CASE STUDY: ANIMAL WASTE DISCHARGE

INTRODUCTION:

Metering farm waste discharges is becoming an increasingly important endeavour. Due to EPA discharge laws, animal waste from farm enterprises such as: dairies; hog farms and slaughterhouses must be measured as critical information is needed on the amount of waste entering settling ponds and also being re-used for irrigation.

The MACE AgriFlo is ideally suited for use with animal waste. Either a full-pipe or open channel sensor (or a combination of both) can be used. The MACE Doppler sensor provides little obstruction to the flow and is impervious to the often greasy build-ups that can coat the electrodes of electromagnetic flow meters. If solid build-ups occur in the pipe, the MACE insertion sensor can easily be removed (via a ball valve) for cleaning without the need to shut down the line. Conventional metering methods such as electromagnetic or mechanical require the shut-down of the process line, as these types of meters are flanged and must be completely removed for service.

Figure 1: *MACE AgriFlo unit installed on a dairy farm in southern Georgia, USA.*

With the added advantage of being able to monitor multiple sensors, with a MACE AgriFlo, the same unit can be used to measure both inflows from the waste source and at the same time be used to monitor the re-use of the waste after mixing with irrigation water.

THE PROBLEM:

A dairy farm in southern Georgia, USA, required flow monitoring on a 6" (150 mm) PVC diameter line. Due to the nature of the waste, which included a high level of solid matter, mechanical meters were seen as an unacceptable solution. Furthermore, trials with insertion electromagnetic devices had been unsuccessful as the sensors would only function for short periods of time before needing to be cleaned. This was as a direct result of "fatty" deposits on the sensor electrodes. An economical, yet robust solution that was self-powered and maintenance-free was essential.

Figure 2: *Typical dairy farm in southern Georgia, USA. Note the 2" insertion sensor in the foreground*

THE MACE SOLUTION:

A MACE AgriFlo with a 2" insertion sensor was installed in 2005. For over three years, the sensor has not needed removing for any cleaning or other maintenance. Until the AgriFlo was installed, this sort of performance was unprecedented. The MACE Doppler sensor is impervious to greasy build-ups in waste flows because the very nature of ultrasound enables the sensor to "see" through the deposits and continue to provide accurate and reliable data.

Figure 3: *MACE 2" insert sensor suitable for full pipes between 100mm to 2.5m (4" to 100")*

THE MACE AGRIFLO BENEFITS:

1. With MACE continuous wave advanced spectrum Doppler processing, the sensor "sees" velocities through the whole cross-section of the pipe and calculates the true average flow rate. This is unlike any other insertion device such as electromagnetic or mechanical, which only sense velocities in a "tennis ball" sized area and then use complex algorithms to attempt to calculate an average flow rate. Because of this technological difference, MACE Doppler technology has a shorter straight-run requirement than other devices.
2. The MACE insertion velocity sensor provides very little obstruction to the flow and has no moving parts. In streams with large amounts of solid material such as those encountered in animal waste applications the whole system is virtually maintenance free.
3. Flow recording allows the EPA and farmer to analyze exact volumes and time periods that waste was released. Furthermore, if the farmer pumps the waste, the data can be used by the farmer to analyze the performance of the pumps over the course of the pumping season.
4. The installation of the insertion sensors meant that the whole flow meter was extremely easy and economic to install as no major pipe-work was required.
5. Because the same insertion sensor can be used in any pipe sized from 4" to 100", should the waste outlet be upgraded in the future, the same flow meter can be used.