

What Weather Conditions Cause Neighbors to Experience Odor?

Fact Sheet

Take Home Message: *Cooling temperatures and low wind speeds commonly seen during evening and nighttime hours produces conditions when odors are trapped near ground level and neighbors are likely to observe odors from a nearby field recently receiving manure.*



Low Risk: Warming conditions experienced during daylight hours typically disperse odors (and smoke) away from neighbors. Higher winds also help dilute odors.



High Risk: Can you recall a time when you observed smoke cloud hanging near the ground? Often this is observed as air temperatures are cooling and when winds are light. Under these conditions the smoke is not being diluted and is being held near the ground for all to experience.

Although we cannot see odors, the exact same atmospheric conditions create the greatest risk for neighbors to experience odors trapped near ground level.

This table helps one identify high-risk conditions that trap odors near ground level from lower risk conditions that dilute and disperse odors more quickly. These high-risk conditions tell us when neighbors are most likely to experience unpleasant odors from a field that has recently received manure.

Table 1. Atmospheric conditions and their risk of holding odors near the ground.¹

Surface Wind Speed (mph)	Daytime Solar Radiation			Nighttime Cloud Cover	
	Strong	Moderate	Slight	>50%	<50%
<4.5	Very Low Risk	Very Low Risk	Very Low Risk	High Risk	High Risk
5 to 7	Very Low Risk	Very Low Risk	Low Risk	High Risk	High Risk
7 to 11	Very Low Risk	Low Risk	Low Risk	Low Risk	High Risk
> 11	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk

¹Based upon Pasquill-Giffort air stability classes (Pasquill, 1961).

Does Wind Direction Impact Neighbor Exposure to Odor?

Fact Sheet

Take Home Message: *Wind direction is the single most critical information for selecting fields. Odor plumes travel in the same direction as wind and spread out laterally very little. By identifying the edges of the field perpendicular to the wind and the wind's direction, one can quickly identify the neighbors at greatest risk and those unlikely to be impacted.*

For the two land application site options illustrated in Figure 1 (Field A and B), Field A presents a much smaller risk to nearby neighbors. By choosing a land application site $\frac{1}{2}$ mile to the north of Field B for this southwest wind, the risk has been dramatically reduced in this example.

Paying attention to the wind directional forecast for a 36-hour period after applying manure, allows a person to gauge the risk of odor affecting neighbors. A 24-hour period of good drying weather, bright sunshine and no precipitation, dries the manure out and reduces the release of odors.

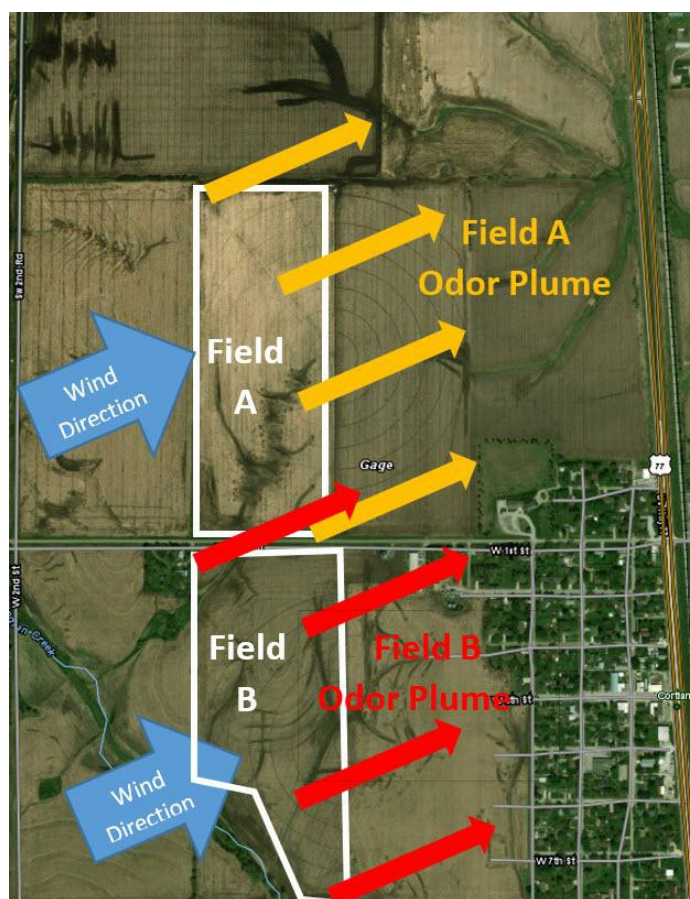


Figure 1. Wind direction is an important predictor for identifying which neighbors are at risk.

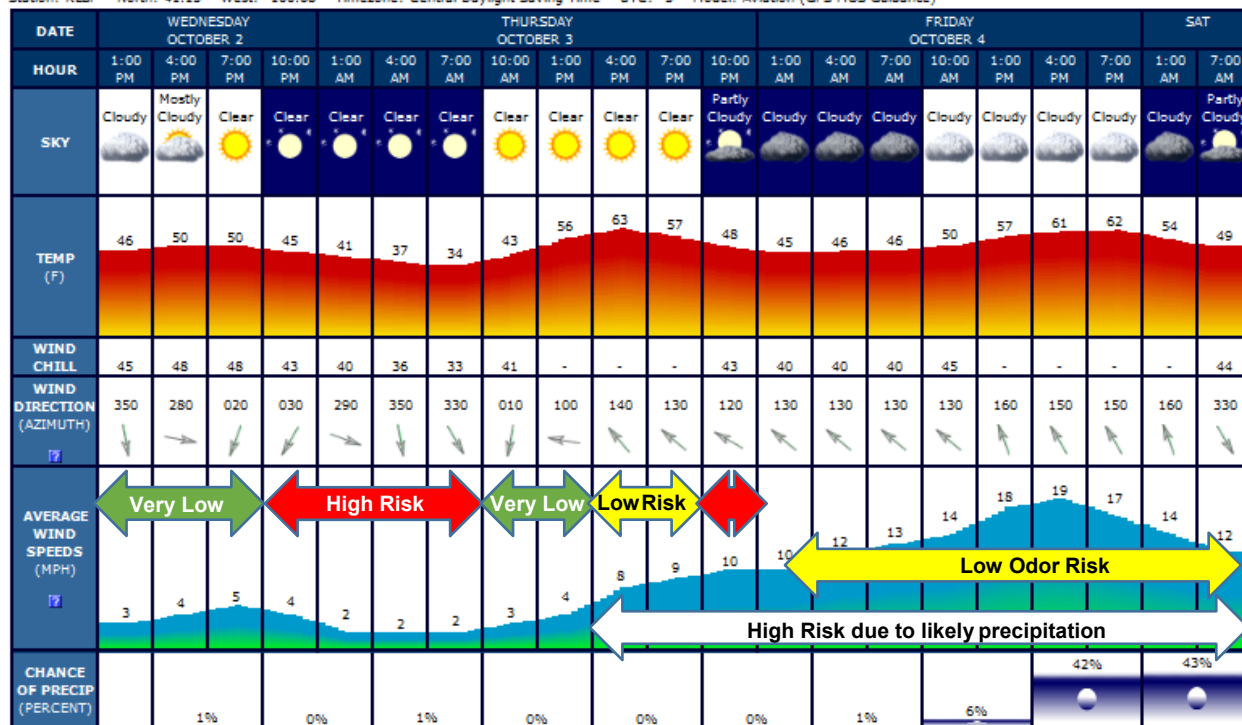
How Do I Use a Weather Forecast to Minimize Odor Risk?

Fact Sheet

Take Home Message: Weather forecasts that provide 1) wind direction and speed and 2) sky conditions for a three to five day period are valuable in deciding when and where to apply manure to minimize neighbor odor risk. It is also valuable to have precipitation forecast for making decisions. Many weather services provide this information. [Aviation Weather Report and Forecast, http://www.usairnet.com/cgi-bin/launch/](http://www.usairnet.com/cgi-bin/launch/), (see below) provides one example.

Aviation Weather Forecast at North Platte, Nebraska

Station: KLBK North: 41.13 West: -100.68 Timezone: Central Daylight Saving Time UTC: -5 Model: Aviation (GFS MOS Guidance)



October 2? The weather forecast (Figure below) suggests that neighbors near a land application site would be at high risk during the evening of October 2 and early morning of October 3. Variable direction of low speed winds suggest risk of neighbors in multiple directions being affected. October 2 is a less desirable day for spreading manure.

Answer: For October 2, select only those fields with no neighbors in the vicinity (possibly within ½ mile). Light winds blowing in variable directions could present a risk in multiple directions.

October 3? Conditions for applying manure are more favorable on October 3. There is an early evening period of higher risk, possibly a time when neighbors would be outdoors. Neighbors to the northwest of a land application site would be the only neighbors impacted. Good drying conditions also exist during the day on October 3 further reducing the odors to be released following manure application.

Answer: For October 3, the forecasted nighttime wind direction to the northwest occurs during the high risk period. Selecting a land application site without neighbors to the northwest would be desirable on October 3.

October 4? Odor Risk is likely to be low through the evening of October 4 and early morning of October 5.

Answer: A low risk of odors being trapped near ground level exist all of October 4 and start of October 5. However, there appears to be rain in the forecast which may prevent manure application. At least 24 hours or more of time should lapse between manure application and precipitation. Check the precipitation forecast before spreading manure on October 4.