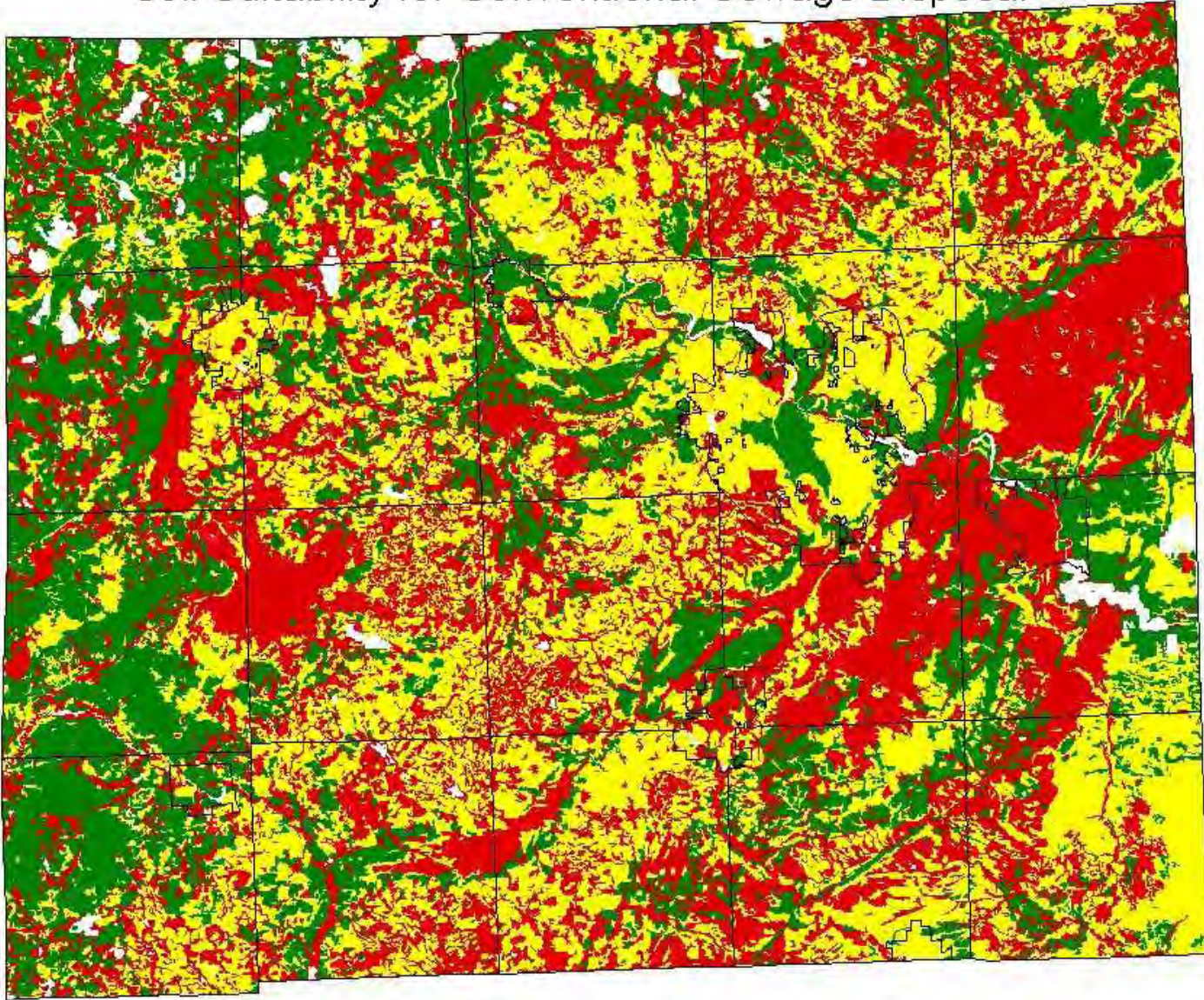


Onsite Water Supply and Sewage Disposal



Department of Environmental Health
Washtenaw County, Michigan

Soil Suitability for Conventional Sewage Disposal



■ No/Slight Limitation

■ Moderate Limitation

■ Severe Limitation/Unsuitable



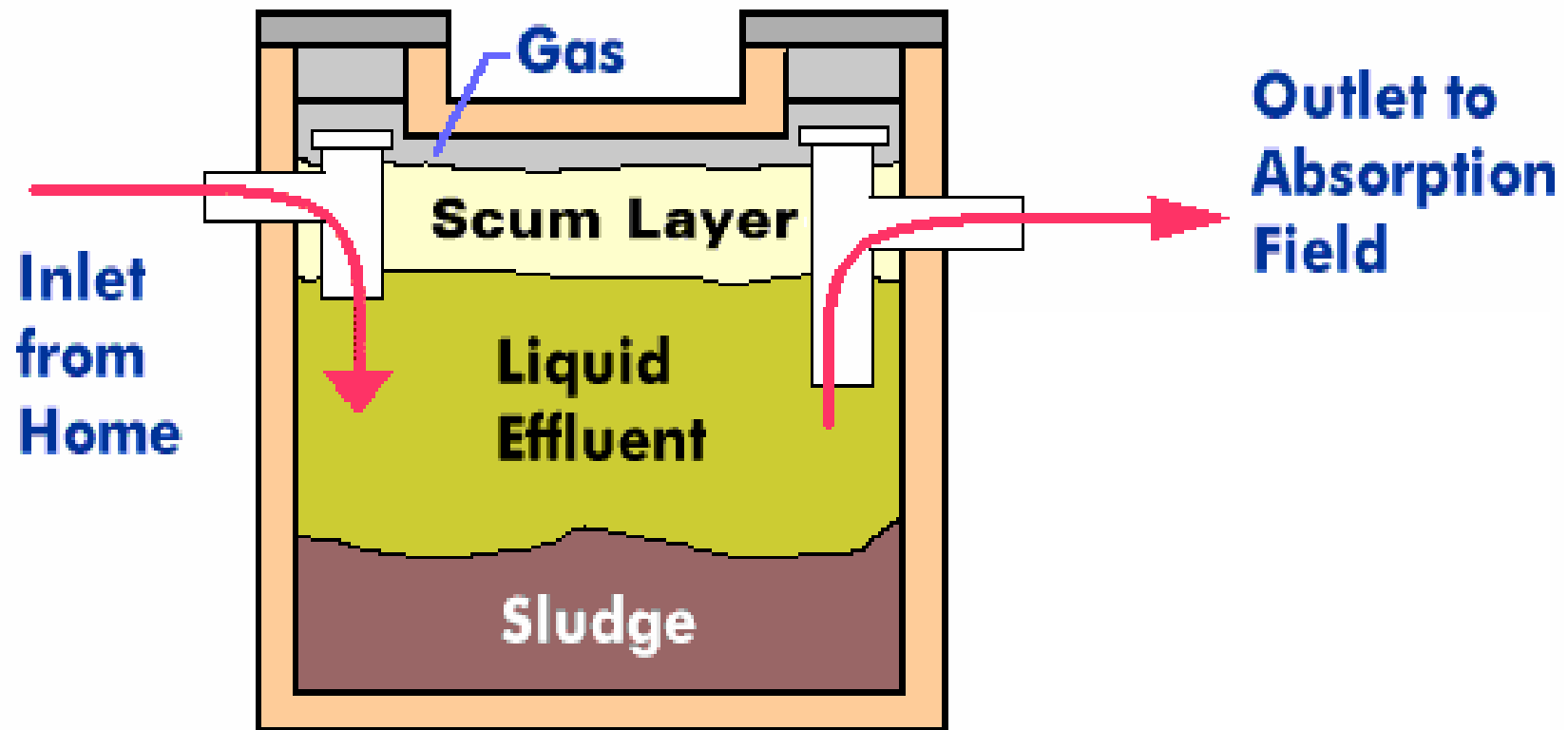
Sewage System Overview

Septic Tank

- Separates liquid wastes from solid wastes
- Anaerobic breakdown of bacteria
- No additives needed
- Needs pumping every 3-5 years



Septic Tank Cross-Section




Septic Tank Installation





Sewage System Overview

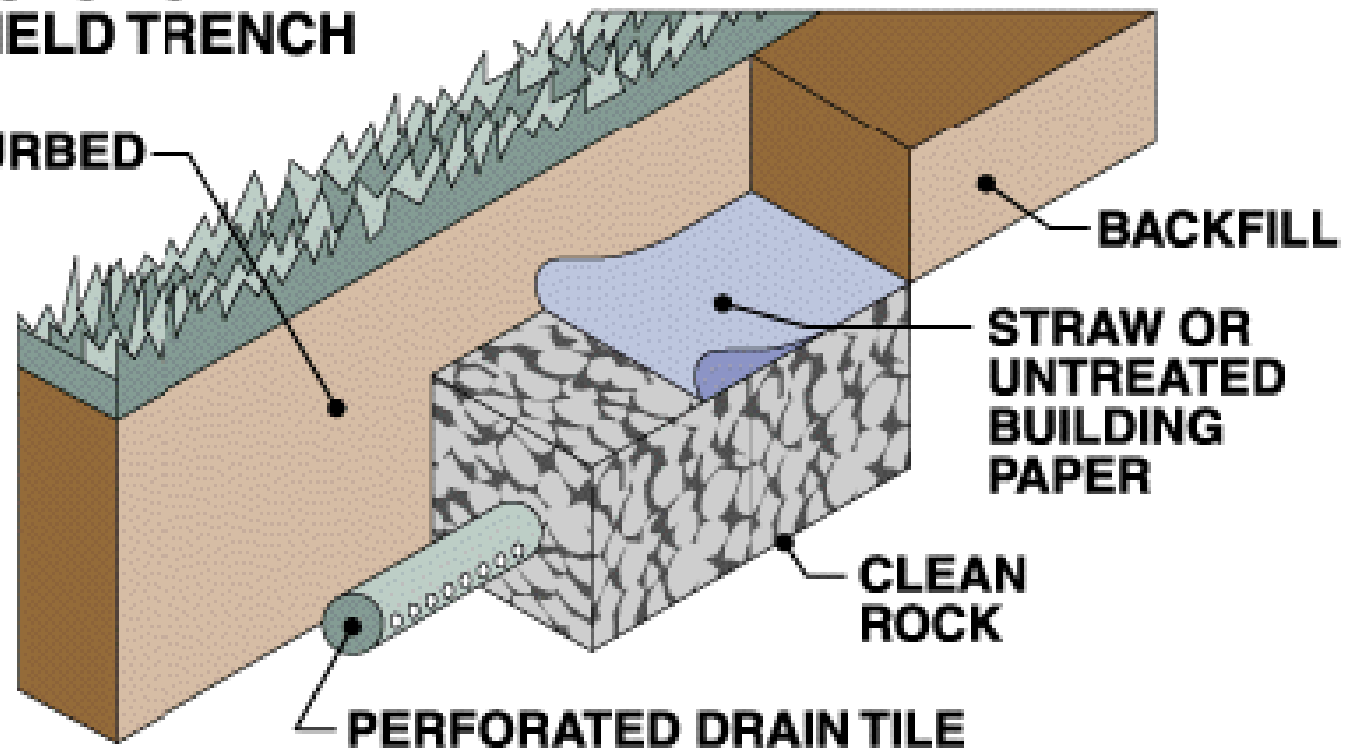
Drainfield

- Cleans liquid wastes by filtration
 - Aerobic treatment of bacteria
 - Converts ammonia to nitrates
 - 4000 sq. ft. needed for average new home
 - Returns liquids to groundwater aquifer
- 

Drainfield Cross-Section

CROSS SECTION DRAINFIELD TRENCH

UNDISTURBED
EARTH




Drainfield Installation






Onsite Sewage Requirements

- On-site systems CANNOT be used if municipal sewer is available
 - Soil evaluation is done before issuing any sewage permit
 - Homeowners are required to prepare plot or site plan in order to receive permit
- 




Onsite Sewage Requirements

- 3 feet of sand
 - A primary and expansion area must be available – typically 4000 sq. ft.
 - Water table can't be within top 12 inches of the ground surface
 - New home site must meet all site criteria, while replacement systems are installed to make the best of a bad situation
- 




Onsite Sewage Terminology

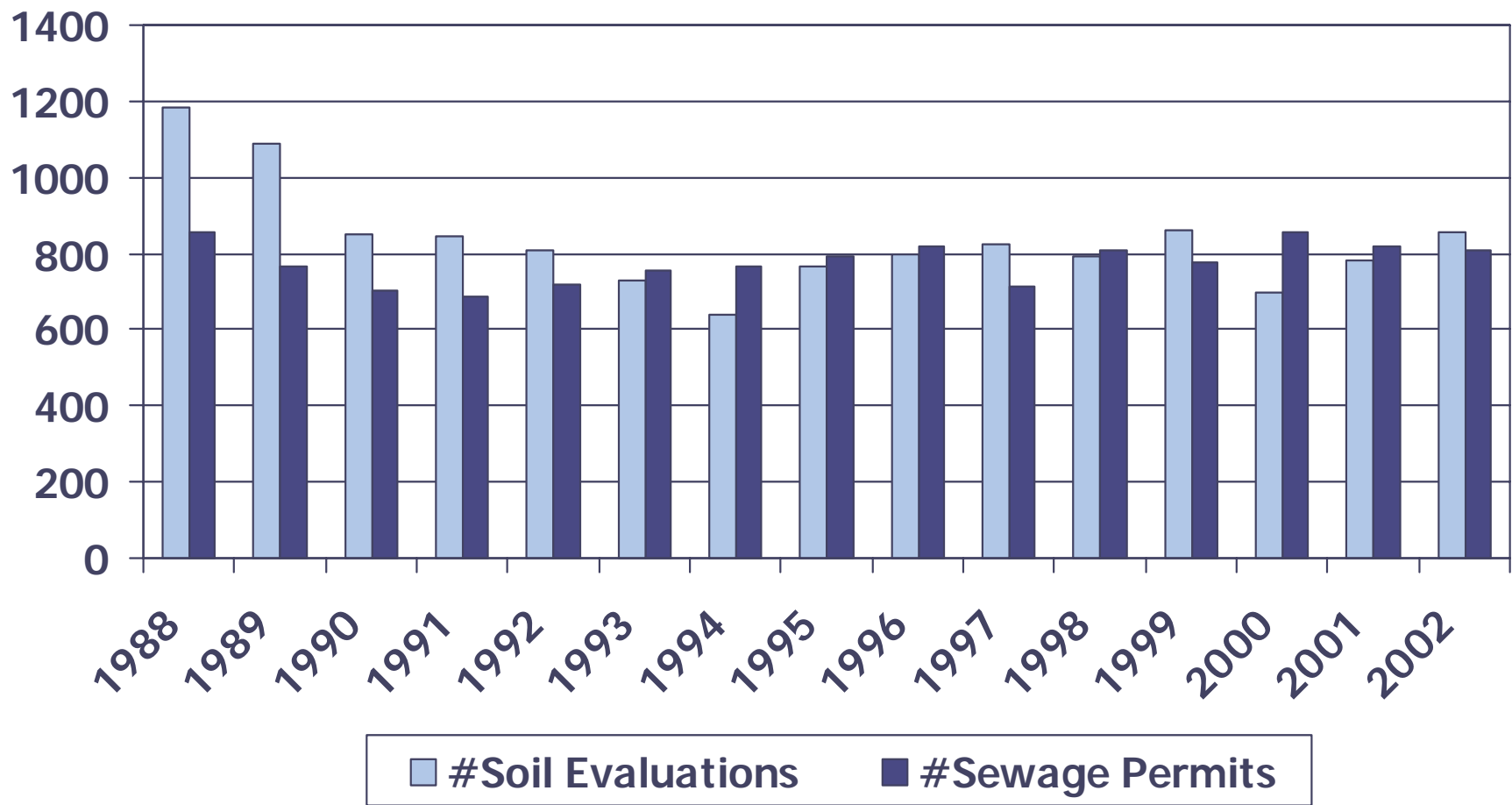
- **Conventional System:** System installed on soils that meet minimum requirements and within established construction guidelines.
 - **Engineered System:** Commonly misused term. Often used to describe system installed when regular gravity-fed septic tank and drainfield system cannot be installed.
 - **Alternative System:** System installed on soils that do not meet minimum requirements, but within established construction guidelines.
 - **Experimental System:** System installed on soils that do not meet minimum criteria and with no established construction guidelines.
- 



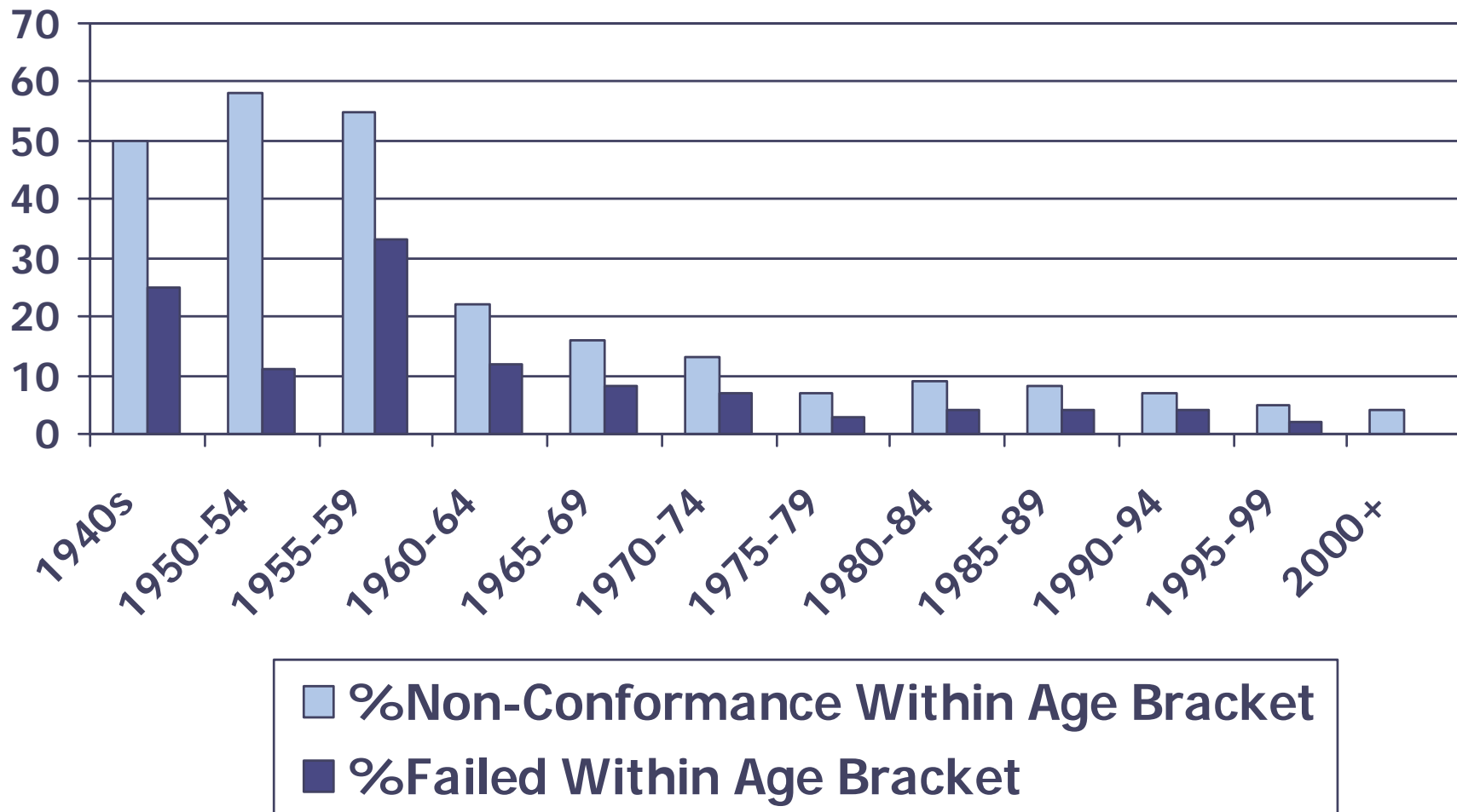
Onsite Sewage Terminology

- **Soil Evaluation/Perk Test:** Evaluation of raw land to determine if a sewage system can be installed in a given location.
 - **Drainfield Clustering:** Practice of locating several sewage systems in one area because of soil conditions.
 - **Sewage Pretreatment:** System that treats sewage after septic tanks and before final disposal. Typically used to compensate for heavy soils or small lot size.
 - **Time of Sale (TOS) Inspection:** Inspection of well and septic system at time of property transfer.
- 

Soil Evaluations & Sewage Permits



Aging Sewage Systems






Water Supply Program

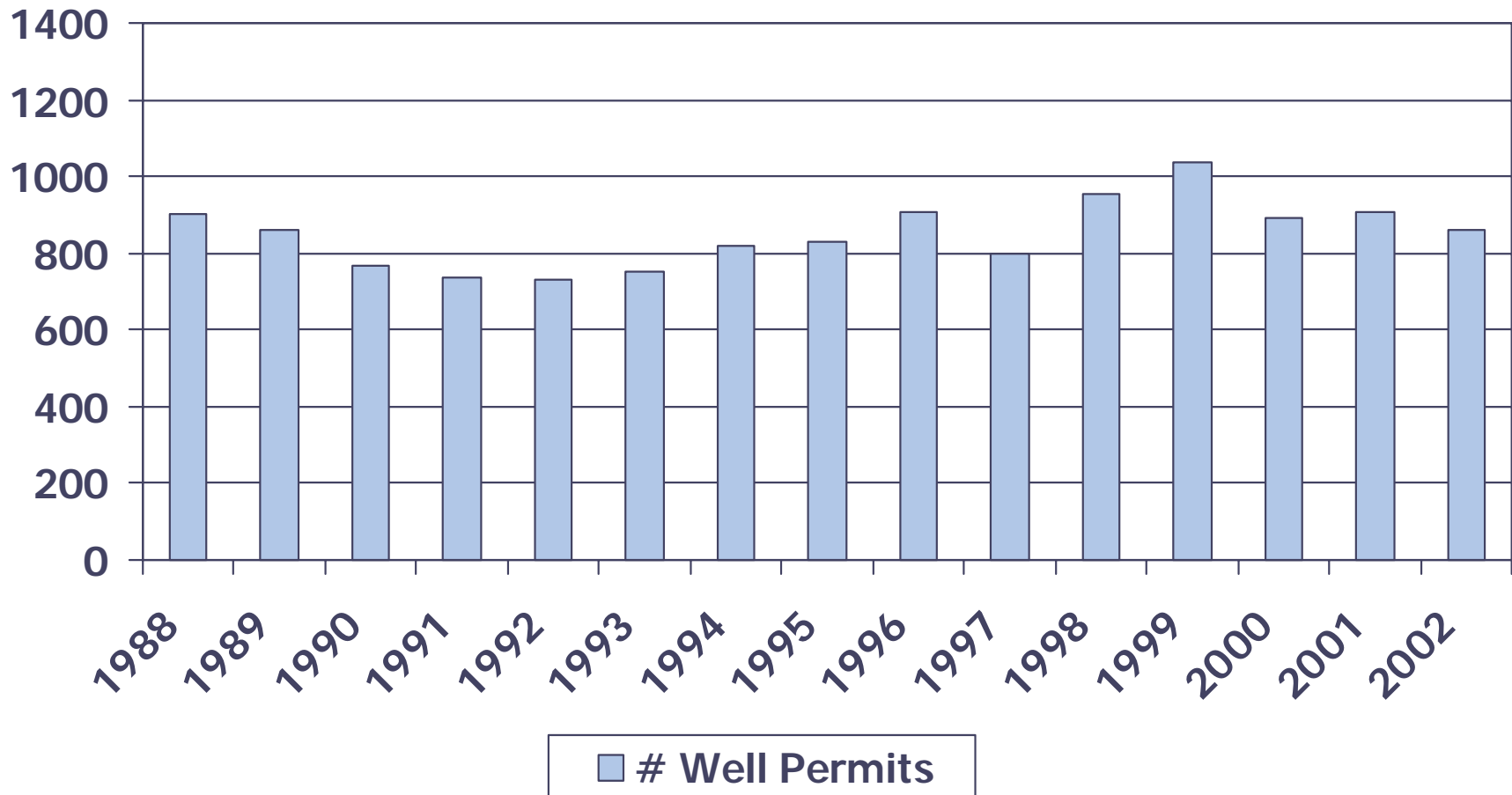
- Well regulation in effect since 1983
 - Well construction regulated by both County regulation and the State of Michigan Well Construction Code
 - Approximately 900 new drinking water wells drilled annually:
 - 40% of new wells are replacement wells
 - 90% of new wells are sand or drift wells
- 



Water Supply Requirements


- Well permit required for all drinking water wells
 - Drinking water wells required to be at least 50 feet deep
 - Well drillers required to submit well logs
 - Old wells required to be abandoned when replacement wells are drilled
 - All wells sampled for Coliform bacteria, Nitrates, and Arsenic
- 

Well Permits






Water Quality Issues

- Bacterial Quality
 - Nitrates
 - Arsenic
 - Industrial/Underground Storage Tanks
 - Salt – Dissolved Solids
 - Well Abandonment
- 

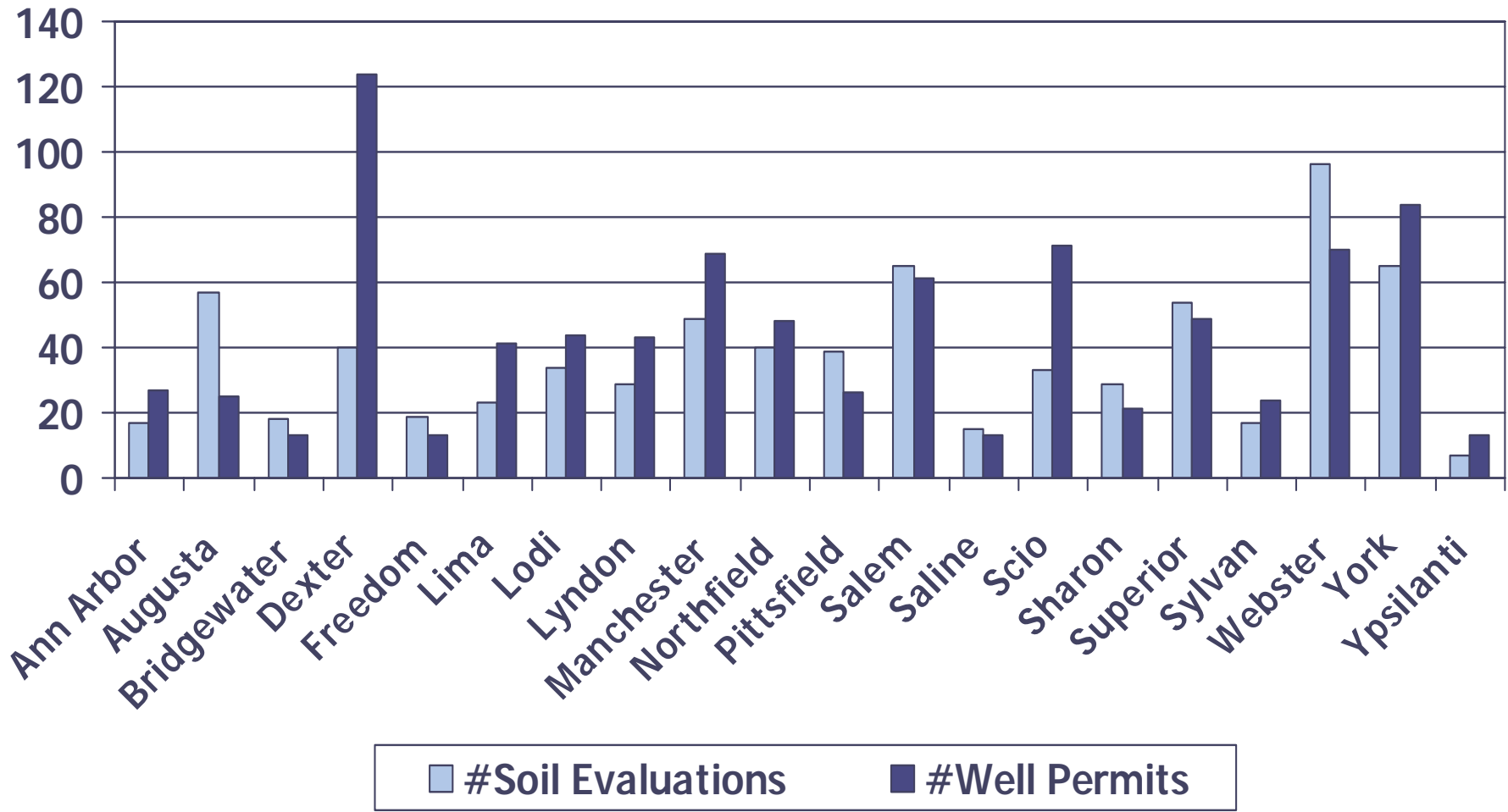


Water Quantity Issues

- Designated “Well First” areas
 - 7 gallons per minute required for metes and bounds
 - 10 gallons per minute required for subdivisions
 - Hydrogeological reports reviewed for subdivisions
 - Large capacity irrigation wells a concern
- 

Soil Evaluations & Well Permits

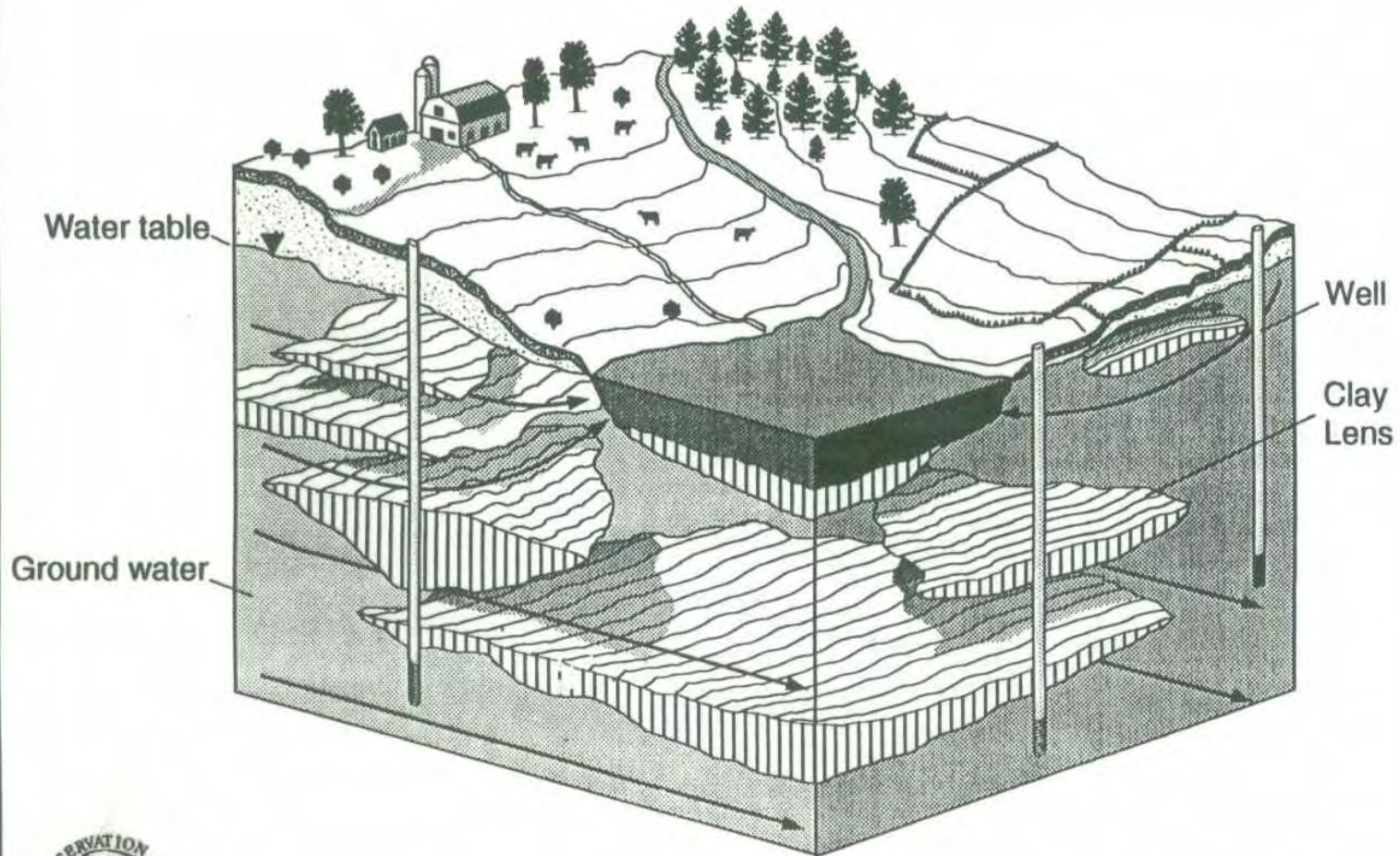
2/24/02 - 2/25/03



Potential Contaminants in Water

CONTAMINANTS	SUGGESTED LEVELS	CONTAMINANT EFFECTS
Aluminum	0.05 - 0.2 mg/L	Discoloration of water
Chloride	250 mg/L	Salty taste; corrosion of pipes
Color	15 color units	Visible tint
Copper	1.0 mg/L	Metallic Taste; blue/green staining of porcelain
Corrosivity	non-corrosive	Metallic taste; fixture staining, corroded pipes (Corrosive water can leach pipe materials, such as lead, into drinking water)
Fluoride	2.0 mg/L	Dental Fluorosis (a brownish discoloration of the teeth)
Foaming Agents	0.5 mg/L	Aesthetic - Frothy, cloudy, bitter taste, odor
Iron	0.3 mg/L	Bitter metallic taste; staining of laundry, rusty color, sediment
Manganese	0.05 mg/L	Taste; staining of laundry, black to brown color, black staining
Odor	3 threshold odor	"Rotten egg," musty or chemical smell
pH	6.5 - 8.5	Low pH - Bitter metallic taste, corrosion High pH - Slippery feel, soda taste, deposits
Silver	0.1 mg/L	Argyria (discoloration of skin), greying of eyes
Sulfate	250 mg/L	Salty taste; laxative effects
Total Dissolved Solids (TDS)	500 mg/L	Taste and possible relation between low hardness and cardiovascular disease; also an indicator of corrosivity (related to lead levels in water); can damage plumbing and limit effectiveness of soaps and detergents
Zinc	5 mg/L	Metallic taste

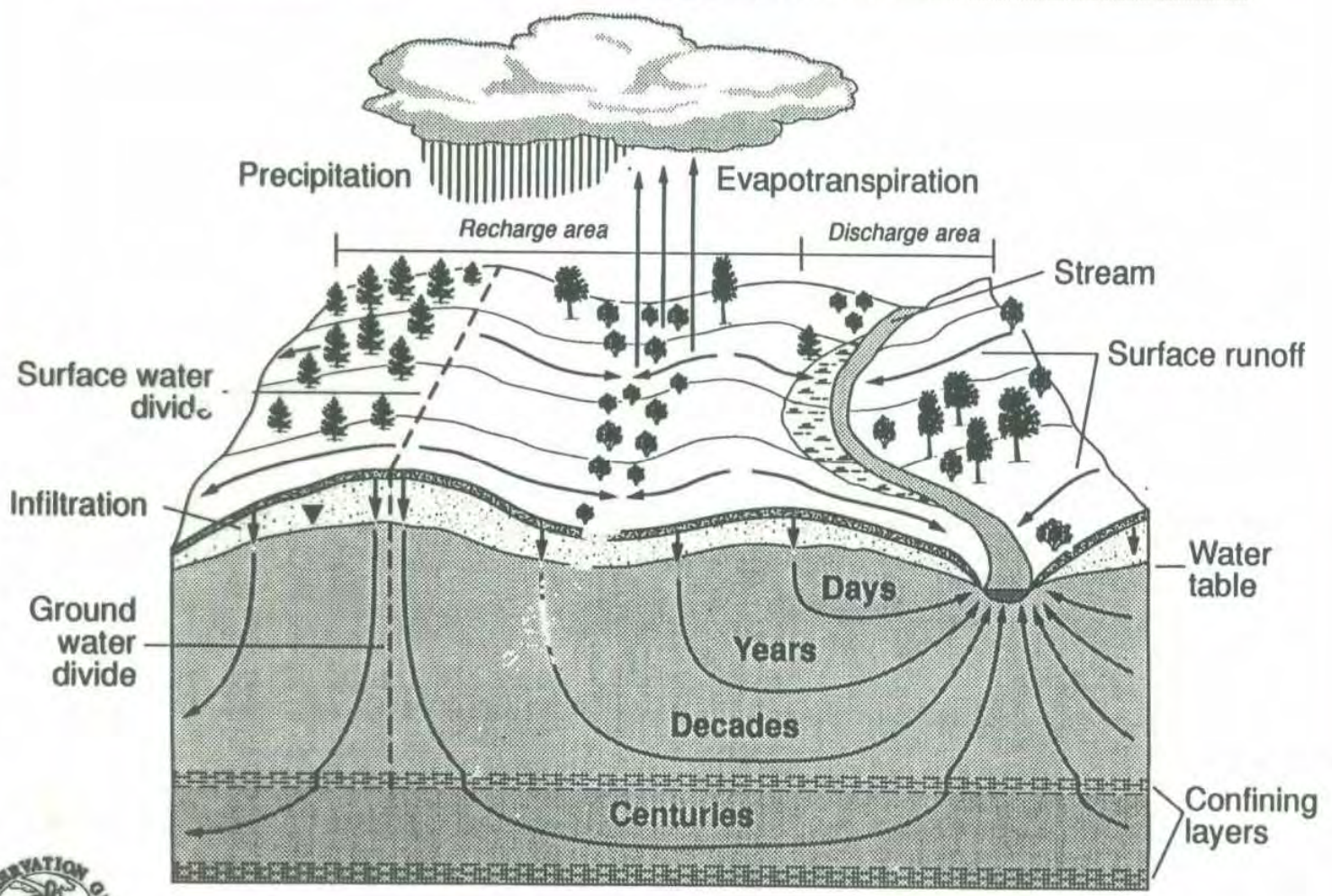
Discontinuous Confining Layers



Agriculture's Role in Protecting Ground Water

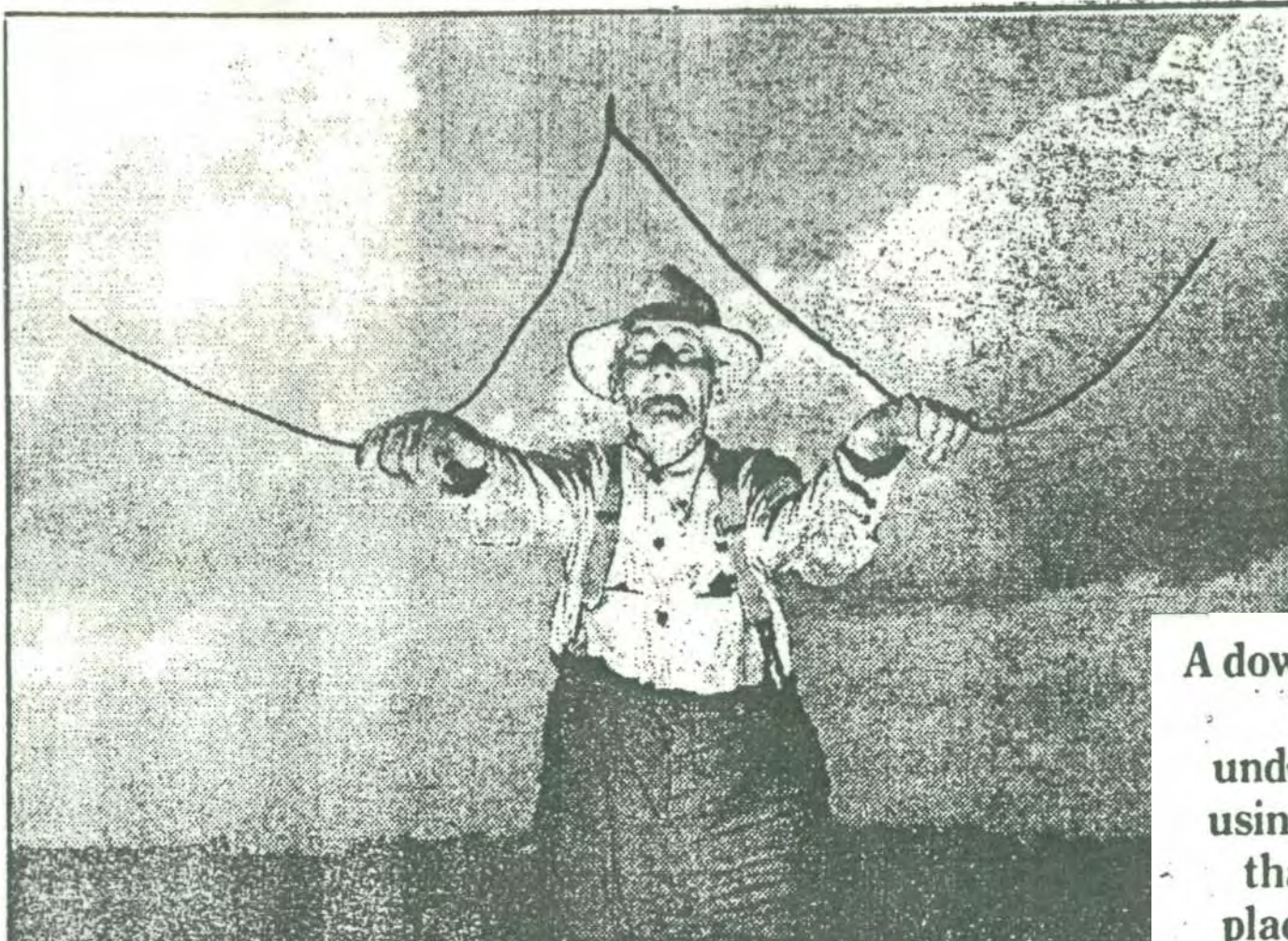
Figure - 29

Hydrologic Time Scales



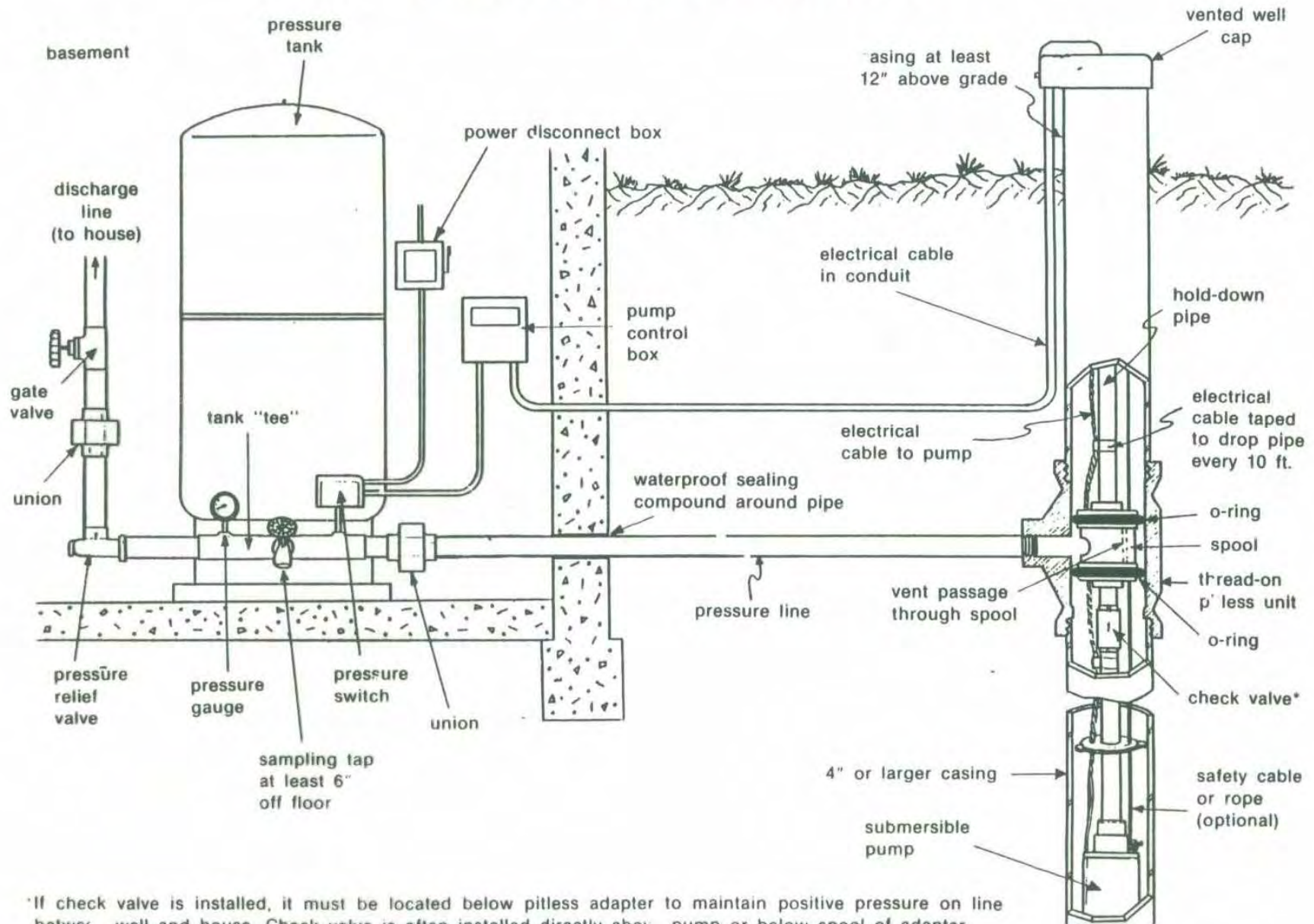
Agriculture's Role in Protecting Ground Water

Figure - 4



A dowser is said to be able to locate underground water using a forked twig that twitches at a place where a well could be drilled. This one seeks water on a farm in Ann Arbor in 1956. He found it.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
GROUND WATER QUALITY CONTROL SECTION
SUBMERSIBLE PUMP INSTALLATION



*If check valve is installed, it must be located below pitless adapter to maintain positive pressure on line between well and house. Check valve is often installed directly above pump or below spool of adapter.

Sample Well Record

10519 TIMBERHILL
Geological Survey No.

**MICHIGAN DEPARTMENT OF PUBLIC HEALTH
WATER WELL AND PUMP RECORD**

03 00 038
PERMIT NUMBER

1 LOCATION OF WELL

County: WASHTENAW Township Name: MANCHESTER Fraction: SE 1/4 SW 1/4 NE 1/4 Section: 9 Town Number: 4 S Range Number: 3 E

Distance and Direction From Road Intersection:
LOT F
10519 TIMBERHILL
MANCHESTER MI 48158

Street Address - City Of Well location
Locate with "X" in Section Below

Sketch Map

3 OWNER OF WELL: BRAD & CONNIE WIDMAYER
10820 M 52
Address Same as Well Location?
MANCHESTER MI 48158

4 WELL DEPTH: 146 ft. Date Completed: 8/12/03 NEW WELL

5 DRILLING METHOD: ROTARY

6 USE: DOMESTIC

7 CASING: PLASTIC
Diameter 5" to 136 ft. depth
Grouted Drill Hole Diameter 9" to 126 ft. depth
Height: ABOVE Surface 1'
Weight SDR 21
Drive Shoe?

8 SCREEN: Type: PVC Diameter 5" Nominal
SLOT 12 Length 10 ft.
Set Between 136 ft. and 146 ft.

FITTINGS:

9 STATIC WATER LEVEL: 29 ft. below land surface Flow?

10 PUMPING LEVEL: below land surface
29 ft. after 2 hrs. pumping at 7 G.P.M.
146 ft. after 2 hrs. pumping at 100 G.P.M.

11 WELL HEAD COMPLETION: PITLESS ADAPTOR

12 WELL GROUTED?
BEN-SEAL From 0 to 126 ft.
10 bags of cement.

13 NEAREST SOURCE OF CONTAMINATION:
Type SEPTIC Distance 100 ft. Direction SE
Well disinfected upon completion?
Old Well Plugged?

14 PUMP: Manufacturers name AERMOTOR
Model number T20 100 230 HP 1 VOLTS 230V
Length of Drop Pipe 65 ft. capacity 18 G.P.M.
Type SUBMERSIBLE
PRESSURE TANK:
Manufacturers Name WELL RITE
Model Number WR200 Capacity 19.3 Gallons

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
BROWN CLAY	3	3
SAND	36	39
GRAY CLAY	19	58
GRAVELY CLAY	69	127
SAND/GRAVEL	19	146

WELL PRODUCTION
EST WITH AIR 100 GPM

CRIBLEY OFFICE NOTES

PS1D03G 187366 4/1/06
WELLS AWC 5 1-1/4 1-1/4" PVC 65
CDCW17181P22185

15 REMARKS, ELEVATION, SOURCE OF DATA, ETC.
700 #SAND PACK

17 RIG OPERATOR'S NAME TROY REVILL

D67d 2/89

16 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Cribley Drilling Co., Inc. 81-2014
REGISTERED BUSINESS NAME REGISTRATION NO.
Address 8300 Water Chelsea Rd., Dexter, MI 48120
Signed: *Timothy A. Clark* Date: 8/19/03
AUTHORIZED REPRESENTATIVE
Authority: Act 368 PA 1978
Completion: Required
Penalty: Conviction of a violation of any provision

IMPORTANT: File with deed.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH
GROUND WATER QUALITY CONTROL SECTION

ROCK WELL CONSTRUCTION

