Owner and Operator Response to Manure, Milk, & Silage Leachate Spills

Manure Runoff Concerns:

- Biological/Biochemical Oxygen Demand.
- Ammonia Toxicity
- Osmotic Shock

  (seen as Specific Conductance and Chlorides).

Corn, Potato, and Sugar Beet Silage Leachate:

All of the above plus low (acidic) pH .

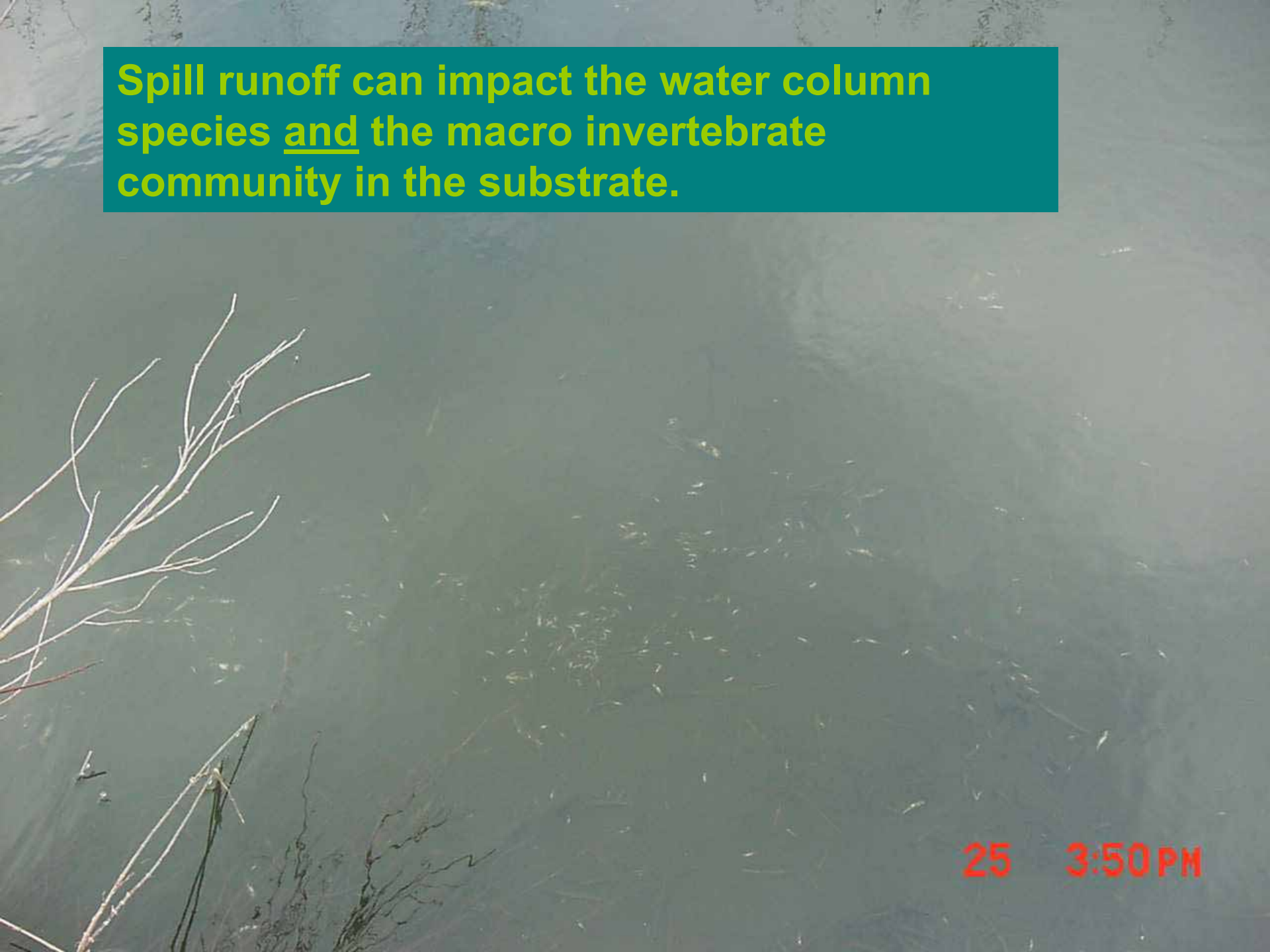
Spilled Milk:

Lack of Oxygen – High BOD.

Manure Runoff and Fish Kills in Minnesota.

Class 2b waters, a “typical” stream, creek or ditch.

Class 1B2a waters, trout streams.


Spill runoff can impact the water column species and the macro invertebrate community in the substrate.
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In Minnesota, many of the manure-related fish kills have been associated with applications just prior to a rainstorm event.

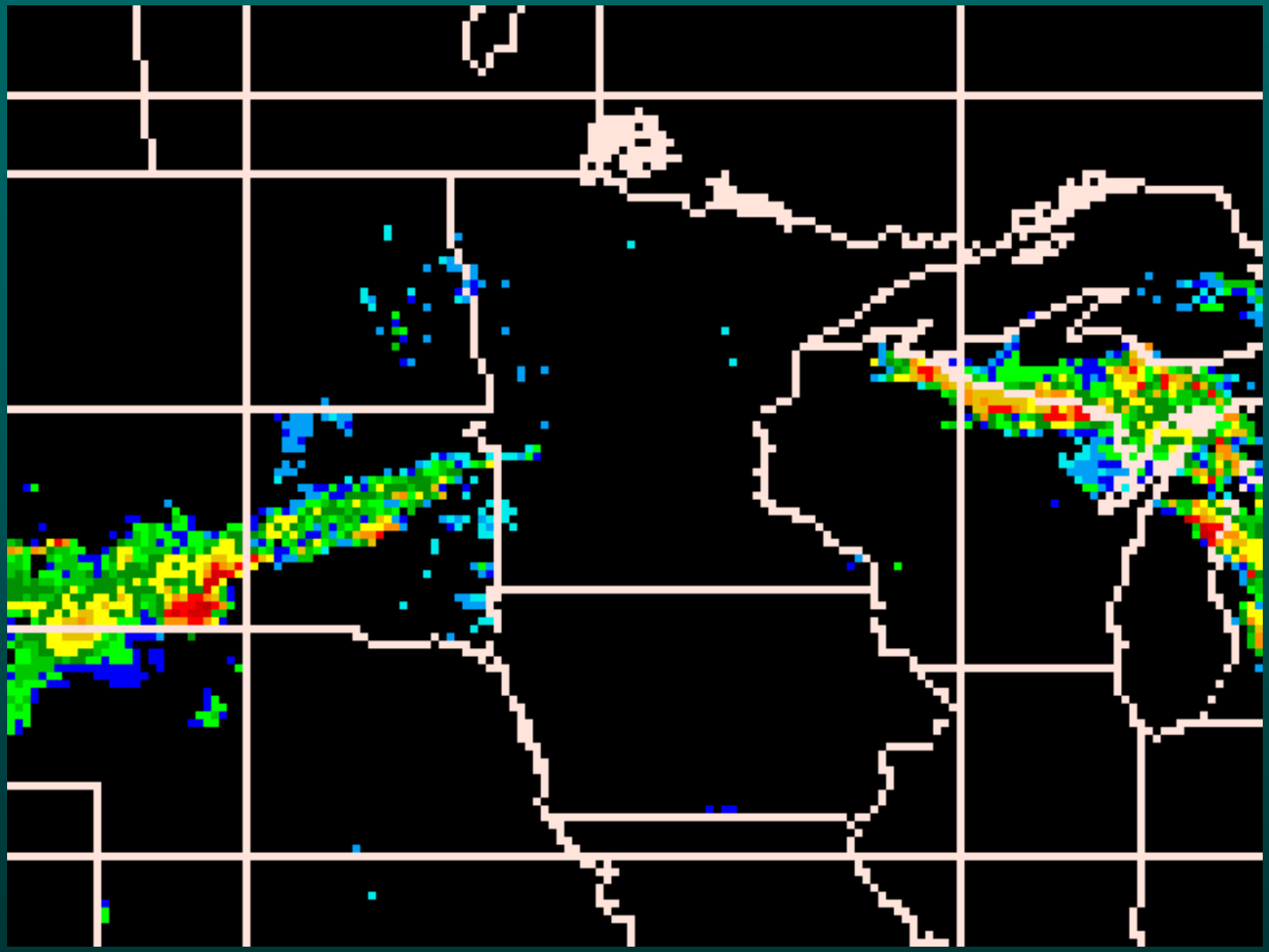
Manure discharges to a stream or lake due to a rainstorm must be called-in to the State Duty Officer. Stopping an on-going discharge during non-precipitation events is key to minimizing impacts (line breaks, equipment failures).

Manure Runoff Water Chemistry

Manure Runoff Event:	Biological Oxygen Demand (BOD) mg/l.	Total Ammonia[1] (mg/l)	Specific Conductance (umhos/cm)	Total Chlorides [4]
Typical Stream Levels[2]	**5.0** ± 3.8	**0.2** ± 0.13	**655** ± 192	**13 - 22**[3]
Runoff from harvested crop field that had heavy application of dairy manure	**2,200**			
Post rainstorm runoff from hayland that received heavy hog manure application.	**360**	**23**		
Post rainstorm manure runoff, fish kill	**590**	**114**		
Manure from basin pooled off-site	**BOD 5,000** **COD 29,000**	**1,440**	**16,000**	**1,100**
Post rainstorm dairy manure runoff in ditch, fish kill.	**1,300**	**137**	**3,800**	**350**

1. *Unionized Ammonia approximately 0.3 to 3 % of Total Ammonia, lethal at .430 to 1.0 mg/l.*
2. *Values for Western Corn Belt Plains (WCBP) ecoregion in Minnesota.*
3. *Freshwater lakes for WCBP Ecoregion in Minnesota.*
4. *Chronic Chlorides in streams can lead to loss of macro invertebrates at levels below 125 mg/l (Mayflies, USGS study).*

Manure Management Scenarios to Avoid.



9 AM, Sunday July 24, 2005. Beautiful day in MN, IA, WI.

JULY 25, 2005 Precipitation

Minnesota

ALTURA 5W	WINONA	3.98
ROCHESTER AP 2NE	OLMSTED	2.41
CALEDONIA 6S	HOUSTON	1.92
DODGE CENTER	DODGE	1.65
GRAND MEADOW	MOWER	1.6
LANESBORO	FILLMORE	1.54
LAKE CITY-COOP	WABASHA	1.24

IOWA

ELMA	HOWARD	2.35
OELWEIN AWOS	FAYETTE	1.72
BLUFFTON	WINNESHIEK	1.71
EDGEWOOD	CLAYTON	1.68
CRESCO	HOWARD	1.56
DORCHESTER	ALLAMAKEE	1.55
OSAGE	MITCHELL	1.41
CHARLES CITY	FLOYD	1.33
IONIA 2W	CHICKASAW	0.85

Wisconsin

FRIENDSHIP	ADAMS	5.88*
VOLK FIELD	JUNEAU	5.04
WINONA DAM 5A	BUFFALO	4.71
WARRENS 5WSW	MONROE	4.1
BLACK RIVER FALLS STP	JACKSON	3.38
GALESVILLE 1S	TREMPEALEAU	3.27
WESTBY 1NE	VERNON	2.44
NEILLSVILLE	CLARK	2.11
LA CROSSE 5SE	LA CROSSE	1.96
GAD 6E	TAYLOR	1.86
RICHLAND CENTER	RICHLAND	1.82
GAYS MILLS	CRAWFORD	1.7
BURTON	GRANT	1.36
ELK MOUND	DUNN	1.25
HOLCOMBE	CHIPPEWA	0.72

Land Application Lessons Learned:

1. Don't surface apply significant volumes of manure when rain is pending. A downburst could cause a fish kill, a lesser rainfall will wash away the fertilizer value of the manure and stress the receiving water body.

2. "grassed waterways" don't' treat manure, only convey it during a rainstorm.

3. If precipitation is looming, Incorporate !

Manure in the Ditch ?

Berm, Recover, Pump, Absorb !

- Contain the spill;
- Recover pooled manure and solids, get a pump truck if necessary,
- Scrape large accumulations, leave vegetation, excavate soils only if critical to ground water.
- Straw, corn stalk bales, and ditch-hay make good absorbents and can be land applied.
- Incorporate areas of bare soils,
- Contact the Duty officer.

Hose Breaks Through a Culvert

Injection and Spray irrigation

- **Stop the leak. Prevent runoff to surface waters and wetlands, protect open-tile intakes.**
- **Both the Manure generator and the applicator have an obligation to report and cleanup a manure release.**
- **Disappearing manure in a “dry run” or on shallow bedrock has affected nearby wells.**

Nuisance Conditions: Manure and Mud on the Road.

- **Contact the Duty Officer** before John Q. Public calls-in a safety complaint about a slippery road surface.
- **Clean mud tracking as soon as possible**, scrape with bucket, and consider a rotary sweeper.
- Manure on the road and frozen wet weather ? also **consider sanding**.

Silage Leachate

Dam it,
Pump it,
Soak it up !

Then: Neutralize the residue (Lime it).

Corn Silage Leachate Runoff Water Chemistry

Corn Silage Runoff Event:	Biological Oxygen Demand (BOD) mg/l.	Total Ammonia[1] (mg/l)	Specific Conductance (umhos/cm)	pH	Total Chlorides[4]
Typical Stream Levels[2]	**5.0**	**0.2**	**655**	**8.1**	**13 - 22[3]**
Corn silage runoff, pooled off-site.	**BOD 43,000 COD 97,000**	**586**	**16,000**	**4.0**	**1,100**
Silage Leachate Discharge	**9,500**	**22.1**		**4.1**	
Silage Leachate in ditch	**COD 17,000 CBOD 14,000**	**54.3**	**4,000**	**4.3**	**170**
Leachate in ditch 1.5 miles downstream of release	**COD 2,000 BOD 630**	**7.5**		**6.7**	

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Milk Releases

- Prevent runoff to surface waters,
- Recover pooled liquid,
- Contact the Duty Officer.

Hydraulic Fluid Spills

- Contain and Recover pooled product,
- Cleanup with absorbent material if sprayed over large area,
- Excavate if soils are saturated, petroleum contaminated soils can often be thin-spread for treatment.
- Contact the Duty Officer if over 5 gallons released.