

#1 Slides to Accompany New Energy Times Issue #34 Investigation: The Emergence of an Incoherent Explanation for D-D "Cold Fusion"

For 21 years, a subgroup of LENR researchers has hypothesized a $D+D \rightarrow 4He + \sim 24 \text{ MeV}$ (heat) "cold fusion" reaction to explain two of the many observed phenomena measured in LENR experiments; excess heat and helium-4 production.

New Energy Times recently discovered that members of this subgroup, through questionable actions and interpretations, have misled not only the scientific community and the Department of Energy but also their peers in the LENR community. The subgroup's actions have delayed the progress and acceptance of the field.

Nonetheless, although the LENR phenomenon may not be D-D "cold fusion," it is nuclear and provides hope for a new source of clean energy.

This subgroup considered attempts to measure experimental values of $\sim 24 \text{ MeV}$ very important because it thought the finding of such values would validate its hypothesis of D-D "cold fusion." To this end, the subgroup has made significant references to two key experiments.

In 1994, experiment "M4," reported in 1998, was performed at SRI International in Menlo Park, Calif. It did not produce $\sim 24 \text{ MeV}$ per atom of helium.

In 1998, another experiment at SRI, called the "Case Replication," also failed to produce $\sim 24 \text{ MeV}$ per atom of helium.

In 2000, researchers at SRI and MIT developed new interpretations and explanations about the 1994 experiment. With these in hand, in a two-step process, they first claimed that the 1994 experiment did, in fact, produce $\sim 24 \text{ MeV}/4\text{He}$.

They then claimed that this newly interpreted $\sim 24 \text{ MeV}$ value for the 1994 experiment could explain the large discrepancy from $\sim 24 \text{ MeV}$ that was observed in the 1998 experiment.

When the researchers described the two experiments in the 2000 paper, they reversed the order (1998 listed as No. 2, 1994 listed as No. 3) and provided text implying that their 1994 experiment took place after the 1998 experiment. Readers were led to believe that the earlier experiment represented added confirmation for the latter experiment.

Among other problems, these researchers did not explain in their 2000 paper that their newly developed interpretations and explanations for the 1994 experiment significantly conflicted with the conclusions of the original report for the 1994 experiment.

This New Energy Times science investigation probes these actions and events in detail.

Experiment	Date	Type
M4	Summer 1994	Electrolysis: Heavy water + Pd
Case	Summer 1998	Gas: D2 + palladium-on-carbon catalyst

June 1998 - Final Report for Experiment M4 [1]

(379 pages, four years, 13 authors)

“The possibility of helium-4 hide-out and slow emergence into the gas phase must be tested by experiment. This applies to the helium-4 thought to be produced by the reaction $D+D > 4He + 22.4 \text{ MeV}$. Definitive statements will be difficult to make about helium-4 production.”

2000 - ICCF-8 Paper (Includes M4 and Case) [2]

“Evidence [in M4 experiment] for near-surface retention of helium-4 in the lattice can be used to accommodate the discrepancy between measured and expected yields of helium-4 [in M4 and Case experiments].”

“There is observed a quantitative or near-quantitative correlation between heat and helium-4 production consistent with the reaction: $D+D > 4He + 24 \text{ MeV}$ (lattice).”

2004 - Department of Energy Paper (Includes M4 and Case) [3]

“Several important conclusions can be drawn from [experiment M4] ... [H]elium is partially retained, and dissolved helium is released only slowly to the gas phase for analysis.”

“[I]t is possible to assess with defined uncertainty the results of deuterium fluxing in freeing lightly trapped $4He$... yield[ing] a value of $104 \pm 10\%$ of the expected value ... due to a reaction $D+D > 4He + \sim 23.8 \text{ MeV}$ (heat).”

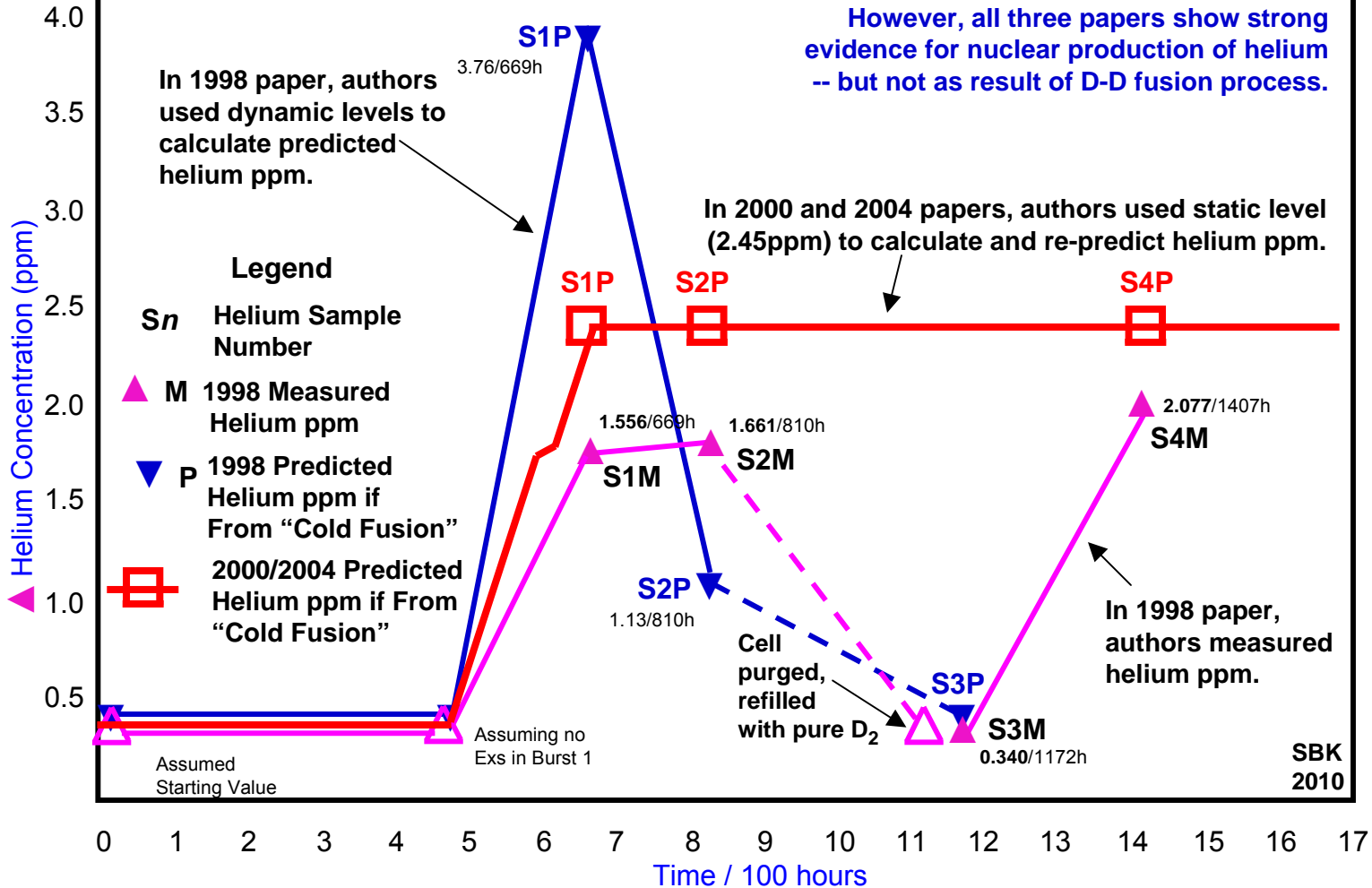
1. Michael McKubre et al., Development of Energy Production Systems from Heat Produced in Deuterated Metals - Energy Production Processes in Deuterated Metals, Volume 1, EPRI TR-107843-V1
2. Michael McKubre, Francis Tanzella, Paolo Tripodi and Peter Hagelstein, "The Emergence of a Coherent Explanation for Anomalies Observed in D/Pd and H/Pd Systems; Evidence for $4He$ and $3He$ Production" 8th International Conference on Cold Fusion. 2000. Lerici (La Spezia), Italy: Italian Physical Society, Bologna, Italy
3. Peter Hagelstein, Michael McKubre, David Nagel, Talbot Chubb, Randy Hekman, "New Physical Effects In Metal Deuterides," Submitted to the 2004 U.S. Department of Energy LENR Review

#3 M4 - Helium Production Predictions: 1998 vs. 2000/2004 Papers

In 1998 paper, **S1** prediction was higher than in 2000 and 2004 papers. In 1998 paper, **S2** prediction was lower than prediction in 2000 and 2004 papers. (2000/2004 authors did not make prediction for **S3P**. 1998 authors did not make prediction for **S4P**.)

In 2000 and 2004 papers, authors prominently reported as decisive evidence of “cold fusion” how close their predictions came to helium measured in 1998 paper. However, new predictions are radically different from old predictions, which do not provide strong evidence of “cold fusion.” Authors have not explained scientific basis for new predictions.

However, all three papers show strong evidence for nuclear production of helium -- but not as result of D-D fusion process.

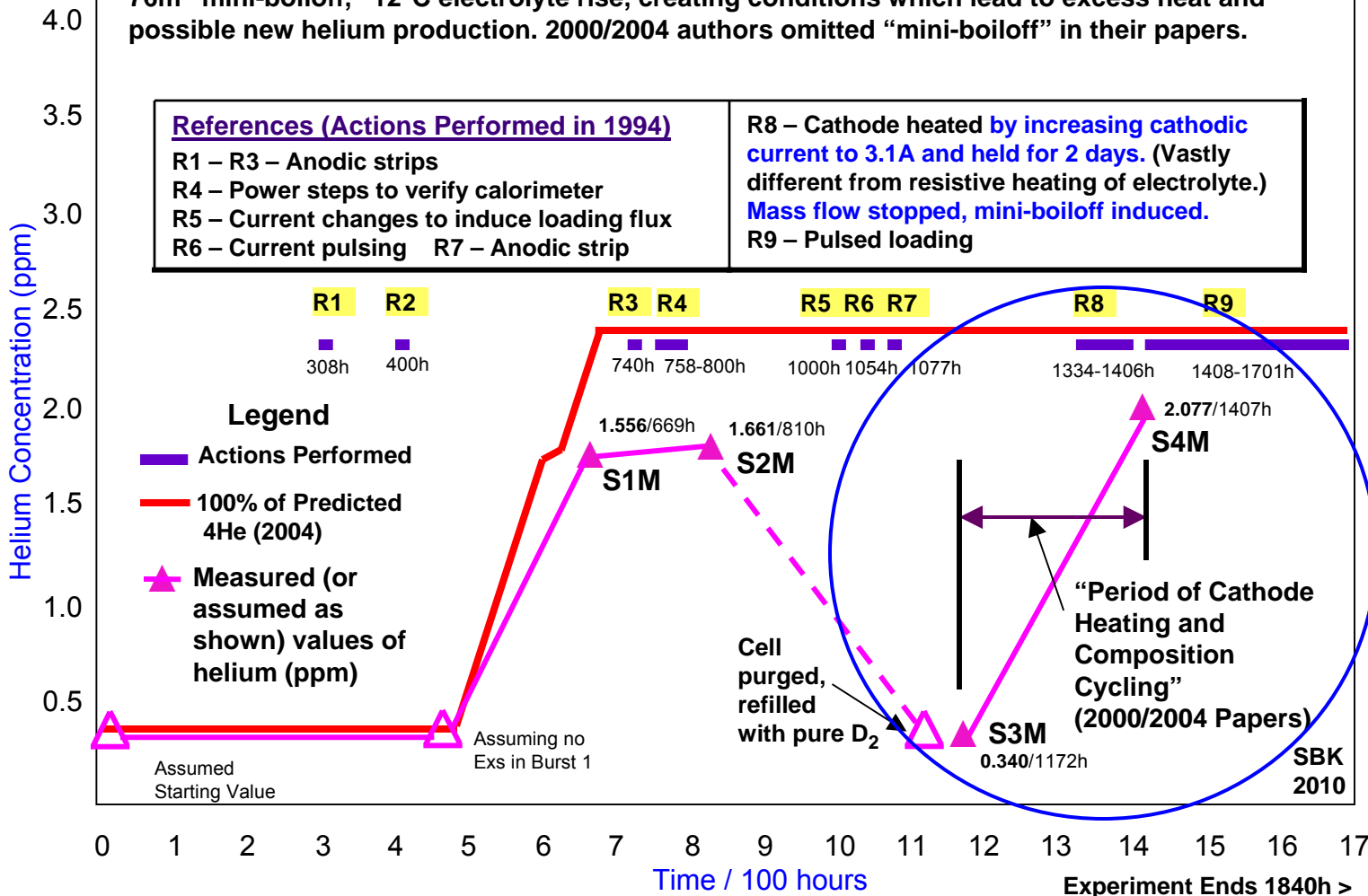


M4 - Authors' Explanation for Releasing Trapped Helium

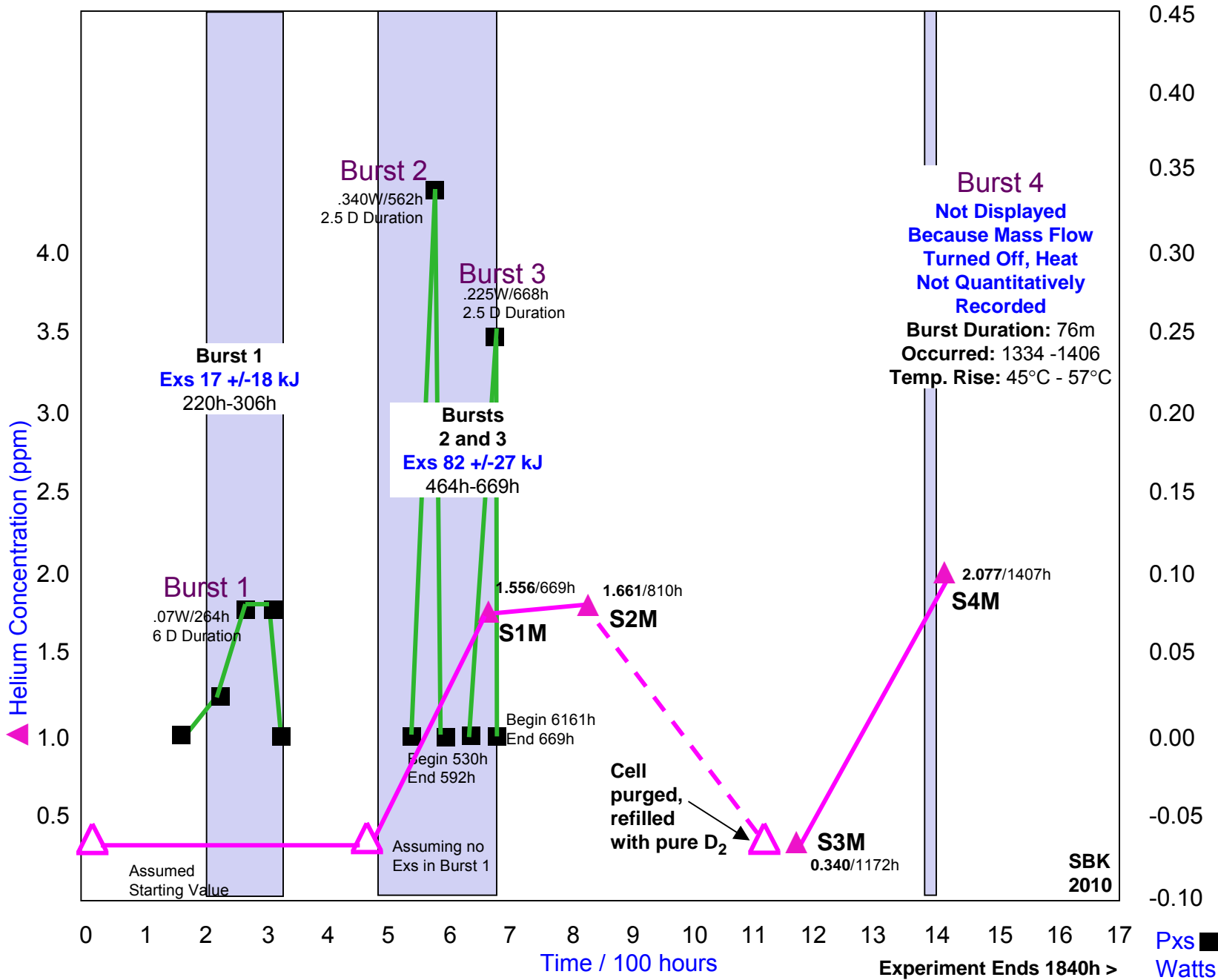
2000/2004 authors obfuscated distinctions between: 1) The fact that helium may permeate through cracks or crevices; 2) Their ad-hoc suggestion that helium is soluble in metals, which conflicts with century of evidence to contrary.

2000/2004 authors *retroactively* claimed 1994 researchers heated cathode *intentionally* during hours 1172-1407 to release trapped helium. 1994 researchers made no such statement.

2000/2004 authors also obfuscated distinction between cathodic heating and resistive heating in electrolyte. By turning mass flow off and ramping current, 1994 researchers subjected cell to 76m "mini-boiloff," 12°C electrolyte rise, creating conditions which lead to excess heat and possible new helium production. 2000/2004 authors omitted "mini-boiloff" in their papers.

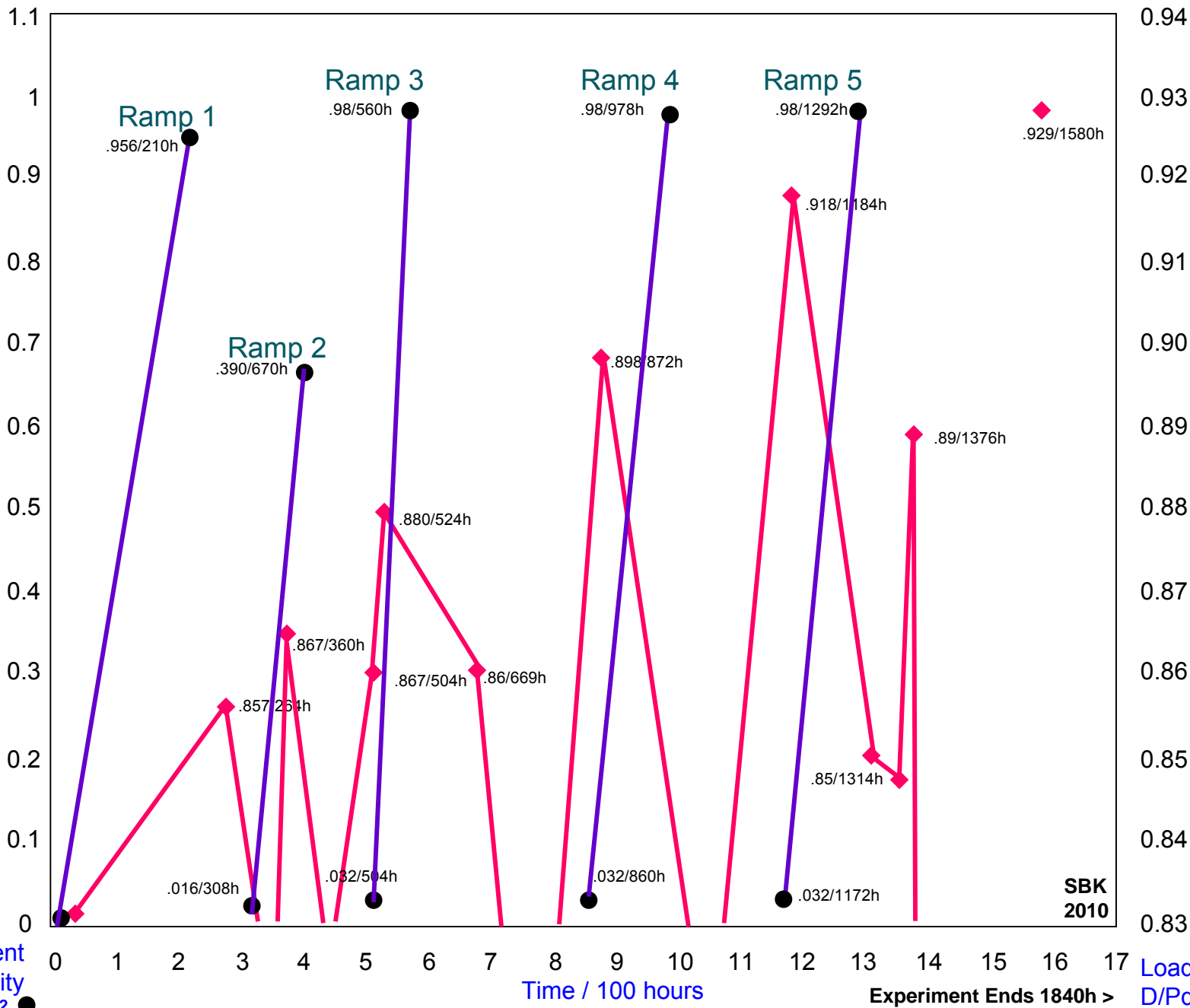


M4 - Helium Samples and Excess Heat vs. Time



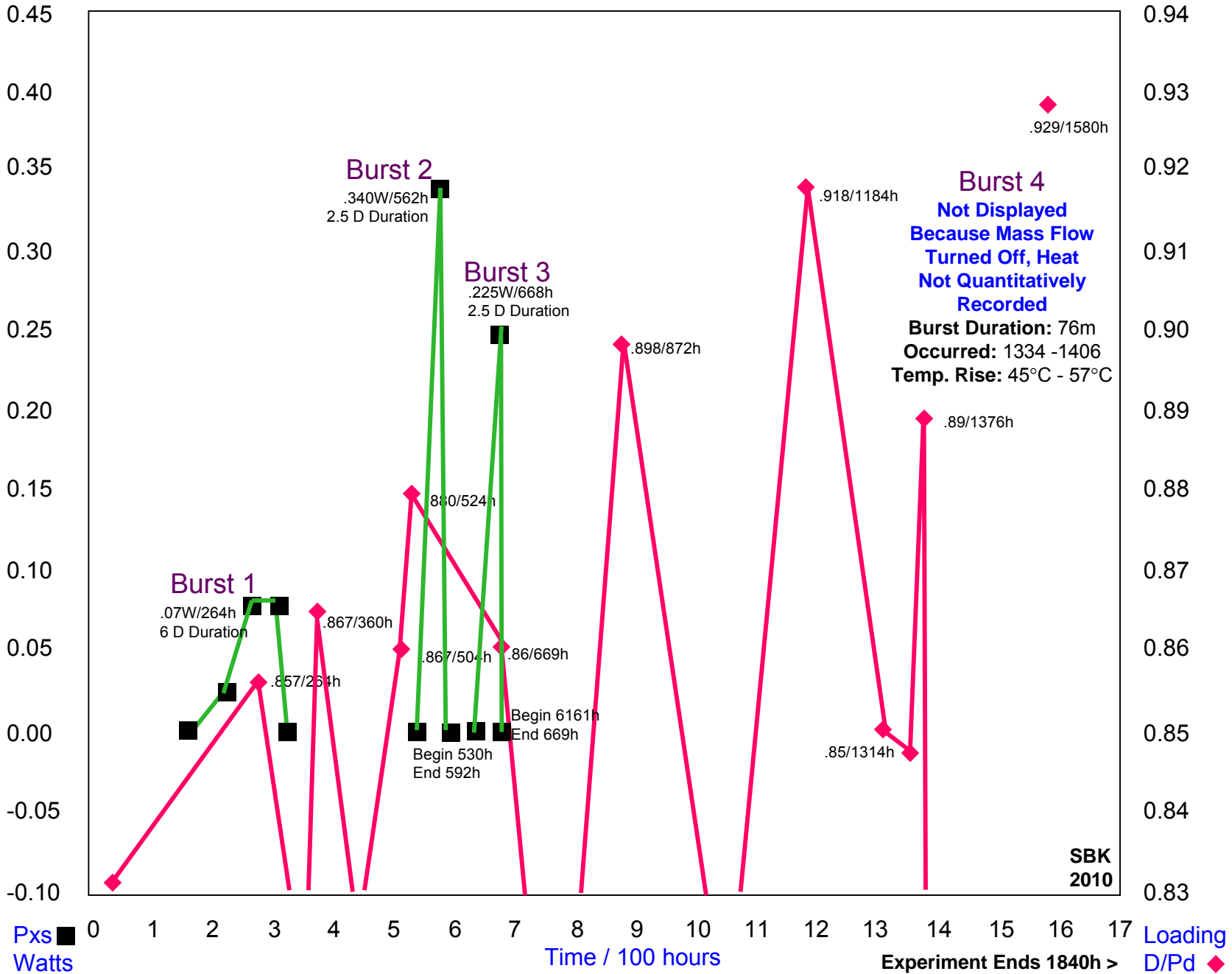
#6

M4 - D/Pd Loading Ratio and Current Ramps vs. Time



#7

M4 - D/Pd Excess Heat and Loading Ratio vs. Time



#8

Experiment M4 - (7/25-10/4 1994) [EPRI TR-107843-V1]

