Anatomy of a Runoff Event

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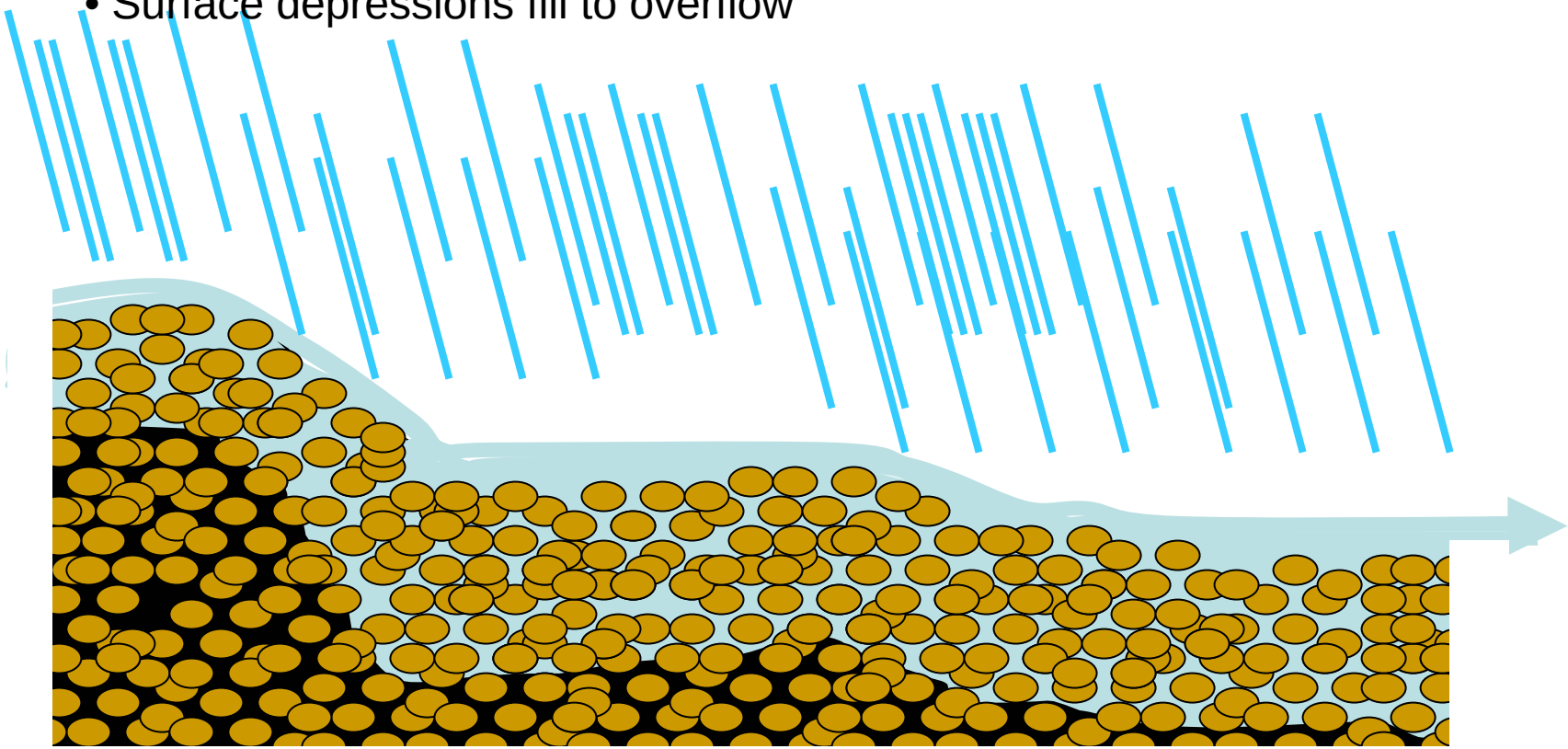
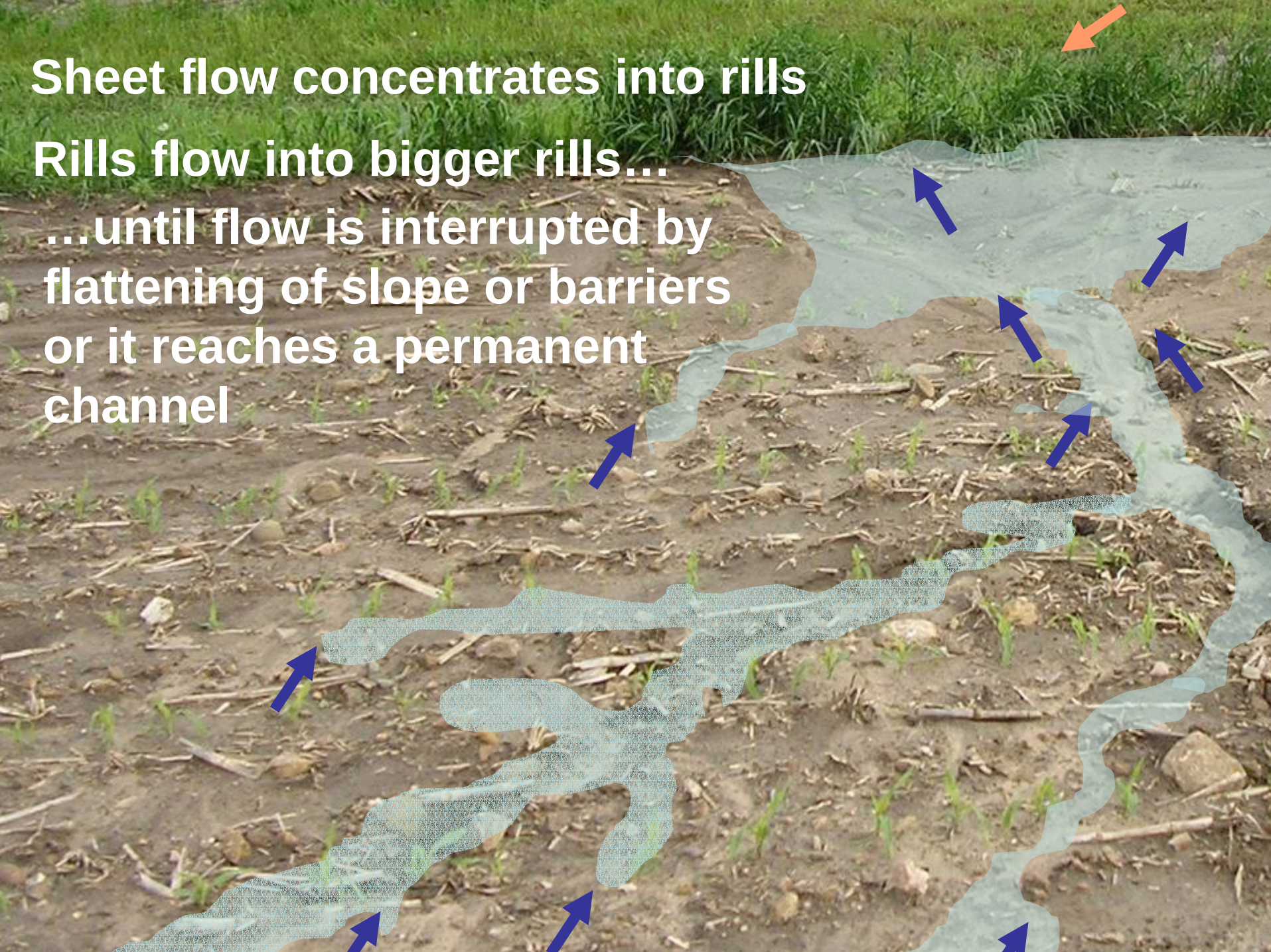
January, 2006

What makes runoff?

- Rate of water accumulation at surface greater than infiltration rate
- Surface depressions fill to overflow

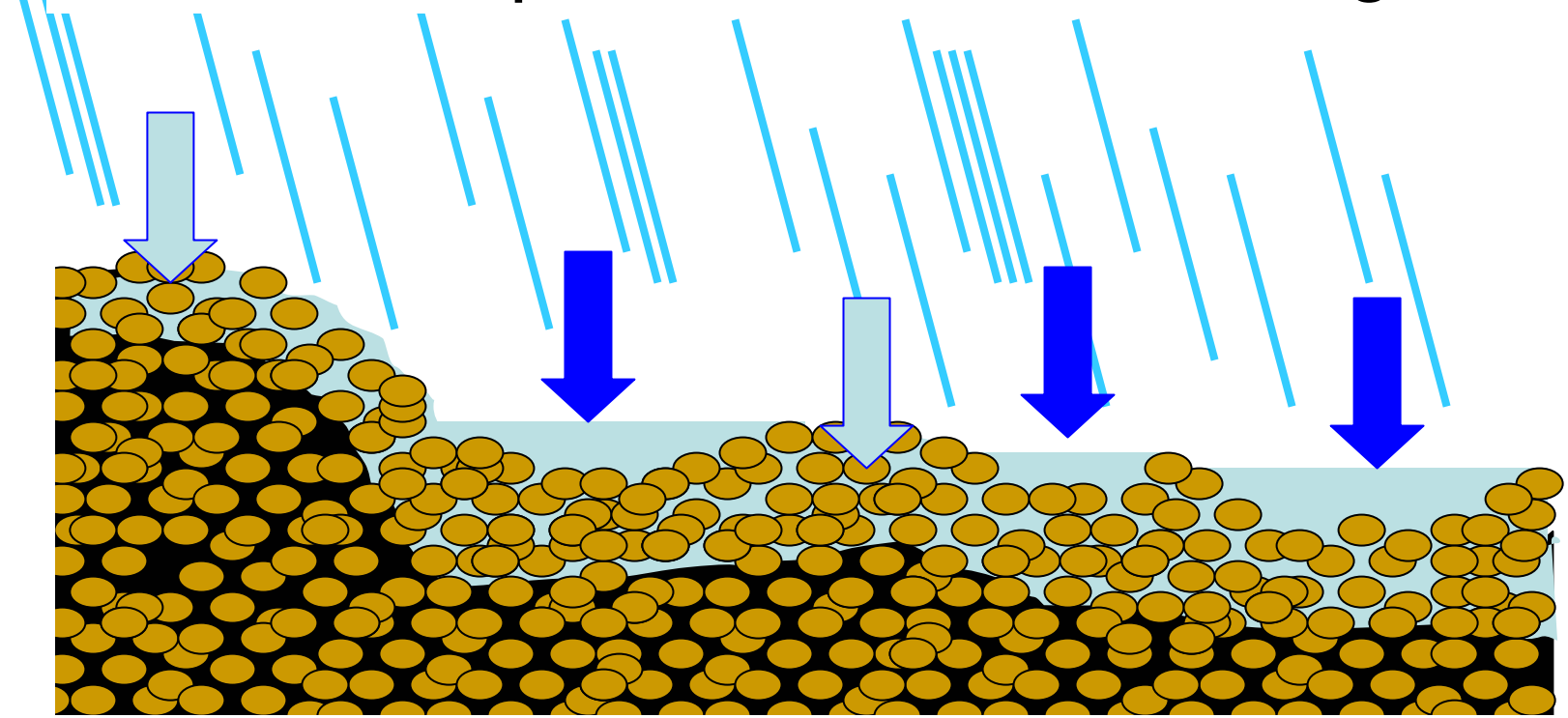



Sheet flow concentrates into rills
Rills flow into bigger rills…
…until flow is interrupted by flattening of slope or barriers or it reaches a permanent channel

Why is there more runoff from some fields than others?

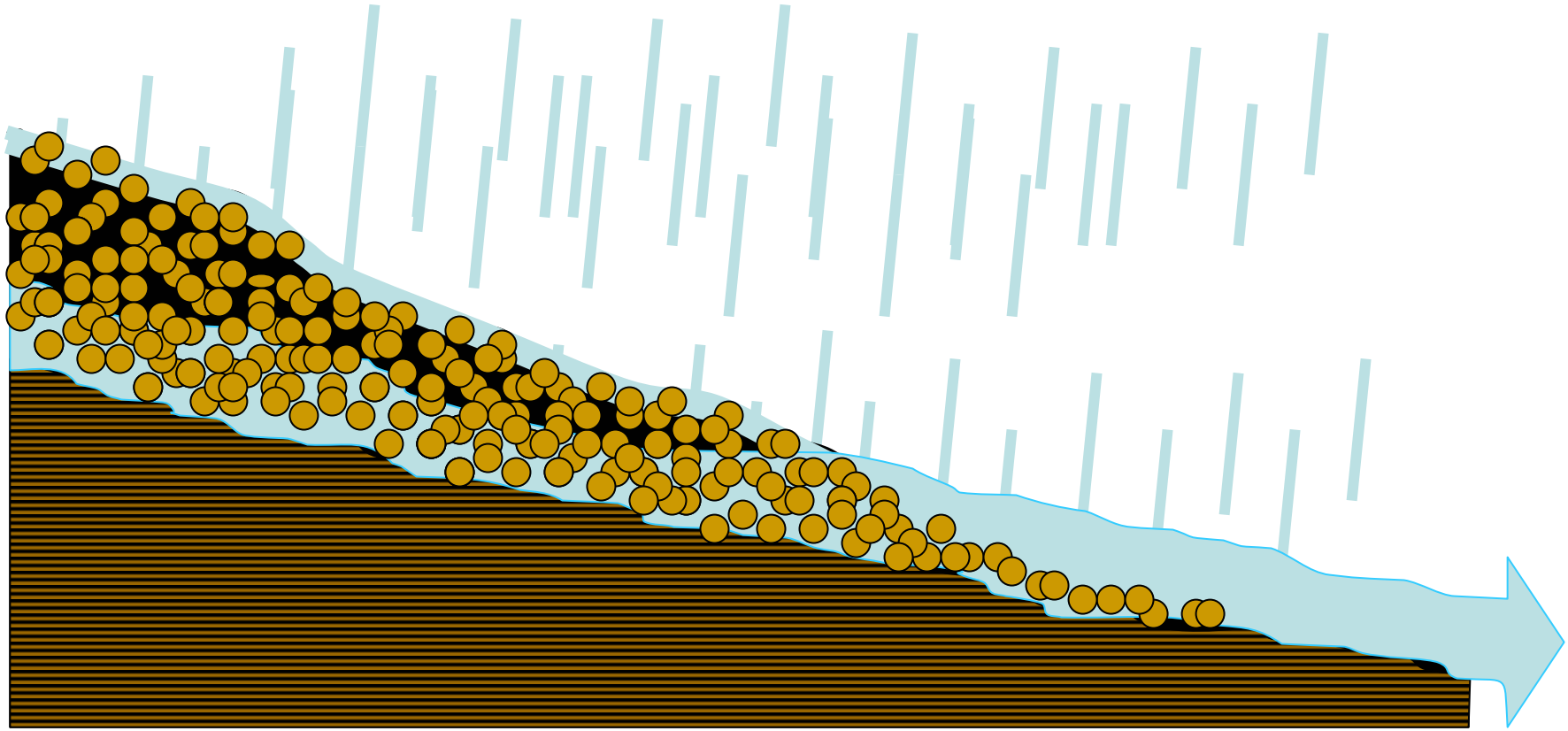
Slower infiltration

Less interception and surface storage



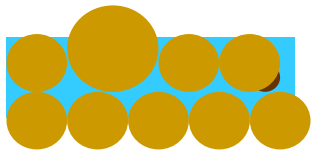
Another kind of runoff

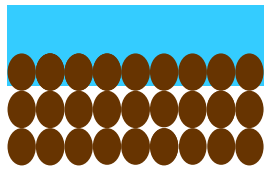
Rising water table or subsurface drainage saturates soil from below and excess water runs off.



Field Properties Influencing Runoff

Soil texture

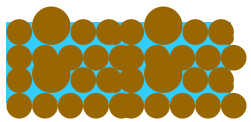


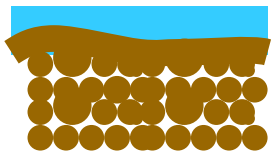


Landscape

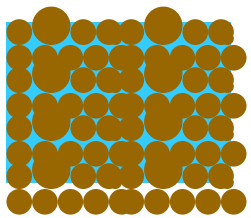
Soil structure

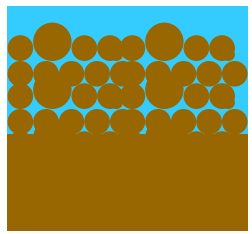
Surface





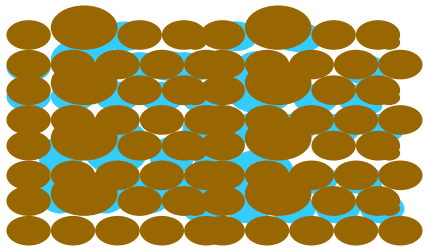
Subsurface



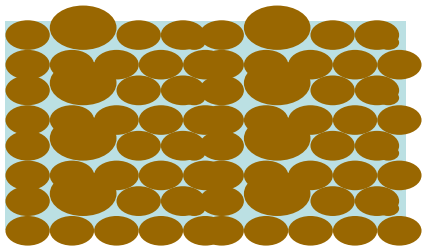


Weather-related Properties that Influence Runoff

Soil moisture



Frozen soil



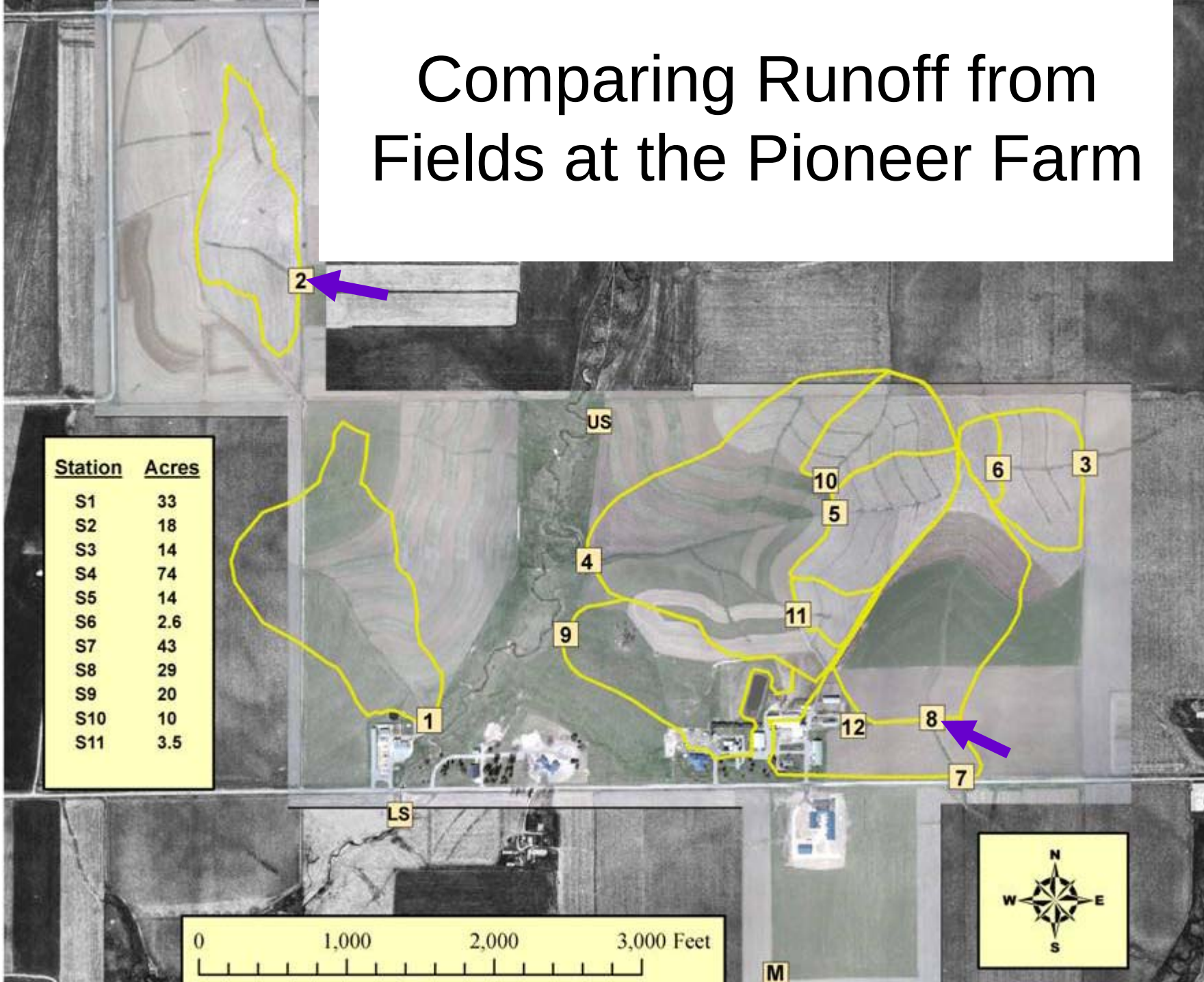
Crop-management Related Properties that Influence Runoff

Canopy
Stem density

Residue

Surface roughness

Comparing Runoff from Fields at the Pioneer Farm



Total runoff May 21-23, 2004

Rainfall = 3.9 inches

1.2 inch

0.1 inch

Runoff for February, 2005

Site 2: Fall-chisel plowed

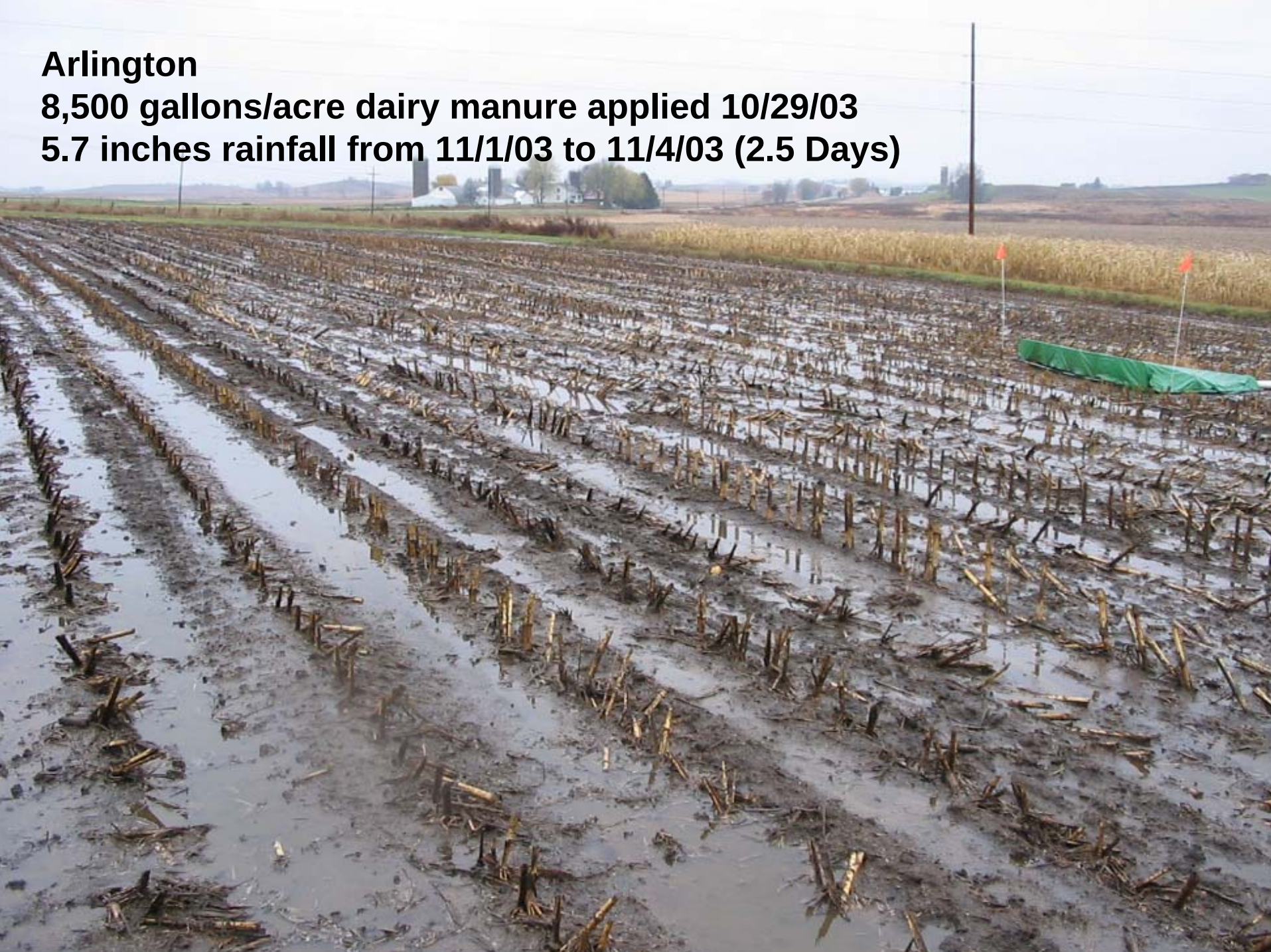
1.3 inches

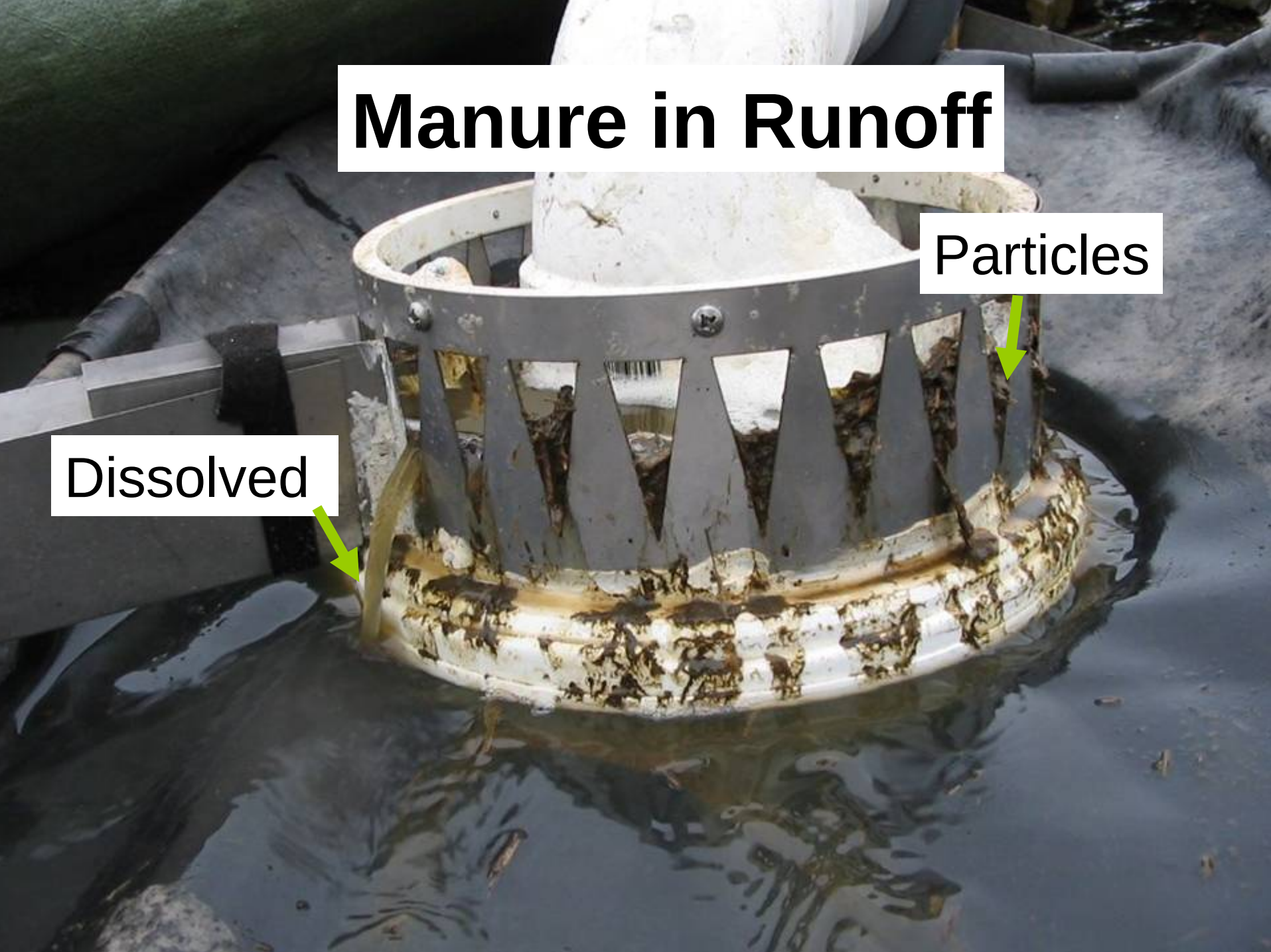
Site 8: Established alfalfa-brome

2 inches

Depressions left from the chisel-plowing hold snowmelt

What happens when there is runoff after a manure application?


Arlington
8,500 gallons/acre dairy manure applied 10/29/03
5.7 inches rainfall from 11/1/03 to 11/4/03 (2.5 Days)


Manure in Runoff
Particles
Dissolved

Factors that Can Affect How Much Manure Runs Off

- Amount of manure
- Type of manure
- Time between application and runoff
- Conditions between application and runoff
- Amount of runoff


Arlington
8,500 gallons/acre dairy manure applied 10/29/03
5.7 inches rainfall from 11/1/03 to 11/4/03
0.25 inches runoff
2 – 5% of the manure ran off

Field: No-till corn silage
6,000 gallons/acre liquid dairy manure October 5, 2005
Intense rainstorm 0.2 inches fell same day.

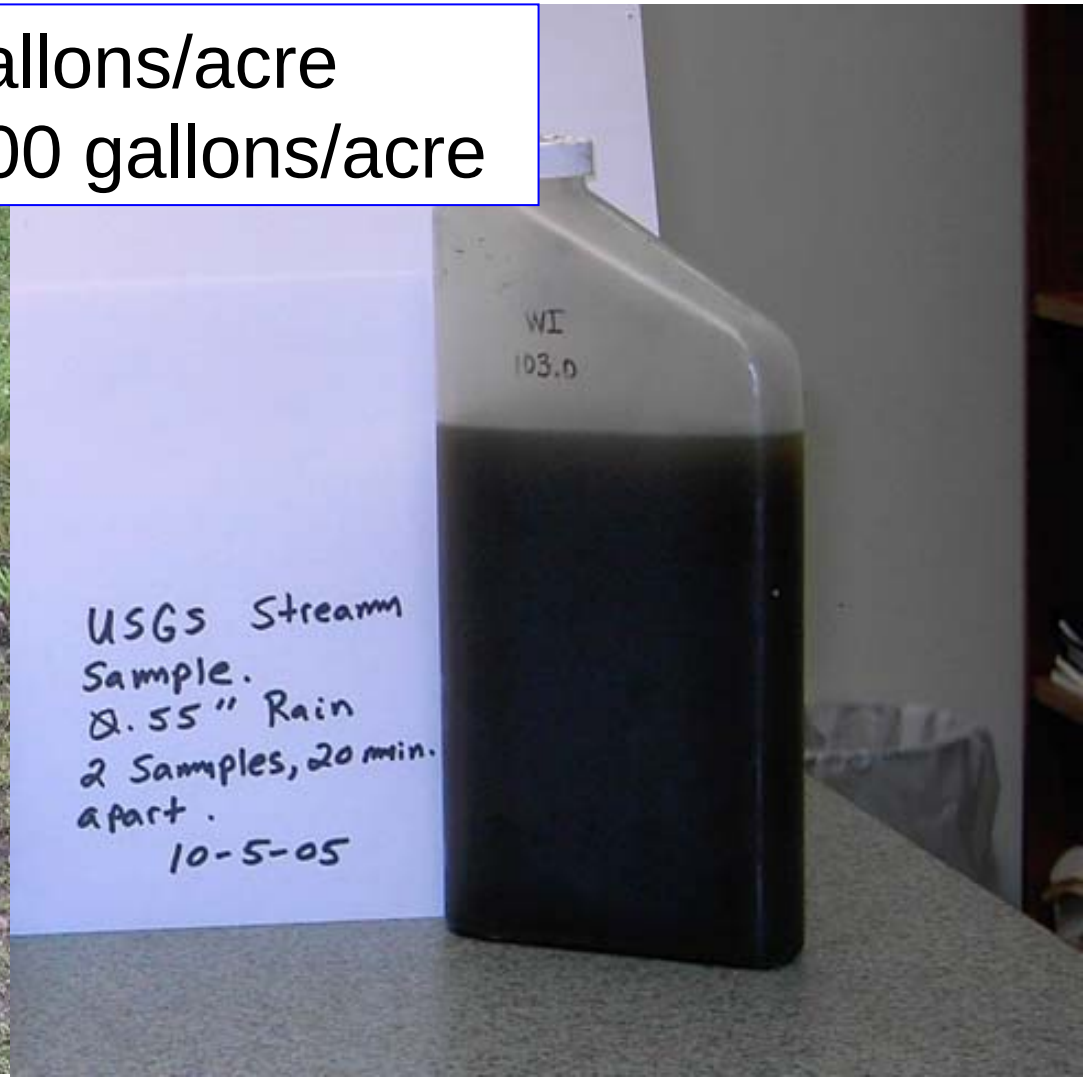
0.02 inches runoff
2 - 5% of the applied manure ran off

Pioneer Farm
6 T/acre solid beef manure (22% dry matter) applied Jan. 31, 2005
Runoff occurred Feb. 4 - 8 and Feb. 12 - 15

1.3 inches of runoff
Approximately 4% of the manure ran off

Effect of Manure Runoff Event from No-till Corn Silage Field on Adjacent Stream

2 – 5 % of 6000 gallons/acre manure = 100 – 300 gallons/acre



Even following good manure nutrient management planning practices, there is always some risk that some manure can run off the field due to unforeseen weather

To lower runoff risk, don’t spread manure:

- Right before or during snow melt
- On wet soil
- On ice-covered ground
- When rain is coming
- In concentrated flow areas (waterways)

To lower runoff risk, do spread manure:

- Following nutrient management plan manure application rates and setback guidelines.
- In winter, on plowed ground where possible.
- On fields with low runoff potential.

Thanks for help from:

- Chris Baxter and Randy Mentz, Pioneer Farm
- Dave Owens, USGS
- Carlos Bonilla, Jim Richmond, John Norman, and Nancy Bohl, UW Soil Science Dept.
- Kevan Klingberg, Discovery Farms
- Jim Leverich, Scott Sturgul, and Mimi Broeske, UW-Extension