



March 15, 2002

National Organic Standards Board  
c/o Toni Strother  
USDA/AMS/TM/NOP  
Room 4008-So  
Ag Stop 0268  
1400 Independence Ave., SW.  
P.O. Box 96456  
Washington, D.C. 20090-6456

RE: Calcium Oxide & Calcium Hydroxide Petitions

Dear Ms. Strother:

I have enclosed a copy of June 13, 2001 report from Q.C. Metallurgical Laboratories that reports the heat given off when Bio-Cal is mixed with water. Bio-Cal is a commercial product that contains complex calcium compounds including Calcium Oxide and Calcium Hydroxide. A similar report dated June 19, 2001 was included in the petitions for Calcium Oxide and Calcium Hydroxide. The June 19, 2001 report also discusses the heat of reaction when dust is mixed with water. The "dust" referenced is fine dust the leaves the Lime Kiln at Linwood Mining and Minerals near Buffalo, Iowa. This fine dust is essentially pure calcium oxide. The Bio-Cal proposed for organic farms is a mixture of calcium oxide, ground limestone, and natural gypsum. Our purpose was to show that the processed final product gives off a negligible amount of heat when mixed with water, especially when compared to the heat given off when lime dust is mixed with water. The laboratory process used was admittedly a simple test. This test could be easily used in the field to verify that the restriction on temperature rise is verified. I believe a similar test is used in ASTM Method C472 that is a test method for certain gypsum products. I believe there are more accurate and expensive ways to test temperature rise. Apparently there is a method (ASTM C186) to test the temperature change of concrete as it sets up and ages. These types of tests might cost several thousand dollars and measure temperature changes in perhaps a hundredth of degree. I think we need a test method that a farmer can do in the back of a pickup truck.

Regards,

Morris Preston, PE, QEP  
President

# Q.C. METALLURGICAL LABORATORY, INC.

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June 13, 2001

To: Meeker Farms  
Butch Meeker

Report # 19356 - A

Sample Description: Bio-Cal

Date Received: 06-13-2001

Date Analyzed: 06-13-2001

## RESULTS:

We were unable to find an ASTM procedure for determining heats of reaction, so we referred to college chemistry and physics textbooks.

We set up the experiment using an insulated flask, stirring motor, and a certified traceable thermometer. Two hundred milliliters of deionized water and 100grams of Bio-Cal (both initially at 25 degrees centigrade) were mixed in the calorimeter, and the temperature was observed.

In general, it takes one calorie to raise the temperature of one gram of water one degree centigrade. However, when a substance is added to the water which changes the temperature through an exothermic chemical reaction, some of the heat released is absorbed by solution, and some is absorbed by any material which did not dissolve.

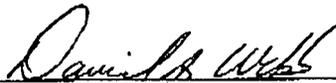
Trying to account for all of the details in this experiment would have been extremely difficult, except for the fact that the temperature of the mixture did not change by an amount which we could measure with our thermometer which is graduated in 0.2 degree increments.

100g Bio-Cal caused less than 0.2°C increase in temperature of a ~300g mixture.  
This roughly calculates to less than 0.6 calories per gram of Bio-Cal.

We could not find a reference with information on heat of reactions for other chemicals to compare with the Bio-Cal.

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John O. Bloodsworth, P.E.

  
David A. Webb/Chemist