



AMERICAN DRYING CONSULTANTS

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December 5, 2007

Shivvers Manufacturing
614 W. English
Corydon, IA 50060

Attn: Mr. Steve Shivvers

Re: Shivvers Heat Recovery Process

Dear Mr. Shivvers:

On November 29th I witnessed your pilot plant test to demonstrate the energy effectiveness of your novel heat recovery process. The primary components of the process flowsheet include the Heating Drum, the Cooling Chamber, and the Heat Exchanger, as identified on Dwg. No. 111907 – Fig 12(iv).

The two tests conducted on November 29th provided me with sufficient data to calculate the theoretical thermal efficiency to be approximately 600 - 620 Btu / lb of evaporated water. The calculation methodology used was an overall enthalpy balance around the entire system, that is, feed inlet, air inlet, product outlet, condensate outlet, and exhaust air discharge to the atmosphere. It should be noted that 825 Btu / lb of evaporated water was determined to be the actual heat input to the pilot scale system. This difference can be attributed to heat losses and air in-leakage, which are always more extensive in small pilot scale operation, as compared to that which would occur in large scale commercial operation. Based upon these test results of the current apparatus I would expect that for a commercial scale operation the actual heat requirement would be in the range of 650 - 700 Btu / lb of evaporation.

Based upon my 30 years of thermal processing experience, it is my opinion that the Shivvers Heat Recovery Process warrants further development. I would suggest that as part of your continuing testing program for the present apparatus that you:

1. demonstrate greater evaporative capacity per stage by:
 - (A) raising the heated product temperature
 - (B) increasing the cooling air flow rate

2. demonstrate the unit's ability to dry the product material over a wider range of moisture content. This could be accomplished with your current pilot scale equipment by running multiple passes through the system.

Sincerely,

John J. Walsh, PE