Kooskia National Fish Hatchery New Egg Incubation Water Reuse/Chiller System

Historically, Salmon eggs at Kooskia NFH were incubated for 5 months (late October to early March) on a single single pass system with chilled well water supply utilizing a high capacity chiller. The water was chilled, (monthly electrical cost was 6-8K to operate chiller), single passed over the eggs and dumped. The existing chiller was oversized (to also accommodate summer operations) so half of the chilled water was dumped (wasted) even prior to reaching the egg incubators. The well water was supplied by two inefficient 25 HP vertical turbine pumps that were over 20 years old.

The following table illustrated energy usage at Kooskia NFH for the five month egg incubation period for FY2009 and FY2010.

FY 2009 hatchery	KW	$	
March	104,880	$7,394.07	chiller on part month, chilled well water used
February	160,240	$10,808.76	chiller on, chilled well water used
January	171,760	$11,451.68	chiller on, chilled well water used
December	136,720	$9,255.80	chiller on, chilled well water used
November	31,280	$2,613.76	large chiller off for repair, creek water used
	604,880	**$41,524.07**	

FY 2010 hatchery	KW	$	
March	74,073	$5,456.59	chiller on part month, chilled well water used
February	122,148	$8,838.55	chiller on, chilled well water used
January	161,196	$11,327.39	chiller on, chilled well water used
December	157,367	$10,990.94	chiller on, chilled well water used
November	158,640	$11,051.86	chiller on, chilled well water used
	673,424	**$47,665.33**	

For contrast, the table below illustrates energy usage at Kooskia NFH during FY 2008 while the chiller was not in use. The chiller was not used due to compressor failure. Creek water was used as an alternate water supply. The creek water, however, results in higher egg mortality due to the silt loading and disease organisms carried in the creek water. The introduced disease organisms then plague the fish throughout their rearing cycle.

FY 2008 hatchery	KW	$	
March	47,280	$3,064.19	Creek water used for egg incubation this year
February	33,920	$2,356.00	due to failure of large Carrier chiller
January	29,280	$2,093.00	
December	22,000	$1,584.80	
November	12,080	$1,233.91	
	144,560	**$10,331.90**	

In FY 2010 ARRA funding was used to address this high energy usage by constructing a new egg incubation system. The project addressed the high energy usage and the disease issues as follows:

1. Rehab the existing (but inoperable) egg incubation recirculation system. Repairing this system resulted in increased efficiency by reusing chilled water, thereby reducing the required chilling capacity from 150gpm to 25gpm. It also reduced the amount of well water pumped from 150gpm to 25gpm.
2. Build a new water reservoir with increased capacity to provide system thermal stability and provide extra alarm response time during a loss of flow event.
3. Add a small (less electricity usage) chiller. This new chiller is a 15 ton unit vs. the old unit at 180 ton.
4. Install a passive heat exchanger to pre-chill well water using the ambient creek temperature.
5. Rehab the production wells with new, efficient pumps. The 25 hp pumps were replaced with 2 hp pumps due to the reduced overall water needs of the reuse system.

The below table illustrates the energy usage utilizing the new egg incubation as of January 2011. Cost of operation rivals that of using creek water, but avoids the disease and silt loading issues present in the creek supply.

FY 2011 hatchery	KW	$	
March			New egg incubation system
February			with small chiller used this
January	59,315	$4,474.55	year
December	43,547	$3,412.64	
November	46,034	$4,045.09	
	148,896	**$11,932.28**	

NEW EGG INCUBATION RECIRC SYSTEM

New Egg incubation system constructed using ARRA funding. The new system includes a new reservoir, a passive heat exchanger, and a new small chiller unit.

PRODUCTION WELL REHAB

Both production wells were rehabbed with new motors, electrical panels, and pitless units.