



Evaluating the Use of Mercury Manometers in the Dairy Industry

Minnesota Technical Assistance Program ■ INTERN SUMMARY

Intern Project Date: Summer 1995

Intern: Charlie Radman, University of Minnesota, Biosystems and Agricultural Engineering Student
Company: Dairyland Equipment Services Inc., Plainview, Minnesota, in conjunction with the Wabasha County Solid Waste/Recycling Office

Process Background

Dairyland Equipment Services sells, installs and services milking systems for dairy farmers within a 60 mile radius of Plainview, Minnesota.

Milking systems have vacuum lines that remove and transport milk from cows' udders to a bulk tank. As part of this system, vacuum gauges measure pressure in the vacuum line. By monitoring the gauges, farmers can be alerted to large pressure fluctuations in the vacuum line, which can result in health problems for the cows or indicate operational inefficiencies.

Mercury manometers are one type of vacuum gauge used in milking systems. Each gauge has a U-shaped plastic tube containing 0.781 pounds of mercury. The mercury in these manometers can become contaminated with water, milk, dirt and cleaning chemicals. Also, the plastic mercury-containing tube can become discolored and cloudy. These problems make the manometers difficult to read accurately. Once this occurs, Dairyland needs to repair or replace the manometers and manage the waste mercury.

After removing contaminated mercury manometers from the farm, service technicians return to the shop and drain the mercury into a sealed storage container. When Dairyland accumulates up to 25 pounds of mercury, they contact their county solid waste officer for assistance with transporting the mercury to a recycling company.

Incentives for Change

Dairyland initially contacted the Wabasha County solid waste officer in 1994 to find out how to

dispose of 25 pounds of mercury that they had accumulated from servicing mercury manometers.

After learning about the need for proper mercury management, Dairyland was concerned about the potential for mercury spills when their service technicians filled new manometers with mercury, and about the collection, storage and disposal of used mercury.

Because they were interested in reducing future disposal costs and liability associated with mercury, Dairyland began replacing contaminated mercury manometers with bourdon (spring) gauges—a nonmercury-containing alternative.

Mercury

Mercury is a toxin that has been associated with nervous system disorders. When mercury enters lakes and streams, it can build up in the tissue of fish and result in high concentrations. Minnesota issues advisories cautioning people to limit how much fish they eat from waters in the state.

Intern Activities

Under the direction of Dairyland and Wabasha County, the MnTAP intern evaluated the use of mercury manometers in Minnesota's dairy industry and researched alternative vacuum gauges. The intern conducted a survey of 85 dairy equipment dealers to 1) determine which dealers offer mercury manometers, and 2) estimate the amount of mercury present on dairy farms and at equipment dealerships

Volume of Mercury

Responses from the equipment dealers survey indicated that nearly 20 percent of all Minnesota dairy farms (2,357 farms) have mercury manometers. These manometers contain a total of about 1,825 pounds of mercury.

An additional 205 pounds of mercury are in storage or in use at dairy equipment dealerships. In 1994 alone, Dairyland accumulated 15 pounds of waste mercury for recycling.

(continued)

MnTAP is funded by a grant from the Minnesota Office of Environmental Assistance to the University of Minnesota, School of Public Health. © 1995 MnTAP. Reprint only with permission from MnTAP. Available in alternative formats upon request. ● Printed on recycled paper containing a minimum of 10 percent postconsumer waste.

MnTAP ■ 1313 5th Street SE, Suite 207 ■ Minneapolis, Minnesota 55414-4504
612/627-4646 ■ 800/247-0015 (Minnesota only) ■ FAX 612/627-4769

Alternative Gauges

Alternative gauges were identified based on four criteria: 1) current dairy industry standards for vacuum gauges, 2) accuracy, 3) durability, and 4) cost. Using these criteria, the intern found that two types of gauges, bourdon liquid-filled gauges and digital gauges, are acceptable alternatives to mercury manometers.

Bourdon Liquid-filled Gauges. The intern determined that the bourdon gauges need to be stainless steel and filled with oil. Stainless steel will prevent corrosion by contaminants, and oil dampens vibrations resulting in smaller needle fluctuations and greater accuracy. The oil also lubricates the moving mechanical parts, which reduces wear. Similar gauges are currently used in the dairy industry and retail costs are comparable to that of mercury manometers.

Digital Gauges. Digital gauges give more precise readings and have a higher degree of accuracy than mercury or bourdon gauges. Unlike these other gauges, digital gauges require a power source. Because the gauges are in use at least 35 hours per week, the intern suggested that the gauges be powered by the same source as the milking system so they can be turned on and off with the system. A few digital gauges are in the price range of mercury manometers.

Equipment manufacturers recommend that service technicians use a bourdon gauge or digital gauge to test the milking systems they are servicing. The gauges used in the field should be calibrated with a mercury manometer kept at the shop.

Conclusion

Dairyland plans to continue replacing contaminated mercury manometers with nonmercury-containing gauges to help reduce the amount of mercury on Minnesota farms.

Management Options

The Minnesota Pollution Control Agency (MPCA) recommends the following management options when replacing mercury manometers.

- Take mercury and mercury manometers to a mercury recycling facility or arrange with a waste hauler to take them to a recycling facility. A list of known mercury recycling facilities is included below. Contact them directly for shipping

information, prices and a list of haulers that serve their facilities.

- Check with dairy equipment dealers to see if they accept mercury or mercury manometers for recycling.
- Check with the county solid waste office to see if any other services are available in the area.
- If accessible management services are not available, store mercury and mercury manometers until services are established in the area.

Storage

Always store mercury and mercury manometers removed from service in covered leak-proof containers, such as small plastic buckets with sealable lids. Mark containers as appropriate: "Mercury for Recycling" or "Mercury Manometers for Recycling."

Shipping Invoice

When shipping mercury or mercury manometers to another location, an invoice must accompany each shipment. That invoice must include: the date of shipment, the amount of mercury or number of mercury manometers in the shipment, the location from where the waste is being shipped, and the destination of the shipment. Keep a copy of each invoice as a record of the shipment.

Mercury Recycling Facilities

Recyclights Bloomington, MN 612/948-0626 or 800/831-2852	D.F. Goldsmith Evanstown, IL 708/869-7800
---	---

Bethlehem Apparatus Hellertown, PA 610/838-7034	Mercury Refining Albany, NY 800/833-3505
---	--

More Information

MnTAP has variety of technical assistance services available to help Minnesota companies manage and reduce their industrial waste. If you would like assistance or more information about MnTAP's Intern Program, call 612/627-4646 or 800/247-0015 in greater Minnesota. Direct questions on mercury management to the MPCA at 612/297-8363 or 800/657-3724.

Recommended Alternative Vacuum Gauges to Mercury Manometers

Ashcroft

Ashcroft Digital Test Gauge
Type 2530 & 2545

Ashcroft Duralife Movement Pressure
Gauge Type 1009, Grade 1A

Ashcroft Pressure Tester
multi-purpose digital pressure indicator

contact:

Dresser Industries
Instruments Division
Domestic Headquarters
PO Box 5605
Newtown, CT 06470
203/426-3115

Bristol Babcock

Helicoid 900 Series Gauges

contact:

Bristol Babcock Helicoid Instruments
1100 Buckingham Street
Watertown, CT 06795
203/945-2218
(effective 10/96 use area code 860)

DCT Instruments

Series JK Digital Pressure Test Gauge

Series TK Digital Pressure Test Gauge

contact:

DCT Instruments
1165 Chambers Road
Columbus, OH 43212
614/481-7777
800/328-1028

HAENNI

HAENNI 2(Inch Diameter Gauges
liquid-filled stainless steel
Bourdon tube pressure gauges

HAENNI 4 Inch Diameter Gauges
liquid-filled stainless steel
Bourdon tube pressure gauges

contact:

HAENNI Instruments, Inc.
1107 Wright Avenue
Gretna, LA 70056
504/392-3344

OMEGA

General Service Gauges Type S

contact:

OMEGA Engineering, Inc.
Worldwide Headquarters
One Omega Drive
PO Box 4047
Stamford, CT 06907-0047
800/826-6342

This may not be a complete list of alternative gauges and does not represent an endorsement by MnTAP. Supplement to the Minnesota Technical Assistance Program Intern Summary *Evaluating the Use of Mercury Manometers in the Dairy Industry*, ©1996 MnTAP.

Current Mercury Work – Dairy Farm

Specific Outreach/Research

Project: *Mercury at Dairy Farms*

Description: A fact sheet establishes a baseline for the amount of mercury currently used in the dairy industry. Further efforts will analyze the efficiency of non-mercury gauges, prepare outreach material, and training workshops

Agencies working on this project:

MnTAP