Border 2012 Project - Examination of risk to groundwater from onsite wastewater management systems (TAA12-021)

NMSU Project Team = Christopher Brown, Alfredo Granados, Adrian Hanson, Mike Montoya, Erin Ward, and Steve Walker

Border 2012 Water Task Force Meeting

19 November 2012 – IBWC Headquarters

Acknowledgements

- USEPA and Border Environment Cooperation Commission provided funding and support.
- Staff in NMSU Departments of Geography and Civil Engineering and NMWRRI did technical work.
- John Hawley was especially helpful with groundwater modeling.
- Michael Montoya at NMED provided important technical input and support.

Project context

- Focus of project is consistent with Border 2012 RFP - "reduce water contamination"
- Project has several components
  - Develop GIS to support modeling of groundwater risk due to onsite systems
  - Address sanitation issues related to onsite systems
  - Develop and execute outreach component
  - Assess outcomes of outreach workshops

The problem

- Dona Ana County and Northern Chihuahua have extensive onsite systems
- Onsite systems present risk to GW contamination
- GiS tools provide ability to model spatial variability of risk
- Binational research team has skills needed to examine risk

Proposed approach

- Three part approach to examining GW risk due to onsite waste disposal systems
  - Working with NMED, develop GIS DB of existing systems with geo-spatial reference
  - Develop risk assessment (based on work WRRI did in late 90s and Colorado School of Mines study) that involves typology of systems, depth to GW, soil properties, and geomorphology/topography

Proposed approach

- Last phase is outreach effort
  - To educate public about risk to GW from onsite systems
  - To disseminate best management practices for managing existing systems and retiring/decommissioning systems no longer in use

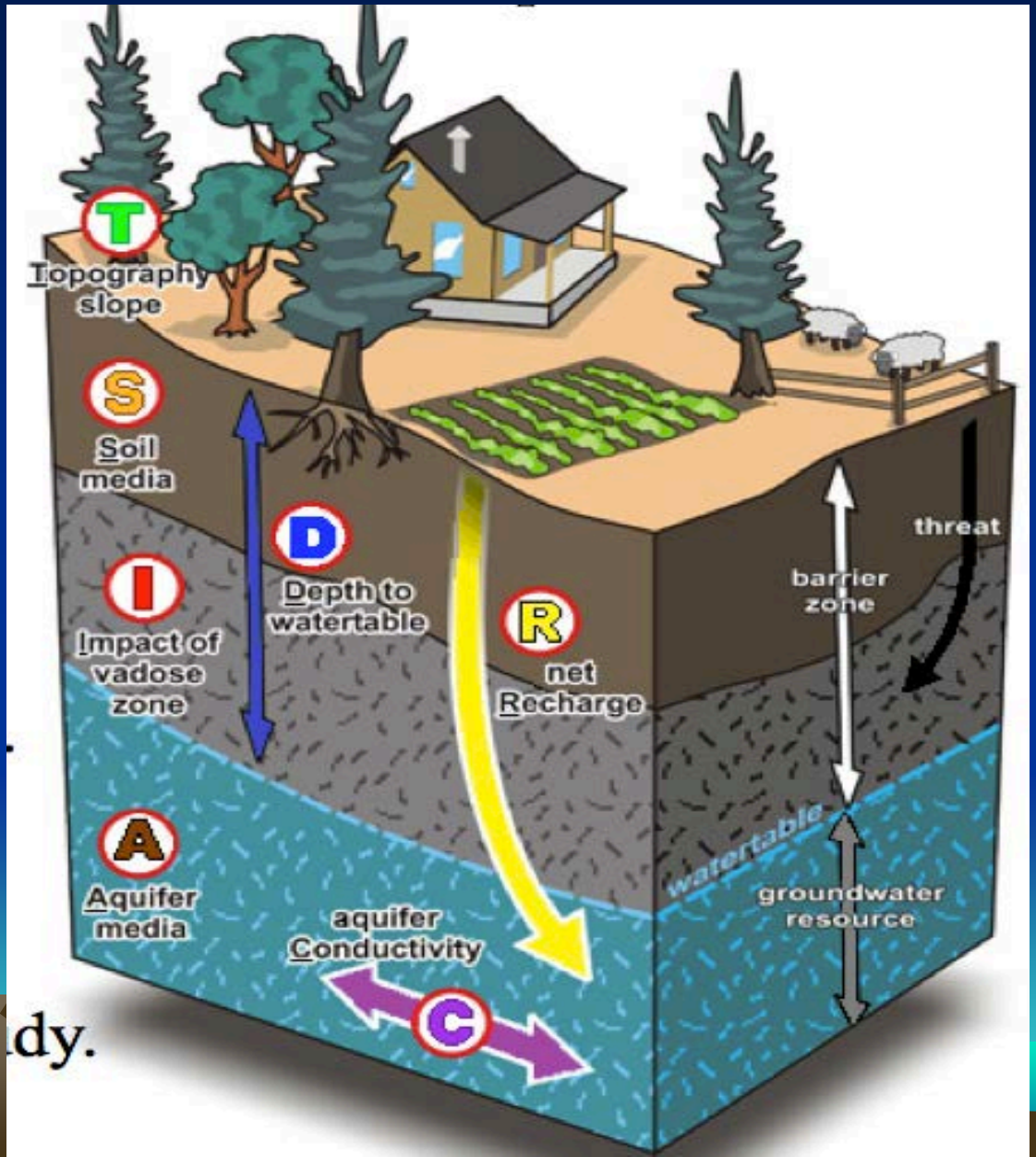
Progress to date

- Compilation of onsite systems data for NM, Texas, and Chihuahua is complete
  - NMED and DAC staff provide onsite data for DAC area
  - EPWU and GIS analysis provided data for Texas
  - Alfredo Granados and Julio Ruiz compiled Mexican data

Groundwater modeling work

- Steve Walker at WRRI did excellent work on literature review to develop model basics
- DRASTIC model was the focus of Steve's work
- Considerable work was needed to fine tune model and compile MUCH needed data.

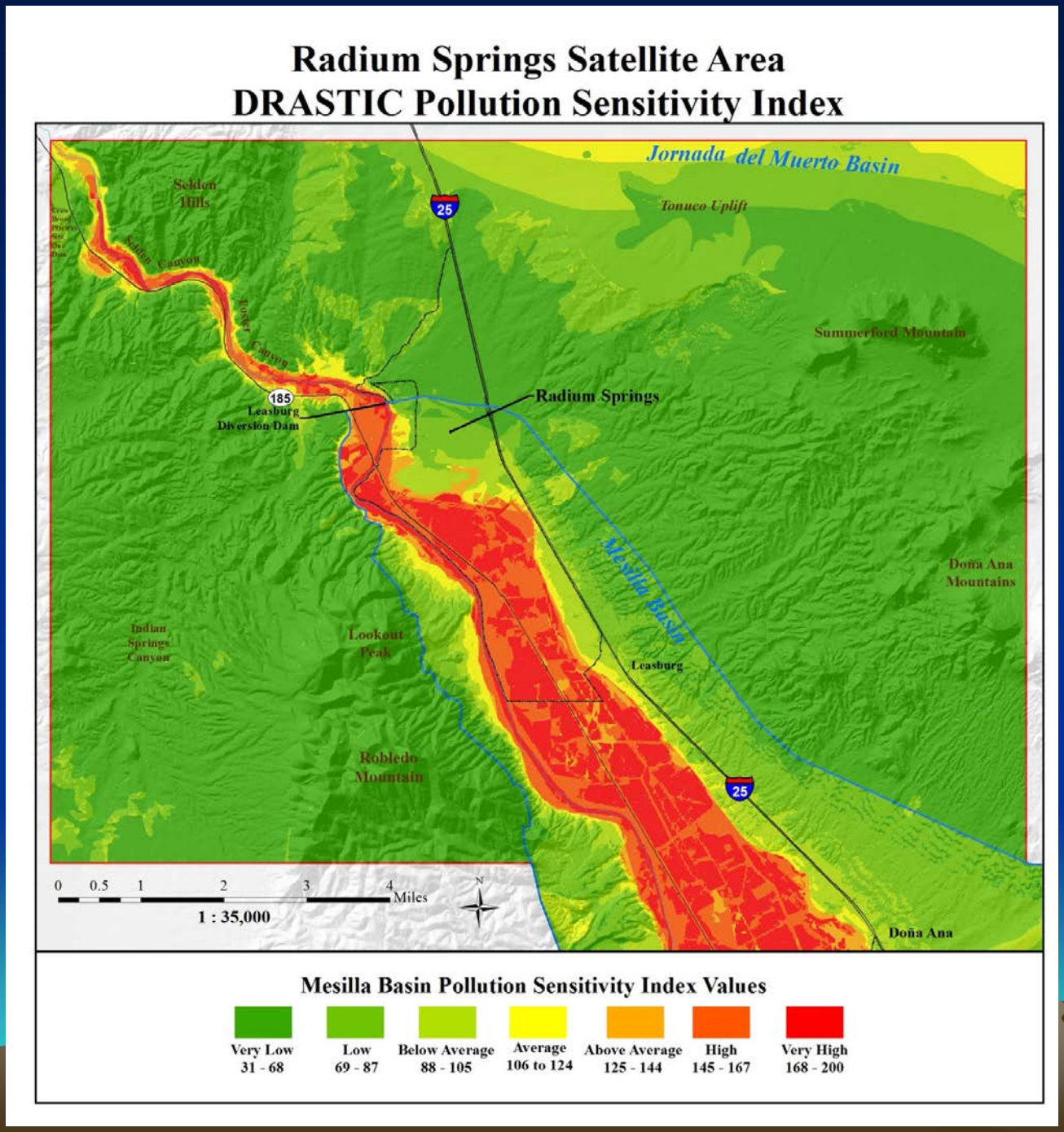
Groundwater & model elements



dy.

Model components& weights

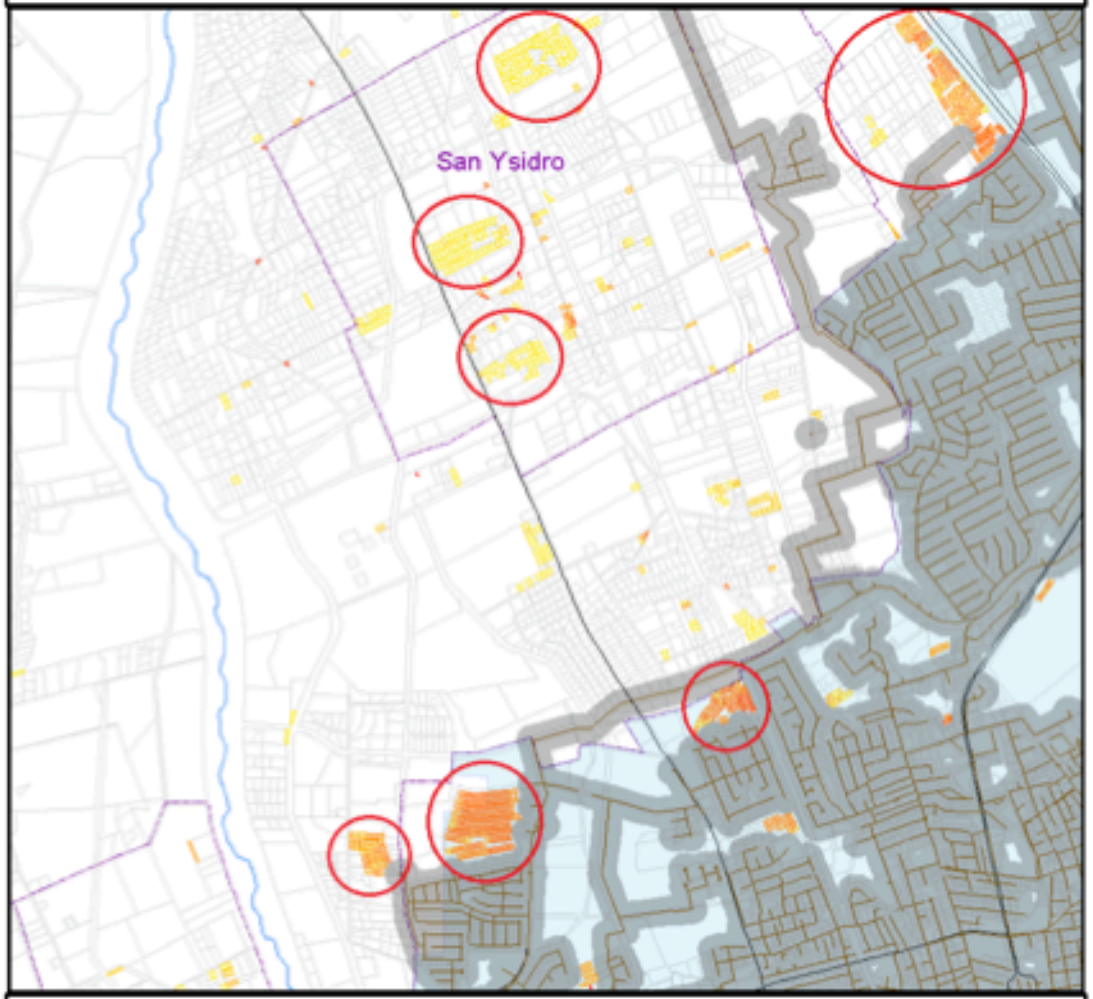
[D]epth to water table	×5
net [R]echarge	×4
[A]quifer media	×3
[S]oil media	×2
[T]opography	×1
[I]mpact of the vadose zone	×5
hydraulic [C]onductivity	×3



Model output

Produced by:
Steve Walker WRRI
and NMSU
Geography Department

APPLICATION



Neighborhoods of high area-weighted average DRASTIC values distant from sewage lines

Model output

Produced by:
Steve Walker WRRI
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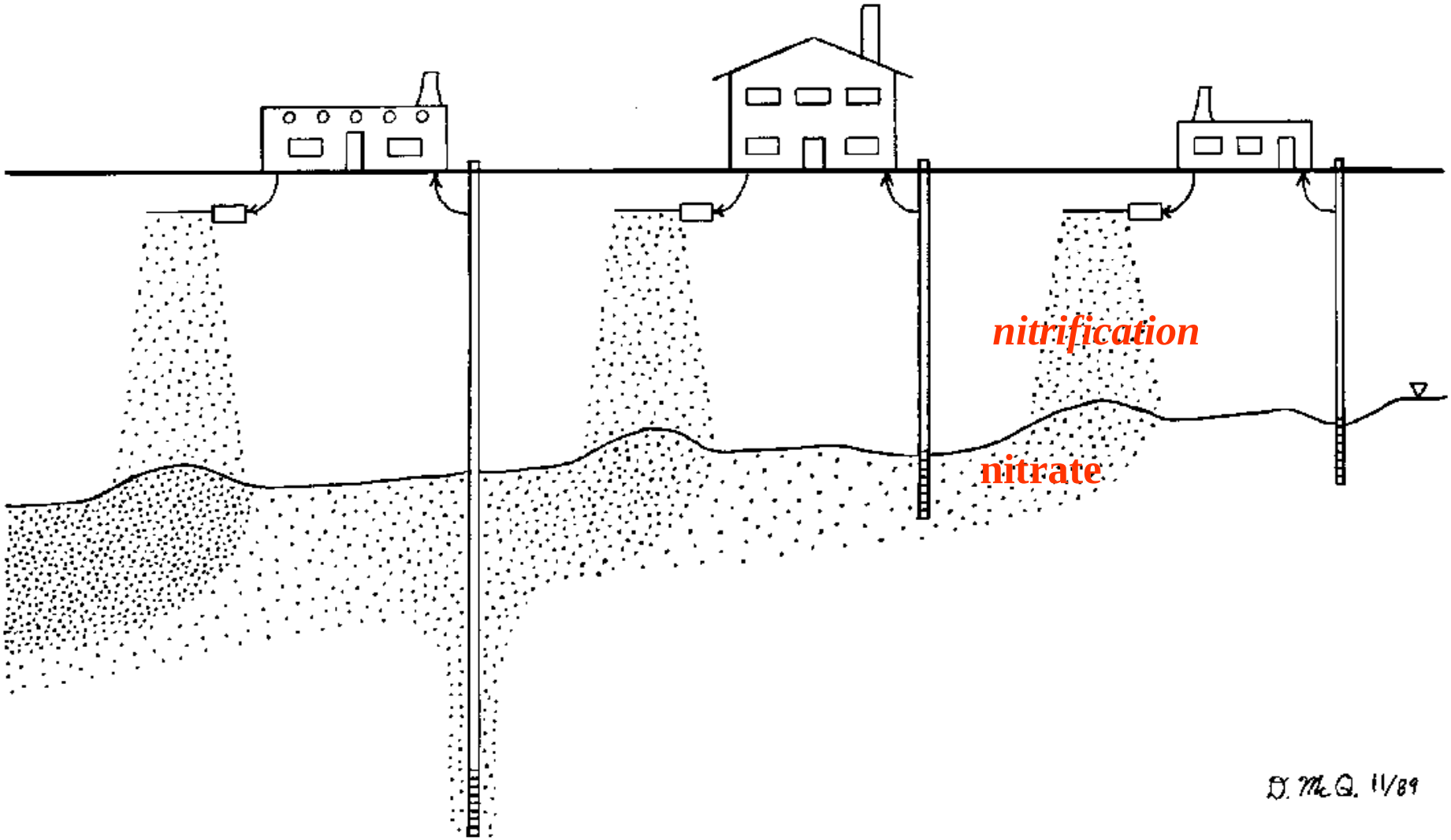
Geography Department

Outreach materials and efforts

- Erin Ward and Adrian Hansen are lead on this work:
  - Development of outreach pamphlets
  - Production of images and slides for workshops
- Mike Montoya was lead on regulations
- Alfredo Granados was lead on materials for Mexican workshop
  - New Mexico materials did not fit Mexico
  - Different geographies → different materials

Drinking Your Neighbor's Sewage



ABQ West Mesa NO_3-N (mg/L)

Figure 1. Geologic Map of Ruidoso, N.M. and Vicinity (From NMBGMR, 2003). Alluvial deposits are not shown. For explanations of geologic units other than the San Andres and Yeso, see NMBGMR, 2003.

☆ Study Area

Psa Permian San Andres Formation (limestone and dolomite with minor shale)
Py Permian Yeso Formation (sandstone, siltstone, anhydrite, gypsum and dolomite)
Fault or Fault zone
River

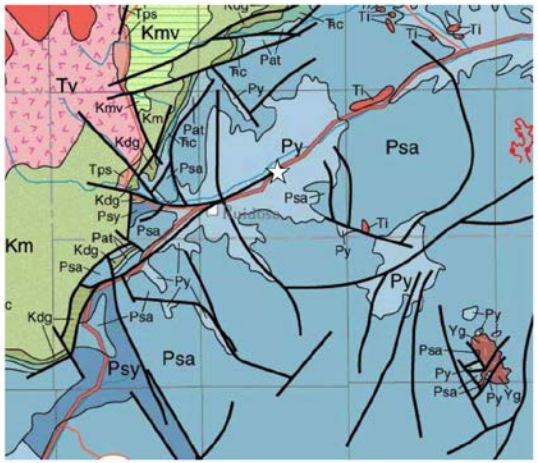


Figure 3. Hydrograph for well T11S R14E 15.432334 (from Donohoe, 2004).

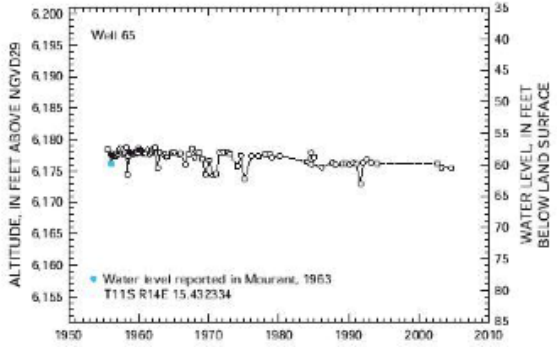
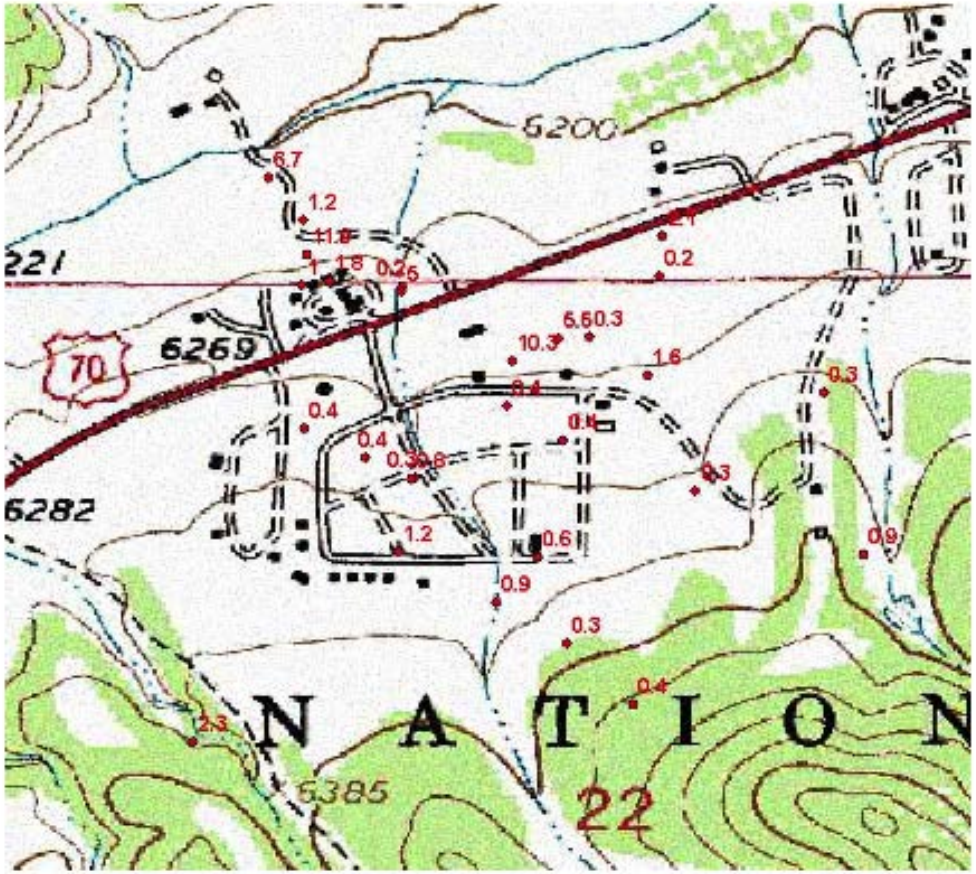
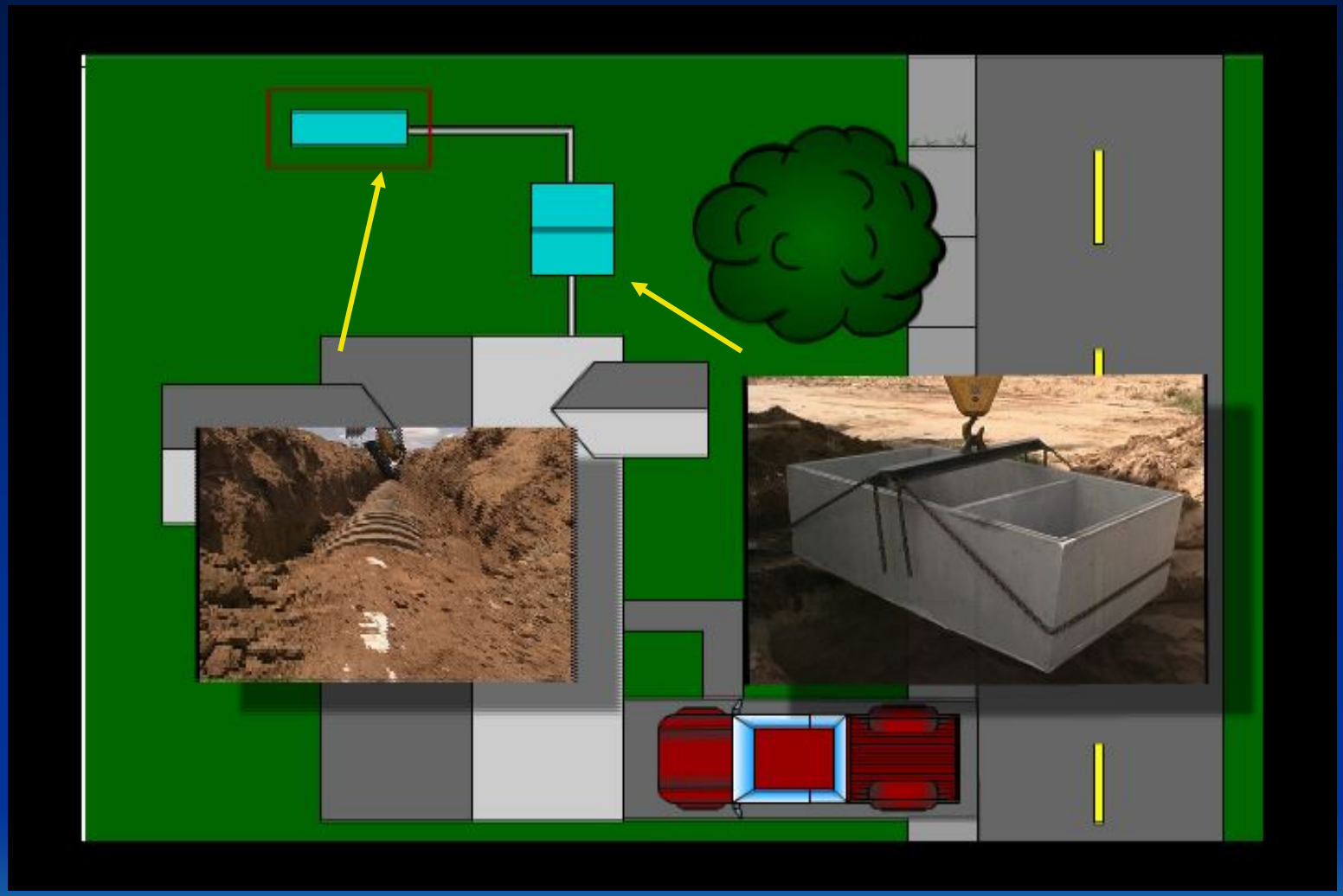
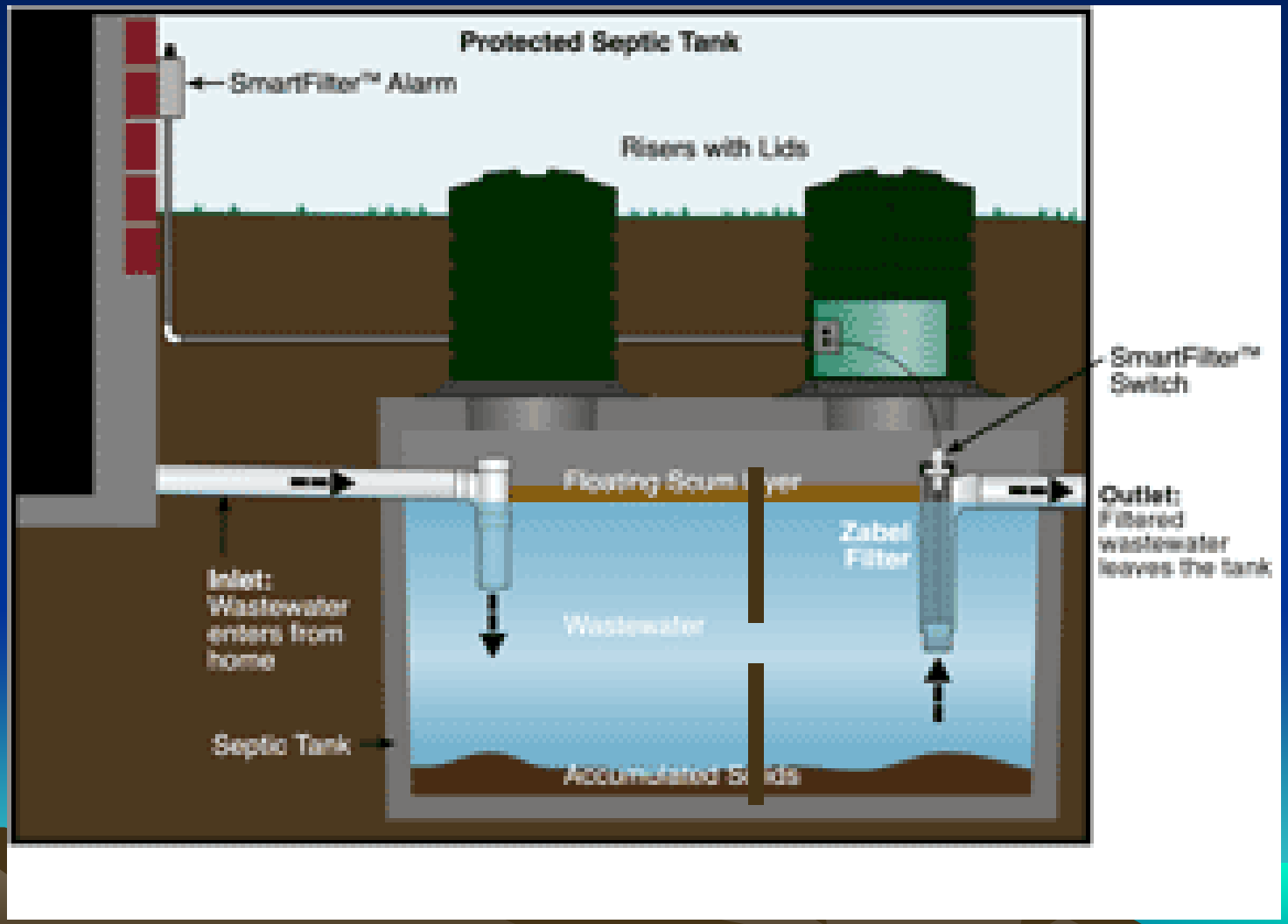


Figure 5. Nitrate plus nitrite (mg/L as N).

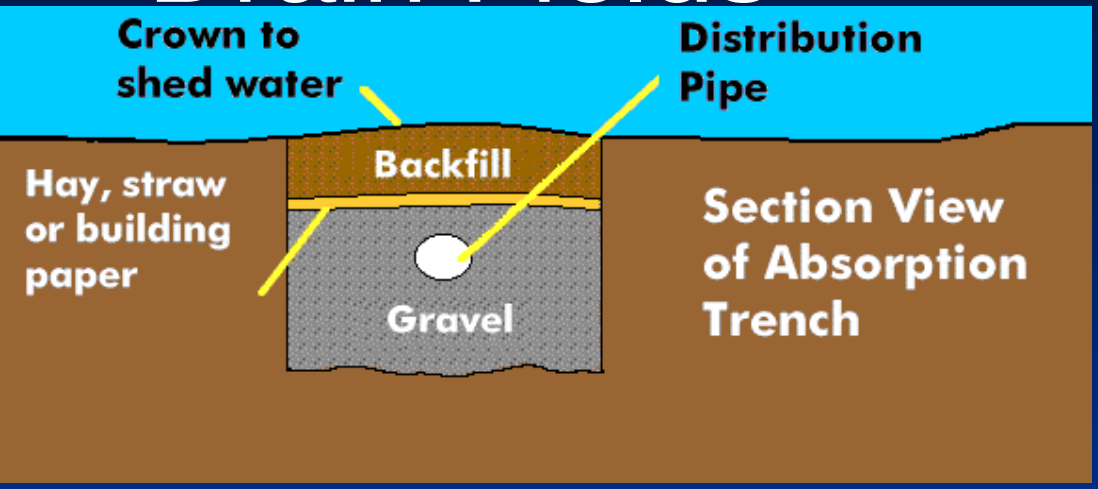




Septic Tanks : Risers & Effluent Screens(Filters)



Drain Fields



Rock and Pipe Drain Field System

Elgin In Drain

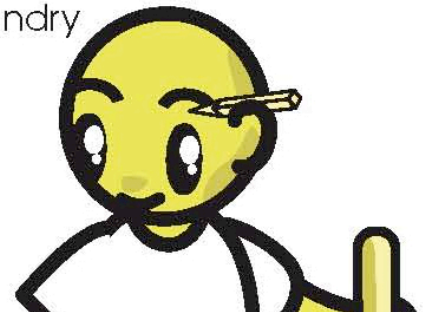
Chamber System

Do:

- Use water-conserving faucets and shower heads.
- Compost organic material rather than flush down the drain.
- Repair all leaking fixtures immediately to prevent flooding of drainfield.

Don't:

- Use the toilet as a trash can.
- Dispose of feminine hygiene products, cleaning tissues, cigarette butts, diapers or other trash in the toilet.
- Use in-sink garbage grinders to send organic matter down the drain.
- Pour grease down the drain.
- Wash all of the laundry on one day. Schedule washing throughout the week.
- Use a detergent with a high percentage of non-dissolving material. Liquid laundry detergent is fine.
- Excessively use bleach.



DO

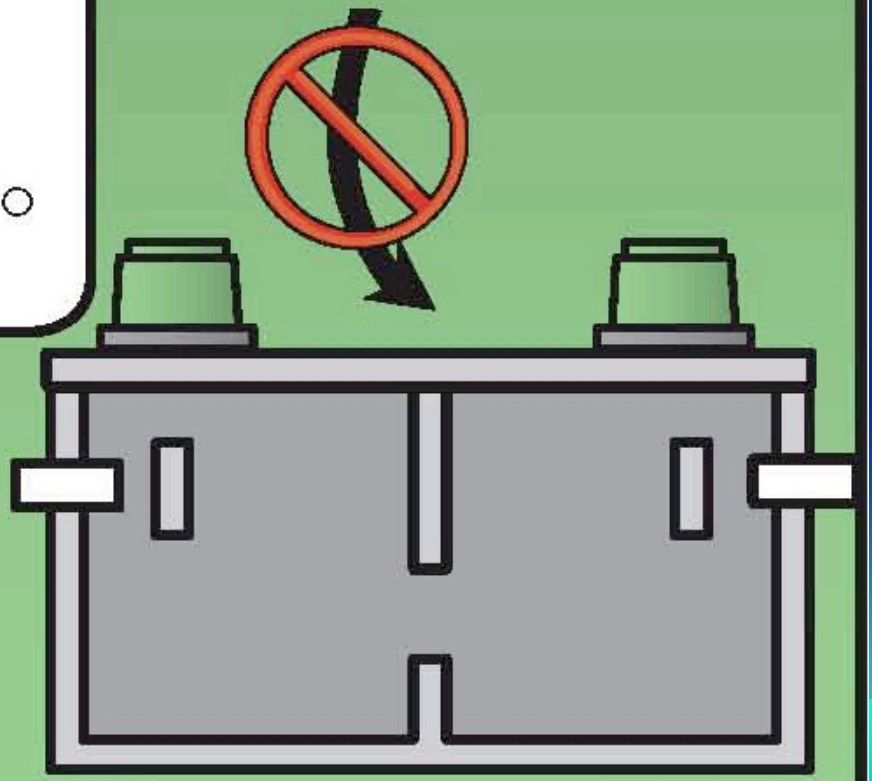
DO NOT

Natural bacteria are present in wastewater to decompose waste. Chemical additives are not necessary for a septic tank to operate. Some additives may even harm the tank's operation. Remember: a septic tank is supposed to collect solids. If you flush solids out of the tank and into the drainfield by adding chemicals, the solids will plug the drainfield, and you'll have to replace the drainfield.

Enzymes

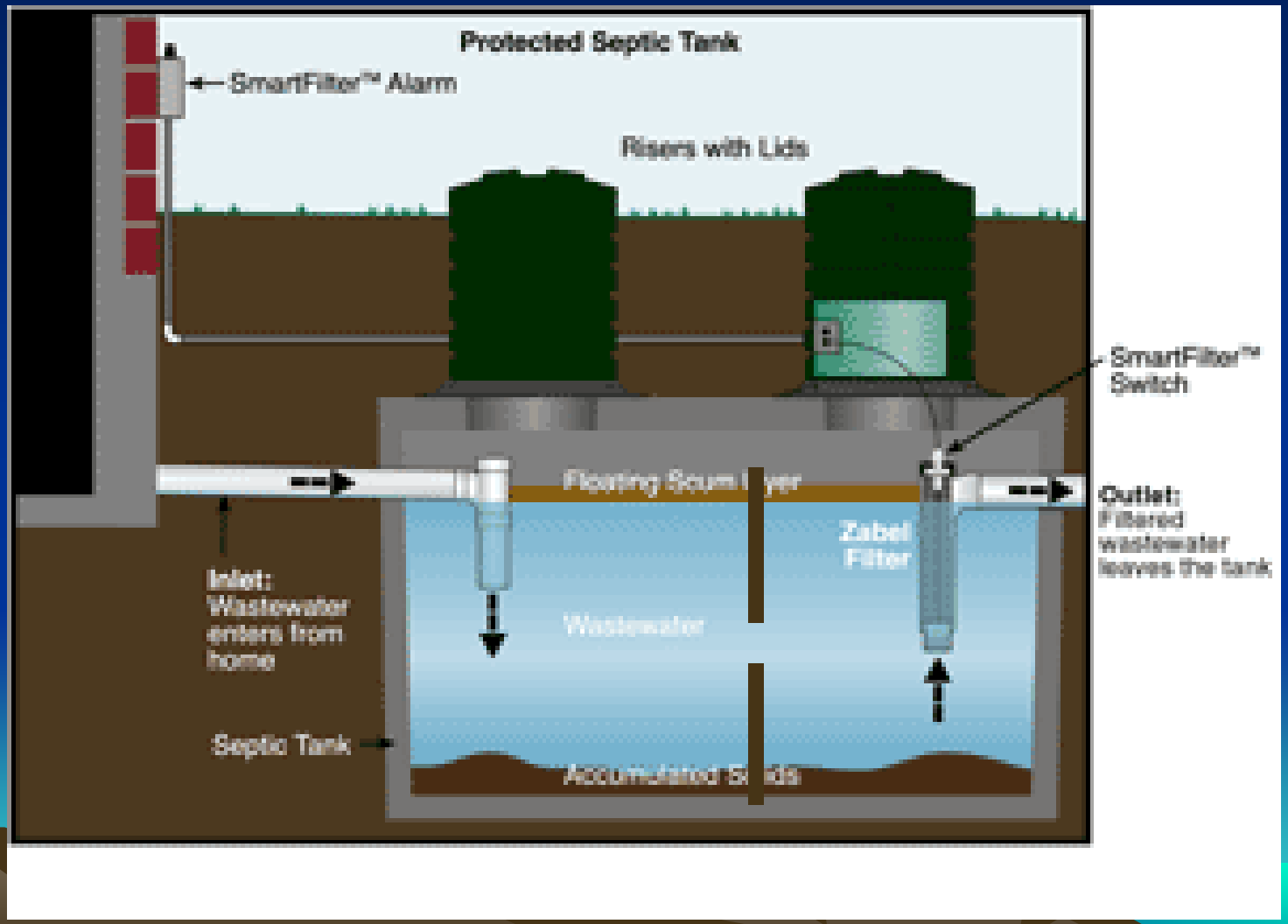
Chemical Additives

Microbes



Septic Tanks Need to be Pumped

Removes solids that the tank is intended to capture!



Progress to date

- Seven workshops in New Mexico to date
- Staff changes and uncertainty of data posed challenges
  - Adrian Hansen left NMSU in summer of 2013
  - Decentralized nature of new small scale sewer systems posed challenges

Future work

- Three more workshops in New Mexico in early December
- JMAS assisting with workshop in Juarez at Anapra WW treatment plant
- Compilation and analysis of assessment data
- Final project report completion and possible presentations at BECC offices

Thank You

QUESTIONS?