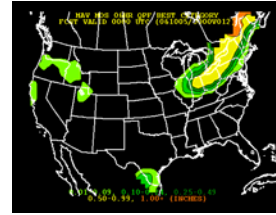


# Online Weather Resources for Manure Application

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Custom Manure Applicator Subcommittee<sup>1</sup>



One of the most common factors in manure runoff situations is precipitation. Rainfall, snowmelt, or a surprise summer thunderstorm can quickly turn a normal manure application into a potential problem. Forecasted precipitation events should not be viewed as a reason to hurry up and get manure applied to fields. Rather, they represent a spreading condition that must be viewed with caution. Producers need to manage their applications with respect to potential future precipitation and consider additional management options or avoiding application altogether when precipitation is forecasted or imminent. Weather forecasts are one means of determining when additional management options are necessary or appropriate. While weather forecasts have not always been accurate (a 1997 study by UW-Green Bay students showed that the precipitation accuracy for January-March was <60%), more modern forecasts are the best tool we have when planning applications during certain times of the year.

The following pages outline several resources available online for professional manure applicators and farmers. There are far too many online sites to examine here in detail, but the following will give you a flavour for what is available. Radar is available on hundreds of sites, so that will not be covered here. The mention or absence of a particular service does not imply endorsement or lack thereof.

**Fee vs. Free:** There are a number of fee-based online weather services available – some online, and some through speciality services like DTN.com or cell phone providers. These non-internet services may be a better deal in the field where internet access is not available or older phone lines make decent connections difficult.

**Liability:** When depending on forecasts in making a decision on whether or not to spread, it is important that you print copies of the forecast used and keep on file for at least one year. Keeping them for 3 years is better, but space in your filing system may be limited. Since forecasts change often, you should check at least once per day, more often if necessary. While documenting that you took into account forecasted precipitation does not remove liability when runoff events occur, it is a factor that can be considered when regulatory agencies are determining an appropriate enforcement response. In addition, documenting that you looked at a forecast does not provide any benefit if you did not take appropriate responses to the forecast. Other factors that can impact an enforcement response include the actions a producer takes to address a precipitation-related runoff event once it is discovered.

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<sup>1</sup> Kevin Erb, UWEX – ERC, Ted Bay, Jerry Clark and Carla Heiman, UWEX. Prepared 9/25/2006

**Local Forecasts by Zip Code:** Many websites and local TV stations now offer the ability to type in the zip code of the farm and view the forecast. Popular ones include [www.weather.com](http://www.weather.com), [www.intellicast.com](http://www.intellicast.com), and [www.weather.gov](http://www.weather.gov). It is important to make sure that the forecast you are viewing is up-to-date. Some services update every few hours, others every day or so.

**Tabular Forecasts:** A number of services now offer hour by hour forecasts. Below is the [www.weather.gov](http://www.weather.gov) forecast for Abbotsford, WI (go to “Additional Forecasts and Information”, click on “tabular”) for September 25, 2006: Note that it lists the % chance of rain for each hour from the current time to 3 days out, in addition to high temperatures.

Tabular Forecast for 44.95N -90.31W  
 Locations within 5 miles of this point include...Abbotsford WI...Colby WI...Dorchester WI  
 Last Update: 3:13 pm CDT Sep 25, 2006

**Digital Forecast**

Temperature   
  Heat Index   
  Rel. Humidity   
  Rain   
  Pcpn. Probability   
  Dewpoint   
  Wind   
  Sky Cover   
  Thunder

Date	09/25															09/26														
Hour	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15						
Temp	63	61	59	55	50	48	47	45	44	43	43	42	42	41	40	40	42	48	54	59	63	66	69	70						
PoP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5	5	5						
WDir	WNW	WNW	WNW	WNW	WNW	NW	NW	NW	NW	NNW	NW	WNW	W	WSW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW						
WSpd	17	16	13	6	5	3	2	1	0	0	0	0	0	0	1	2	5	8	11	14	16	18	18	18						
GSpd	21	20																				23	23	23						
Rain	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--						

Date	09/26																							
Hour	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Temp	70	69	67	62	58	56	54	53	52	51	51	50	50	49	48	48	49	51	53	54	56	57	58	58
PoP	11	11	11	61	61	61	61	61	61	21	21	21	21	21	21	30	30	30	30	30	30	30	50	50
WDir	SW	SW	SW	SW	SW	WSW	W	W	WNW	NW	NW	NW	NW	NW	NNW	NNW	NNW	NNW	NW	NW	NW	NW	NW	NNW
WSpd	17	15	14	11	11	10	9	9	8	8	8	7	7	7	7	7	8	9	10	11	13	14	14	13
GSpd	22	20	18																					
Rain	--	--	--	Lkly	Lkly	Lkly	Lkly	Lkly	Lkly	SChc	SChc	SChc	SChc	SChc	SChc	Chc	Chc	Chc	Chc	Chc	Chc	Chc	Chc	Chc

Date	09/27																								
Hour	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	
Temp	58	57	55	52	49	47	46	45	44	44	43	43	42	42	41	41	42	44	46	48	49	51	51	52	
PoP	50	50	50	40	40	40	40	40	40	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
WDir	NNW	NNW	NNW	NNW	N	N	N	N	NNE	NNE	NNE	NNE	NNE	NNE	NNE	NNE	NNE	N	N	NNW	NNW	NW	NW	NW	
WSpd	13	11	10	9	8	8	7	6	6	5	3	3	2	2	2	2	2	2	2	2	3	3	5	6	6
GSpd																									

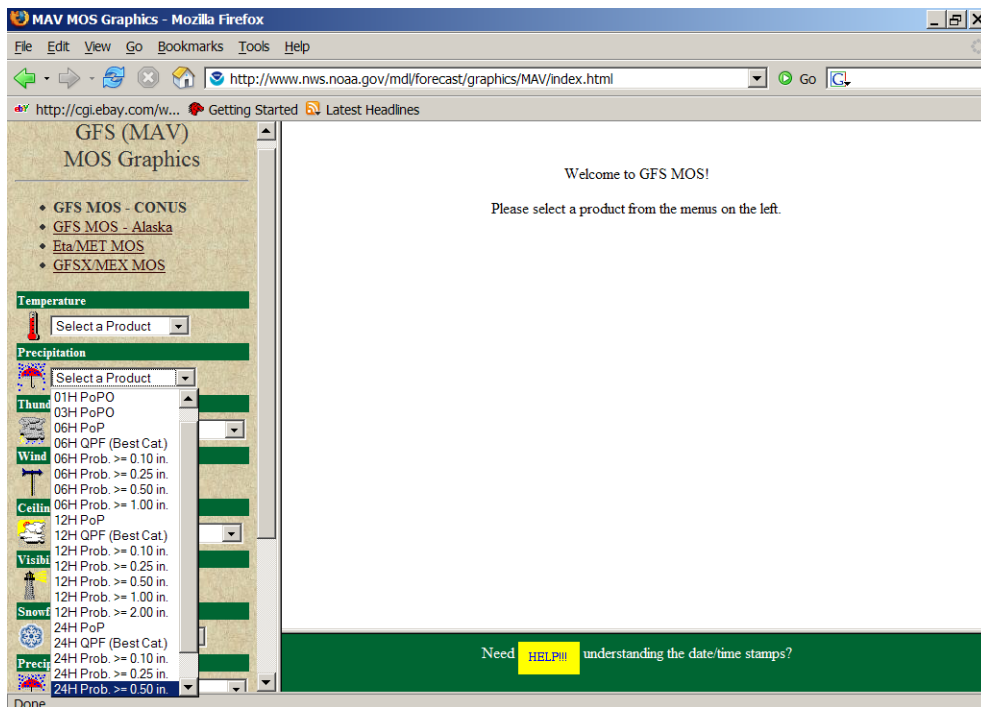
Starting at hour 16 (1600 hours military time, 4 pm conventional), the hour by hour predicted conditions are shown. Note that the chance of rain (PoP) remains below 20% until hour 19 on the 26<sup>th</sup> (5 pm), then jumps to 61% until 1 am, then back down again. The bottom row (Rain) shows it is likely during these hours, then becoming a scattered chance (SChc) after. Of course, this type of forecast does not predict the amount of rain, just whether it will rain or not (or whether the temperature will get above freezing and the snow start melting)

## So How Much Will It Rain?

The decision on whether or not to spread manure must also be based on the amount of rainfall forecast. One of the easier to use options for determining precipitation probabilities is the National Weather Service forecast model graphics website:

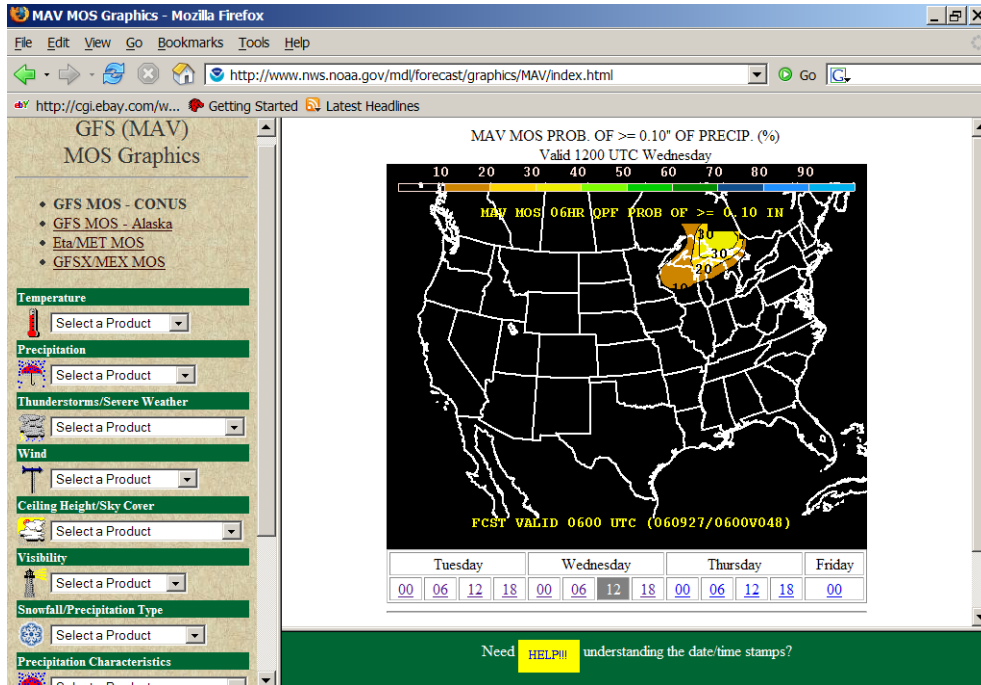
<http://www.nws.noaa.gov/mdl/forecast/graphics/MAV/index.html>

The National Weather service uses several computer models (GFS (MAV) MOS, Eta/MET MOS and GFSX/MEX MOS)—the one EPA recommends for the upper Midwest is the GFV (MAV) MOS, and this link takes you right to that model’s output. Note that the forecast is a synthesis of all 3 models (plus the intuition of the weather forecasting staff), while the graphic is just one model’s output. Hence this map may differ (and on this date, it did) from the tabular forecast



*Under “precipitation”, we clicked the down carrot on the right side to get this menu.  
You can view maps showing wind, temperature and more from this page*

Once there, under “Precipitation” on the left side, select the incremental category you want (1 hour, 3 hour, 6 hr, 12 hr or 24 hr) and the amount of rain (0.1 inches up to >1 inch). This will generate a map, and across the bottom of the screen are the time increments you selected. For the one below, I’ve looked at the > .1 inch in 6 hour increments, and have clicked on Thursday (that’s the first time that rain is forecast in Wisconsin by this model). PLEASE NOTE that the time on the map is not in our timezone – during Standard time, **subtract 6 hours**. During Daylight Savings, **subtract 5 hours**. This is explained by clicking on the yellow button on the bottom of these screens.



The map above shows the chance of rain between 7 am and 1 pm on Wednesday of that week (remember, 5 hours difference in summer, 6 in winter)

## Using the Maps

Once you have the maps, you now need to make a decision: Is it safe to spread, or should I wait? While there are no hard and fast regulations for all farms in Wisconsin at this time, the following guidelines will help you make that decision.

- 1. What can the soil absorb?** The 590 standard has a table that looks at how much moisture a field can absorb before runoff occurs. Use of this table is only required in sensitive areas (near water resources), however it does provide good guidance for determining if soils in any field are saturated or can absorb liquid manure.

Max manure rate

Surface Texture Class <sup>A</sup>	Max manure rate <sup>B</sup>		Allowable Soil Moisture Description for Applications <sup>C</sup>
	< 30%	≥ 30%	
Fine	3000	5000	Easily ribbons out between fingers, has a slick feel.
Medium	5000	7500	Forms a ball, is very pliable, slicks readily with clay.
Coarse	7000	10000	Forms a weak ball, breaks easily.

<sup>A</sup> Fine – clay, silty clay, silty clay loam, clay loam  
 Medium – sandy clay, sandy clay loam, loam, silt loam, silt  
 Coarse – loamy sand, sandy loam, sand. This category also includes peat and muck based on their infiltration capacity

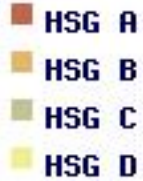
<sup>B</sup> Crop residue or vegetative cover on the soil surface after manure application.

<sup>C</sup> Soils are saturated **when you can do these actions with a handful of soil** – do not apply in these cases along stream and sensitive areas.

In addition, factors that producers must also take into account include previous manure applications and precipitation events. If the soil is already moist, it can absorb less liquid manure than a dry soil. Remember too that recent manure applications events can seriously inhibit the ability of the soil to absorb additional moisture. This makes pollutants associated with manure highly mobile when any amount of additional precipitation occurs.

2. **What will happen if it rains after application?** Different soils absorb moisture differently—sands much more quickly than clays. The EPA guidance for permitted livestock operations is based on soil hydrologic group. Their guidance suggests that manure, litter, or process wastewater shall not be surface applied when the National Weather Service predicts a 50 percent or more probability of rain in excess of the amount that is reasonably likely to generate runoff, as provided below, within 24 hours of the end of an intended application.

**Minimum Quantity of Rainfall Required to Create Runoff (EPA Guidance)**

Hydrologic Soil Group	Quantity of Rainfall (inches)	
A	1.0	
B	0.5	
C	0.25	
D	0.25	



For Hydrologic Soil Group B soils, you would on the previous page, select the forecast product labeled, “24H Prob.>=0.5in. Different soils react differently based on cropping history, and this map should only be one of many factors you consider. The actual Hydrologic Group for each field (and soil) is available from the NRCS (Natural Resources Conservation Service) soil survey. Talk to the local office or the farmer’s crop consultant for more information.

Soils that become saturated as a result of recent manure applications or precipitation following applications can no longer hold moisture. Manure related pollutants can run off a field either with the manure or along with the precipitation related runoff. Under saturated conditions, pollutants associated with recent applications are also more prone to seep or be “pushed” into drain tiles that can lead directly to streams.

**Summary and Conclusions:**

Given the history of manure-contaminated runoff, it is essential that manure applicators pay attention to both soil conditions and the weather forecast. Using the technological tools available and documenting your actions will reduce the chance of a problem happening, and decrease your liability should one occur.