Appendix C

Anhydrous Ammonia

Anhydrous ammonia and LPG products such as propane have very similar physical properties. However, unlike LPG, which is a mixture of hydrocarbons (predominately propane), anhydrous ammonia is a relatively pure form of ammonia. It is most commonly synthesized from nitrogen and hydrogen combined at high temperatures and pressures in the presence of a catalytic agent. Anhydrous ammonia is used as a refrigerant and in a number of industrial applications, but its most important use is as a fertilizer.

Anhydrous ammonia has a boiling point of -28 EF and is stored and handled in a manner similar to that used for LPG. It has a very distinctive odor even in small concentrations, and so does not require the addition of an odorant.

Anhydrous ammonia is very corrosive when it acquires some moisture. Moist anhydrous ammonia will react rapidly with copper, brass, zinc, and many alloys, especially those containing copper. For this reason, equipment used for metering anhydrous ammonia and proving equipment used to test these systems must be fabricated from materials that will not react with the product.

Because of its relatively high ignition temperature in air (1,562 EF) and its narrow limits of flammability (16 to 25 percent), anhydrous ammonia is classified as a non-flammable substance by the U.S. Department of Transportation. Although anhydrous ammonia can burn, most injuries resulting from exposure to anhydrous ammonia are caused by chemical burns or suffocation.

Ammonia is a caustic substance and will cause serious chemical burns to the skin, eyes, and, if inhaled, to the lungs. This is especially true in the relatively high concentrations that occur when anhydrous ammonia, a relatively pure form of the chemical, is emitted under pressure from a liquid storage container.

Fortunately, anhydrous ammonia vapor is lighter than air and so is relatively easily dispersed. It is also highly soluble in water and thus (unlike LPG) may be readily diluted.

The devices used for the commercial measurement of anhydrous ammonia in the liquid state are very similar in design and operation to LPG liquid-measuring devices. The proving equipment used to calibrate and test these devices is also similar to LPG liquid-meter proving equipment. However, as mentioned above, metering devices and prover materials, including hoses, fittings, piping, gauges, and other associated equipment that comes in contact with ammonia, must be suitable for use with that substance.

This is one reason why it is strongly recommended that provers <u>not</u> be used interchangeably for testing LPG and anhydrous ammonia, despite their similarities. In addition, contamination of the product dispensed by the system being tested might occur if it is mixed with residue of another product in the prover and then returned to the system. Contaminated product could in turn cause damage not only to the dispensing system but also to equipment used by purchasers of the product. Depending upon the extent of contamination and the specific application, use of contaminated product may also be hazardous. In addition to the basic safety equipment described in Chapter 4, which is appropriate for both LPG and anhydrous ammonia, the inspector

should also be equipped with a gas mask and eye wash unit suitable for use with anhydrous ammonia.

Inspection and test procedures for anhydrous ammonia liquid-measuring systems are fundamentally the same as those described in Chapters 6 and 7 for LPG liquid meters. However, the following specific differences should be noted:

- The inspector should wear a gas mask suitable for use with anhydrous ammonia at all times.

- Corrections for temperature difference between product in the system and in the prover (used for uncompensated test drafts only) should be derived from Table 2A (not Table 2). This table is included in Appendix B, immediately following Table 2.

- The volume correction factor for adjusting the proved reading on compensated test drafts should be derived from Table 4A (not Table 4). This table is also included in Appendix B, immediately following Table 4.