritium-load lithium, a combination which is considered highly dangerous as lithium can burn in air and release huge quantities of radioactive tritium.** With the huge size of the proposed ITER, an accident could release

radiation equivalent to the Chernobyl accident, this article reports.

The article concludes with "There is no doubt that the world's energy needs are increasing rapidly. Eventually, fossil fuels will become harder to find, and their environmental cost may become unbearable sooner. However, fusion is not the answer to these linked problems -- at least not in the short term. Billed as a clean, safe solution to the world's energy problems, fusion is not necessarily much cleaner or safer than fission, and it is a lot less practical."

Editor's Conclusions: What *The Economist* has yet to learn is that the new science of cold fusion or "new hydrogen energy" is now far more developed than the hot-fusion devices will ever be. **There is now no reason for any government to spend billions of dollars on hot fusion research. Except for military uses, there is no reason for any government to finance "new hydrogen energy" research. The progress is sufficient to attract corporate research and development funds.**

HUNGARY - SUPER-THICK, SUPER-FLUID ETHER

Courtesy of Sam Faile

László Gazdag (Janus Pannonius Univ, Pécs, Hungary), *Beyond the Theory of Relativity*, Szenci Molnár Literary and Scientific Society, Hungary, c1995, in Hungarian.

EDITOR'S SUMMARY

The first chapter of the English translation includes the following: "The superfluid ether is not static. It has different impulsive components (bosons). It is even a superthick (super compact) medium. Look at the Planck equation."

In describing how dense the ether is, Gazdag uses the Max Planck equation (c1910) which Max Planck formulated to relate the electromagnetic energy distribution of the vacuum. This equation has a term which is ignored as being too small. However, Gazdag stresses the fact that if the ether supports the conduction of very high frequency radiation (up to 10^{44} Hz) then this term can become enormously large -- up to 10^{93} kilogram per cubic meter of mass converted to energy by Einstein's formula of $E=mc^2$! The author notes that matter, which is much less dense, "floats" in this sea of etheric energy much as a deep-ocean fish swims in sea water having enormous pressures.

It is important to note that this figure of etheric energy is consistent with Hal Puthoff's similar calculations of the energy density of the vacuum zero-point energy. [H.E. Puthoff, "The Energetic Vacuum: Implications for Energy

Research," *Speculations in Sci. & Tech.*, vol 13, no 3, p 247-257.]

See also the following article:

László Gazdag (Janus Pannonius Univ, Pécs, Hungary), "Einstein's second postulate," *Speculations in Science and Technology*, Vol 18, pp 150-152, 1995, 1 fig.

JAPAN - ELECTRON BOMBARDMENT

K. Kamada (Natl. Inst. for Fusion Science, Nagoya), H. Kinoshita and H. Takahashi (Dept. of Eng., Hokkaido Univ., Sapporo, Japan), "Anomalous Heat Evolution of Deuteron Implanted Al on Electron Bombardment," *SOFE '95 Seeking a New Energy Era, Book of Abstracts*, 16th IEEE/NPSS, Symposium on Fusion Engineering, Sept. 30-Oct. 5, 1995, p 217.

AUTHORS' ABSTRACT

Anomalous heat evolution, which is presumed to continue for about 2×10^{-11} seconds, was observed in deuteron implanted Al foils on 175 keV electron bombardment. Local regions with linear dimension of more than 100 nm each showed simultaneous transformation from single crystalline to polycrystalline structure in roughly one minute of the electron bombardment, indicating the temperature rise up to more than melting point of Al from room temperature. The amount of energy evolved was typically 160 MeV for each transformed region. The transformation was never observed in proton implanted Al foils. Any kind of chemical reactions or the heating effects of the bombarding electron beam were proved to be not responsible for the melting. Therefore, the heat evolution was presumed to be a result of some kind of nuclear reaction in D_2 molecular collections.

G. SHORT ARTICLES

CHALLENGE TO OLD PHYSICS

John E. Chappell, Jr. "A Landmark Challenge to Establishment Physics." Reprinted with slight revisions from *Apeiron* (4405 St-Dominique, Montreal, QU H2W 2B2 Canada), no 20, October 1994, p 40-41.

The most important thing to report about the meeting of dissident physicists and cosmologists in San Francisco during 20-23 June 1994 - advance notice of which was printed in *Apeiron* in October 1993 - is simply that it did take place. It was not canceled shortly before the scheduled time, as some worried might happen, since late cancellations of meeting of

this type have indeed occurred before, as a result of pressure from an intolerant establishment.

This meeting was a landmark in at least two senses: (1) It was the largest organized challenge to modern physics in North America for several decades, although even larger dissident meetings have been held in Europe since the 1980s - the most recent was in St. Petersburg, Russia in May 1994, and was attended by S.F. contributor Neil Munch. (2) It was part of a regional meeting of the world's largest general science organization, the American Association for the Advancement of Science (AAAS), which for decades has not allowed such a degree of dissidence at its national meetings. It was also much larger than originally anticipated, offering a program with 57 papers by 53 different authors - the result of many invitees suggesting still others, until the number of invitations tripled. But unfortunately no reporters attended, nor any physicists from major departments, although many were invited.

We might have had more visitors, but the Pacific Division of the AAAS, to whose regular yearly meeting our special sessions were attached, kept our plans obscure by not allowing us symposium status, which would have meant advertisement months in advance; and even in the final program, it refused to print our individual session titles, which had such eye-catching phrases as "Beyond Special Relativity." Even the general title of our 14 sessions was distorted, when the AAAS added "...in an historical context" to the agreed-upon "Challenges to Contemporary Views in Physics and Astronomy;" only the first of them was primarily historical. Hosting San Francisco State University chipped in too, causing serious inconvenience - especially to a few of us with hip, heart, *etc.* problems - by moving our initial sessions on Monday to a smaller room far from the scheduled one, too late to notify most attendees (and the forbidden room went unused all day).

Still, our group was very grateful to be able to meet in some way, and this we owe mainly to Michele Aldrich, official liaison person between the AAAS national office and the Pacific Division. She had already taken a tolerant interest in the efforts of the late Lee Coe, of Berkeley, California, in criticizing special relativity and the Big Bang theory at several previous Pacific AAAS meetings, most often alone in single papers, but also in a very small 1992 group effort in Santa Barbara (see *Apeiron*, October 1993).

Sadly, Lee Coe passed away in February 1994, at the age of 86. To honour his efforts on behalf of our cause, this San Francisco meeting was dedicated to his memory, and also to the memories of two other valiant workers on behalf of a new and more soundly-based physics who had died during the previous year: Petr Beckmann of Boulder, Colorado, well-

known founder of the journal *Galilean Electrodynamics* (see his obituary by Howard Hayden, who contributed to the S.F. meeting, in *Apeiron* February 1994 [1]); and William Carnahan of Austin, Texas, for many years the leader of the Association for Pushing Gravity Research, whose members promoted Lesage-type theory, which claims that space is filled with a medium that transmits gravitational forces.

Although rather obscure, the APGR was probably the largest and best organized group of dissident theoretical physicists in North America during the nadir of intolerance for such efforts from the late 1950s to recent years; and since about 20 of its members gathered in 1981 in Huntington Beach, California, probably no other meeting of this size and type has occurred on this side of the Atlantic until this year. Contributors to that APGR meeting who also read papers in S.F. included John Fernandez, John Kizer and myself. The renowned pioneer radio astronomer Grote Reber of Tasmania, who contributed in S.F. *in absentia*, was also an active APGR member.

Of the 53 authors, only 33 were scheduled to be there in person, and four of these were unable to make the trip. Among the U.S. authors, several were absent co-authors, and a few of those present read two or more papers each. Eleven papers from outside the U.S. were on the program; nine of these were read *in absentia*, one was not sent, and another was read by philosopher Bernardo Gut of Switzerland, who was one of the 29 attending authors.

The AAAS was particularly anxious for us to include as many discussants representing establishment physics as possible, so as to offer a balanced presentation. An exhaustive search was undertaken, by mail and in person, which most likely reached over 250 academics in physics and related fields. Out of all these, Edward Apgar, who teaches extension courses at Harvard University, was the only one who joined us; and he did so as a fellow dissident.

At least, none of the invited physicists, some of whom were later invited again as listeners, issued any complaint about us to the AAAS. And yet a controversial symposium at the same S.F. meeting, with speakers arguing that the medical establishment is incorrect in claiming that the HIV virus is the main cause of AIDS, elicited vigorous objections and much pre-meeting debate in the press. Does the contrasting silence among the physicists reflect growing tolerance for dissent? Or do they think we are so ineffectual a threat that we don't seem worth acknowledging?

We did finally locate two discussants, mainly because each is a long-time friend of one of us: Ralph Vrana, retired from Cal Poly San Luis Obispo, and Lewis Epstein of San Francisco City College, who debated against Lee Coe at the 1992 mini-meeting.

Vrana and Epstein were both assigned to discuss special relativity (SR), which was the chief center of interest at our meeting; about 60% of the papers dealt with it primarily, either to discuss its shortcomings or to elaborate on alternative ideas. In my invitations, I had singled it out as the key topic of concern, with lesser attention to Big Bang theory and quantum mechanics. In one of our too-infrequent general discussion periods, we tried to develop a statement on the "sense of the meeting," but could not reach unanimity about any scientific topic. Yet we did agree that at least 75% of attending authors - I would guess at least 80% - found at least some serious shortcoming in SR, many if not most of these being convinced that it is totally invalid. To my surprise, three authors revealed they were not sure the Big Bang theory is wrong, leaving only 90% opposed to it. The only issue on which all agreed is that establishment physics has for many years been far too dogmatic and intolerant towards challenges to current orthodoxy.

Alternatives to SR suggested in S.F. ranged from various ether and field concepts and theories, with or without Maxwellian or Lorentzian elements, to some variant of the Ampère-Gauss-Neumann-Weber line of electrodynamic field theory - which in our century has been developed by Ritz, Bush, O'Rahilly, Waldron and also by a few contributors to our meeting, including Peter Graneau of Northeastern University in Boston (whose paper was co-authored and read by Milo Wolff), and Domina Spencer of the University of Connecticut in Storrs (whose late husband and collaborator Parry Moon was a student of Bush). I believe that it is vital to work for possible syntheses of such varying approaches. For example, O'Rahilly and Spencer have suggested that an electromagnetic field and an ether might ultimately be just different concepts representing the same reality. Also, one of my papers showed how additive photon speeds and unvarying net velocity of photons across a gaseous ether of uniform density can *both* be accepted without real conflict, if the photons undergo collisions and move on indirect paths, variable in amplitude and length depending on the force they introduce into the ether (as would follow from Newton's Third Law).

There is no way I can come close here to characterizing the entire range of ideas presented in all the papers read in S.F. But let me mention at least the substantial contributions made by Francisco Müller of Miami, Florida. Francisco presented three individual papers, one reporting on laboratory experiments contradicting SR, and also read a paper co-authored with Dale Means, discussing an ambitious plan to detect a large-scale Sagnac effect resulting from the earth's orbital motion.[2] His great effort and dedication led to his being provisionally elected, by the minority of attendees who met on the last evening after all sessions had ended, as President of a new organization designed to promote the purposes of this meeting. Its exact name is still being decided,

but it will probably include the words "Natural Philosophy," as suggested by Jorge Curé, who proposed that the organization be formed.

Curé also organized an extra informal session of about 8 people to discuss cold fusion.

This new organization hopes to publish a *Proceedings* of the meeting to plan more meetings in the future, and to encourage additional publicity. The only press coverage of our meeting so far was a supportive article, "Silenced by Science," in the *Ottawa Citizen* in Canada, on 19 June. (Contributor Paul Marmet and *Physics Essays*, editor Emilio Panarella [3] both live in Ottawa, and provided interviews and the desired "local angle.")

We would like eventually to break the decades-long barrier to Neo-Newtonian symposia at AAAS national meetings; and of course we could meet on our own. But as of September 1994, our best hope for a future meeting seems to be in conjunction with the Southwestern and Rocky Mountain (SWARM) Division of the AAAS, at Norman, Oklahoma in May 1995. Early inquiries suggest we may be allowed symposium status there, and even if not, we may still be allowed extra discussion time in the midst of individual contributed papers - an important element in any such program that for the most part was not allowed to us in S.F. [4]

Probably the most valuable of our few general discussions in S.F. occurred on Wednesday afternoon. When Kizer, Müller, Apgar and others shared information on the reasons SR was not essential to the primarily technological effort of developing atomic energy. This issue seems to be one of the most crucial of several special themes we need to focus on prominently in future meetings, since assuming a necessary link between SR and atomic energy is a very widespread and influential error that causes many to ignore our work.

I apologize to those many contributors, some of them especially important to whatever success our meeting has achieved, whose names I have not listed here because of limited space.

[1] Address: c/o Howard Hayden, Dept. of Physics, Univ. of Connecticut, Storrs, CT 06269.

[2] Later published in *Galilean Electrodynamics*, vol 5, no 5, 1994, p 90-97.

[3] Address: c/o E. Panarella, National Research Council, Room 100, Bldg M-10, Ottawa, Ontario K1A 0R6, Canada.

[4] 1995 note: Symposium status and extra discussion time were both generously allowed by SWARM organizers, much enhancing the value of the Norman meeting (22-24 May).

The next major meeting of the Natural Philosophy Alliance will be held in Flagstaff, Arizona on 2-6 June, 1996. **All paper titles for intended contributions to it must be received by 10 December 1995 (abstracts due later). For information and to send titles, write to John E. Chappell, Jr., 1212 Drake Circle, San Luis Obispo, CA 93405.**

ENERGY PROBLEMS LOOMING?

Courtesy of Gordon B. Moody

Quotes from *World Energy Update*

The Consumer Energy Council of America Research Foundation has issued an alert (Aug 21, 1995). Increases in transportation in the decades ahead will cause a 15 percent increase in congestion; 30 percent in oil consumption; 70 percent in oil imports; and a 30 percent increase in pollution from carbon emissions. The International Energy Agency (IEA) forecasts that oil consumption will reach 71 million barrels per day during the fourth quarter of 1995 and 100 million bpd by 2010.

The Chief IEA economist, Sean O'Dell, concludes that oil will dominate all forms of energy well into the 21st Century. The British weekly, *The Economist*, in its energy survey suggests that energy demand could double by 2020; coal output will double; and more electrical generating capacity will be built over the next 25 years than has been built during the past 100 years.

Editor's Comments:

None of the energy agencies are forecasting any energy production from new enhanced energy systems such as cold fusion. Without discussing why there is such a lack of information transfer, it will be useful to examine the rate at which a fundamental new energy development can impact the world's energy supply. The key question to be addressed is, "How fast will enhanced energy systems supply new energy?"

Background:

Soon after the end of World War II, an extensive study was made of the projected use of computers. The conclusion was that the total world computer market in the year 2000 would be 1,000 computers. By 1975 there were an estimated 150,000 computers installed and operating. In 1995 it is estimated that the number of computers exceeds 80 million.

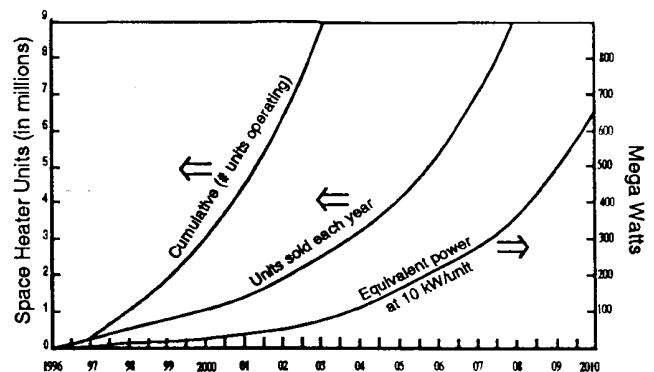
It took about 100 years for the telephone to penetrate into most of the homes in the U.S. Radio took about 50 years. Television about 25. The first personal computers were marketed in numbers in the early 1980s. In 1995, in Colorado and Utah, over half the households have personal computers in their homes.

At this stage it is wise to remember that this editor believed, in 1989, that it would take about two years before a commercial prototype of a cold fusion device could be demonstrated. It was not until 1994 or 1995 (depending on whose inputs you use) that the first cold fusion prototype was available.

Here are the basic forecasting **assumptions**:

1. The year 1996 will be the year for major licensing to manufacturers and manufacturing prototypes will abound by December 31, 1996.
2. The first volume production of cold fusion systems will be space heaters, many targeted at home and office use, and will occur in 1997. 500,000 space heaters will be sold in 1997.
3. The average installation will be a 10 kilowatt unit (approximately the heat output of a 35,000 b.t.u. small furnace).
4. The growth rate will be 30 percent per year, an exponential growth rate.

The following graph depicts the results of these assumptions.



As shown in the figure, by the year 2010, there will be an annual world sales volume of space heaters of 64 million per year. Assuming that all units sold are operational, there will be 8.38 million units in service. At the conservative heat-producing output of 10 kilowatts per unit, there will be a total potential heat production of over 650 megawatts of equivalent electrical power.

A similar projection could be devised for the impact that the use of enhanced energy systems will have on the automotive industry. The forecast for automobile sales in the U.S. is 17 million per year in 1996. The number of cars running is about 145 million. This is the market to be penetrated, in the U.S.,

By zero-emission vehicles. For example, a cold fusion device could be designed to run a generator to charge the batteries in an electric (zero-emission) vehicle. Using somewhat the same assumptions and growth rates, and assuming that 500,000 on-board battery chargers would be sold in 1997, by 2010 there would be an annual sales volume of about nine million units. The total number of electric automobiles, counting some destroyed or worn out, would be about 30 million electric automobiles. The current number in the United States is approaching 150 million autos. Therefore, that would represent a market penetration of about 20 percent -- an altogether reasonable or conservative figure. However, that number of electric vehicles would have a considerable impact on the amount of oil consumed. Assuming the savings of 5 gallons per week of gasoline per vehicle, then there would be 250 gallons of gasoline per year for each of 30 million vehicles. If you assume that one barrel of oil supplies 30 gallons of gasoline, then there would be a reduction in oil consumption of 250 million barrels per year or roughly 1 million bbls of oil per day. The current U.S. oil production (not consumption) is about 6 million bbl per day. At \$20 per bbl, the U.S. could save \$ 5 billion per year on its balance of payments.

In conclusion, by the year 2010, the use of cold fusion devices in a variety of systems ranging from space heaters to battery chargers **would make a substantial difference in the demand for oil.** As a rough estimate, we should see about one-fifth of the energy requirements of the U.S. being provided by new enhanced energy systems by the year 2010. **This supply will have sufficient impact on energy futures to help moderate the impending energy crisis that is being predicted by various agencies and experts around the world.**

References:

Albert H. Teich, Editor, Technology and Man's Future, Third Edition, St. Martin's Press, New York, c1981.

Gordon B. Moody, Publisher/Editor, World Energy Update, Arlington, Texas, various issues including October 1995.

1995 Book of the Year, Encyclopaedia Britannica, Chicago, c1995.

H. LETTERS FROM OUR READERS

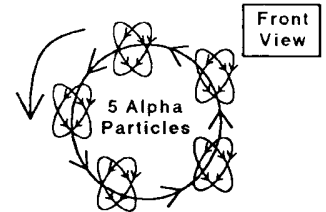
A CHALLENGE FROM MILLENIUM TWAIN

F u s i o n F a c t s ,

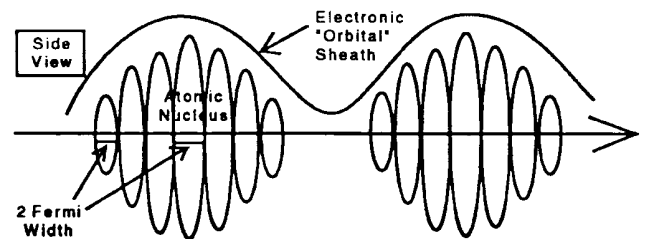
Re: Your lead editorial of September, "Nuclear Scientists Wanted". You made **no** mention of theory or theorists! It's true that many many more experimenters and engineers will

and must come -- but what of the total dearth of theorists? To date, I know of only one theorist in the world who has advanced a physical model of nuclear structure with any detail at all. (What a very sad statement about our world.) That theorist is Chris Illert of Australia. Unfortunately, even Illert's great work is a static (nondynamic) caricature of the true nucleus! [1]

My paper in progress develops the world's first dynamic physical model of nuclear structure. It expands upon the concept previewed in my paper on Superluminal-Velocity theory [2], illustrated here. At right I show one of the spinning lateral slices (shells), several slices of which placed side-to-side make up a whole nucleus. This slice by itself is the Neon nucleus.



Below is illustrated two adjacent plasma ions whose nuclei are shown to be football-shaped [3], formed by axially-aligning several spinning shell slices:



My pioneering work on nuclear structure will be released in draft form in the next few months. If any of your readers feel they have anything on the ball, I challenge them to come up with an understandable and detailed physical model of nuclear structure!

/s/ Millennium Twain

[1] Chris Illert, "Alchemy Today, Volume 2", c1993, (2/3 Birch Crescent, East Corrimal, NSW 2518 Australia).

[2] "Life Without Spacetime," April 1995

[3] M.H. MacGregor, "Evidence for Two-Dimensional Ising Structure in Atomic Nuclei," *Il Nuovo Cimento* vol 36A, no 2, 21 Nov 1976, p 113-168

I. FOR YOUR INFORMATION

WHO AND WHAT IS FIC?

Over six years of growth and development.

Hal Fox was the director of the first research laboratory at the University of Utah's Research Park. Shortly after achieving retirement age, Hal heard the announcement of the discovery of cold fusion. Knowing that the University of Utah had little or no systems engineering programs, Fox decided that his experience could help in the development of cold fusion. The result was the formation of Fusion Information Center, Inc. (FIC) as a Utah corporation in April 1989. The first step was to begin collecting information and sharing this information with others by publishing a newsletter. Thus, *Fusion Facts* was begun with its first issue in July 1989. The first subscriber was Utah Power and Light Co., the local intermountain electric power utility.

FIC is best known around the scientific world for its publications, the distribution of *Fusion Facts* at cold fusion conferences, and FIC's extensive (world's best) database on cold fusion. With over 2500 papers collected, read, reviewed, and reviews published, FIC's database has become a valuable resource to many corporations, scientists, engineers, and inventors. FIC is the publisher of *Fusion Facts*; *New Energy News*, a monthly newsletter for members of the Institute for New Energy; *Cold Fusion Source Book*; *Cold Fusion Impact in the Enhanced Energy Age*, this book includes a diskette with over 2500 references; and in press is *Proceedings of the Conference on Low-Energy Nuclear Reactions*.

strides in building an organization that can take advantage of the latest developments in the new science of cold fusion.

The block diagram depicts the formalized activities of FIC.

BRIEF DESCRIPTION OF CORPORATE ORGANIZATION

FUSION INFORMATION CENTER

The six-year old Fusion Information Center, Inc., a Utah corporation, will continue to develop its worldwide leadership position as the premier center of information on cold fusion and other enhanced energy systems. The two monthly newsletters (*Fusion Facts* & *New Energy News*) will be continued. The publishing of books and conference proceedings will be continued and expanded with an added emphasis on marketing all newsletters and publications. The publication of a new peer-reviewed professional journal for cold fusion and enhanced energy papers is planned. In addition, the extensive computerized database which has been formed over the past six years will be made available on the World-Wide Web and also planned for release on CD-ROM. The combination of these information publishing activities is expected to provide a modest positive cash flow for FIC. **More importantly, this publishing activity provides FIC with an expanding contact with some of the world's best scientists, engineers, and inventors working on these new technologies.**

UTAHKOMETA & CBM TECHNOLOGY, Inc.

This Canadian company has been established by FIC. The main purpose is to have a means for the raising of funds for the further development of Dr. Kulak's new battery technology and for the development of Dr. Michalev's brushless motor technology for the electric vehicle industry. A full business plan is completed. With an investment by founders of \$100,000, at least \$500,000 is expected to be raised in the Canadian stock market. This amount is needed to support the manufacturing, importing, and marketing of currently developed products and the development of further marketable products. The Utahkometa factory will help to develop prototypes and will then manufacture the motors and batteries. These products will then be imported for distribution throughout North America by CBM Technology, Inc.

FIC & IMSC JOINT VENTURE COMMODITY SALES

FIC has joined with International Management Systems Company to pursue the selling of some international commodities that were made available to FIC. This program is about six months old and a great deal of progress has been made. Sales opportunities now in progress are expected to

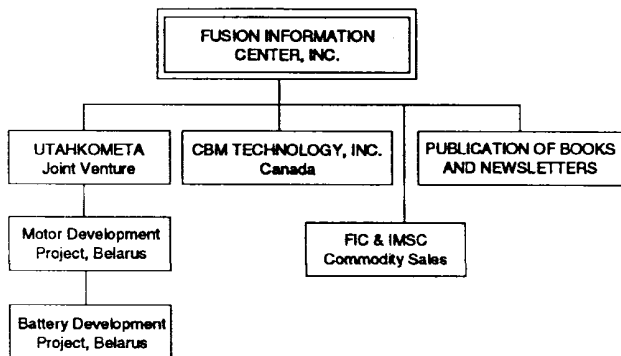


Fig. 1. Organization Chart for Fusion Information Center, Inc.

Since its incorporation as a Utah company in April, 1989, the Fusion Information Center, Inc. (FIC) has been dedicated to the commercialization of cold fusion. Most of its visible business activities has been the publishing of technical information. Behind the publishing, FIC has made significant

bring over \$2 million in revenues to FIC during the next six months. **More important is the FIC/IMSC** joint development of the Global Trading Communications System (GTCS). The concepts involved in this system have been presented to major commodity companies, including oil companies, and have been acclaimed as solving the major problems (involving many types of scams and fraud) currently bothering international commodity trading. About \$500,000 of the FIC earnings from commodity trading will be allocated for the development and marketing of the GTCS. This system is also proposed to be used to interconnect a world-wide network of affiliated new energy companies. This system is expected to be a major source of early revenue for FIC.

The planned development of profit centers affiliated with the Fusion Information Center (FIC) is important to the financial well-being of the corporation. A series of planned and partially completed international corporate activities are being negotiated by FIC. The basic concept is the mutual financing of new-energy systems and the manufacturing and marketing of such systems. A mutually agreeable distribution of development tasks and the cross-licensing of intellectual properties is planned as a part of these joint ventures.

For further information about the world-wide activities of FIC, please contact Hal Fox at the address or phone numbers on the last page of this newsletter.

Commercial Column

The following companies (listed alphabetically) are commercializing cold fusion or other enhanced energy devices:

COMPANY: PRODUCT

American Cold Fusion Engineering and Supply: Information and troubleshooting for the fusion research and development industry. Sacramento, California. The president, Warren Cooley, can be reached at 916-736-0104.

CETI (Clean Energy Technologies, Inc.): Developers of the Patterson Power Cell™. Dallas, Texas. Voice (214) 458-7620, FAX (214) 458-7690.

ENECO: Portfolio of intellectual property including over thirty patents issued or pending in cold nuclear fusion and other enhanced energy devices. Salt Lake City, Utah. Contact Fred Jaeger, Voice 801/583-2000, Fax 801/583-6245.

E-Quest Sciences: Exploring The Micro-Fusion™ process. Seeking qualified research partners for their sonoluminescence program. Contact Russ George, FAX (415) 851-8489.

Hydro Dynamics, Inc.: Hydrosonic Pump, heat-producing systems using electrical input with thermal efficiencies of 110 to 125 percent. Rome, Georgia. Contact James Griggs, Voice 706/234-4111 Fax 706/234-0702.

Nova Resources Group, Inc.: Design and manufacture ETC (Electrolytic Thermal Cell); EG (commercial power cogeneration module); and IE (integrated electrolytic system). Denver, Colorado. Call Chip Ransford, Phone (303) 433-5582.

UV Enhanced Ultrasound: Cold Fusion Principle being used for an ultrasonic water purifier. Hong Kong. FAX (852) 2338-3057.

Note: The Fusion Information Center has been acting as an information source to many of these companies. We expect to augment our international service to provide contacts, information, and business opportunities to companies considering an entry into the enhanced energy market.

INFORMATION SOURCES

Fusion Facts monthly newsletter: Salt Lake City, UT 801/583-6232, also publishes Cold Fusion Impact and Cold Fusion Source Book. Plans on-line database access for later in 1995.

New Energy News monthly newsletter, edited by Hal Fox, Salt Lake City, UT 801/583-6232

Cold Fusion Times, quarterly newsletter published by Dr. Mitchell Swartz, P.O. Box 81135, Wellesley Hills MA 02181.

Infinite Energy, new bi-monthly newsletter edited by Dr. Eugene Mallove (author of **Fire from Ice**), P.O. Box 2816, Concord, NH 03302-2816. 603-228-4516.

Fusion Technology, Journal of the American Nuclear Society publishes journal articles on cold nuclear fusion. 555 N. Kensington Ave., La Grange Park, IL 60525.

21st Century Science & Technology, P.O. Box 16285, Washington, D.C., 20041. Includes cold fusion developments.

Planetary Association for Clean Energy Newsletter, quarterly, edited by Dr. Andrew Michrowski. 100 Bronson Ave, # 1001, Ottawa, Ontario K1R 6G8, Canada.

Electric Spacecraft Journal, quarterly, edited by Charles A. Yost, 73 Sunlight Drive, Leicester, NC 28748.

Space Energy Journal, edited by Jim Kettner & Don Kelly,
P.O. Box 11422, Clearwater, FL 34616.

"*Cold Fusion*", monthly newsletter, edited by Wayne Green,
70 b Route 202N, Petersborough, NH 03458.

The above list of commercial and information sources will be growing. New listings will be added as information is received. Send information to *FF*, P.O. Box 58639, Salt Lake City, UT, 84158.

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New Energy News

New Energy News is the monthly newsletter of the Institute of New Energy, an international organization promoting research and development of clean energy of all kinds. Individual yearly memberships are \$35 per year in the U.S., \$40 to Canada and Mexico, \$50 worldwide. Yearly rate to corporations, libraries, and universities is \$60.

For membership, information or submissions information contact *New Energy News*, P.O. Box 58639, Salt Lake City, UT 84158-8639. Phone 801-583-6232, Fax 801-583-2963.

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COLD FUSION IMPACT in the Enhanced Energy Age

By Hal Fox

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