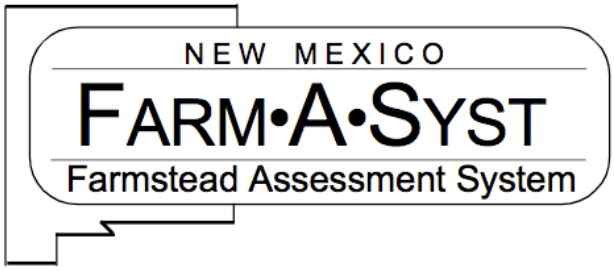
Worksheet #8

Assessing the Risk of Groundwater Contamination from

Livestock Yards Management



NM STATE

NEW MEXICO
FARM•A•SYST
Farmstead Assessment System

Worksheet #8

Assessing the Risk of Groundwater Contamination from

Livestock Yards Management

Why should I be concerned?

Livestock yards, such as barnyards, holding areas and feedlots, are areas of concentrated livestock wastes. They can be a source of nitrate and bacteria contamination of groundwater. This is especially true if there is no system to 1) divert clean water flow from the livestock yard or 2) collect polluted runoff from the yard for diversion to an area where its effect on surface water or groundwater is minimal. The potential for livestock yards to affect groundwater is greatest if the yard is located over coarse-textured permeable soils, if the water table is at or near the surface, if bedrock is within a few feet of the surface, or when polluted runoff is discharged to permeable soils and bedrock.

Nitrate levels in drinking water above federal and state drinking water standards of 10 milligrams per liter (mg/l; equivalent to parts per million for water measure) nitrate-nitrogen can pose health problems for infants under 6 months of age, including the condition known as methemoglobinemia (blue baby syndrome). Nitrate can also affect adults, but the evidence is much less certain.

Young livestock are also susceptible to health problems from high nitrate-nitrogen levels. Levels of 20-40 mg/l in the water supply may prove harmful, especially in combination with high levels (1,000 ppm) of nitrate-nitrogen from feed sources.

Fecal bacteria in livestock waste can contaminate groundwater if waste seeps into nearby wells, causing such infectious diseases as dysentery, typhoid and hepatitis. Organic materials, which may lend an undesirable taste and odor to drinking water, are not known to be dangerous to health, but their presence does suggest that other contaminants are flowing directly into groundwater.

The goal of Farm•A•Syst is to help you protect the groundwater that supplies your drinking water.

How will this worksheet help me protect my drinking water?

- It will take you step by step through your livestock yards management practices.
- It will rank your activities according to how they might affect the groundwater that provides your drinking water supplies.
- It will provide you with easy-to-understand rankings that will help you analyze the "risk level" of your livestock yards management practices.
- It will help you determine which of your practices are reasonably safe and effective, and which practices might require modification to better protect your drinking water.

How do I complete the worksheet?

Follow the directions at the top of the chart on the next page. It should take you about 15-30 minutes to complete this worksheet and figure out your ranking.

Glossary

Livestock Yards Management

These terms may help you make more accurate assessments when completing Worksheet #8. They may also help clarify some of the terms used in Fact Sheet #8.

Filter strip: A gently sloping grass plot used to filter runoff from the livestock yard. Influent waste is distributed uniformly across the high end of the strip and allowed to flow down the slope. Nutrients and suspended material remaining in the runoff water are filtered through the grass, absorbed by the soil and ultimately taken up by the plants. Filter strips must be designed and sized to match the characteristics of the livestock yard.

Infiltration: The downward entry of water through the soil surface.

Percolation: The downward movement of water through the soil.

Runoff control system: A combination of management practices that can be used together to prevent water pollution from livestock yard runoff. Practices may include diversion of runoff from the yard, roof runoff systems, yard shaping, settling basins, and filter strips or buffer areas.

Soil drainage class: The conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soils, as opposed to human-altered drainage. Different classes are described by such terms as "excessively drained," "well-drained," and "poorly drained."

Soil permeability: The quality that enables the soil to transmit water or air. Slowly permeable soils have fine-textured materials, like clays, that permit only slow water movement. Moderately or highly permeable soils have coarse-textured materials, like sands, that permit rapid water movement.

Soil texture: The relative proportions of the various soil separates (clay, sand, silt) in a soil. Described by such terms as "sandy loam" and "silty clay."

Worksheet #7

Livestock Waste Storage: Assessing Drinking Water Contamination Risk

1. Use a pencil. You may want to make changes.
2. For each category listed on the left that is appropriate to your farmstead, read across to the right and circle the statement that **best** describes conditions on your farmstead. (Skip and leave blank any categories that don't apply to your farmstead.) For categories separated by "OR," choose only one category.
3. Then look above the description you circled to find your "rank number" (4, 3, 2 or 1) and enter that number in the blank under "your rank."
4. Directions on overall scoring appear at the end of the worksheet.
5. Allow about 15-30 minutes to complete the worksheet and figure out your risk ranking for livestock waste storage practices.

	RANK 4	RANK 3	RANK 2	RANK 1	YOUR RANK
LONG-TERM STORAGE (180 days or more)					
Steel, glass-lined (liquid-tight design, above ground)	Designed and installed according to accepted engineering standards and specifications. Properly maintained.	Designed and installed according to accepted engineering standards and specifications. Not maintained.	Leaking tank on medium-textured soils (silt loam, loam).	Leaking tank on coarse-textured soils (sands, sandy loam). Water table or fractured bedrock shallower than 20 feet.	_____
OR					**OR**
Concrete stave (liquid-tight design)	Designed and installed according to accepted engineering standards and specifications. Properly maintained.	Designed and installed according to accepted engineering standards and specifications. Not maintained.	Concrete cracked, medium-textured soils (silt loam, loam). Water table deeper than 20 feet.	Concrete cracked, coarse-textured soils (sands, sandy loam). Water table or fractured bedrock shallower than 20 feet.	_____
OR					**OR**
Poured concrete (liquid-tight design)	Designed and installed according to accepted standards and specifications. Properly maintained.	Designed and installed according to accepted engineering standards and specifications. Not maintained.	Concrete cracked, medium-textured soils (silt loam, loam). Water table deeper than 20 feet.	Concrete cracked, coarse-textured soils (sands, sandy loam). Water table or fractured bedrock shallower than 20 feet.	_____
OR					
Earthen waste storage pit (below ground)	_____	Designed and installed according to accepted engineering standards and specifications. Properly maintained.	Not designed to engineering standards. Constructed in medium- or fine-textured dense materials (silt loam, loam, clay loams, silty clay). Water table deeper than 20 feet. Earthen lining eroding.	Not designed to engineering standards. Constructed in coarse-textured materials (sands, sandy loam). Fractured bedrock or water table shallower than 20 feet. More than 10 years old. Earthen lining perforated.	**OR** _____

	RANK 4	RANK 3	RANK 2	RANK 1	YOUR RANK
SHORT-TERM STORAGE (usually 30-90 days; in some cases, up to 180 days)					
Stacked in field (on soil base)	_____	_____	Stacked on high ground. Medium- or fine-textured soils (silt loam, loam, clay loams, silty clay). Water table is deeper than 20 feet.	Stacked on high ground. Coarse-textured soils (sands, sandy loam). Fractured bedrock or water table shallower than 20 feet.	_____
Stacked in yard	Covered concrete yard with curbs, gutters and settling basin.	Concrete yard with curbs and gutters. Grass filter strips installed and maintained.	Earthen yard with medium- or fine-textured soils (silt loam, loam, clay loams, silty clay). Water table deeper than 20 feet.	Earthen yard with coarse-textured soils (sands, sandy loam). Fractured bedrock or water table shallower than 20 feet.	_____
Water-tight structure designed to accepted engineering standards and specifications	Designed and installed according to engineering standards. All liquids retained.	Designed and installed according to engineering standards on medium- and fine-textured soils (silt loam, loam, clay loams, silty clay). Water table deeper than 20 feet.	Designed and installed according to engineering standards on coarse-textured soils (sands, sandy loam). Water table or fractured bedrock shallower than 20 feet.	Designed and installed according to engineering standards. Not properly maintained. Water treatment and diversion and terrace structures allowed to deteriorate.	_____
Stacked in open housing	Building has concrete floor, protected from surface water runoff. Adequate bedding provided.	Building has earthen or concrete floor on medium- or fine- textured soils (silt loam, loam, clay loams, silty clay), protected from surface water runoff. Water table deeper than 20 feet.	Building has earthen or concrete floor on medium- or fine-textured soils (silt loam, loam, clay loams, silty clay), subject to surface water runoff. Water table or fractured bedrock shallower than 20 feet.	Building has earthen floor on coarse-textured soils (sands, sandy loam), subject to surface water runoff. Water table or fractured bedrock shallower than 20 feet.	_____

	RANK 4	RANK 3	RANK 2	RANK 1	YOUR RANK
LOCATION					
Location of livestock waste storage in relation to drinking water well	Manure stack or earthen waste storage pit more than 250 feet downslope from well. Manure storage structure (liquid tight) more than 100 feet downslope from well.	Manure stack or earthen waste storage pit more than 250 feet upslope from well. Manure storage structure (liquid tight) more than 100 feet upslope from well.	Manure stack or earthen waste storage pit less than 250 feet downslope from well. Manure storage structure (liquid tight)***less than 100 feet**** downslope from well.	Manure stack or earthen waste storage pit less than 250 feet upslope from well. Manure storage structure (liquid tight)***less than 100 feet**** upslope from well.	____

Boldface type: Besides representing a higher-risk choice, this practice also violates New Mexico law.

* Illegal for new construction. Existing wells must meet separation distances in effect at time of construction.

TOTAL ☐

Use this total to calculate risk ranking on back page of worksheet.

What do I do with these rankings?

Step 1: Begin by determining your overall livestock yards risk ranking. Total the rankings for the categories you completed and divide by the number of categories you ranked:

_____ divided by _____ equals [ ]*
total of rankings; # of categories ranked; risk ranking

*Carry your answer out to one decimal place.

3.6–4=low risk 2.6–3.5=low to moderate risk 1.6–2.5=moderate to high risk 1–1.5=high risk

This ranking gives you an idea of how your livestock yards management practices **as a whole** might be affecting your drinking water. This ranking should serve only as a **very general guide, not a precise diagnosis.** Because it represents an **averaging** of many individual rankings, it can mask any **individual** rankings (such as 1's or 2's) that should be of concern. (See Step 2.)

Enter your boxed livestock yards management risk ranking on page W12.1 . Later you will compare this risk ranking with other farmstead management rankings. Worksheet #11 will help you identify your farmstead's site conditions (soil type, soil depth and bedrock characteris tics). Worksheet #12 will show you how these site conditions affect your risk rankings.

Step 2: Look over your rankings for individual activities:

- **Low-risk** practices (4's): ideal; should be your goal despite cost and effort
- **Low-to-moderate-risk** practices (3's): provide reasonable groundwater protection
- **Moderate-to-high-risk** practices (2's): inadequate protection in many circumstances
- **High-risk** practices (1's): inadequate; pose a high risk of polluting groundwater

Regardless of your overall risk ranking, any individual rankings of "1" require immediate attention. Some concerns you can take care of right away; others could be major—or costly—projects, requiring planning and prioritizing before you take action.

Find any activities that you identified as 1's and list them under "High-Risk Activities" on pages W12.6-W12.7 of Worksheet #12.

Step 3: Read Fact Sheet #8, *Improving Livestock Yards Management*, and consider how you might modify your farmstead practices to better protect your drinking water.

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