A PRELIMINARY ANALYSIS OF 300 MANURE INCIDENTS IN WISCONSIN[1]

Eric T Ronk[2] and Kevin A Erb[3]

Since 2002, the Professional Nutrient Applicators Association of Wisconsin (PNAAW) and UW Extension have conducted 15 live action field events to train applicators, farmers, first responders and agency staff how to respond in the event of a manure spill or release. As these sessions have evolved and training materials developed, the question of how many spills or incidents occur per year and what impact they actually have on the environment is repeatedly asked. While many citizen groups and agency staff collected some information, there is no comprehensive Wisconsin-specific database of manure-related incidents available to help farmers and applicators prepare for and prevent manure spills.

The only comparable research available in the North Central States is a 2003 Ohio Extension summary of manure incidents. This analysis of 98 incidents highlighted numerous commonalities between spills, created a top ten list of reasons why problems occur, and helped the industry pinpoint ways to reduce the risk.

This past spring, PNAAW funded a research project to inventory all of the manure incidents in Wisconsin during the past 5 years (2005-2009). The goals of the project were to:

1. Determine the root causes of manure spills/incidents.
2. Develop simple strategies the manure application and livestock industries can use to prevent and reduce the severity of future incidents.
3. More clearly define what a manure spill or manure incident actually is.
4. Develop a better tracking system to help farmers, applicator and agencies learn from manure incidents.

This is a mid-project summary as of December 10, 2009. As the data are verified and more incidents added to the database, the conclusions may change. Hence the focus of this summary paper is on the methodology, barriers and general results. The formal presentation will include more specifics not available as of the proceedings deadline.

Data Collection

To get the most accurate picture of incidents, we started by gathering all of the publically available data on manure incidents from state agencies, including WDNR and DATCP. At WDNR, these sources included files and records within a number of Programs, including but not limited to:

- Ag Runoff (including Ag Waste)
- Drinking Water
- Environmental Enforcement
- Law Enforcement
- Spills/R&R

[1] Partial funding for this project was provided by the Professional Nutrient Applicators Association of Wisconsin (PNAAW).
[2] Undergraduate student, UW Madison Dairy Science, 4499 Shirley Rd, Denmark, WI 54208.
[3] CCA, Conservation Professional Development and Training Coordinator, UWEX Environmental Resources Center, 1150 S Bellevue St, Green Bay WI 54302.

Some of these Programs may have up to 5 different filing or tracking systems within a DNR region, so each incident was cross-referenced with any available files both within and between programs. For example, in the Spills Program, information may be located in one of two electronic sources –SERTS (recent, open incidents) or BRRTS (database of closed incidents), and/or in a paper file which may be supplemented with digital photos and other electronic documentation located on multiple computers and file servers.

Data collection was initiated by reviewing written and electronic records and phone/in person interviews of agency staff around the state. A screening test was then applied to determine if each incident was significant enough to be included in the database (unsubstantiated complaints, odor issues, etc, were removed from consideration). Records from the Manure Management Task Force were provided by DATCP and incorporated into the dataset. To protect the farmer and responsible parties, any incident with potential enforcement action pending was marked and handled in a way to protect those involved.

As the data were consolidated, it was entered into a secure, password protected web-based tracking system (Checkbox), which allows for rapid data entry and export in a format that can be used by Excel and SPSS for future statistical analysis.

When the agency file review was complete, draft copies of each incident's summary were sent to the county Land Conservation Department for updating/correction/local verification. Counties have also been asked to provide information on incidents not in our dataset. Once this is complete (Winter 2009/2010), contact will be made with as many of the responsible parties (RP) as possible (farmer, manure applicator) to error check the data, unless a reason exists not to make the contact (pending enforcement, privacy concerns).

Data Collection Challenges

As noted above, there currently is no uniform tracking system between agencies, much less within a single agency. There is a wide variety of tracking systems (from through to almost non-existent) across the WDNR regions.

State law is very clear that if a release of a substance occurs that has the potential to impact the resources of the state (air, water, soil), it must be reported immediately to the WDNR. The Spills/R&R program maintains a 24-hour hotline for reporting of spills/one-time emergency situations with an impact to human health or the environment. When a call comes into this 24-hour hotline (800-947-0003), notification is made to the local WDNR warden and Regional Spills Program staff, who assess the situation.

Farms with WPDES permits are required to immediately notify their WDNR Ag Waste Specialist when an incident occurs—if they are unable to reach them in person, the permit requires them to contact the Spills Hotline or other DNR staff to report the incident. Citizens often call these same Ag Waste/Runoff specialists to report incidents or ongoing problems.

Some counties have set up their own system (Oconto, Manitowoc, Kewaunee are examples) where farmers/applicators/citizens may call 911 and report locally. The 911 center notifies the county Land Conservation Department and may notify local law enforcement (for traffic control). Some 911 centers will notify the WDNR Warden, others will not unless requested. Still other counties request reports be made directly to the Land Conservation Department, while some counties have no policy in place. LCDs are often the first call for citizens concerned about ongoing, chronic problems.

No matter how or to whom these reports are made, we have found that the initial report is often inaccurate. This is due to the nature of the spill (excitement of the incident, reporting person not on site or familiar with the equipment), and that the facts have not been verified. The quantity released is often reported at unknown, or at best an estimate at the time of the initial notification — citizen complaints tend to overestimate the volume of manure and scope of the problem, while those responsible often downplay the incident when reporting it. Since responsibility for going to the site is shared by different WDNR programs (and staff, depending on workload, incident severity and other incidents occurring the same day) these initial reports are not updated in a timely manner (or at all) to reflect what is seen in the field. Sometimes the information is updated in one, but not in other parts of the multiple record keeping systems.

After the initial report, information on an incident may be scattered in one or more of 11 different tracking systems within WDNR. As noted before, some are electronic and readily searchable, others are paper and filed within an organized system, and still others are only notations in remotely related records (for example, the only record of manure pump failure was a printout of an email in a folder that contained technical drawing for a farm's reception pit).

Even when the records are in an electronic format, the systems may not be easily searchable or the information in the system may be incomplete/inaccurate (manure labeled as "other" or "septage"). They often reference documentation kept in non-searchable formats. The electronic tracking systems are not cross-linked to allow one-step updating and elimination of duplicate information

Another challenge is that many incidents go unreported. While state law says that all spills that "have the potential to impact surface or groundwater" must be reported, we suspect that many are cleaned up by the farmer and not reported to the WDNR. Permitted livestock operations (CAFOs) are required by their permit to report any incident, and that is reflected in the total number and the fact that many reported CAFO incidents are of a minor nature when compared to non-CAFO farms.

County LCDs also have varying levels of tracking incidents. Some (such as Dane) have a very detailed system in place for tracking both complaints and manure incidents. Others do not have a central registry, but include notes in the farmer's file if action (repair of storage, etc) was needed, or the record was obtained by interviewing staff. The majority of counties have no system in place.

Manure Incident Summary

It is important to note that this is a mid-project summary. We are 85% complete reviewing the WDNR files and about halfway through the LCD information. As noted above, the actual event is often different from the initial report, and every event is undergoing a final review before we attempt to contact the farmer/responsible party. It is also important to note that since farms who are under public scrutiny for perceived or past problems are more likely to self report incidents AND smaller farms are less likely to report, the data is skewed towards incidents from CAFOs.

With these caveats in mind, the dataset includes information on just over 300 incidents. The most surprising result is that less than one third of the incidents occurred in the field where manure was applied. As shown in Figure 1, More than 40% of the incidents occurred at the farmstead itself, with the remaining 30% occurring during transportation from the farmstead to the field. Of the incidents at the farmstead, 37% involved manure storage overtopping and 18% were related to manure runoff from livestock production areas. April and August were the most likely months for manure storage overflows.

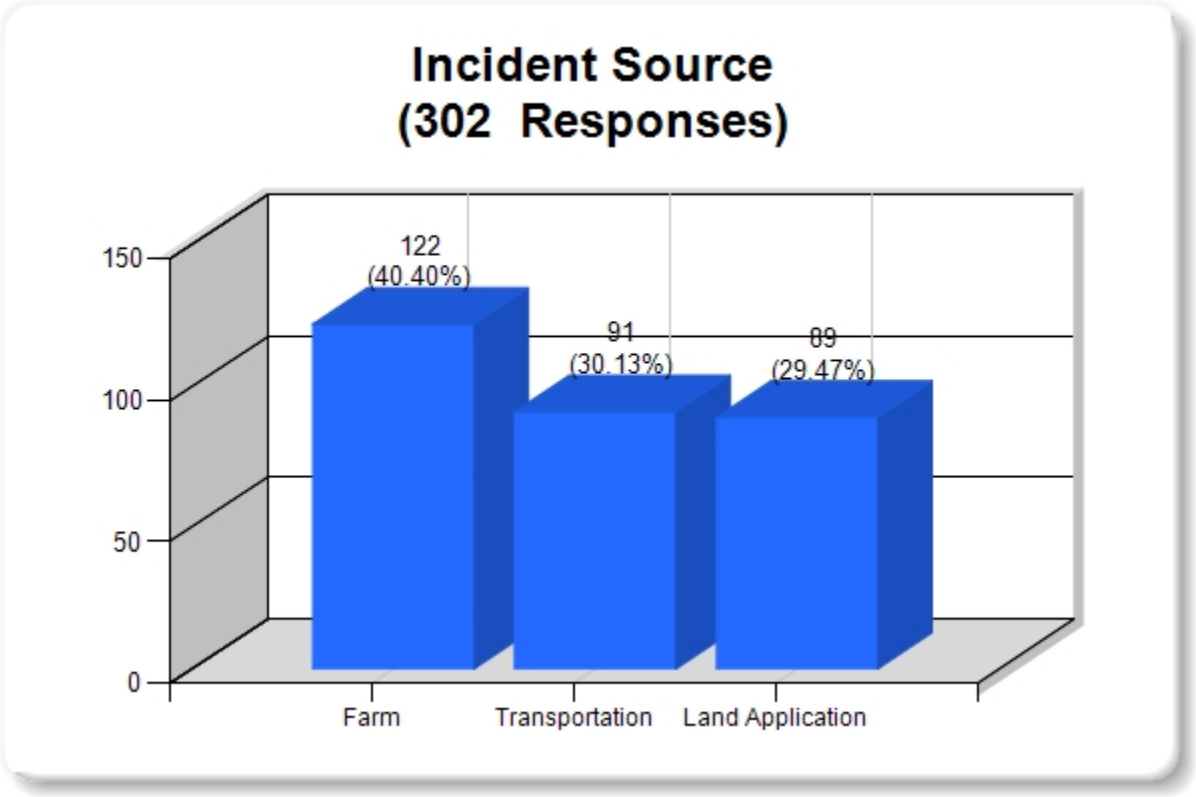

Figure 1. Manure incidents (2005-2009) by location. Farm means the incident occurred at the farmstead (such as a pit overtopping, line break, etc). Transportation includes both road/tanker issues and dragline issues occurring between the manure storage and the application site. Land application includes incidents that occurred during and after application (such as off-site movement in rain event the next day).

Another surprise was when incidents occur. We expected February (Figure 2) to be a high incident month, but it came in 4th. We attribute some of this to the decrease in manure applications on frozen soil over the past few years as famers and applicators have become more aware of the risk of snowmelt/precipitation driven runoff.

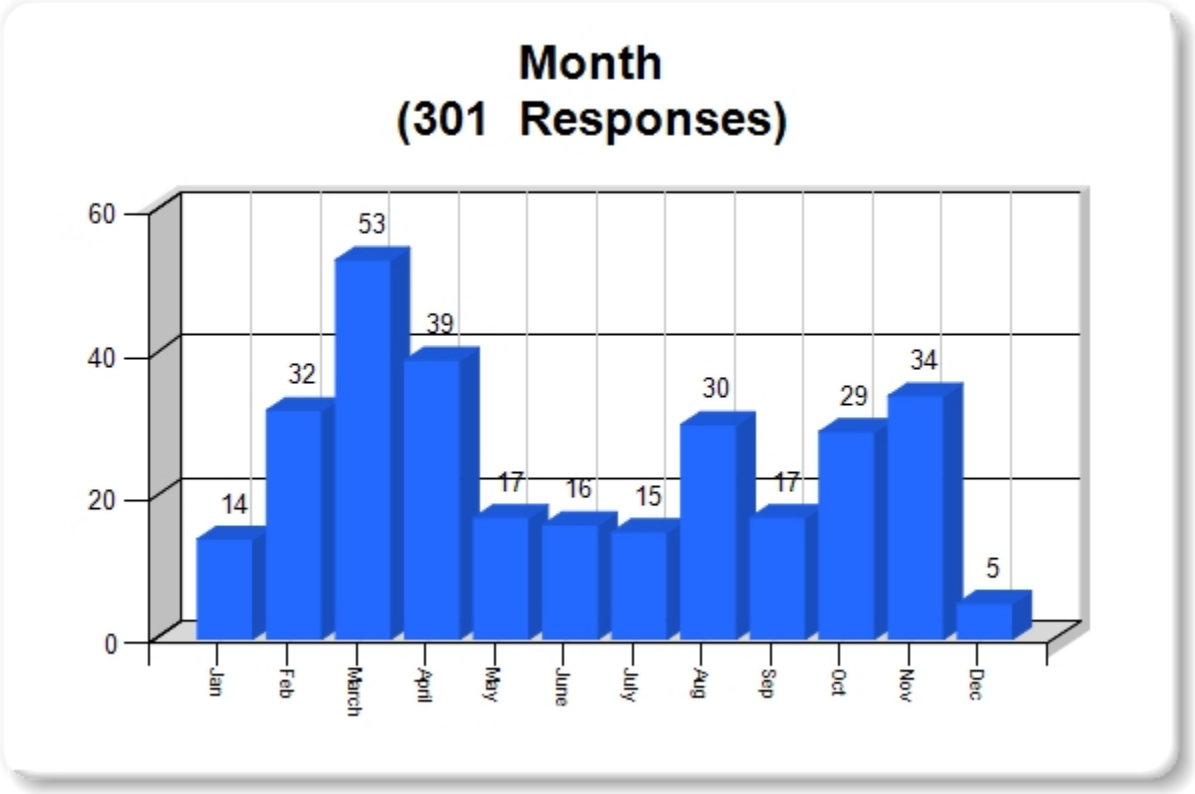

Figure 2: Manure incidents (2005-2009) by month. The spike in August can be attributed in part to manure storage overtoppings that occur (April and August are the most common months for storage issues).

As noted earlier, the incident rate at CAFOs was higher than at non-CAFOs, and this may be attributed to both the mandatory reporting required by the permit and the desire of permit holders to self report rather than be reported by neighbors. Additional factors may include the fact that citizens watch CAFOs more carefully, neighbors are more willing to report a CAFO compared to a smaller neighbor and the fact that larger farms pump, haul and apply a much larger volume of manure than a smaller farm. As noted in Figure 3, there is an upward trend in the number of spills. WDNR and UWEX staff attribute part of this increase to an increased willingness of professional applicators and farmers to self-report problems to the WDNR, as well as greater vigilance by concerned citizens.

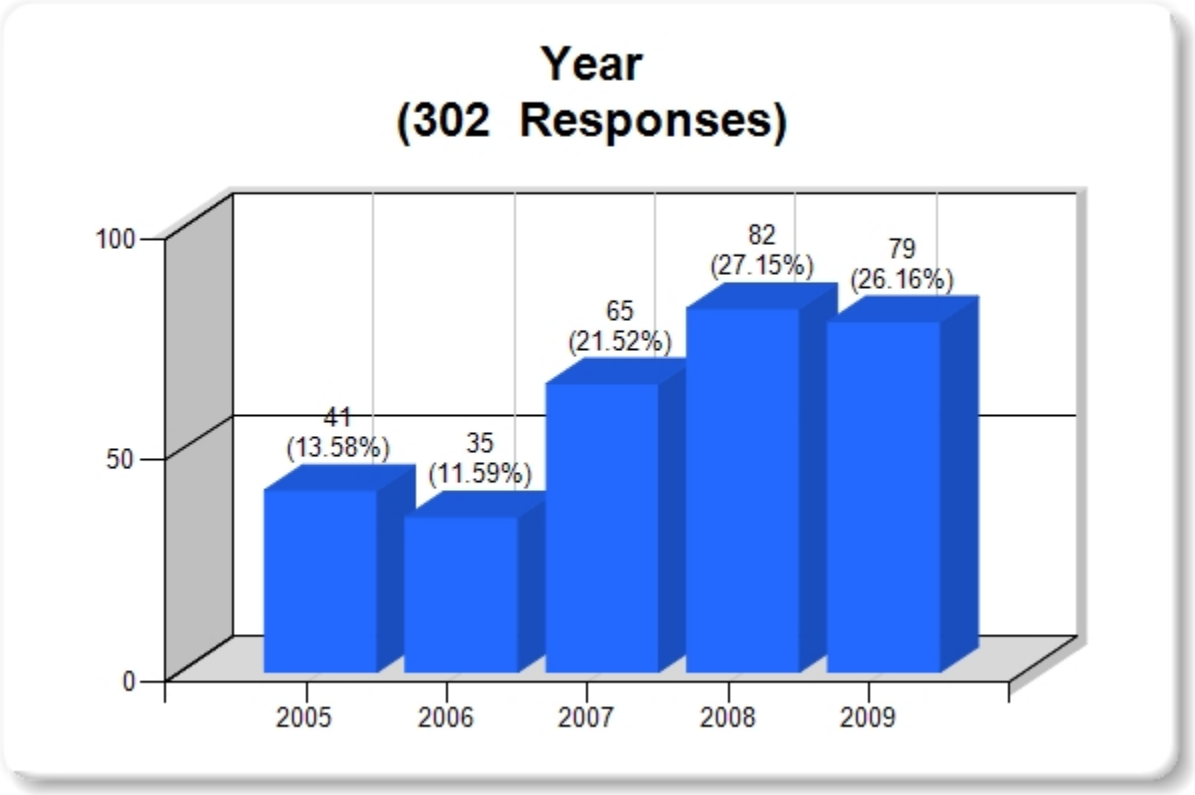

Figure 3: Manure incidents (2005-2009) by year. 44% of the 2005 incidents occurred in February and March., while only 30% of 2009 occurred during that same time period.

Fifty-five percent of the incidents were determined to have no official environmental impact to surface or groundwater. 43% did have a surface water impact, however any manure released into a road ditch was included in this category even if the manure was cleaned up before it could leave the site. Only 4% of incidents resulted in a fish kill

Future Directions

One goal of this project is to create a better working definition of a spill. A ranking system is being considered that will help all parties determine the level of response that is needed to an incident.

We will continue to add to and refine the database as the project concludes. It is hoped that the data gathered will guide the efforts of professional applicators, farmers, CCAs and regulatory staff as we work together to reduce manure's environmental impact.

This project would not have been possible without the cooperation of WDNR, DATCP, and LCD staff around the state, as well as farmers, CCAs, and professional applicators.