**Weller Hybrid Ground Source Heat Pump**

**Overview:** The North Star Borough School District is installing a GSHP with thermal recharge at the Weller Elementary School. The system was designed with the help of PDC engineering, Andy Roe, and CCHRC input. It will be commissioned at the end of May 2011; after multiple years of planning and installing. CCHRC will monitor the install based on the following objectives:

**Objectives:**

1. To determine how ground source heat pumps can be effectively used in combination with solar thermal collection systems in Interior Alaska.
2. To collect and analyze a data set quantifying the multi-year performance of a residential-scale demonstration system which, if the system performs well, would provide a factual basis for more wide-spread use of heat pump technology in Alaska.
3. To calculate the COP of the heat pump and determine a payback time estimate
4. To inform the school district on the viability of the solar recharge heat pump
5. To compare the COP of the hybrid system to the COP of the GSHP without thermal recharge

**Equipment:**

* 2 Onicon BTU meters
* Ebtron in-duct flow meter
* 7 CT for amp readings
* 4 in-ground temperature strings

**Procedure:**

1. Monitor the temperature changes in the ground loop.
2. Monitor the energy in the heat pump and solar thermal loop.
3. Monitor the energy produced and used by the heat pump.
4. Use school district records to estimate the impact on fuel and electrical use.

**Analysis:**

* Estimate install costs – much of the install was donation and volunteer time
	1. Get consumer costs of majority of components
		1. Ground loop
			1. Piping
			2. manifold
		2. Heat pump
			1. Piping and ducting
			2. glycol
		3. Pumps
		4. Solar system
			1. Panels
			2. Piping
			3. glycol
		5. Tie into school system?
	2. Labor estimates
		1. Andy’s time
		2. SD personnel time
			1. Plumber
			2. Electrictrician
* Estimate energy savings
	1. Compare previous years’ fuel and electrical use to heat pump years.
* Determine COP with and without recharge
	1. Monitor system for one year without recharge
	2. Monitor system with recharge
* Study the thermal regime of the ground loop
	1. Compare year of recharge to year without recharge
* Estimate Payback
	1. Compare install costs to energy savings (if anything is noticeable)

**Timeline**

June 2011 – final install and commissioning of the heat pump

August 2011 – Weller website and data online

December 2011 – Preliminary report to the school district and Denali Commission

June 2012 – charge the solar loop with glycol

December 2012 – Preliminary report to school district on solar recharge