

DOCUMENTATION OF DR. EDMUND STORMS' 29 YEARS OF COLD FUSION RESEARCH

***EXPERIMENTS, EXPLANATIONS, AND RELATED
SCIENTIFIC CONTRIBUTIONS***

DRAFT SUMMARY

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Synopsis

Dr. Edmund Storms was one of the first researchers to follow up on the cold fusion claims of Martin Fleischmann and Stanley Pons in March 1989. He has continued his cold fusion (now widely referred to as low-energy nuclear reactions, LENR) research in the years since, first in his position at Los Alamos National Laboratory (LANL) and then in his home laboratory in Santa Fe, New Mexico. His work has included both laboratory experiments and development of explanations of the LENR phenomenon. During his 29 years of investigations, he has developed one of the most extensive LENR research records in existence. Much of this work is available in the public realm through his publication of papers and presentations at conferences. There is in addition an extensive body of research results that are in his private files. A project, termed the “Storms LENR Research Development Project”, has been undertaken to compile the publicly-available documents and to capture, organize, store, and document the private records.

Dr. Storms had enjoyed a 35-year career at LANL, primarily in advanced materials research, when LENR was announced. His pre-LENR investigations were mostly in refractory materials, such as the carbides and nitrides, for high-temperature nuclear energy applications (nuclear rocket, nuclear and power source for space). This highly relevant foundation enabled him to quickly become established as a premier investigator in the LENR field. He has conducted many types of LENR experiments, utilizing most of the methods for achieving the effect, including the Fleishman-Pons approach (electrolytic cells) and the gas discharge and gas loading methods. He has also designed and constructed many kinds of calorimeters for measuring excess heat.

Dr. Storms’ LENR research career took place in several phases, which may be defined by the type of investigative approach and the entities he was working with or whom he was receiving financial support. These phases are as follows, with the primary collaborator or sponsor shown in parentheses: LANL (Carol Talcott), ENECO (Charles Becker), Lattice Energy (Lewis Larsen), and KivaLabs (Brian Scanlan). These phases are separated by periods of independent investigation by Dr. Storms.

As a consequence of his many years of LENR research, Dr. Storms has developed a large body of experimental data along with many publications and unpublished reports. The records collected for the Project have been organized into the Components based primarily on the source of information: publications, unpublished progress reports, work history (lab notebook entries), electronic files, hard-copy materials, LENR library holdings, and interviews of Dr. Storms.

The principal objectives of the LENR Research Documentation Project are to secure and archive the public and private collection of hard-copy and electronic LENR files and to make the materials more accessible for Dr. Storms and others who are interested in the LENR field to conduct more enhanced review for additional insights. The Project scope is from March 1989 through December 2015, the date selected for cut off. It began in August 2015, when Dr. Grimshaw made his first visit. Eleven more trips were made to collect information, interview Dr. Storms, and prepare documents.

An incremental approach was used to collect information because the full scope of the research materials was not known in advance. The first steps were to prepare memos describing each element as it was found. The Project was conducted in three stages – information collection, organization, and documentation. Reports were prepared for each stage. The Stage 1 report documented the information obtained. The Stage 2 objective was to organize the Stage 1 information. The organization was accomplished by developing timelines for each Component. The Stage 3 (Final) report includes appendices with timelines for each Component as well as copies of the publications and progress reports (as separate report annexes). Annexes with Dr. Storms’ interviews and copies of the memos prepared for the Project are also included.

There are a number of opportunities for additional development and analysis of Dr. Storms’ LENR research record. Almost all of the Project Components could be documented in greater detail, and the associated timelines could be further refined, leading to a more complete Integrated Timeline. In particular, the relationship among the Components could be further analyzed and a more complete picture of the research and results developed. Since the cutoff date for the Project is December 31, 2015, the effort could also be extended for 2016 and 2017. Technical analysis and interpretation could be another fruitful area for further development. Dr. Storms is currently conducting additional review and analysis for new insights or discoveries. A permanent location for the hard-copy and electronic records will be advisable, such as a repository at a qualified and interested university.

Dr. Storms took an early interest in LENR research and has worked diligently in the field since its announcement. He has made many contributions with both sophisticated experiments and advanced explanations of the LENR phenomenon. He has developed a sophisticated home laboratory in which he has conducted experiments employing all the methods known to produce LENR using its various signatures, including excess heat, radiation, tritium production, and elemental transmutation. His novel exclamations, such as the nanocrack and hydroton idea for nuclear reaction, conform generally to current scientific understanding but also push into the frontiers of new knowledge. Dr. Storms has served as a vital member of the LENR research community from the very beginning. He has provided intellectual and other support to other investigators, and he has been willing to share his expertise and insight freely.

The future of humankind may well depend on achieving LENR and realizing its benefits as a clean, abundant, and inexpensive source of energy. Society will owe a great deal to Dr. Storms when LENR becomes a reality it is widely deployed as a source of energy.

1 Introduction

Cold fusion was announced by Dr. Martin Fleischmann and Dr. Stanley Pons at a press conference at the University of Utah in March 1989. The many potential benefits of cold fusion (now widely referred to as low energy nuclear reactions, LENR) were quickly realized:

- Virtually unlimited energy source
- Extremely low cost
- Environmentally secure (no emissions or effluents)
- No harmful radiation
- Deployable in centralized or dispersed configuration
- Displacement of current polluting sources of energy

Numerous attempts have been made worldwide to confirm the LENR claim of Fleischmann and Pons. Dr. Edmund Storms, one of the earliest researchers to follow up, has continued to conduct investigations and develop explanations in the 29 years since the announcement. As a consequence, he has created one of the most extensive LENR research records in existence. A photo of Dr. Storms that was taken in about 2000, possibly in conjunction with an interview by Eugene Mallove¹, appears in Figure 1-1.



*Figure 1-1.
Dr. Storms in about 2000*

¹ Mallove, E., 2000. Interview of Edmund Storms. Storms LENR Library, CD in Envelope.

Dr. Storms' roots are in Pennsylvania, where he received his undergraduate degree. He then went to graduate school at Washington University in St. Louis and received his PhD in radiochemistry². He was employed part-time at Los Alamos National Laboratory (LANL) during his graduate work, and he became a permanent employee in about 1956 after completing his studies. His main research area at LANL was high-temperature materials, such as the carbides and nitrides³. His extensive research in materials provided a solid foundation for his subsequent LENR investigations. Dr. Storms retired from LANL in 1991, but continued as a consultant until 1993. More detail on his research career at LANL before he became involved with LENR is provided in Section 3.

Dr. Storms' LENR investigations began while he was at LANL and continued through a number of phases of research. He led one of two LANL teams that had success in replicating LENR. During this time he authored or co-authored a number of papers and publications, and he gave testimony on LENR to the U.S. Congress in 1993⁴. The other successful team was led by Tom Claytor, who used primarily tritium as the signature of LENR. It is interesting to note that the leaders of the two successful teams have continued to research LENR in their private labs to this day.

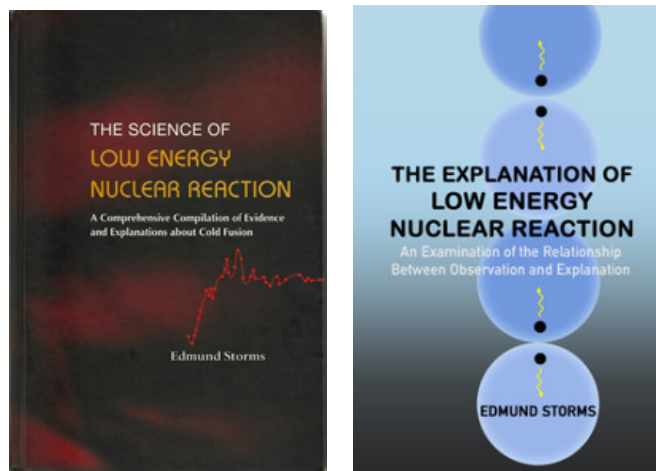
After he retired from LANL and took a break from his research activities to build his home in Santa Fe with his wife, Carol, Dr. Storms began LENR experiments at his private laboratory. This research in his home lab has continued through many phases up to the present day. During this timeframe, he has also made many contributions to explanation of the LENR phenomenon.

² Storms, E.K., 1957. A Preliminary Study of the Effect of Temperature on High-Vacuum Electrical Conduction. Dissertation. Washington University, Department of Chemistry.

³ "Research at Los Alamos National Laboratory Prior to LENR Involvement". Memo to Edmund Storms from Tom Grimshaw, September 26, 2016.

⁴ Storms, E., 1993. Statement of Dr. Edmund Storms before Congress. in Hearing Before the Subcommittee on Energy of the Committee on Science, Space, and Technology, U. S. House of Representatives, One Hundred Third Congress, First Session. Washington, C.D.: U.S. Government Printing Office. p. 114.

Dr. Storms' most prominent publications are his two books published in 2007⁵ and 2014⁶ (Figure 1-2). He has also documented the results of his research in other publicly-available publications and in unpublished progress reports. About 125 publicly-available publications have been located, and some 111 unpublished reports have also been identified. A principal venue for reporting his results has been the conferences dedicated to LENR, the International Conferences on Cold Fusion (ICCFs), of which Dr. Storms attended all but three of the 18 conferences at locations in many countries from 1990 to 2015.



*Figure 1-2.
Storms' 2007 and 2014 LENR Books.*

Dr. Storms has accumulated one of the best libraries of LENR publications, books, and related materials in the world. The library contains more than 5000 electronic files and at least 1700 hard-copy papers (some of which are also in the electronic file collection). His publication collection also formed the "kernel" of an online library, LENR-CANR.org, which was started in about 2002 by Jed Rothwell and Dr. Storms⁷.

⁵ Storms, E.K., 1997. *The Science of Low Energy Nuclear Reaction: a Comprehensive Compilation of Evidence and Explanations about Cold Fusion*: Singapore, World Scientific Publishing.

⁶ Storms, E.K., 2014. *The Explanation of Low Energy Nuclear Reaction: an Examination of the Relationship Between Observation and Explanation*. Concord, NH. Infinite Energy Press.

⁷ Rothwell, J., and E. Storms, 2003. *The LENR-CANR Website, Its Past and Future*. Proceedings of ICCF-10, p. 939-942. August.

Dr. Storms was honored (along with Michael McKubre) by Wired Magazine in 1998 as one of the 25 people in the US making a significant contribution to new ideas. As noted above, with few exceptions Dr. Storms has participated in the ICCF conferences. In the 2005 conference he was awarded the Preparata Medal, the most prestigious award of the LENR field, by the International Society of Condensed Matter Nuclear Science (Figure 1-3). In 2013 he received a Distinguished Scientist Award from the University of Missouri for his contributions to the LENR field.



Figure 1-3.

Dr. Storms' Preparata Metal, Which He Received in 2005. Photo Taken April 2016.

As a consequence of his many years of LENR research, Dr. Storms has developed a large body of experimental data along with his publications and unpublished reports. The data and reports currently exist in Dr. Storms' private collection of electronic and hard-copy files. A project has been undertaken with the assistance of Dr. Thomas Grimshaw to collect and organize Dr. Storms' research files and make them more readily accessible. The initiative is referred to as the "Storms LENR Research Documentation Project" ("SLRDP" or "Project"). The principal objective is to secure and archive Dr. Storms' private collection of hard-copy and electronic LENR files. An additional objective is to make the materials more accessible for Dr. Storms and others who are interested in the LENR field to conduct more enhanced review for additional insights.

The Project has been conducted in three stages – information collection, organization, and documentation. Work on the Project began in August 2015⁸ when Dr. Grimshaw made his first onsite visit for information collection. The “cutoff date” for the Project is December 31, 2015.

This Summary begins with a description of the eight phases of Dr. Storms’ LENR investigations:

1. LENR Work at Los Alamos National Laboratory
2. Independent Investigation 1
3. ENECO
4. Independent Investigation 2
5. Lattice Energy
6. Independent Investigation 3
7. Kiva Labs
8. Independent Investigation 4

His long career as a researcher at LANL before he began his LENR work is then provided, followed by a description of the Project and how it was accomplished. The following components of Dr. Storms’ research record are then delineated:

1. Publications
2. Unpublished Progress Reports
3. Work History
4. Electronic Data Files
 - 4a. Storms Computer Files (Round 1)
 - 4b. Storms Computer Files (Round 2)
 - 4c. ZIP and Round 1 CD Electronic Files
 - 4d. Round 2 CDs, DVD Files and VHS Tapes
 - 4e. External Hard Drive Files
 - 4f. 3–1/2 Inch Floppy Files
5. Hard Copy Records
6. Research Laboratory
7. LENR Library
8. Other Components (Conferences, 2007 Book)
9. Interviews

Ongoing efforts by Dr. Storms to reevaluate the record in light of current understanding are also described, and future potential opportunities are set forth.

The authors wish to extend their gratitude particularly to Carol Storms and JoAnne Grimshaw. Carol participated in the pursuit of LENR with Dr. Storms in the early days of the field. For this Project, she was not only a gracious hostess for the onsite visits, but was also a valuable source

⁸ The Project was actually initiated in the Spring 2015 (“Professional Biography Initiative: Next Step”. Memo to Ed Storms from Tom Grimshaw, June 10, 2015), but substantive effort began in August.

of information and perspectives from her early experience in LENR research. JoAnne Grimshaw also provided support both on-site during the visits and in the Austin-based part of the Project. She also reviewed many of the Project reports.

Tom Claytor and Malcolm Fowler, both participants in preparation of proposals that preceded the Project, were also valuable resources for information about LENR development, particularly for the early efforts at LANL^{9,10,11}. Acknowledgment is also given to the managers of the Energy Institute for supporting a LENR initiative within the organization. Thanks especially go to Fred Beach, Assistant Director, for his interest in LENR and for serving as "mentor" for the Project and other activities at the Energy Institute such as energy policy toward LENR.

⁹ The Project was preceded by initiatives by Dr. Storms and Dr. Grimshaw to establish a new laboratory in Santa Fe separate from Dr. Storms' home lab. These initiatives resulted in two versions of a proposal (see next two footnotes), both in collaboration with Dr. Tom Claytor. Dr. Claytor, like Dr. Storms, is a retiree from Los Alamos National Laboratory who operates his own private LENR lab. It is located in White Rock, NM. Funding for the two initiatives has not yet been acquired.

¹⁰ Storms, E., T. Grimshaw, and T. Claytor, 2013. Proposal for a Santa Fe LENR Research Laboratory, Los Alamos and Santa Fe, New Mexico. December.

¹¹ Claytor, T., E. Storms, M. Fowler, and T. Grimshaw (LENRGY Collaboration), 2015. Investigation of LENR for Energy Production. March.

2 Context: Dr. Storms' Pre-LENR Research in Refractory Materials

Dr. Storms had enjoyed a 35-year career, primarily in advanced materials research, when LENR was announced in 1989. This highly relevant foundation enabled him to quickly become established as a premier investigator in the LENR field¹². His pre-LENR research was primarily in refractory materials such as the carbides and nitrides for high-temperature applications. One of his major publications during this period was a book on the refractory carbides¹³ (Figure 3-1). He also authored or contributed to many LANL reports, which are listed Table 3-1.

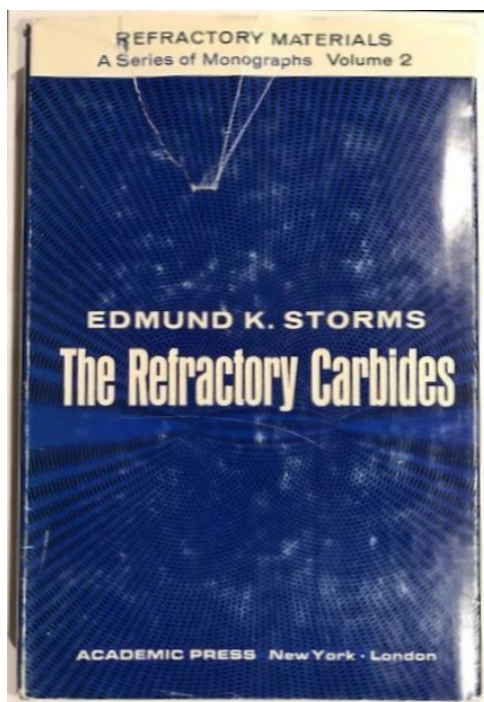


Figure 3-1.
Dr. Storms 1967 Book on Refractory Carbides.

¹² "Research at Los Alamos National Laboratory Prior to LENR Involvement". Memo to Edmund Storms from Tom Grimshaw, December 17, 2016.

¹³ Storms, E., 1967. The Refractory Carbides. New York. Academic Press.

1		Enhanced-wetting, boron-based liquid-metal ion source and method.	Bozack, Michael J.	US PATENT 5,871,848	1999
2	MFICHE: LA-12043-MS REPT: LA-12043-MS	Behavior of ZrC (sub 1-x) and U(sub y)Zr(sub 1-y)C(sub 1-x) in flowing hydrogen at very high tem	Storms, Edmund Kugler,	LA-12043-MS	1992
3		Liquid metal ion source and alloy.	Clark, William M., Jr.	US PATENT 4,775,818	1988
4		Liquid metal ion source and alloy for ion emission of multiple ionic species.	Clark, William M., Jr.	US PATENT 4,670,685	1987
5	MAIN: QD172.A3 C45 pt.6	The actinide carbides /	Holley, C. E.		1984
6	MFICHE: LA-9524 REPT: LA-9524	An analytical representation of the thermal conductivity and electrical resistivity of UC _{1±x} ,	Storms, Edmund Kugler,	LA-9524	1982
7	MFICHE: LA-DC-9724	Uranium--carbon and plutonium--carbon systems.	Storms, Edmund Kugler, 1931-	LA-DC-9724	1968
8	MAIN: TA418.26 R43x v.2	The refractory carbides /	Storms, Edmund Kugler,		1967
9	MFICHE: LA-3331 REPT: LA-3331	Heat capacities of NbC[sub 0.702], NbC[sub 0.825], NbC[sub 0.980] and Nb[sub 2]C below 320[degre	Sandenaw, Thomas A.	LA-3331	1965
10	MFICHE: LA-2942 REPT: LAMS-2942	A critical review of refractories.	Storms, Edmund Kugler, 1931-	LA-2942	1964
11	REPT: LAMS-2674	Critical review of refractories. Part 1. Selected properties of group 4a, -5a, and -6a carbides	Storms, Edmund Kugler, 1931-	LAMS-2674- Pt. 1	1962
12	REPT: LAMS-2674-pt.2	Critical review of refractories. Part 2, Selected properties of group 4a, -5a, and -6a nitrides	Storms, Edmund Kugler, 1931-	LAMS-2674- pt.2	1962
13	REPT: LADC-4478	Lattice dimensions of NbC as a function of stoichiometry.	Kempter, C. P. (Charles P.)	LADC-4478	1960
14	REPT: LA-DC-4356	Properties of lithium hydride. I, Single crystals	Pretzel, F. E. (Frank E.)	LA-DC-4356	1960
15	REPT: LADC-3755	The variation of lattice parameter with carbon content of niobium carbide.	Storms, Edmund Kugler, 1931-	LADC-3755	1959

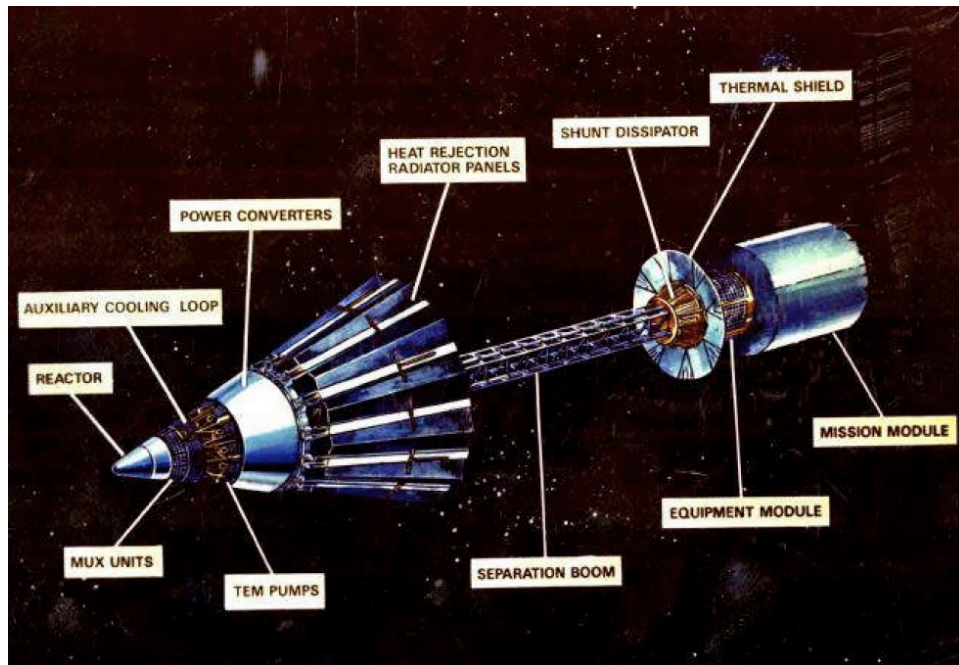
*Table 3-1.
Pre-LENR Publications That Ed Storms Authored (or Contributed to) as
Listed on LANL Library Website*

Dr. Storms' work was primarily in support of two large programs for a nuclear rocket (Rover) and for nuclear reactors as power sources for satellites (SP-100). The objective of the Rover program was to develop a nuclear thermal rocket. It continued at LANL from 1955 to 1972 and had three phases – Kiwi, Phoebus, and Peewee (Figure 3-2). It involved NASA and the Atomic Energy Commission and was managed by the Space Nuclear Propulsion Office of the Executive Office.



*Figure 3-2.
Nuclear Rocket Test Equipment from LANL's Rover Program.
The equipment from the first phase (Kiwi) is on the left. Equipment from the second phase (Phoebus) is on the right.*

The SP-100 (for Space Power 100 kWe) program objectives were to develop nuclear reactors as power source is primarily for spy satellites during the Cold War (Figure 3-3). The program originated in the 1980s as a space-based power supply for Star Wars weapons. Later it evolved into a flexible design capable of space-based, lunar-based, and Mars-based power applications. It continued until the early 1990s.



*Figure 3-3.
Schematic of SP-100 Space Reactor with Generic Deployment Boom*

Dr. Storms' advanced research in refractory materials is evident in both programs. The Rover design, for example, utilized nuclear reactors that he had solid cores. The high temperatures of operation (over 4300°F) of the solid core reactors required the use of materials with very high melting points. The refractory materials were used to protect reactors from corrosion caused by very high temperature hydrogen that was used for propulsion. Dr. Storms has a large collection of hard-copy and electronic files from his pre-LENR work at LANL¹⁴. Similar hard-copy files have also been obtained from Tom Claytor¹⁵. Neither of these collections has been incorporated in the Storms LENR Documentation Project.

Dr. Storms' pre-LENR career as a nuclear chemist doing advanced materials research at LANL has made him particularly well qualified to conduct LENR experiments and develop advanced explanations. He has in-depth of knowledge of the nucleus and the electron shell of atoms, both of which are involved in the LENR mechanism.

¹⁴ "File Boxes for Pre-LENR Research at Los Alamos National Laboratory". Memo to Edmund Storms from Tom Grimshaw, March 24, 2017.

¹⁵ "Inventory of Claytor Materials Related to Early Cold Fusion Research at Los Alamos National Laboratory". Memo to Tom Claytor from Tom Grimshaw, March 13, 2017.

3 Phases of LENR Research, 1989-2015

Dr. Storms has conducted many types of LENR experiments, utilizing most of the methods for achieving the effect, including the Fleishman-Pons approach (electrolytic cells) and the gas discharge and gas loading methods. He has also designed and constructed many kinds of calorimeters for measuring excess heat. Although he has collaborated with many individuals and organizations, for the most part he has conducted his private research on an individual basis. Dr. Storms has enjoyed the support of a number of different sponsors during the years of his LENR research.

Dr. Storms' laboratory was initially set up in the main building of his home, but was subsequently moved to the annex building, where it is currently located. Among the assets of his laboratory are a scanning electron microscope (SEM) with energy-dispersive x-ray (EDX) spectroscopy capability, mass spectrometers, and an optical microscope, as well as a complete shop for constructing experimental apparatus, including metal machining and glass working.

Dr. Storms' LENR research career took place in several phases, which may be defined by the type of investigative approach and the entities he was working with or whom he was receiving financial support. These phases are shown below with the approximate beginning and end dates for each phase.

<u>Phase</u>	<u>Description</u>	<u>Dates</u>
1	LENR Work at Los Alamos National Laboratory	3/1989 – 8/1991
2	Independent Investigation 1	9/1991 – 12/1993
3	ENECO	1/1994 – 2/1998
4	Independent Investigation 2	3/1998 – 6/2000
5	Lattice Energy	7/2000 – 2/2006
6	Independent Investigation 3	3/2006 – 1/2007
7	Kiva Labs	2/2007 – 2/2012
8	Independent Investigation 4	3/2012 – 12/2015

An overall description of each of Dr. Storms' LENR research phases is provided in subsections below, including the type of experimental work undertaken and the sponsor with whom Dr. Storms was working. The Publications and Unpublished Progress Reports are listed, followed by a review of the research record as contained in the other Project Components: Work History,

Electronic Files, Hard-Copy Records, and other Components. A description of the contents of each of the Components is in Section 5.

3.1 Phase 1. Los Alamos National Lab (3/1989 – 8/1991)

As he was working on the SP-100 Program at LANL, Dr. Storms took an immediate interest in LENR when he heard about its announcement in March 1989. He began experiments and development of explanations within a few weeks and continued to research the phenomenon for the next 2½ years until he retired from LANL in August 1991. The initial stage of his experiments utilized tritium as the signature of LENR, and heat energy as measured in a calorimeter was used in the second stage. He achieved success in initiating and measuring LENR in both stages.

LANL Response to LENR Announcement

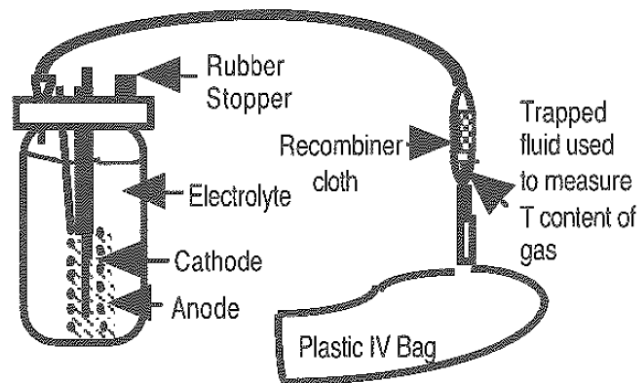
A compact source of high-density energy like LENR would help LANL to accomplish its mission, particularly for energy for space applications as noted for the SP-100 program. An initial meeting of several organizations in LANL took place on March 27, a mere four days after the announcement. No fewer than eight teams emerged to achieve LENR using different methods and signatures. Initial funding from the DOE of \$350,000 was shared among the various teams. Stanley Pons was invited to give a presentation in April 1989, and Martin Fleischmann made a visit in February 1990.

Many consolidated progress reports covering activities and results of the various LANL research teams were issued from March 1989 until research was discontinued. A meeting was convened in Santa Fe by LANL and DOE on May 23 to 25, 1989 in which investigators in the national laboratories around the country described their methods and results. In the end, just two LANL teams, headed by Ed Storms and Tom Claytor, had success in achieving LENR using different methods but with tritium as the signature. It is interesting that Drs. Storms and Claytor are the researchers who continued to pursue the phenomenon in their private laboratories after retiring from LANL.

Experiments with Tritium as the Signature

Dr. Storms' initial LENR experiments utilized electrolytic cells with palladium and deuterium similar in concept to the devices is used by Fleischmann and Pons. Tritium was used as the signature because its presence clearly demonstrates nuclear reactions and because of a high level of expertise and long history of tritium research at LANL. Furthermore, tritium had been reported by Fleischmann and Pons. Carol Talcott, whose expertise was on hydrogen storage in palladium for highly confidential applications for nuclear devices, worked closely with Dr. Storms¹⁶. Carol and Ed were subsequently married.

More than 250 electrolytic cells were investigated using deuterium oxide (heavy water) and palladium from many sources. The experimental setup is shown in Figure 3-1. Tritium was measured in the electrolyte and in the gas evolved, which was captured in IV bags (normally used to administer fluids intravenously). Thirteen of the cells were found to produce tritium from LENR. The study included extensive measurements to eliminate possible non-LENR sources of the tritium. Dr. Storms and Carol Talcott presented the results of their tritium research at the first annual conference on cold fusion¹⁷.



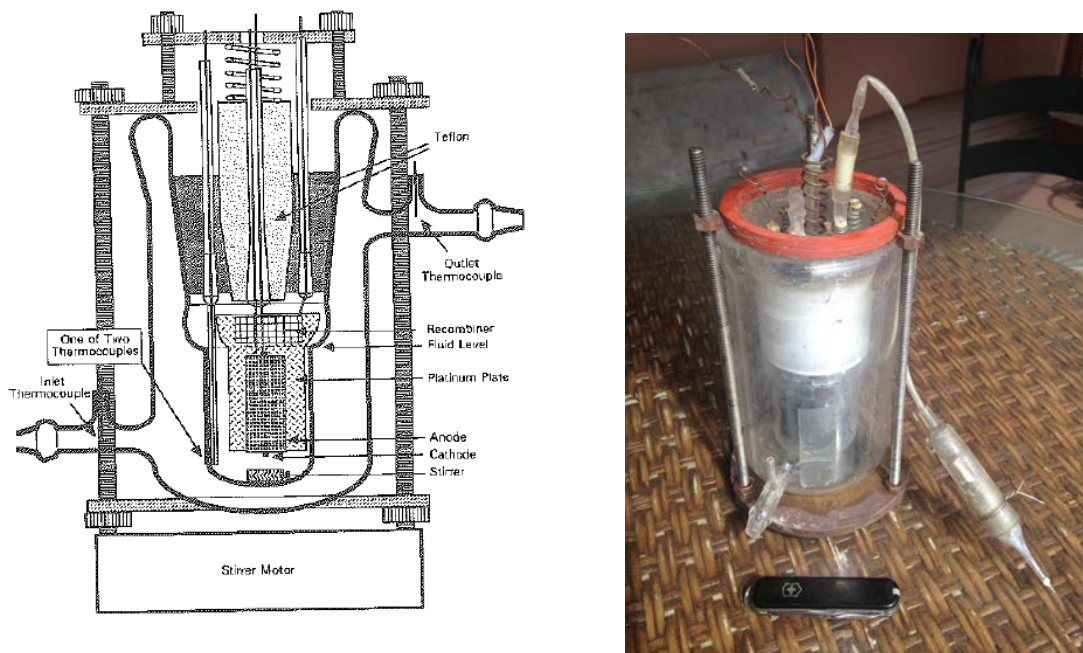
*Figure 3-1.
Experimental Setup for Electrolytic Cels. (From Storms, 2007, Figure 3.)*

¹⁶ Storms, E.K., 2007. *The Science of Low Energy Nuclear Reaction: a Comprehensive Compilation of Evidence and Explanations about Cold Fusion*: Singapore, World Scientific Publishing, p. 10.

¹⁷ Storms, E.K. and C.L. Talcott. A study of electrolytic tritium production. in *The First Annual Conference on Cold Fusion*. 1990. University of Utah Research Park, Salt Lake City, Utah: National Cold Fusion Institute. p. 149.

Experiments with Excess Heat as the Signature

In the second phase of his LENR experiments at LANL, Dr. Storms again used electrolytic cells with palladium and deuterium, but with excess heat rather than tritium as the signature. The calorimeter for measuring heat contained the experimental cells. A drawing and photo are shown in Figure 3-2. The most significant palladium samples used were from Dr. Akito Takahashi in Japan. Three samples from Tanaka Kikinzoku Metals were run. The first produced considerable excess heat, The second generated none, and the third also produced heat, but in a lesser amount than the first.



*Figure 3-2.
Diagram and Photo of Calorimeter and Electrolytic Cell Utilized in
LANL Excess Heat Experiments.*

(Diagram from Storms, 2007, Figure 8. Photo Taken at Dr. Storms Home Lab, April 2016.)

Discontinuation of LENR Research at LANL

The controversy surrounding LENR was well underway within a month or so or two after the March 1989 announcement. The Secretary of Energy directed DOE's Energy Research Advisory Board (ERAB) to conduct an investigation and make recommendations. LANL submitted its

report to ERAB on September 11, 1989¹⁸. The draft ERAB report was issued in July and the final report in November 1989. Although the content of the report appeared not to be completely negative, the effect was the same as if it were. After the final ERAB Report, the DOE directed the national laboratories to discontinue LENR investigations. The LANL correspondence implementing this direction appeared as an undated hand-written note to Bruce Jensen (author unknown) on an internal LANL memo dated March 1, 1991¹⁹.

Dr. Storms nevertheless was able to continue his LENR research at a reduced level. After the work on the Takahashi samples, he collected the significant papers in the field, and in 1991 he published a summary of what was known in the field at that time²⁰. This collection was the foundation for Dr. Storms' LENR Library, undoubtedly the most complete collections of literature in the field. It also led to Dr. Storms' subsequent work with ENECO, which is described below in Phase 3. Dr. Storms also had extensive correspondence with other LENR researchers during these earliest years of the field, and he sponsored and organized Martin Fleischmann's visit to LANL in February 1990. As noted above, Dr. Storms attended the first conference dedicated to LENR research, ICCF-1, in Salt Lake City in 1990.

LENR Publications and Reports

Dr. Storms, along with Carol Talcott, prepared a number of reports, presentations and published papers from their LENR work at LANL as shown below:

Talcott, C.L., et al. Tritium measurements: Methods, pitfalls, and result. in EPRI/NSF Workshop. 1989. Washington, DC.

Storms, E. and C. Talcott, Electrolytic charging of palladium with deuterium to high stoichiometry, P. Report, Editor. 1989.

Storms, E. A New method for initiating nuclear reactions. in First International Conference on Future Energy. 1989. Washington, DC: Unpublished.

Storms, E.K., and C. Talcott., Attempts to understand and reproduce cold fusion. Workshop on Cold Fusion Phenomena, Santa Fe. Abstracts. May 1989.

¹⁸ "Results of Cold Fusion Research at Los Alamos National Laboratory. Prepared September 11, 1989, for the Cold Fusion Panel, Energy Research Advisory Board to the U. S. Department of Energy". Unpublished Report. Item 1 of Memo to Tom Claytor from Tom Grimshaw, March 13, 2017.

¹⁹ "Cold Fusion". Memo from Bruce Matthews to Michael Stevenson and Reed Jensen (LANL Staff), March 1, 1991.

²⁰ Storms, E., Review of experimental observations about the cold fusion effect. *Fusion Technol.*, 1991. 20: p. 433.

Storms, E., C. Talcott, and M. David., Recent results for electrolytic tritium production at Los Alamos. 1989.

Talcott, C.L. and E. Storms. An overview of "cold fusion". in JOWOG-12 Meeting, Atomic Weapons Estab. 1990. Aldermaston, England.

Storms, E.K. and C.L. Talcott. A study of electrolytic tritium production. in The First Annual Conference on Cold Fusion. 1990. University of Utah Research Park, Salt Lake City, Utah: National Cold Fusion Institute. p. 149.

Storms, E. and C.L. Talcott, Electrolytic tritium production. Fusion Technol., 1990. 17: p. 680.

Storms, E.K., Letter to Science. 1990.

Storms, E., Review of experimental observations about the cold fusion effect. Fusion Technol., 1991. 20: p. 433.

Storms, E.K. and C. Talcott-Storms, The effect of hydriding on the physical structure of palladium and on the release of contained tritium. Fusion Technol., 1991. 20: p. 246.

Research Record

The research record for Phase 1 includes generally the contents of the Project Components for 1989, 1990, and 1991. The electronic folders and files are almost entirely on the floppy disks and include folders named "Cold Fusion Text Archives", "Progress Reports and Memos and Proposal", "Physical Study", and "CF Data" as well as papers by Dr. Storms and Carol Talcott from their LENR research at LANL. Information on the tritium work is also on one of the floppy disks and a ZIP desk.

The Phase 1 hard-copy records are quite extensive and include LANL memos on LENR work by various entities at the Lab as well as other National Laboratories, copies of LENR articles in newspapers and magazines, data from the tritium studies at LANL, chemical analysis reports, micrographs of samples, and correspondence with other LENR researchers. Items of particular interest in the research record are the LANL report submitted to the ERAB committee, the internal memo stopping LENR work at LANL, correspondence with other prominent researchers, and proceedings from the earliest ICCF conferences.

3.2 Phase 2. Independent Investigation 1 (9/1991 – 12/1993)

Although Dr. Storms focused on building a new home in Santa Fe after his retirement, he continued to make contributions to the LENR field. This phase of his research extended from his August 1991 retirement to about January 1994, when he began working closely with ENECO.

During this Phase, as he was consulting to LANL after retirement, Dr. Storms was asked to give testimony to the US Congress in 1993²¹, although as an independent citizen rather than representing the Laboratory. He was also requested to visit New Hydrogen Energy (NHE) Laboratory in Japan, where he provided guidance on how to achieve LENR. One of the NHE supporters, IMRA, subsequently provided some 90 palladium samples to investigate the effect of lattice expansion on achieving LENR.

Dr. Storms had plans to develop a LENR research lab when he and Carol designed and built their new home. The lab was opened during Phase 2, although the lab notebooks began later, in 1995, when Dr. Storms started lab work for ENECO. Because he had one of the few facilities investigating LENR after the ERAB report and widespread withdrawal of research support, Dr. Storms was asked to investigate samples from many researchers. After completing the IMRA work in his home lab, he subsequently used the palladium samples for other kinds of experiments for many years.

Charles Entenmann periodically provided financial support during Phase 2, which was documented in several letters in the hard-copy records. Also during this phase, Dr. Storms participated in a collaborative effort for a proposal to DOE designed to conform to guidance for LENR research support in the November 1989 ERAB report²². DOE did not respond favorably to the proposal even though the collaborators were highly successful scientists with strong credentials. Dr. Storms also attended ICCF Conferences #3 (1992, Nagoya, Japan) and #4 (1993, Lahaina, Maui, Hawaii). He did not attend ICCF-2 in Italy.

Publications and Reports

Publications and reports that Dr. Storms authored during 1992 and 1993 are shown below.

Talcott, C.L., et al., Effects on the palladium deuteride lattice constant upon alloying with lithium, draft, Editor. 1992.

²¹ Storms, E.K. Statement of Dr. Edmund Storms before Congress. in Hearing Before the Subcommittee on Energy of the Committee on Science, Space, and Technology, U. S. House of Representatives, One Hundred Third Congress, First Session. 1993. Washington, C.D.: U.S. Government Printing Office. p. 114.

²² Hansen, L.D., et al., Cooperative investigation of anomalous effects in Pd/LiOD electrolytic cells. 1994. A proposal submitted to the Department of Energy.

Storms, E. Measurement of excess heat from a Pons-Fleischmann type electrolytic cell. in Third International Conference on Cold Fusion, "Frontiers of Cold Fusion". 1992. Nagoya Japan: Universal Academy Press, Inc., Tokyo, Japan. p. 21.

Storms, E.K., Measurements of excess heat from a Pons-Fleischmann-type electrolytic cell using palladium sheet. *Fusion Technol.*, 1993. 23: p. 230.

Storms, E. Some characteristics of heat production using the "cold fusion" effect. in Fourth International Conference on Cold Fusion. 1993. Lahaina, Maui: Electric Power Research Institute 3412 Hillview Ave., Palo Alto, CA 94304. p. 4.

Storms, E. The status of "cold fusion". in 28th Intersociety Energy Conversion Engineering Conference. 1993. Atlanta, GA., P.

Storms, E.K. Statement of Dr. Edmund Storms before Congress. in Hearing Before the Subcommittee on Energy of the Committee on Science, Space, and Technology, U. S. House of Representatives, One Hundred Third Congress, First Session. 1993. Washington, D.C.: U.S. Government Printing Office. p. 114.

Research Record

The research record for Phase 2 was created generally in 1992 and 1993. As in Phase 1, most of the electronic records are on the floppy disks and include data from experiments with palladium (e.g. Pd#1d, Pd#24) and other samples (e.g. J#4). One of the ZIP disks or CDs contains files from ICCFs 1, 3, 4, 5, 6, and 7. The hard-copy records contain cold fusion papers, correspondence with other LENR researchers, materials related to a proposal by Lagowski and the Congressman Swett Committee, and a copy of the statement by Dr. Storms before the House of Representatives Committee on Science, Space, and Technology in May 1983. The LENR Library has the proceedings for ICCF-3 (1992) and ICCF-4 (1993).

3.3 Phase 3. ENECO (1/1994 – 2/1998)

ENECO was a lab that was formed in Salt Lake City to secure patents on LENR utilizing applications to the US Patent and Trade Office (PTO) that have been made by Drs. Fleischmann and Pons through the University of Utah. At the request of Charles Becker, who provided funding for ENECO, Dr. Storms initially assisted with development of patent application documentation. This work started in about January 1994, when he began to receive compensation from ENECO. He had continued to build his LENR Library after his initial compilation and report on the status of the field while still at LANL. This Library provided the literature resource for the PTO patent documentation for ENECO.

The ENECO lab in Salt Lake City was concurrently performing LENR experiments in support of the patent applications with Yan Kucherov as the Director. Dr. Storms was asked to join the ENECO Board of Directors in 1994. He was requested to begin LENR experiments in his home lab, which was started in Phase 2, to support the ENECO work. His work history (lab notebooks) started in June 1995. He continued his work with ENECO until he resigned from the Board of Directors when he felt his contributions were no longer useful to the company. He received his final compensation in February 1998. Primarily because of the negative PTO stance on LENR, ENECO's efforts to secure a US patent were not successful. ENECO continued operations, including patent efforts not related to LENR (which were also not successful), and the company filed for bankruptcy after Dr. Storms' departure.

During Phase 3, Dr. Storms attended ICCF Conferences #5 (1995, Monte Carlo, Monaco) and #6 (1996, Hokkaido, Japan). Along with Michael McKubre, he received an award in 1998 from Wired Magazine as one of 25 "Those Who Dare".

Publications and Reports

Dr. Storms prepared (or contributed to) the following publications and other documents during Phase 3.

Storms, E., Chemically-assisted nuclear reactions. *Cold Fusion*, 1994. 1(3): p. 42.

Storms, E. Methods required for the production of excess energy using the electrolysis of palladium in D₂O-based electrolyte. in International Symposium, "Cold Fusion and Advanced Energy Sources". 1994. Belarusian State University, Minsk, Belarus.

Storms, E.K., Some characteristics of heat production using the "cold fusion" effect. *Trans. Fusion Technol.*, 1994. 26(4T): p. 96.

Hansen, L.D., et al., Cooperative investigation of anomalous effects in Pd/LiOD electrolytic cells. 1994, A proposal submitted to the Department of Energy (1994).

Storms, E.K., Walt Polansky DOE Briefing. 1994.

Storms, E., Cold Fusion: From reasons to doubt to reasons to believe. *Infinite Energy*, 1995. 1(1): p. 23.

Storms, E.K., Cold fusion, a challenge to modern science. *J. Sci. Expl.*, 1995. 9: p. 585.

Storms, E. Status of "cold fusion". in 5th International Conference on Cold Fusion. 1995. Monte-Carlo, Monaco. p. 1.

Storms, E. The nature of the energy-active state in Pd-D. in II Workshop on the Loading of Hydrogen/Deuterium in Metals, Characterization of Materials and Related Phenomena. 1995. Asti, Italy. p.

Storms, E.K., The nature of the energy-active state in Pd-D. Infinite Energy, 1995 (#5 and #6).

Storms, E.K. Reaction of Pd with D. In ASTI. 1995. Asti, Italy.

Storms, E. Some thoughts on the nature of the nuclear-active regions in palladium. in 6th International Conference on Cold Fusion, Progress in New Hydrogen Energy. 1996. Lake Toya, Hokkaido, Japan: New Energy and Industrial Technology Development Organization, Tokyo Institute of Technology, Tokyo, Japan. p. 105.

Storms, E., A review of the cold fusion effect. J. Sci. Exploration, 1996. 10(2): p. 185.

Storms, E., How to produce the Pons-Fleischmann effect. Fusion Technol., 1996. 29: p. 261.

Storms, E.K., A study of those properties of palladium that influence excess energy production by the Pons-Fleischmann effect. Infinite Energy, 1996. 2(8): p. 50.

Storms, E.K., Some problems with palladium and how to solve them. 1997: NHE Japan.

The following unpublished progress reports also appeared during the Phase 3 timeframe.

<u>Title</u>	<u>File Name</u>
(7/3/1995)	Update of activity, 7/3/95
(8/17/1995)	progress report 8/17/95
INITIAL LOADING VALUES (1/3/1997)	Summary of calorimeter studies

Research Record

The record for Phase 3 was developed in the period 1994 to 1997. As noted, the work history (lab notebook summary) began in June 1995. The initial samples were noted as “A1-B4” with many sample designations attached (e.g. A1-B4#1, #2, #3, #4, #5). They continued through 1995. A second set of samples was designated “Pd” followed by number samples (e.g. Pd#1, #11, #36). They began in 1996 and continued into late 1997, when additional samples began with “Pd” followed by a different designation (e.g. Pd-W1.1, Pd-VFTP, Pd-A13.1).

Many of the electronic files are once again on floppy disks for Stage 3. Three disks cover the following folders and topics: 1) cold fusion letters; 2) interviews of Dr. Storms and other LENR topics by the Utah News Team and Good Morning America; 3) the DOE proposal described for Phase 2 (Hanson, 1994); and 4) Miley data (which actually belongs in Phase 5).

The hard-copy records include primarily correspondence with other LENR researchers. A set of records titled “ENECO” is also in the hard-copy records, along with a set with the name “Bankruptcy”, which also apply to ENECO. The LENR Library has the proceedings for ICCF Conferences #5 (1995, Champaign, Illinois,) and #6 (1996) as well as the 2nd Conference on

Low-Energy Nuclear Reactions (1996, College Station, Texas), and for an Asti Workshop on Anomalies in Hydrogen/Deuterium Loaded Metals (1997, Bologna, Italy).

3.4 Phase 4. Independent Investigation 2 (3/1998 – 6/2000)

Following his February 1998 separation from ENECO, Dr. Storms continued LENR research in his home lab independently. This phase continued until about July 2000, when he started his work with Lattice Energy. He periodically received financial support from Charles Entenmann during Phase 4 and continuing until about November 2001.

During Phase 4, Dr. Storms attended ICCF Conferences #7 (1998, Vancouver, BC) and #8 (2000, Lerici (La Spezia), Italy) as well as a Conference on Future Energy (COFE, 1999) in Washington, D.C.

Publications and Reports

Dr Storms' publications and unpublished progress reports for Phase 4 generally included the years 1998 to 2000.

Storms, E.K. Relationship between open-circuit-voltage and heat production in a Pons-Fleischmann cell. in The Seventh International Conference on Cold Fusion. 1998. Vancouver, Canada: ENECO, Inc., Salt Lake City, UT. p. 356.

Storms, E., Cold fusion revisited. *Infinite Energy*, 1998. 4(21): p. 16-29.

Storms, E.K., Formation of β -PdD containing high deuterium concentration using electrolysis of heavy-water. *J. Alloys Comp.*, 1998. 268: p. 89.

Storms, E., Factors affecting heat production in a Pons-Fleischmann Cell. ICCF-7, April 1998.

Storms, E., My life with cold fusion as a reluctant mistress. *Infinite Energy*, 1999. 4(24): p. 42.

Storms, E., Anomalous heat generated by electrolysis using a palladium cathode and heavy water in American Physical Society. 1999. Atlanta, GA.

Storms, E., Cold fusion: Theory and practice in Japan. *21st Century Sci. & Technol.*, 1999. Spring: p. 82.

Storms, E., Proposal for study of palladium powder at UNM. 1999.

Storms, E.K., The present status of chemically assisted nuclear reactions. in ACS. 1999. Ontario, CA.

Storms, E.K., New Method for initiating nuclear reactions. in Conference on Future Energy. 1999. Bethesda, MD.

Storms, E., Excess power production from platinum cathodes using the Pons-Fleischmann effect. in 8th International Conference on Cold Fusion. 2000. Lerici (La Spezia), Italy: Italian Physical Society, Bologna, Italy. p. 55-61.

Storms, E., A critical evaluation of the Pons-Fleischmann effect: Part 1. *Infinite Energy*, 2000. 6(31): p. 10.

Storms, E., A critical evaluation of the Pons-Fleischmann effect: Part 2. *Infinite Energy*, 2000. 6(32): p. 52.

Storms, E.K., Description of a dual calorimeter. *Infinite Energy*, 2000. 6(34): p. 22.

Storms, E., The present status of chemically-assisted nuclear reactions. *Infinite Energy*, 2000. 5(29): p. 26.

Storms, E., Where do we stand on cold fusion? *21st Century Sci. & Technol.*, 2000. Winter: p. 76.

Hansen, L.D., S.E. Jones, J.M. Thorne, and E. Storms., Cooperative investigation of anomalous effects in Pd/LiOD electrolytic cells. 2000.

The unpublished progress reports for Phase 4 are from 2000.

<u>Title</u>	<u>File Name</u>
(1/9/2000)	History of flow calorimeter
(9/12/2000)	History of composi
(9/12/2000)	loading based on oil
(9/12/2000)	Pd history
(9/12/2000)	Pd property summary
(11/10/2000)	History of Miley Tests

Research Record

The Phase 4 research record extends generally from 1998 to 2000. Several items indicate that Phase 5 (Lattice Energy) started in the latter part of 2000 (e.g. “Miley Study Initiated“ in work history, September 2000 and “History of Miley Test“, an unpublished progress report, November 2000).

The samples examined during Phase 4 as indicated by the work history were primarily palladium with other materials (e.g. Pd-W2.3, Pd-Al2.5, Pd-Ag#7, PdB(0.75%)). Samples of palladium, platinum, nickel, and titanium (e.g. Pd#24, Pt#11, Ni#6, and Ti#1) were also studied. Electronic files were found on several of the legacy media except the floppy disks – ZIP discs, CDs, the external hard drive, and DVDs. The most significant electronic files included the following: 1) a study of Ag on C; 2) broad-based storage folders (e.g. “Work in Progress”, “Current Articles”, “Calorimeter Study”, “Archive, General”); 3) digital pictures; 4) conference files (American Chemical Society, 1999; ICCF-8, 2000); 5) Ed’s website (which may be found at <http://home.netcom.com/~storms2/index.html>) but has not been active for a long time); and 6) Gene Mallove interview of Dr. Storms (April 15, 2000).

The hard-copy records for Phase 4 include a variety of materials, including papers, reports, and presentations by Dr. Storms, a study with John Dash using titanium (“Ti Study Dash”), letters from Entenmann, and correspondence with other LENR researchers. Dr. Storms’ LENR Library contains the proceedings of ICCF #7 and #8, and the First International Conference on Future Energy (COFE, 1999, Washington, DC).

3.5 Phase 5. Lattice Energy (7/2000 – 2/2006)

Phase 5 began when Dr. Storms was approached by Lew Larson of Lattice Energy in July 2000 to conduct independent assessments of LENR work being performed by Larson's associate, Dr. George Miley of the University of Illinois. After the assessments came to an end, Dr. Storms continued work with Lattice, conducting many types of experiments on a large variety of materials. This extensive work continued until Larson withdrew financial support in February 2006. Dr. Storms joined Lattice Energy as a Senior Scientist in April 2003, and a written agreement between Dr. Storms and the company was prepared in June 2004.

While he was conducting the independent confirmation of Dr.'s Miley's research, Dr. Storms found an apparent error in the method by which Miley and his colleague in LENR research, Andre Lipson, were calculating excess energy. Discussions among the participants did not result in a resolution of the issue.

Many progress reports were prepared during by Dr. Storms during his research for Lattice Energy. He also received a scanning electron microscope (SEM) equipped with energy dispersive x-ray (EDX) capability to support the investigations. He was able to continue the SEM and EDX component of his LENR research after the end of his support from Lattice Energy, and he continues to use the equipment to this day. Despite many experiments with a large variety of materials and methods using electrolytic cells, reproducible energy was not achieved.

An important component of Dr. Storms' research during his work with Lattice Energy was the "Case Study". Les Case was a retiree from a prominent catalyst production company who conducted LENR experiments utilizing his background in catalysts. He developed a method that used drums of charcoal made from coconuts from an island in the Pacific Ocean. This method utilized a palladium chloride solution that was deposited on the charcoal particles. After

observing excess heat, Case requested Michael McKubre, LENR researcher at SRI International, confirm his work. When this confirmation was found to be a success, Dr. Storms asked to conduct an additional check. He performed many experiments with the charcoal and palladium chloride solution, and at one point received guidance from Dr. McKubre on specific procedures. Dr. Storms was not able to confirm the occurrence of LENR in the Case Study.

Following his support of Dr. Storms' research, Larson changed his focus to developing a LENR explanation. His collaboration with Allan Widom resulted in the Widom-Larson theory, one of the best-known explanations in the LENR field.

Dr. Storms developed a website, “Taking the Chill Out of Cold Fusion“, in the 2001 timeframe. The website is still available²³, although it has not been updated for several years. It contains a number of photos of Dr. Storms’ lab experiments (with electrolytic cells) and about a dozen of his cold fusion papers prepared from about 1996 to 2001. A complete list of Dr. Storms’ publications, including papers and books from his pre-LENR research on high-temperature refractory materials, is also on the website.

During Phase 5, Dr. Storms attended ICCF-10 (2003, Cambridge, Massachusetts), ICCF-11 (2004, Marseilles, France), and ICCF-12 (2005, Yokohama, Japan). He received the Preparata Medal during ICCF-12. He did not attend ICCF-9, which took place in Beijing, China in 2002. He also presented papers at other conferences, including the American Physical Society (2001, Seattle Washington; 2003, Austin, Texas; 2005, Tucson, Arizona). He presented short courses (“An Update of LENR“) at ICCF-10 and ICCF-11. He also co-authored a paper with Jed Rothwell on the LENR-CANR.org website, which have been created by Rothwell based primarily on publications in Dr. Storms’ LENR Library²⁴. After the US DOE held a second review of LENR in 2004 (with similar findings to the original 1989 ERAB review), Dr. Storms wrote a highly critical commentary on the review.

Publications and Reports

The period of publications and other reports for Phase 5 was generally from 2001 to 2005. As

²³ <http://home.netcom.com/~storms2/index.html>.

²⁴ Rothwell, J., and E. Storms, 2003. The LENR-CANR Website, Its Past and Future. Proceedings of ICCF-10, p. 939-942. August.

noted in the previous section, some of the progress reports started in the latter part of 2000.

- Storms, E., Cold fusion: An objective assessment. www.LENR-CANR.org, 2001.
- Storms, E.K. Ways to initiate a nuclear reaction in solid environments. in American Physical Society Meeting. 2001. Seattle, WA. p.
- Storms, E.K., Review of paper by Shanahan. 2001.
- Storms, E., Cold fusion, the next big step up the energy ladder. Submitted to 21st Century Science and Technology. June 2002.
- Storms, E., The nature of the nuclear-active-environment required for low energy nuclear reactions. *Infinite Energy*, 2002. 8(45): p. 32.821
- Storms, E., Ways to initiate a nuclear reaction in solid environments. *Infinite Energy*, 2002. 8(45): p. 45.
- Storms, E. Why cold fusion has been so hard to explain and duplicate. in American Physical Society Winter Meeting. 2003. Austin Convention Center, Austin, TX: unpublished. p.
- Storms, E., A student's guide to cold fusion. 2003, LENR-CANR.org.
- Storms, E.K. How to make a cheap and effective Seebeck calorimeter. in Tenth International Conference on Cold Fusion. 2003. Cambridge, MA: World Scientific Publishing Co. p. 269.
- Storms, E.K. Use of a very sensitive Seebeck calorimeter to study the Pons-Fleischmann and Letts effects. in Tenth International Conference on Cold Fusion. 2003. Cambridge, MA: World Scientific Publishing Co. p. 183.
- Storms, E.K. What conditions are required to initiate the LENR effect? in Tenth International Conference on Cold Fusion. 2003. Cambridge, MA: World Scientific Publishing Co. p. 285.
- Rothwell, J. and E.K. Storms. The LENR-CANR.org website, its past and future. in Tenth International Conference on Cold Fusion. 2003. Cambridge, MA: World Scientific Publishing Co. p. 939.
- Storms, E.K. Cold fusion has now come out of the cold. in APS. 2003. p.
- Storms, E.K. My history with cold fusion. 2003.
- Storms, E., Calorimetry 101 for cold fusion. 2004, www.LENR-CANR.org.
- Storms, E. An update of LENR for ICCF-11 (Short Course, 10/31/04). in 11th International Conference on Cold Fusion. 2004. Marseilles, France: World Scientific Co. p. 11.
- Storms, E.K., Study of electrodeposition on a Pt surface, P. Report, Editor. 2004, Lattice Energy.
- Storms, E., Cold Fusion – the Experimental Evidence. 21st Century. Winter 2004-2005.
- Storms, E., A response to the review of cold fusion by the DoE. 2005.
- Storms, E., Cold fusion for dummies. www.LENR-CANR.org, 2005.
- Storms, E. Why I believe "cold fusion" is real. in American Physical Society. 2005. Tucson, AZ.
- Storms, E., Description of a Seebeck calorimeter. 2005: www.LENR.org.
- Storms, E.K., Description of a sensitive Seebeck calorimeter used for cold fusion studies. in Condensed Matter Nuclear Science, ICCF-12. 2005. Yokohama, Japan: World Scientific. p. 108.
- Storms, E., Construction details of a new design for a Seebeck Calorimeter. 2005.
- Storms, E., How to cause nuclear reactions at low energy and why you should care. 2005.
- Storms, E., undated. Study of Deuterium Activity Changes Produced in Metals When Electrolyzed in LiOD. Lattice Energy Unpublished Paper.
- Storms, E., 1996. The Nature of the Nuclear Active Environment For LENR. Lattice Energy

Unpublished Paper.

Phase 5 includes a large number of unpublished progress reports prepared by Dr. Storms to convey results of his research to Lew Larsen of Lattice Energy.

<u>Title</u>	<u>File Name</u>
(1/20/2001)	Progress Report 1/19/01
(1/21/2001)	Progress Report 1/20/01
(1/25/2001)	Progress Report 1/25/01
(2/1/2001)	Progress Report 1/31/01
(2/8/2001)	Progress Report 2/8/01
(2/17/2001)	Progress Report 2/16/01
(3/2/2001)	Progress Report 3/2/01
(4/15/2001)	Progress Report 4/15/01
(5/5/2001)	Progress Report 5/5/01
(12/20/2001)	Progress Report 12/1/01
PROGRESS REPORT. 9/28/01 to 12/21/01. (12/21/2001)	Progress 12/21/01
Case Study, EKS Progress Report No. EKS 2-1-02 (2/1/2002)	Progress 9/01-2/02 N
[Several anomalous effects were seen.] (2/9/2002)	thermal arrests
(2/14/2002)	Progress Report 2/14/01
(3/13/2002)	Progress Report 3/13/01
(8/30/2002)	8/30/02 progress report
[Letts Study report] (12/18/2002)	Labreport2001.efx
TRIP REPORT, APS MEETING, AUSTIN, TX, 3/6/03-3/8/03(3/8/2003)	TRIP REPORT
Evaluation of the Calorimeter Used by G. Miley (3/25/2003)	COMMENTS ON CALORIMETER OF GM
LENR Reaction Product "Signature"... (6/16/2003)	Miley Dr George – Various charts
(6/16/2003)	Miley spectrum
(6/16/2003)	Miley spectrum(2)
Memorandum: Replication of the Miley claims (6/16/2003)	Miley replication
PROGRESS REPORT. Test of samples prepared by Prof. Miley. (10/25/2003)	PROGRESS REPORT 10
PROGRESS REPORT. 10/25/03 (10/25/2003)	Word Work File D 2310
PROGRESS REPORT. 10/25/03. Test of samples prepared by Prof. Miley. (10/25/2003)	PR#10, 10-25-03(Miley)
PROGRESS REPORT. Test of an electrolyte using D2SO4. (11/16/2003)	PROGRESS REPORT 11
PROGRESS REPORT 11/16/03. Test of an electrolyte using D2SO4. (11/16/2003)	PR#11, 11-03-03(H2SO4)
PROGRESS REPORT 12/21/03) (12/21/2003)	PR#12, 12-21-03
PROGRESS REPORT. HISTORY OF PT DOT 6 (1/12/2004)	HISTORY of Pt Dot 6.doc
PROGRESS REPORT 1/14/04 (1/14/2004)	PR#13, 1-14-04
A Discussion of Those Variables that Affect the Nuclear Active Environment. (2/1/2004)	A Discussion of Those Variables
PROGRESS REPORT OF Pt 2/9/04. HISTORY OF EXPERIMENTS STARTING 2/3/04 (2/9/2004)	HISTORY OF EXPERIMENTS STARTING
Summary of Results. (2/9/2004)	Summary of Results(2/3/04)

PROGRESS REPORT. HISTORY OF EXPERIMENTS STARTING 2/3/04. (2/9/2004)	Progress Report Pt 3-9-04.doc
PROGRESS REPORT. HISTORY OF EXPERIMENTS STARTING 2/3/04. (2/9/2004)	Word Work File D 1
EXAMPLES OF SEM PICTURES (5/16/2004)	MEMO, SEM 5-16-04.DOC
PROGRESS REPORT. HISTORY OF EXPERIMENTS STARTING 2/3/04. (7/5/2004)	PROGRESS REPORT Pt 2-3-04
PROGRESS REPORT. 7/19/04. Test of samples prepared by Prof. Miley. (7/19/2004)	PROGRESS REPORT, 7-19-04.doc
PROGRESS REPORT. 8/19/04. Study of electrodeposition on a Pt surface. (8/19/2004)	PR 8-19-04.doc
PROGRESS REPORT. 8/19/04. Study of electrodeposition on a Pt surface. (8/19/2004)	PR 8-19-04.jpg pics.doc
PROGRESS REPORT. 8/29/04 (8/29/2004)	PR#8-29-04.doc
HISTORY OF PT DOT 4. Run in Cell #2, Small SB #1, Pd anode. Cell cleaned with ... (9/3/2004)	HISTORY OF Pt Dot 4.doc
PROGRESS REPORT. A collection of questions. (9/10/2004)	PR 9/10/04
PROGRESS REPORT. 9/20/04. HISTORY OF EXPERIMENTS STARTING 9/3/04 (9/30/2004)	PROGRESS REPORT 9(2).doc
HISTORY OF PT DOT 3. Seebeck #1 cell #2 with Pd anode and containing... (11/16/2004)	HISTORY of Pt Dot 3.doc

Research Record

The research record for Phase 5 encompasses generally the years 2001 to 2005. The record, as indicated by the work history, shows extensive experiments with platinum (e.g. PtC, PtD, Pt#26#3, Pt#22#13, Pt-2-1, Pt-4-1) early in Phase 5. The Case Study started in October 2001, as indicated by work history notations for Cell #1, #2, #3, #4, and #5. These experiments continued until early 2003. At the same time, parallel experiments continued with other samples (probably palladium) as indicated by samples EKS001, 002, 004, 005, etc. Later in 2003 and thereafter, additional work was done with platinum and palladium alone and with gold (e.g. Pd#64+Au, Pt+Pd, Pd+Au, Pt(9-10-4, PdDot2). In the latter part of Phase 5, Dr. Storms did additional experiments with palladium samples received in the 1990s from IMRA (e.g., IMRA #60, #88, #93, #94). There are also entries in the work history indicating experiments involving Miley's samples as well as with a cell from Dennis Letts in 2002 and 2003.

The electronic data files are on most of the legacy media, particularly the ZIP disks, CDs, and the external hard drive. One of the ZIP disks and the external hard drive record have records of the Case Study (August 2003). Similarly in the same timeframe, files were created for the Miley study (e.g. "Miley", "Miley Study", "Miley Data", "Miley pictures, 2004"). Several electronic

files folders and files were created for the work Dr. Storms was performing with Lattice Energy (e.g. “Lattice, 2003”; “Proposed Research Plan for Lattice Energy, 2003”). Many unpublished progress reports are also among the electronic data files. The files also contain materials from ICCF-11 (2004) and ICCF-12 (2005). A 1994 ZIP or CD contains a collection of the PDF files of papers from Dieter Britz's collection, which Dr. Storms was adding to the EndNote collection of files for his LENR Library.

The hard-copy record includes a variety of research-related items, including coverage of the Case Effect Study (2001-2002), a collection of materials on Lattice Energy (2003-2005), Lattice Energy Progress Reports, correspondence with other LENR researchers, materials for the ICCF-10 Short Course, the Lattice Energy agreement, and a collection of non-disclosure agreements.

The LENR Library contains a number of important materials for the field, particularly the proceedings for ICCF-9 (2002, Beijing, China), ICCF-10 (2003, Cambridge, Massachusetts), ICCF-11 (2004, Marseilles, France), and ICCF-12 (2005, Yokohama, Japan). The Library also has a copy of Dr. Storms' rejection history of one of his papers that have been submitted to a prominent journal, the program for the 4th Meeting of the Japan CF Research Society (2002), the Integrity Research Institute's "Collected Works of Edmunds Storms about the Science of Chemically Assisted Nuclear Reactions", and a bulletin of the American Physical Society containing a paper by Dr. Storms (2003).

3.6 Phase 6. Independent Investigation 3 (3/2006 – 2/2007)

After Lattice Energy withdrew financial support in February 2006, Dr. Storms continued his LENR research on a self-supported basis. This phase continued for about a year until he started working with Brian Scanlon in February 2007.

Publications and Reports

Only one publication is recorded for Dr. Storms for 2006.

Storms, E., Comment on papers by K. Shanahan that propose to explain anomalous heat generated by cold fusion. *Thermochim. Acta*, 2006. 441(2): p. 207-209.

Research Record

The research record for Phase 6 was developed generally in 2006. Two types of samples were

being run according to the work history – IMRA samples obtained during Phase 2 and re-run during this phase (e.g. IMRA #6, #9, #16A, #77B) and palladium samples with other materials e.g. Pd+zeolite, Pd+CaCl₂, Pd+CaO, Pd+SrCl₂).

The electronic files are mostly on ZIP disks and CDs and include files from the Dieter Britz collection of LENR papers and documents obtained during preparation of Dr. Storms' first book, which was published in the next phase. Lattice Energy Progress Reports from the previous phase are also present for the early part of 2006. One folder from Dr. Storms' computer is also on one of the CDs: "Old Data: 2006".

The hard-copy records include pages for "Anomalous Heat Produced by Electrolytic Electrolysis of Palladium Using a Heavy-Water Electrolyte", two items consisting of materials related to Dr. Storms' 2007 book, and items for a trip to the Naval Research Laboratory ("NRL trip, 10").

3.7 Phase 7. Kiva Labs (3/2007 – 3/2012)

Dr. Storms met Brian Scanlon at one of the LENR conferences, and they agreed to pursue research jointly. Mr. Scanlon began providing support for Dr. Storms' lab in February 2007 while he continued research in his own lab. This support continued until March 2012, when Scanlon's budget for LENR research was exhausted. The collaboration included many experiments using a variety of methods, starting with electrolytic cells. Subsequently, the gas discharge and gas loading methods were also utilized. Research after early 2011 focused on attempts to achieve LENR with nickel-hydrogen gas loading setups similar to those used by Andrea Rossi in demonstrations starting in January of that year. The collaboration was changed to a more formal relationship when a company, KivaLabs, was created.

One of the most important accomplishments of Dr. Storms during Phase 7 was the publication of his first book on LENR, "The Science of Low Energy Nuclear Reactions" in 2007. He also gave presentations in Catania, Sicily, Italy, at the American Physical Society (2008, New Orleans), and at the University of Missouri (2009, Columbia, Missouri).

Publications and Reports

Dr. Storms prepared many publications in Phase 7, several of them jointly with Brian Scanlan. No unpublished reports have yet been recorded.

- Storms, E.K. and B. Scanlan. Radiation produced by glow discharge in deuterium (Part 1). in 8th International Workshop on Anomalies in Hydrogen / Deuterium Loaded Metals. 2007. Catania, Sicily: <http://www.iscmns.org/catania07/index.htm>. The International Society for Condensed Matter Science. p. 297-305.
- Storms, E.K., The science of low energy nuclear reaction. 2007, Singapore: World Scientific. 312.
- Storms, E.K. The science of low energy nuclear reactions. in APS, March Meeting. 2007. Denver, CO.
- Storms, E.K., How to explain cold fusion?, in ACS Symposium Series 998, Low-Energy Nuclear Reactions Sourcebook, J. Marwan and S.B. Krivit, Editors. 2008, American Chemical Society: Washington, DC. p. 85.
- Storms, E.K. and B. Scanlan. Radiation produced by glow discharge in a deuterium containing gas (Part 2). in American Physical Society Conference. 2008. New Orleans.
- Storms, E.K. and B. Scanlan. Radiation produced by glow discharge in a deuterium containing gas (Part 2). in American Physical Society Conference. 2008. New Orleans. p. Presentation.
- Storms, E.K. and B. Scanlan. Detection of radiation from LENR. in 14th International Conference on Condensed Matter Nuclear Science. 2008. Washington, DC: www.LENR.org. p. 261-287.
- Rothwell, J. and E.K. Storms, Report on Arata's paper and lecture about his "solid fusion" reactor. www.LENR-CANR.org, 2008.
- Storms, E.K. The method and results using Seebeck calorimetry. in ICCF-14 International Conference on Condensed Matter Nuclear Science. 2008. Washington, DC: www.lenr.org. p. 11-25.
- Storms, E., CASE STUDY – Cold Fusion. Unpublished Presentation. 2008.
- Storms, E.K. An informed skeptic's view of cold fusion. in Vice Chancellor for Research Seminar Series: Excess Heat and Particle Tracks from Deuterium-loaded Palladium. 2009. Univ. of Missouri.
- Storms, E.K. An informed skeptic's view of cold fusion. in Vice Chancellor for Research Seminar Series: Excess Heat and Particle Tracks from Deuterium-loaded Palladium. 2009. Univ. of Missouri. Presentation
- Storms, E.K., What is known about cold fusion? www.LENR-CANR.org, 2009.
- Storms, E.K. and B. Scanlan. Role of cluster formation in the LENR process. in 15th International Conference on Condensed Matter Nuclear Science. 2009. Rome, Italy: ENEA. p. 331-336.
- Storms, E.K. and B. Scanlan. Role of cluster formation in the LENR process. in 15th International Conference on Condensed Matter Nuclear Science. 2009. Rome, Italy: ENEA. p. 331-336. Presentation
- Storms, E.K. and B. Scanlan, What is real about cold fusion and what explanations are plausible?, in AIP Symposium Series, J. Marwan, Editor. 2010, Am. Inst. of Phys.
- Marwan, J., et al., A new look at low-energy nuclear reaction (LENR) research: a response to Shanahan. J. Environ. Monit., 2010.
- Storms, E.K., The status of cold fusion (2010). Naturwissenschaften, 2010. 97: p. 861.
- Storms, E.K. and T.W. Grimshaw, Judging the validity of the Fleischmann–Pons effect. J. Cond.

Matter Nucl. Sci., 2010. 3: p. 9-30.

Storms, E., PROGRESS REPORT, SrTiO₃+Pd #1, 9/1/10 to 10/2/10. Unpublished Report. 2010.

Storms, E.K. Examination of errors that occur when using a gas-filled calorimeter. in ICCF-16. 2011. Chennai, India: <http://lenr-canr.org/acrobat/StormsEexaminatio.pdf>. p.

Storms, E.K. and B. Scanlan, What is real about cold fusion and what explanations are plausible? J. Cond. Matter Nucl. Sci., 2011. 4: p. 17-31.

Storms, E.K., What is now known about cold fusion? (Addendum to the Student's Guide). 2011, www.lenr.org.

Srinivasan, M., G. Miley, and E.K. Storms, Low-energy nuclear reactions: Transmutations, in Nuclear Energy Encyclopedia: Science, Technology, and Applications, S. Krivit, J.H. Lehr, and T.B. Kingery, Editors. 2011, John Wiley & Sons: Hoboken, NJ. p. 503-539.

Storms, E., The fall and rise of cold fusion. 2011.

Research Record

The Phase 7 research record was created generally during 2007 to 2011. Experiments in Dr. Storms' LENR lab as recorded in his work history utilized the electrolytic method and, starting in 2008, the gas loading method. The early electrolytic cell work utilized primarily palladium along with other elements and compounds (e.g., Pd#2, Pd with Li₂O, Pt coated with Pd, Cu sputtered with Pd, Al₂O₃+Pd). Many experiments with different metals and compounds were used throughout the rest of Phase 7 (e.g. CeO#2, ZrO₂+Pd(NO₃)₂, Al₂O₃+Pd, Li₂CO₃, Pd on CaCO₃). The record also includes work with Dennis Letts' Cells 672, 674, 675, and 676 in late 2008 and early 2009.

The electronic files are primarily from CDs, DVDs, and Dr. Storms' current computer. The DVDs include materials from ICCF-14 and ICCF-15. The files from the current computer are generally in two folders, "Old Data" and "Data". Examples of the contents of "Old Data" are files from 2007, 2008, and 2009 as well as folders with the names "Gas Discharge", "Optical Spectrum", "DAQ", and "Pd-Ni-Cu Radiation". The "Data" file has in it folders with the names "Laser #2", "(10/25/09)", "Seebeck", "10/30/09", "Theory of LENR", "Seebeck Design", and "Letts".

The hard-copy files include a large collection entitled "Glow Discharge 2007", "Information on Catania Meeting, 10/07", an envelope labeled "Patent with Brian Scanlon", correspondence with other researchers, files termed "Radiation Produced by Glow Discharge", "Review of Papers 2009-2014", "EDX Plots and SEM Images", "EDX Plots, 2010-2011", "KivaLabs

Progress Reports, and reports entitled “Cold Fusion Studies”, “What Is Real about Cold Fusion”, and “The Path toward a Plausible Theory of Cold Fusion”.

The LENR Library has proceedings for ICCF-14 (2008, Washington, DC), ICCF-15 (2009, Rome, Italy), and ICCF-16 (2011, Chennai, India). The Library also has the proceedings of the 8th International Conference on Anomalies in Hydrogen/Deuterium Loaded Metals (2007, Sicily, Italy) and a pre-print of a chapter in Volume 1 of the Wiley Encyclopedia of Energy and Technology (“Low Energy Nuclear Reactions: Transmutations”).

3.8 Phase 8. Independent Investigation 4 (4/2012 – 12/2015)

When the KivaLabs collaboration ended in February 2012, Dr. Storms continued his LENR research once again on a self-supported basis. Phase 8 continued until the cutoff date for the Project in December 2015.

Dr. Storms became interested in forming a new LENR lab outside his home and located closer to the more developed part of Santa Fe. He was joined in this effort by Dr. Grimshaw in the late 2013, and a draft proposal for the Santa Fe LENR Laboratory was prepared in 2013²⁵. A subsequent initiative that included Drs. Tom Claytor and Malcolm Fowler was given the name “CSFG Collaboration”. A draft proposal²⁶ also called for a Phase 1 lab in Dr. Claytor's current lab in White Rock and Phase 2 lab in Santa Fe. When funding was not received for the second proposal, Dr. Storms and Dr. Grimshaw began work on the Storms LENR Research Documentation Project. Dr. Grimshaw subsequently utilized the name LENRGY for an LLC in Texas and received a trademark in 2017. Dr. Storms constructed a new Seebeck calorimeter and performed a series of calibrations and LENR experiments, which were described in a series of Progress Reports posted on the CMNS Google Group blog from July to September 2015²⁷.

Part 1. Description of the Calorimeter (July 30, 2015)

Part 2. Calibration of the Calorimeter Used to Study Sources of LENR Energy

²⁵ “Proposal for a LENR Research Laboratory, Los Alamos (Stage 1) and Santa Fe (Stage 2), New Mexico”. Santa Fe LENR Laboratory Proposal by Edmund Storms, Tom Claytor, and Tom Grimshaw, December 12, 2013.

²⁶ “Investigation of LENR for Energy Production”. CSFG Collaboration (Thomas Claytor, Edmund Storms, Malcolm Fowler, and Tom Grimshaw, May 14, 2015.

²⁷ “Study of PdD as a Host for LENR” Series of 6 Memos by Edmund Storms posted to the CMNS Google Blog, July 30 to September 30, 2015. 2013. Columbia, MO.

(August 9, 2015)

Part 3. Insights Obtained during the Initial Study (August 21, 2015)

Part 4. Initial Studies Showing the Effect of Important Variables (September 1, 2015)

Part 5. Behavior of Pure PdD (October 1, 2015)

Part 6. Additional Behavior of Pure PdD (September 30, 2015)

A principal accomplishment of Dr. Storms in Phase 8 was publication in 2014 of his second book, “The Explanation of Low Energy Nuclear Reaction”. Also, he attended ICCF-18 in Columbia, Missouri in 2013, but he did not go to ICCF-17 (2012, Daejeon, South Korea) or ICCF-19 (2015, Padua, Italy).

Publications and Reports

The publications prepared by Dr. Storms in Phase 8 are shown below.

Storms, E.K., A student's guide to cold fusion, revised. 2012: www.LENR.org.

Storms, E.K., An explanation of low-energy nuclear reactions (cold fusion). *J. Cond. Matter Nucl. Sci.*, 2012. 9: p. 85-107.

Storms, E.K., Student's guide. 2012, www.LENR.org.

Storms, E.K., Explaining Cold Fusion. In 18th International Conference on Condensed Matter Nuclear Science.

Research Record

The record for Phase 8 includes generally the years 2012 to 2015. Dr. Storms continued his lab research in LENR using methods similar to those he had been utilizing in the preceding phase. Both the gas loading and then the electrolytic cell techniques were employed. Many metals and compounds were used separately and in combination (e.g. Ni+CO+H₂, Ni+CO+He#3, Cr₂O₃+H₂+CO, Ni+Zr, Ni²⁵⁵, Pd+Ni, Pd#6A, Pd powder+ZrO₂).

The electronic files are from Dr. Storms' current computer and consist mostly (as in the previous phase) of files in the folder “Old Data“ (e.g. “12/7/2012”, “DotNi+Cu(8-29-13)”, “Ni powder SEM”, “Pd on Si disc study”, “sputtering discharge”. The hard-copy records include several types of materials (e.g. “Mass Sweep Plots, 2011-2012”, papers entitled “An Explanation of Low Energy Nuclear Reactions (Cold Fusion)”, “The Nature of Radiation Remitted from Nickel Exposed to Hydrogen”, “A Potential Source a Perfect Energy”, and “Cold Fusion from a Chemist's Point of View”. These records also have copies of a “NASA Contract, 2013-2014”, “Hagelstein Correspondence”, “Sven Thatje Email”, “Cooper Life Sciences, 2014”, “Prometheus

Fusion Laboratory”, “Infinite Energy Book Contract, 2014”, and “LENRGY Laboratory Preparation Materials, 2014”.

The LENR Library has the proceedings for the “International Low-Energy Nuclear Reactions Symposium” (2012, Williamsburg, Virginia), ICCF-18 (2013), and “Low-Energy Nuclear Reaction Introductory Short Course: (2013, National Security Innovation Center).