ANNUAL APPLICATION RATE

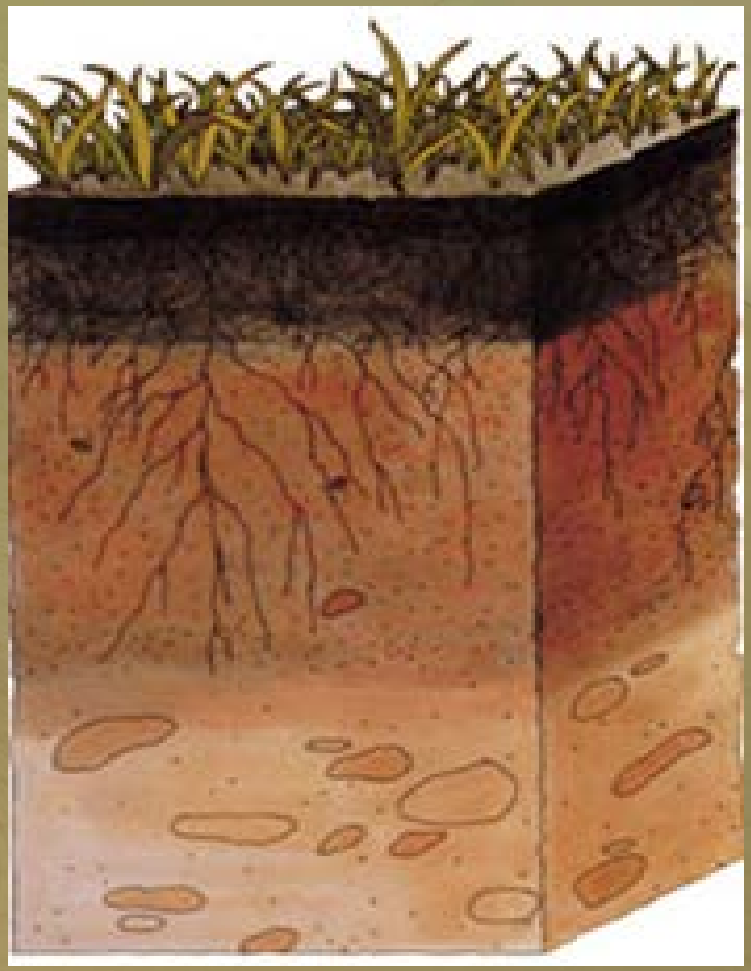
Agronomic Application Rate = AAR

APPLICATION RATE

- The application rate is designed to:

  - provide the amount of nitrogen needed by crops or vegetation grown on the land

  - to minimize the amount of nitrogen in the sewage sludge that passes below the root zone of the crop or vegetation grown on the land to the ground water.



NITROGEN

- **Nitrogen is an essential element for plant growth. Farmers buy fertilizer containing nitrogen to improve their crop yields.**
- **Because septage contains organic materials, it also contains nitrogen which can be used by the vegetation growing in fields used for land application.**

- **Some plants, such as alfalfa, clover, and soybeans, can take nitrogen from the air and convert it into forms they can use. Other plants such as corn, small grains, and grasses, must rely on nitrogen stored in the soil. Therefore, they remove much more nitrogen from the soil than the plants that can convert nitrogen from the air.**

NITROGEN

- **Loading rates for land application of septage are based in part on protecting groundwater from nitrate leaching. Landowners can calculate the amount of nitrogen added by septage and use less amounts of nitrogen fertilizer on land application sites.**

- **If there is not enough nitrogen in the soil, crop yields will be lowered. If there is too much nitrogen in the soil, some of it can leach into the groundwater and cause high levels of nitrate. High levels of nitrate in groundwater can cause problems for both humans and livestock if it is used for drinking water.**

Section 3 - LAND APPLICATION SITE INFORMATION

Property Owner Mailing Address:	City:	State:	Zip:
Site Physical Address:	City:	State:	Zip:
Directions to Site:			

Legal Description of Site: (*to nearest ¼ section*) ..... /4	Section:	Township:	Range:	County:
Number of acres available for land application:	Type of Crop:			Estimated Depth to Ground Water:
Number of acres proposed for land application during license year:	Crop Nitrogen Requirement: (pounds per acre per year --- *lbs N/acre/yr*)			Source of Ground Water Information:
Soil Type:	Present use of adjacent lands:		Approximate Slope:	

Distance to nearest building:	Distance to closest surface water:	Is site zoned: *(If yes, list Zone. Zoning/Planning Officer signature required for zoned areas)*

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Agricultural/Pasture/Range Lands

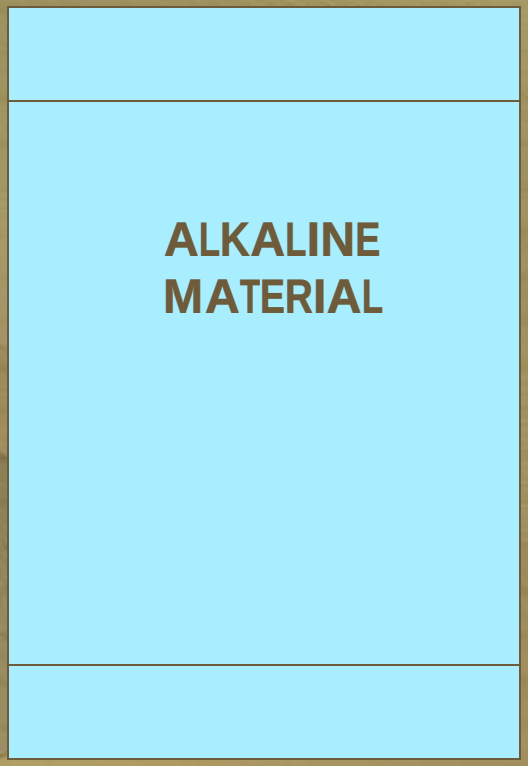
Application Methods

Surface Application of Septage.

Tilling

Subsurface Injection of Septage

ALKALINE STABILIZATION

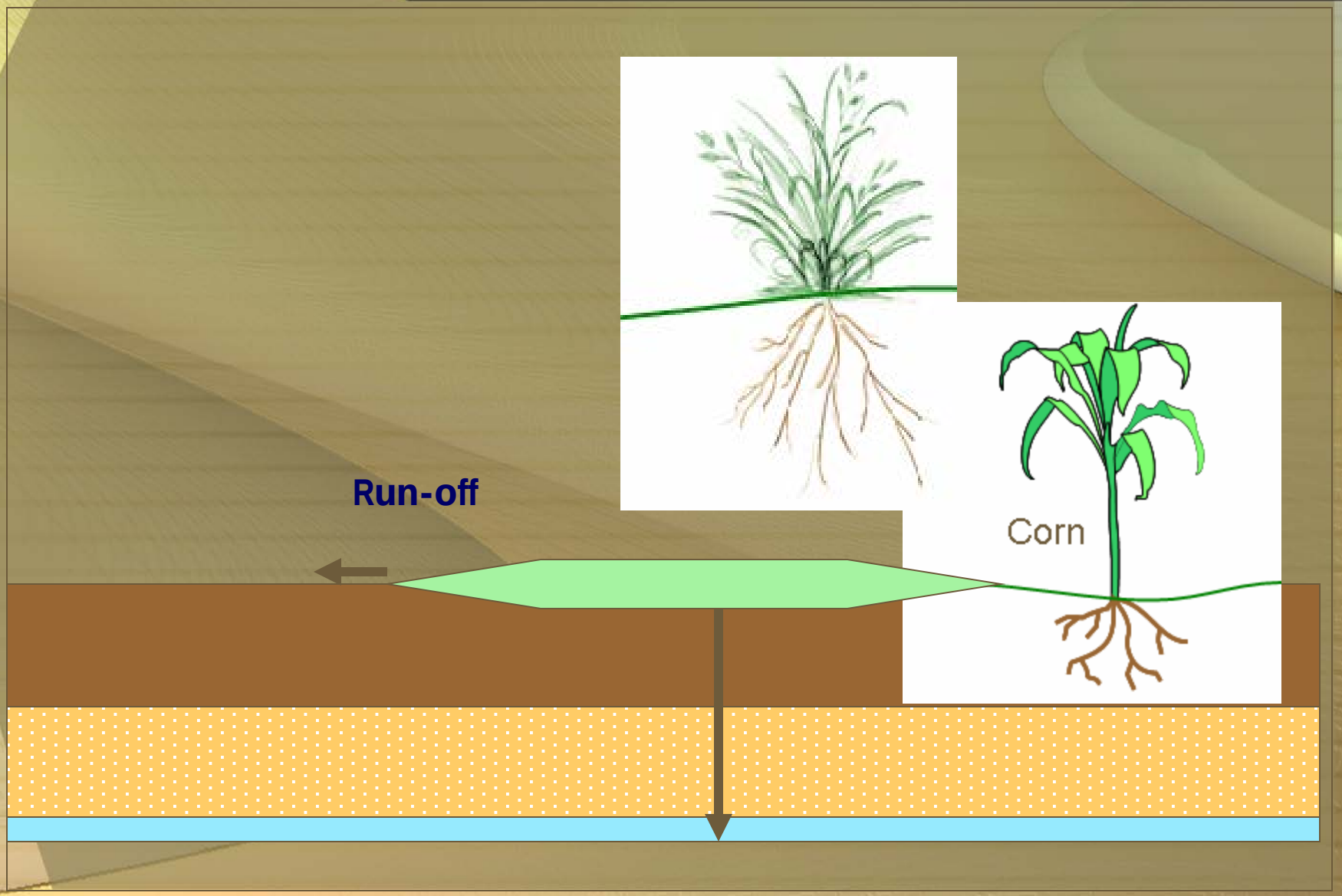


Watch the Set Backs

Flooded, Frozen, or Snow-Covered Land

Photo by: Travel Montana

Over application



OVER APPLICATION CAN EFFECT:

TYPES OF WASTE

- SEPTAGE
- PRIVY, PIT TOILET, PORTABLE TOILET, VESSEL PUMPOUT FACILITY, AND RECREATIONAL VEHICLE DUMP STATION
- GREASE TRAP
- SUMP

DOMESTIC SEPTAGE

- **Defined as the liquid or solid material removed from a septic tank, cesspool, portable toilet, type III marine sanitation device, or a similar system that receives only domestic septage (Household, non-commercial, non-industrial sewage).**

GREASE TRAP WASTE

- **Grease trap waste from a restaurant is considered commercial septage.**
- **Mixing grease trap waste and domestic septage causes the entire batch of septage to be considered commercial septage and is not covered by the 503 Regulation.**
- **Grease trap waste does have disposal requirements in the Montana Rules.**
- **No AAR required.**

SUMP WASTE

- **Sump waste is the mixture of dirt, grime, and grit that accumulates in a sump. Sump waste is considered solid waste and may be hazardous, depending on its content.**
- **Car wash sumps and other sump wastes is not covered by the 503 Regulation.**
- **Sump waste must be managed and disposed of in accordance with the Montana rules.**
- **No AAR required.**

AAR FOR SEPTAGE

AAR FOR SEPTAGE

$$AAR = \frac{N}{0.0026}$$

AAR FOR SEPTAGE

- **AAR** = annual application rate in gallons per acre per 365 day period

$$AAR = \frac{N}{0.0026}$$

AAR FOR SEPTAGE

- **N** = Amount of nitrogen in pounds per acre per 365 day period needed by the crop or vegetation grown on the land.

$$AAR = \frac{N}{0.0026}$$

AAR FOR SEPTAGE

$$AAR = \frac{N}{0.0026}$$

- **0.0026** = annual application rate formula for domestic septage. (EPA 503 Rule)

AAR FOR

Privy Waste, Pit Toilet Waste, Portable Toilet Waste, Vessel Pumpout Facility Waste, and Recreational Vehicle Dump Station Waste

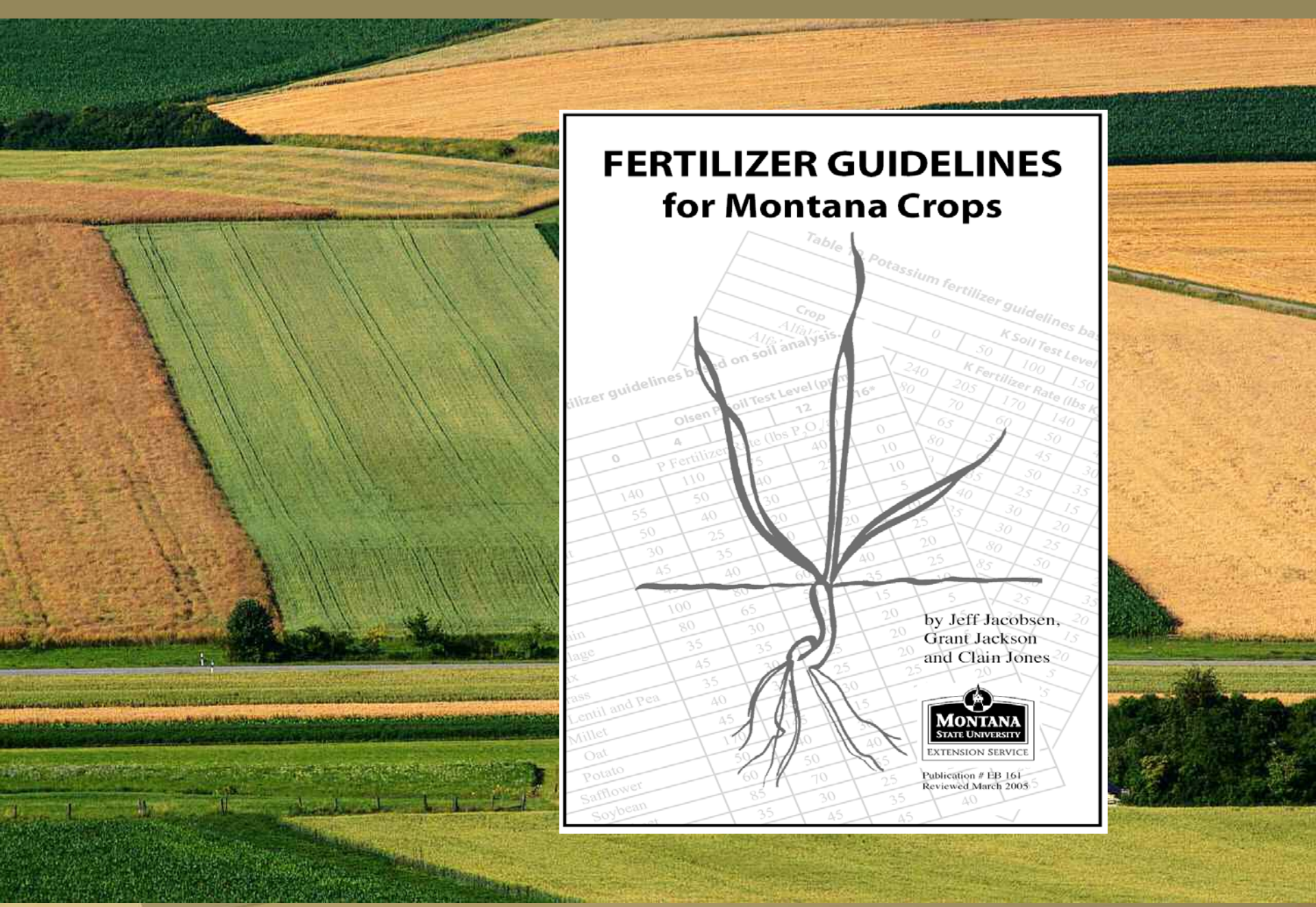
AAR FOR PT/VT

$$AAR = \frac{N}{0.0052}$$

AAR FOR PT/VT

$$AAR = \frac{N}{0.0052}$$

- **0.0052** = annual application rate formula for PT/VT/marine sanitation etc. Waste contains 4 to 6 times more total nitrogen than domestic septage. (EPA 503 Rule)


FERTILIZER GUIDELINES
for Montana Crops
by Jeff Jacobsen,
Grant Jackson
and Clain Jones
MONTANA
STATE UNIVERSITY
EXTENSION SERVICE
Publication # EB 161
Reviewed March 2005

Spring and winter wheat N guidelines based on soil analysis

WHEAT- SPRING***	
Yield Potential (bu/a) *	Available N (lbs/a) **
30	99
40	132
50	165
60	198
70	231
80	264
90	297
100	330

WHEAT- WINTER	
Yield Potential (bu/a)*	Available N (lbs/a) **
30	78
40	104
50	130
60	156
70	182
80	208
90	234

* Attainable yield with ***all*** growth factors optimized.
** Fertilizer N = Available N - soil analysis NO_3-N.
***Includes durum and hard red and hard white spring wheat at 13% and 14% protein, respectively.

Example: (Septage)

- **Given:**
  - **Type of Crop = Spring Wheat**
  - **Nitrogen Needed = 165 pounds per acre**
  - **EPA Factor = .0026**
- **AAR = $\frac{N}{.0026}$**

- **AAR = $\frac{165}{.0026}$**

= 63,461 gals

Example: (PT/VT etc.)

- **Given:**
  - **Type of Crop = Spring Wheat**
  - **Nitrogen Needed = 165 pounds per acre**
  - **EPA Factor = .0052**
- **AAR = $\frac{N}{.0052}$**

- **AAR = $\frac{165}{.0052}$**

= 31,730 gals

Table 8. Grass N guidelines based on soil analysis

GRASS	
Yield Potential (t/a) *	Available N (lbs/a) **
1	25
2	50
3	75
4	100
5	125

* Attainable yield with ***all*** growth factors optimized.
** Fertilizer N = Available N - soil analysis NO_3-N.

Example:

- **Given:**
  - **Type of Crop = Grass**
  - **Nitrogen Needed = 75 pounds per acre**
  - **EPA Factor = .0026**

- **AAR = $\frac{N}{.0026}$**

- **AAR = $\frac{75}{.0026}$**

= 28,846 gals

Example:

- **Given:**
  - **Type of Crop = Grass**
  - **Nitrogen Needed = 75 pounds per acre**
  - **EPA Factor = .0052**

- **AAR = $\frac{N}{.0052}$**

- **AAR = $\frac{75}{.0052}$**

= 14,423 gals

Your Turn

$$AAR = \frac{N}{0.0026} = \_\_\_\_\_ \text{ gallons/acre}$$

$$AAR = \frac{N}{0.0052} = \_\_\_\_\_ \text{ gallons/acre}$$

Acre Calculation

- **Acres proposed for land application = 20**
- **Estimated 250,000 gal/yr of septage waste**
- **AAR = 63,461 gals (septage)**

- **$\frac{250{,}000}{63{,}461\ \text{gals}} = 3.93\ \text{acres required}$**

How Many Acres Do I need ?

- **Acres proposed for land application = 20**
- **Estimated 250,000 gal/yr of septage waste**
- **AAR = 31,730 gals (PT/VT)**

- $\frac{250{,}000}{31{,}730 \text{ gals}} = 7.87 \text{ acres required}$


QUESTIONS?