

DEVELOPMENT OF AN OPERATIONAL PROTOTYPE DIVER COOLING SYSTEM USING METAL HYDRIDES



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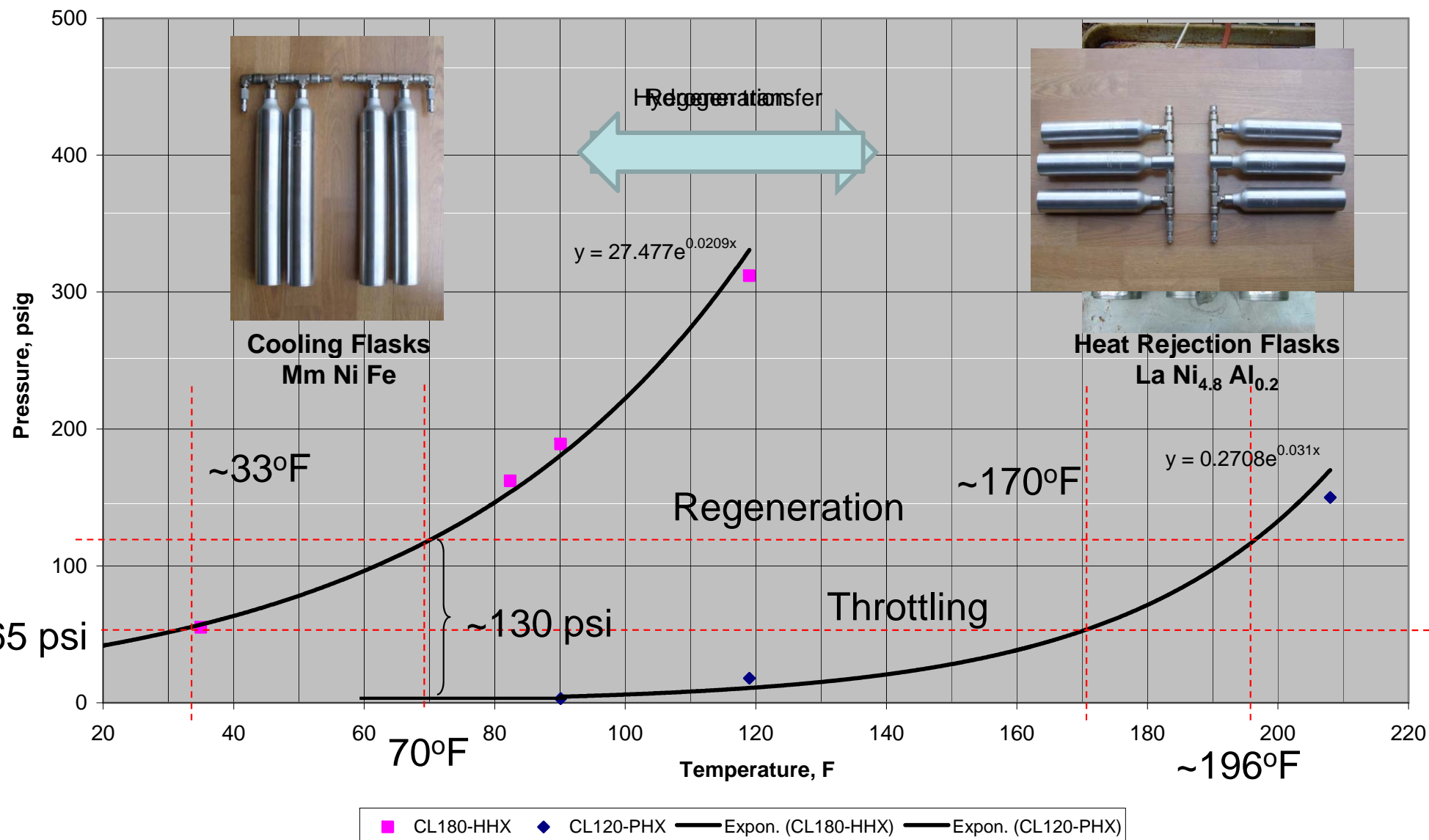
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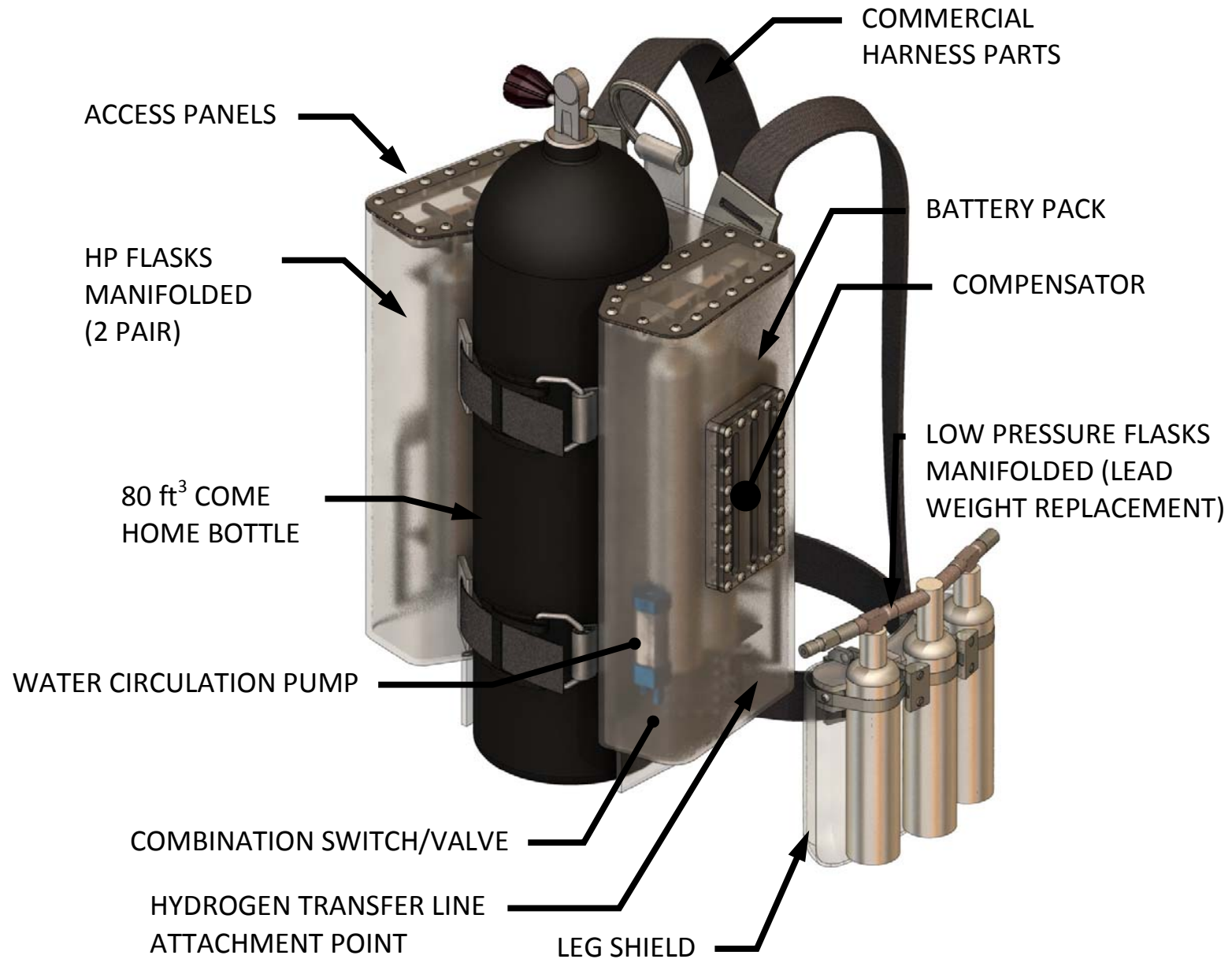
DIVER COOLING PROTOTYPE DESIGN



HYDRIDE OPERATING/REGENERATION CONCEPT



Prototype Metal Hydride Cooling System



Thermal Manikin Testing – Oct 2010

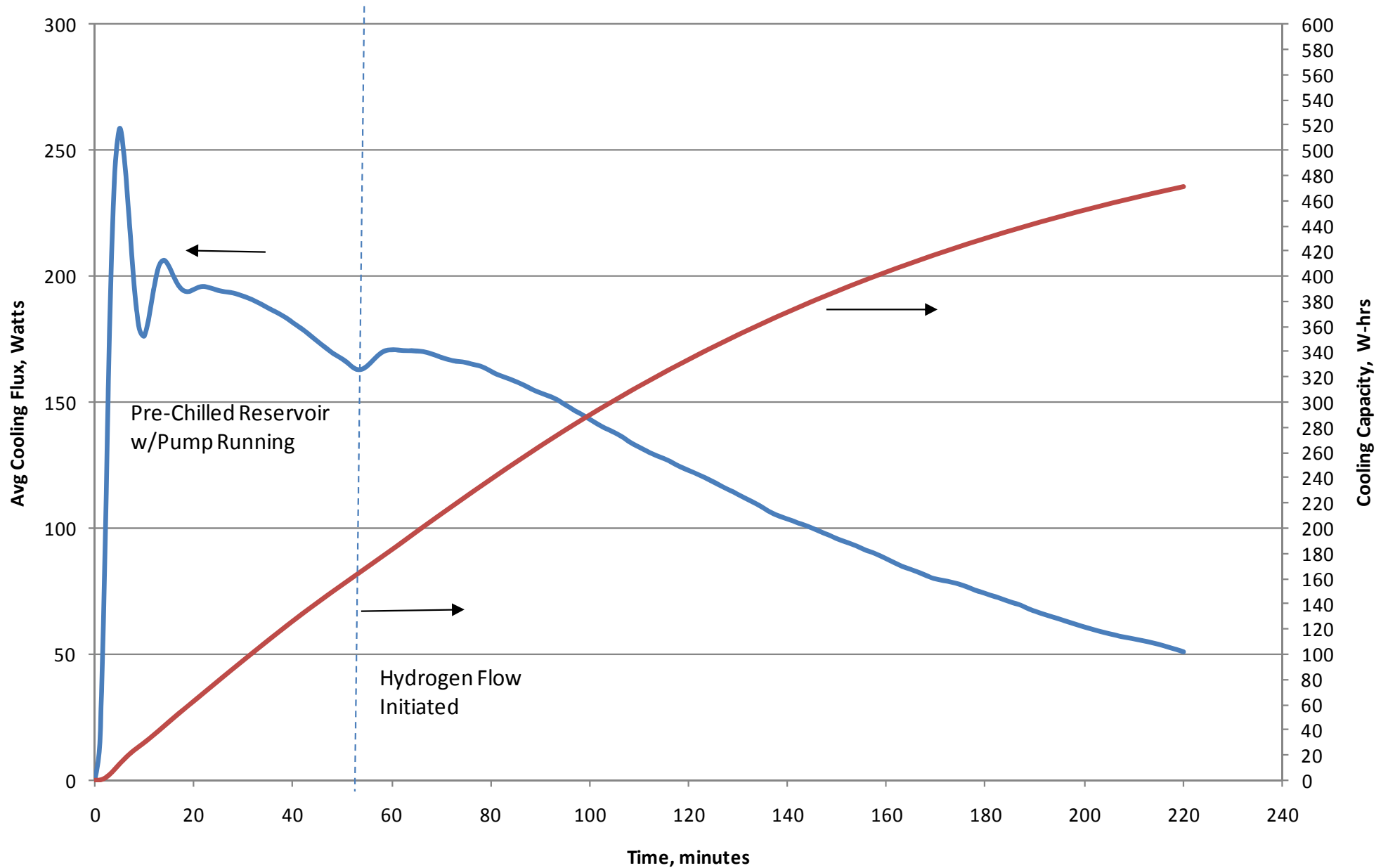


Allen Vanguard LCG



BARE XCD2 Drysuit w/drygloves

Test #2--Cooling Performance With Pre-Chilled Reservoir Measured By Manikin (-HHF) (Minus Baseline)

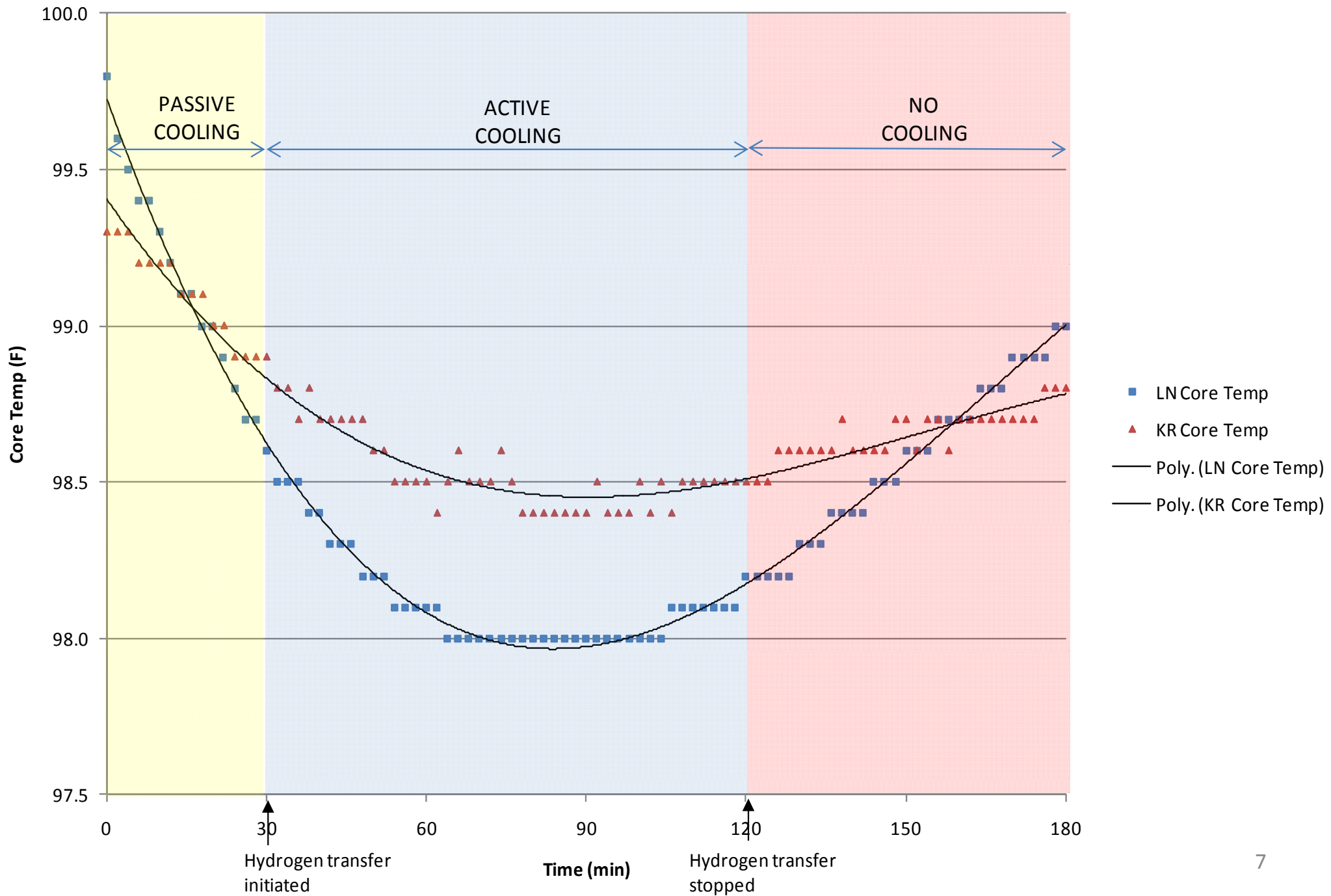


Pool Testing – Dec 2010



- 3-hour exposures
- 95°F pool temperature
- Drysuit/dry gloves
- Core and skin temperatures monitored

Core Temperatures Recorded During Metal Hydride Cooling System Testing--Dec 2010



KEY BENEFITS

- Low complexity, low maintenance
 - Manual transfer valve
 - Circulation pump
- No consumables
- High energy density
- Minimal electrical requirement
- Easily regenerated
- High cycle life
 - >1000 regenerations
- Heating applications possible

PROPOSED FOLLOW-ON EFFORT

Based on the recommended action items from a January 2010 design review meeting at NAVSEA OOC, the proposed follow-on effort includes the following:

- Investigate alternatives for efficiently recharging the diver cooling system under operational conditions
- Design and fabricate a pre-production recharging system for the metal hydride cooling system
- Develop a separate chilled water unit for use topside during waits
- Incorporate lessons-learned from prototype testing to develop a pre-production system
 - More compact and lightweight system
- Initiate NAVSEA diving equipment certification process.
- Get potential fabricator(s) involved in the development process
- Investigate techniques to rapidly decontaminate the cooling system