# Spacesuit Evaporator-Absorber-Radiator (SEAR)

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**For decades advanced spacesuit developers have pursued a regenerable, robust non-venting system for heat rejection. Toward this end, this paper investigates linking together two previously developed technologies, namely NASA's Spacesuit Water Membrane Evaporator (SWME), and Creare's lithium chloride Heat Pump Radiator (HPR). Heat from a liquid cooled garment is transported to SWME that provides cooling through evaporation. The SEAR is evacuated at the onset of operations and thereafter, the water vapor absorption rate of the HPR maintains a low pressure environment for the SWME to evaporate effectively. This water vapor captured by solid LiCl in the HPR with a high enthalpy of absorption, results in sufficient temperature lift to reject most of the heat to space by radiation. After the sortie, the HPR would be heated up in a regenerator to drive off and recover the absorbed evaporant. A one-fourth scale prototype was built and tested in vacuum conditions at a sink temperature of 250 K. The HPR was able to stably reject 60 W over a 7-hour period. A conceptual design of a full-scale radiator is proposed. Excess heat rejection above 240 W would be accomplished through venting of the evaporant. Loop closure rates were predicted for various exploration environment scenarios.**