Well Construction Standards for Groundwater Protection

Agenda

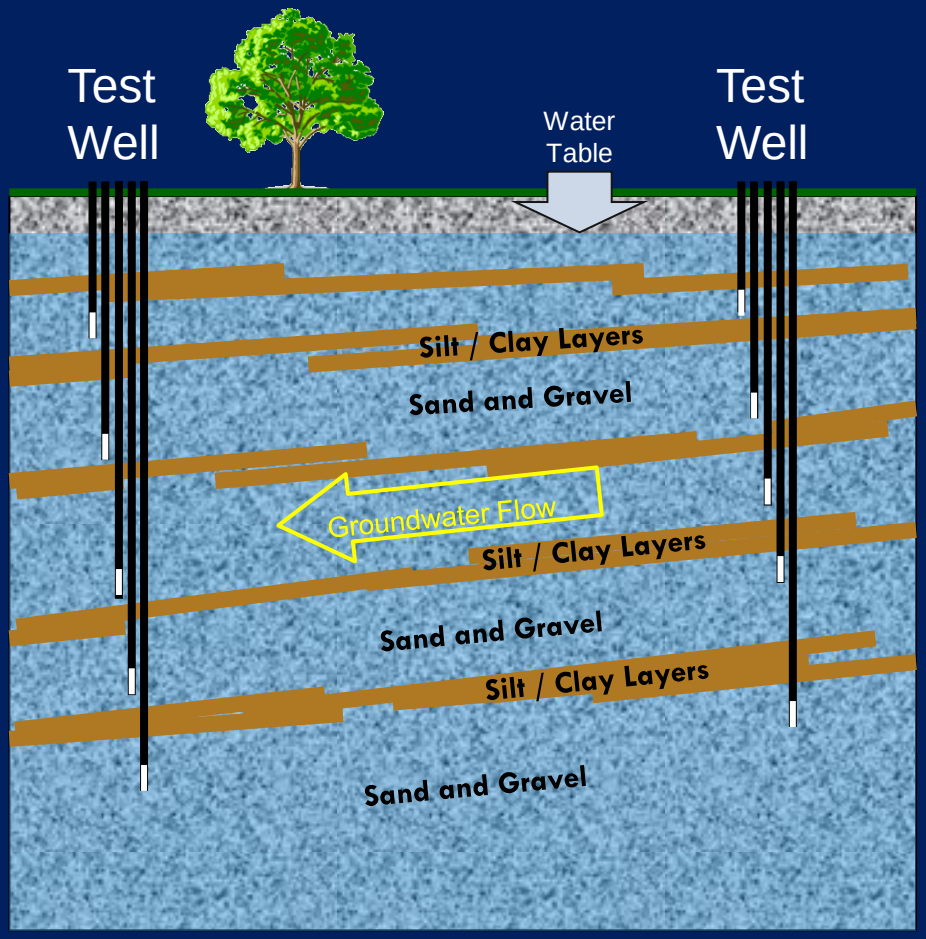
- Background Info
- Multi-zone Test Wells
- Source Water Threats
- The Problem
- A Solution
- What’s Next?

Background- Groundwater and Meridian

- Groundwater
  - Supplies 95% of drinking water in Idaho
- City of Meridian water supply
  - About 120,000 residents and growing
  - 3.6 billion gallons /year demand (could be 3x at buildout).
  - Groundwater is only source- diverted from 26 wells

Multi-Zone Test Wells

- Identify sub-aquifer units and contaminants of concern
- Identify the best quality water for production well
- Help you understand what sub-aquifer units well will draw on
- Characterize aquifer- quantity, quality, hydraulic connection, contaminant identification and tracking
- Help plan for the future



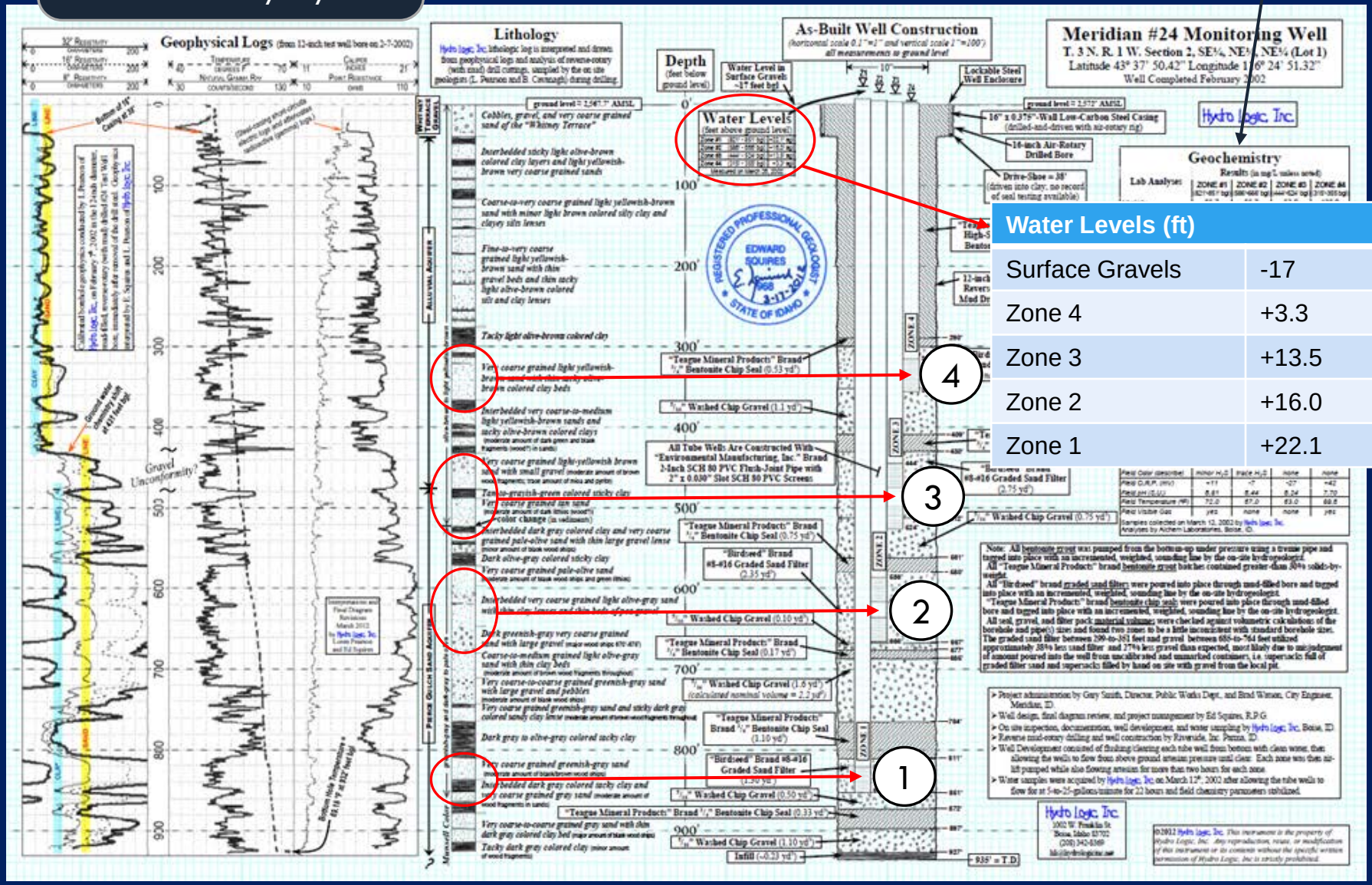
Simplified Aquifer Section

Geophysical Logs

Resistivity and natural gamma radiation identify sand and clay layers

Test Well 24

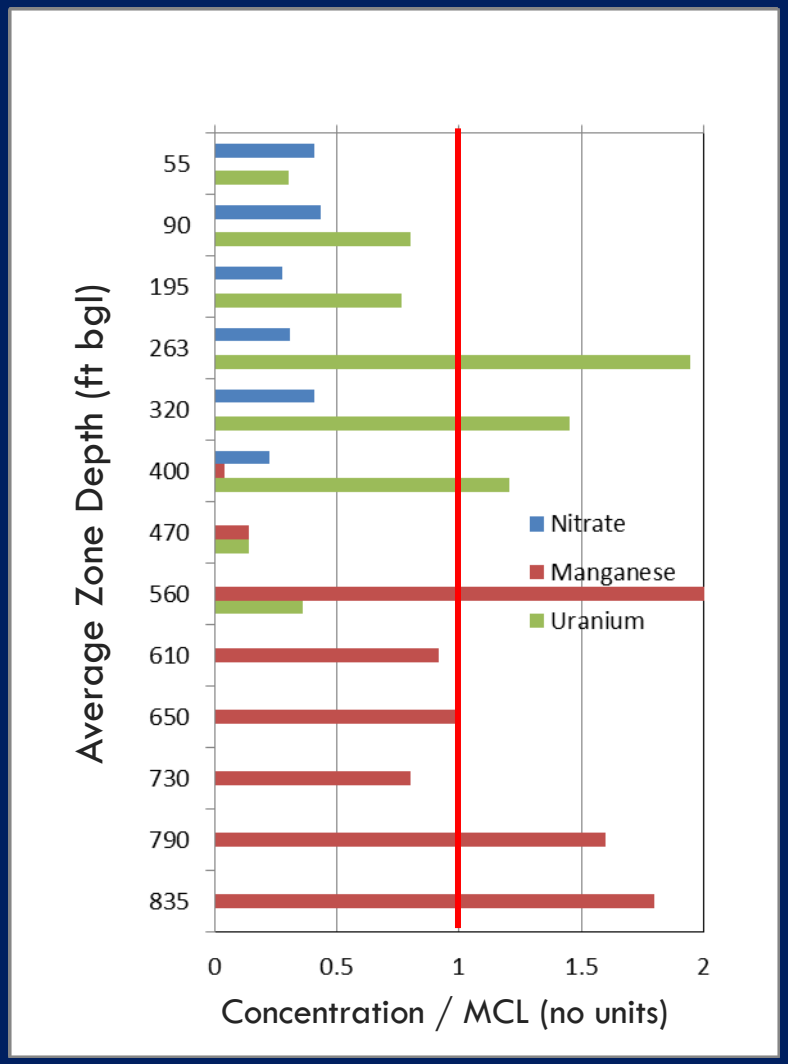
Chemistry



Water Levels (ft)	
Surface Gravels	-17
Zone 4	+3.3
Zone 3	+13.5
Zone 2	+16.0
Zone 1	+22.1

Multi-Zone Test Wells

Test Well 15
13 zones
Varying water chemistry

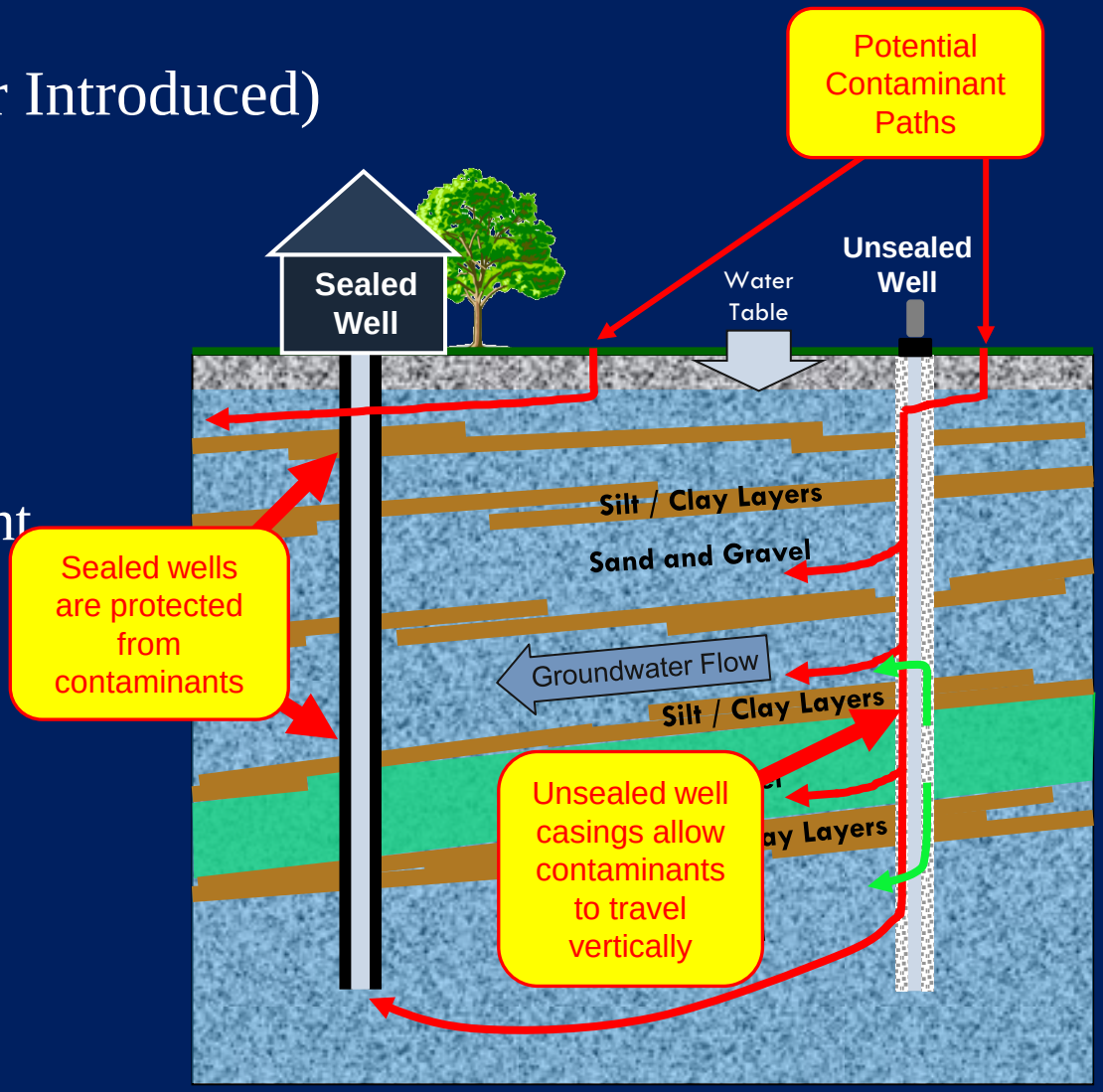


Source Water Threats

Contaminants (Natural or Introduced)

Protection Strategies

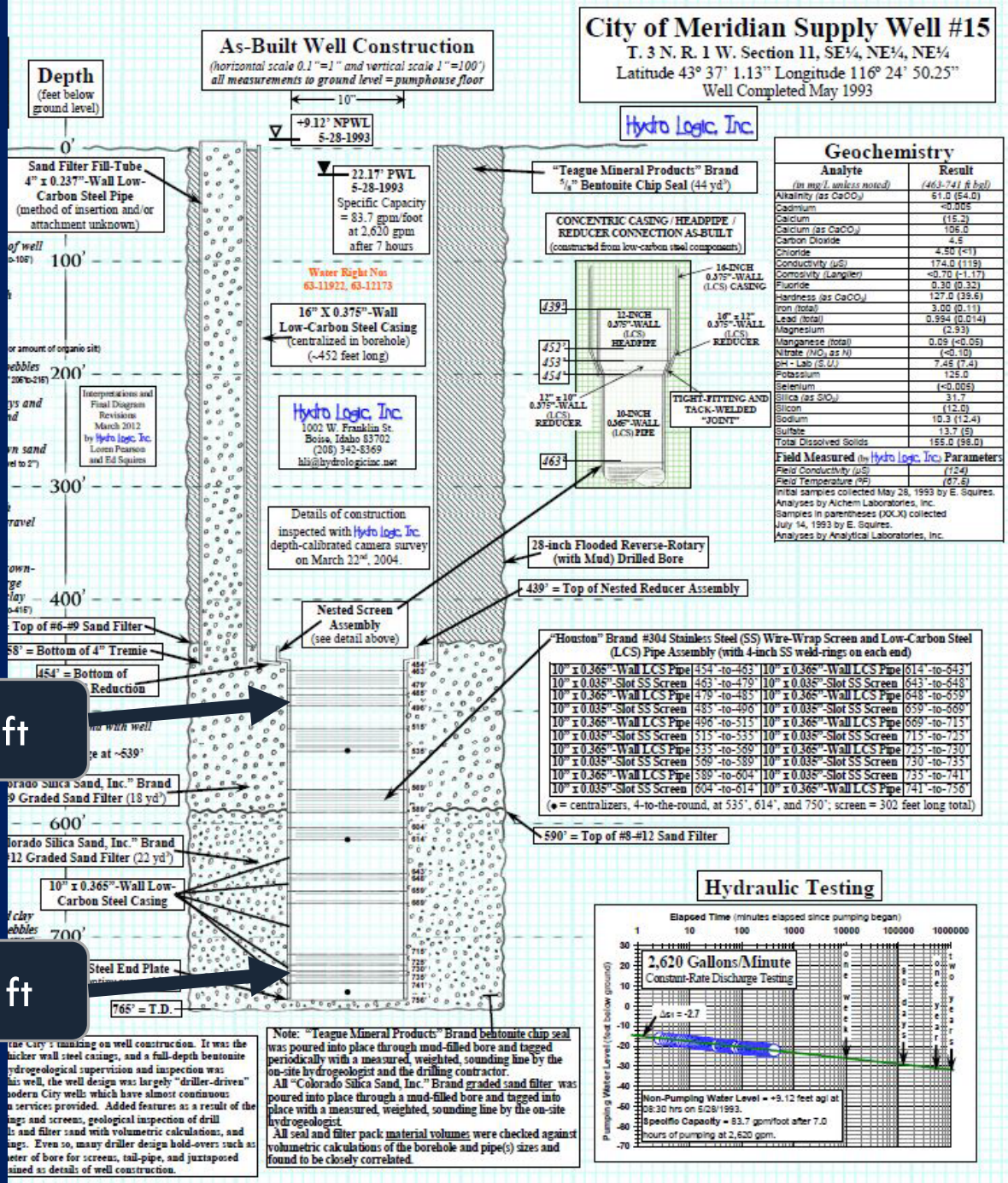
- Build test wells
- Seal wells (<u>all wells</u>) to prevent vertical movement of contaminants
- Manage pumping rates
- Water treatment ($)
- Ordinances?
- Monitoring?



Well 15

Zone 7: Water Level – 2.05 ft

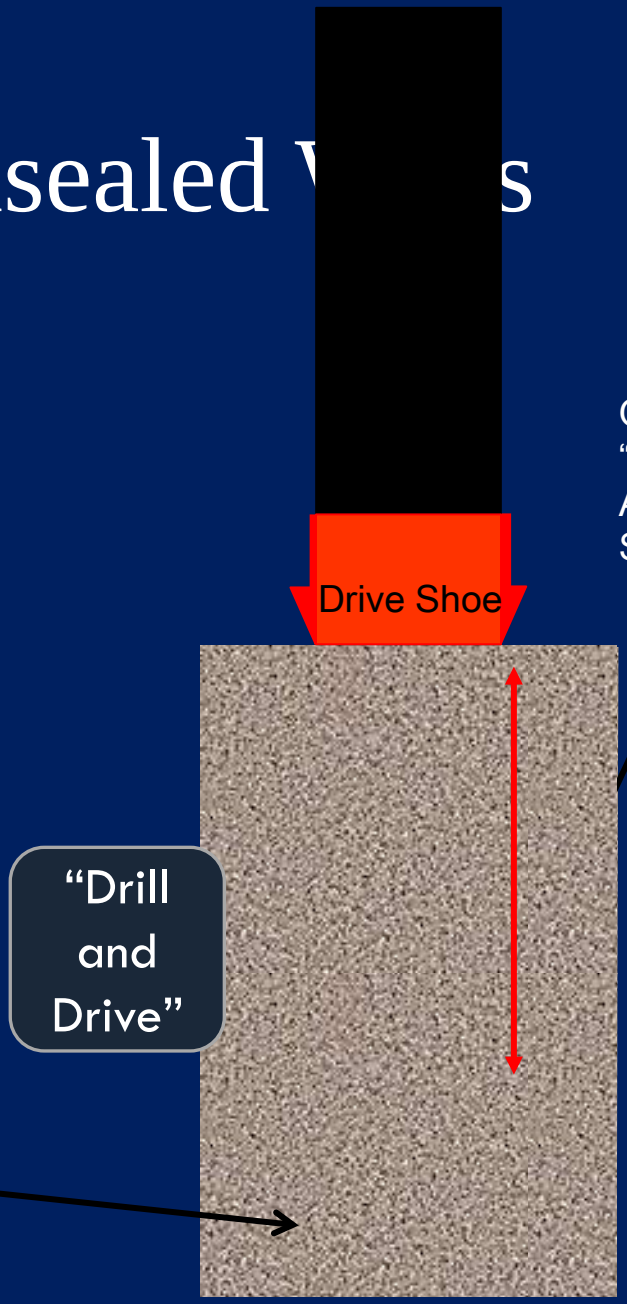
Zone 3: Water Level + 1.90 ft



The Problem: Unsealed V[redacted]s

"Drill-and-Drive" construction methods

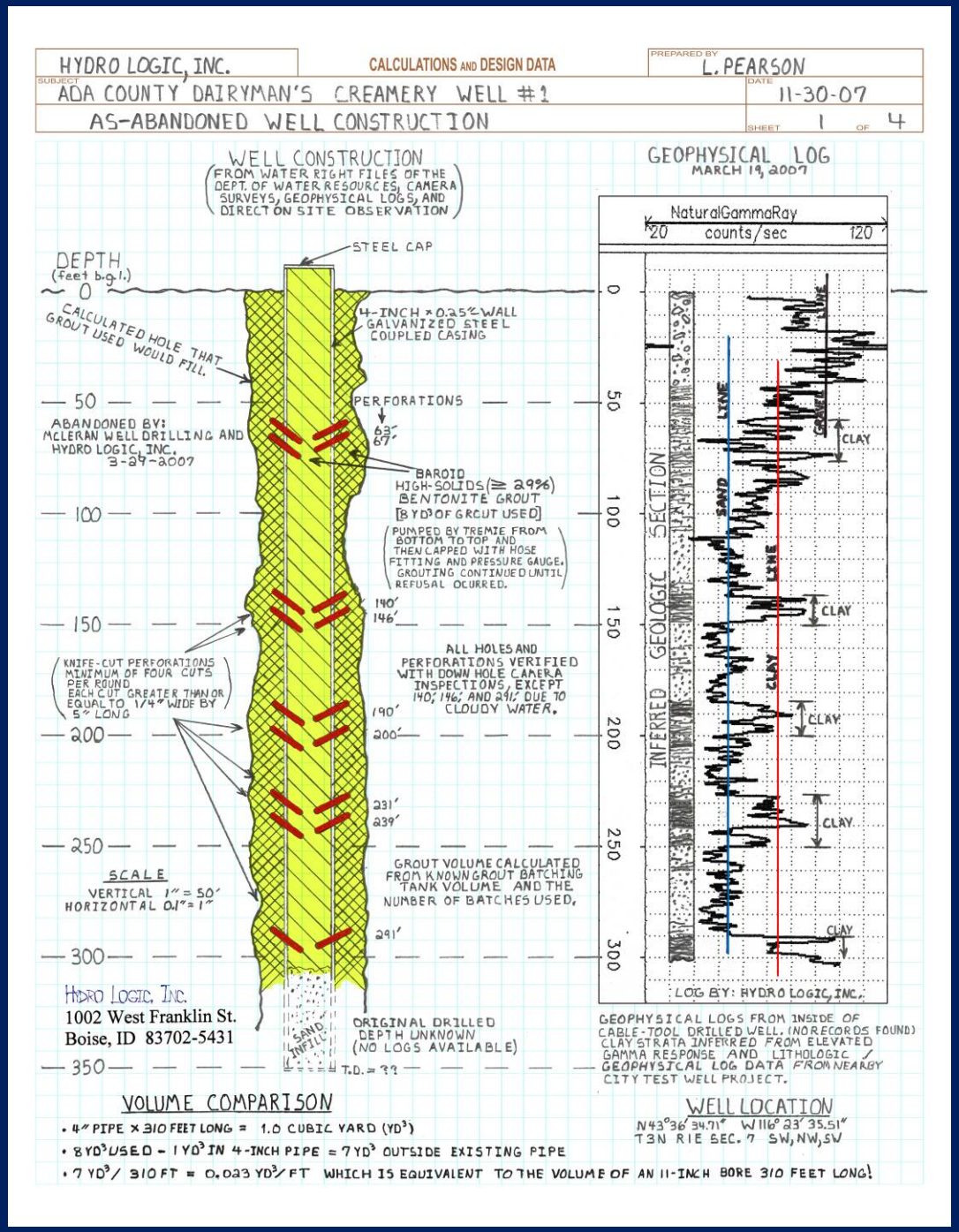
- Unsealed by design
- Data from well abandonments proves that voids exist outside casings



Example 1

Meridian Creamery Well #1 Abandonment (Meridian City Hall)

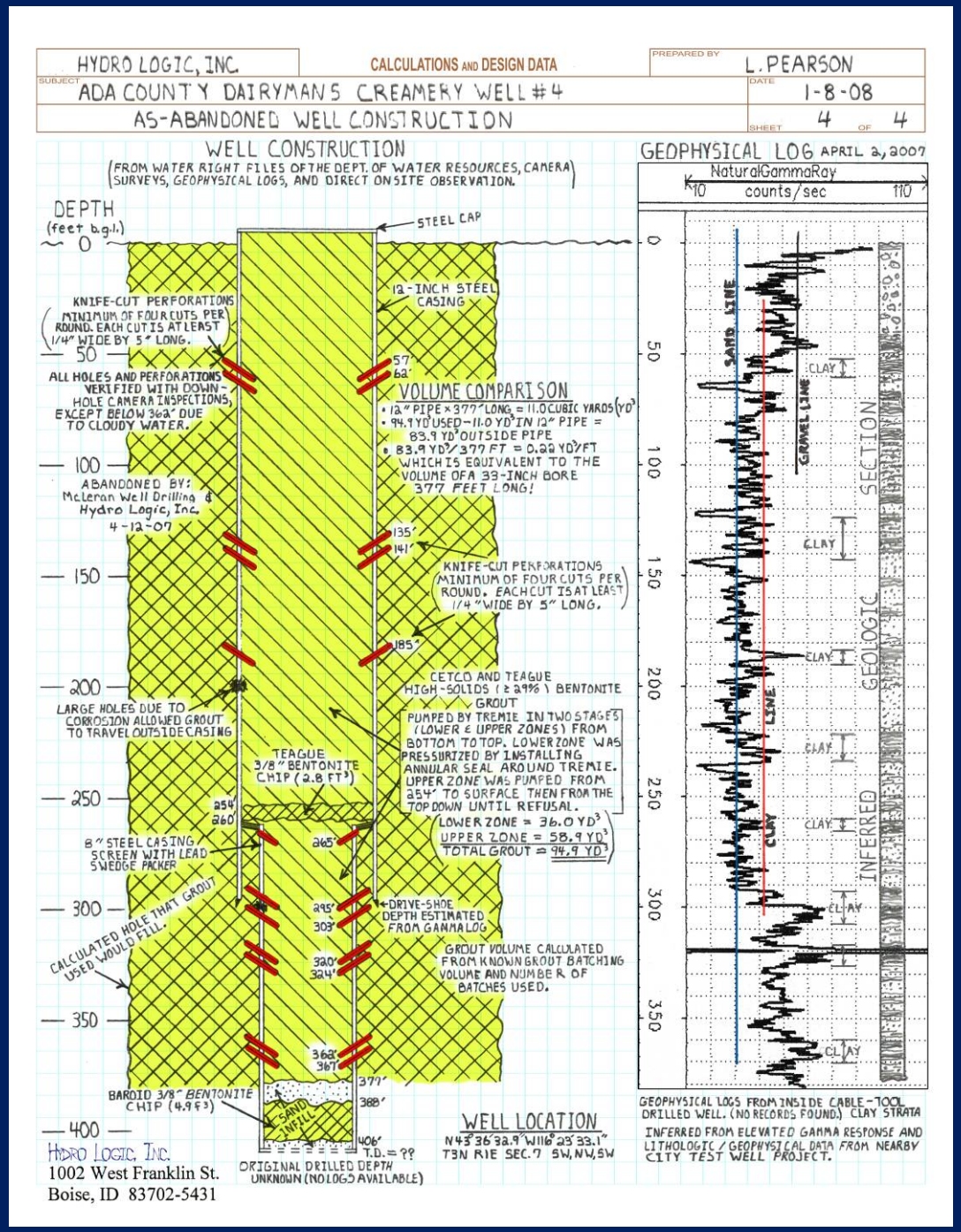
- Casing Volume-1cy
- Grout Volume Pumped- 8cy
- 7 Cy Pumped Outside Of Casing



Example 2

Meridian Creamery Well #4 Abandonment (Meridian City Hall)

- Casing volume-11cy
- Grout Volume Pumped-95cy
- 84 cy pumped outside of casing
- About the same volume as a 40ft freight trailer



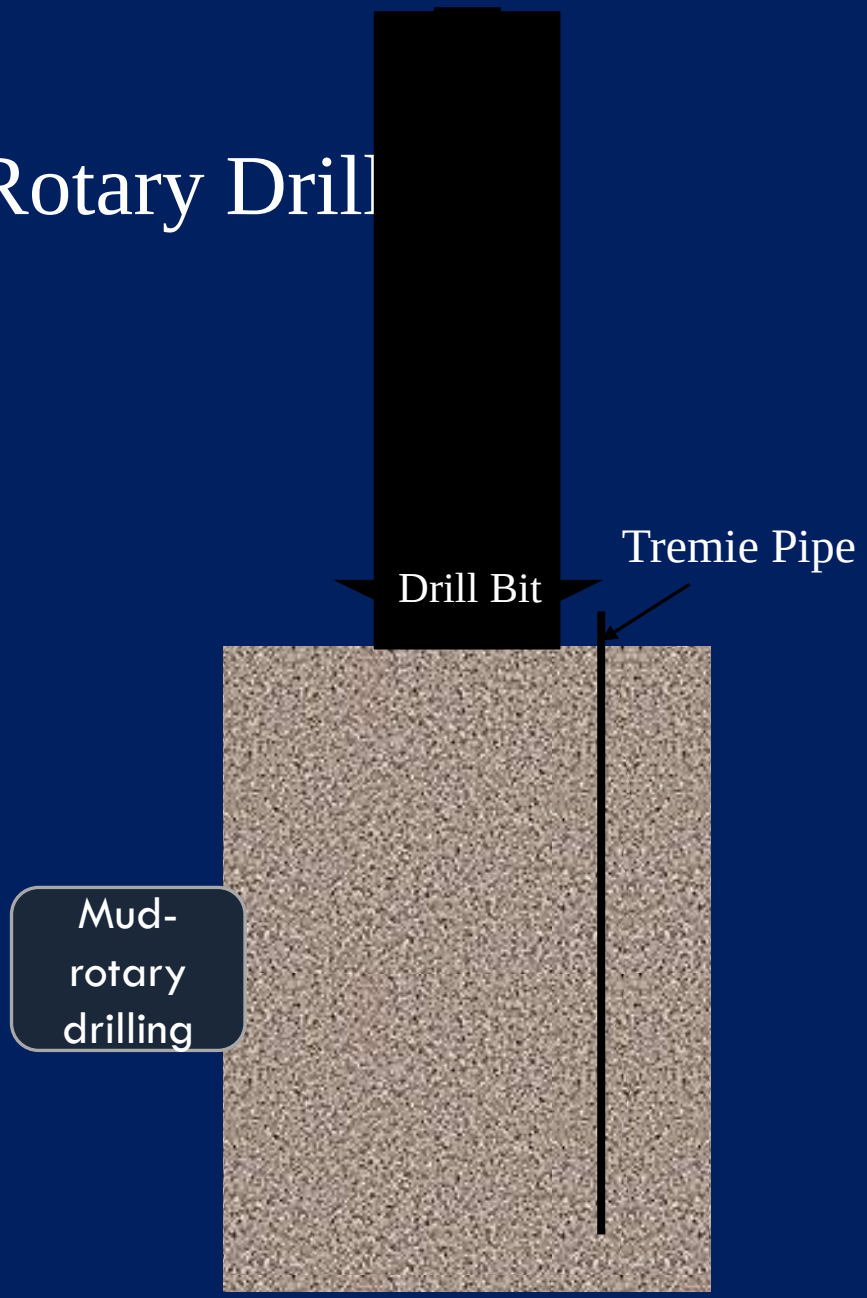
Solution

Well Construction Techniques Appropriate For The Geological Setting:

- Wells need to be constructed so the area outside of the casing is sealed from land surface to the production zone
- Mud-rotary drilling and pumped grout seals
- Limit screened intervals
- Perforate and pressure grout wells being abandoned

Solution: Mud-Rotary Drill

- Enables placements of full-depth casing seals



Solution

Meridian Worked With IDWR:

- Petitioned IDWR For Designation Of An "Area Of Drilling Concern" (ADC)

SOLUTION: Area Of Drilling Concern Explained

IDAHO ADMINISTRATIVE RULES

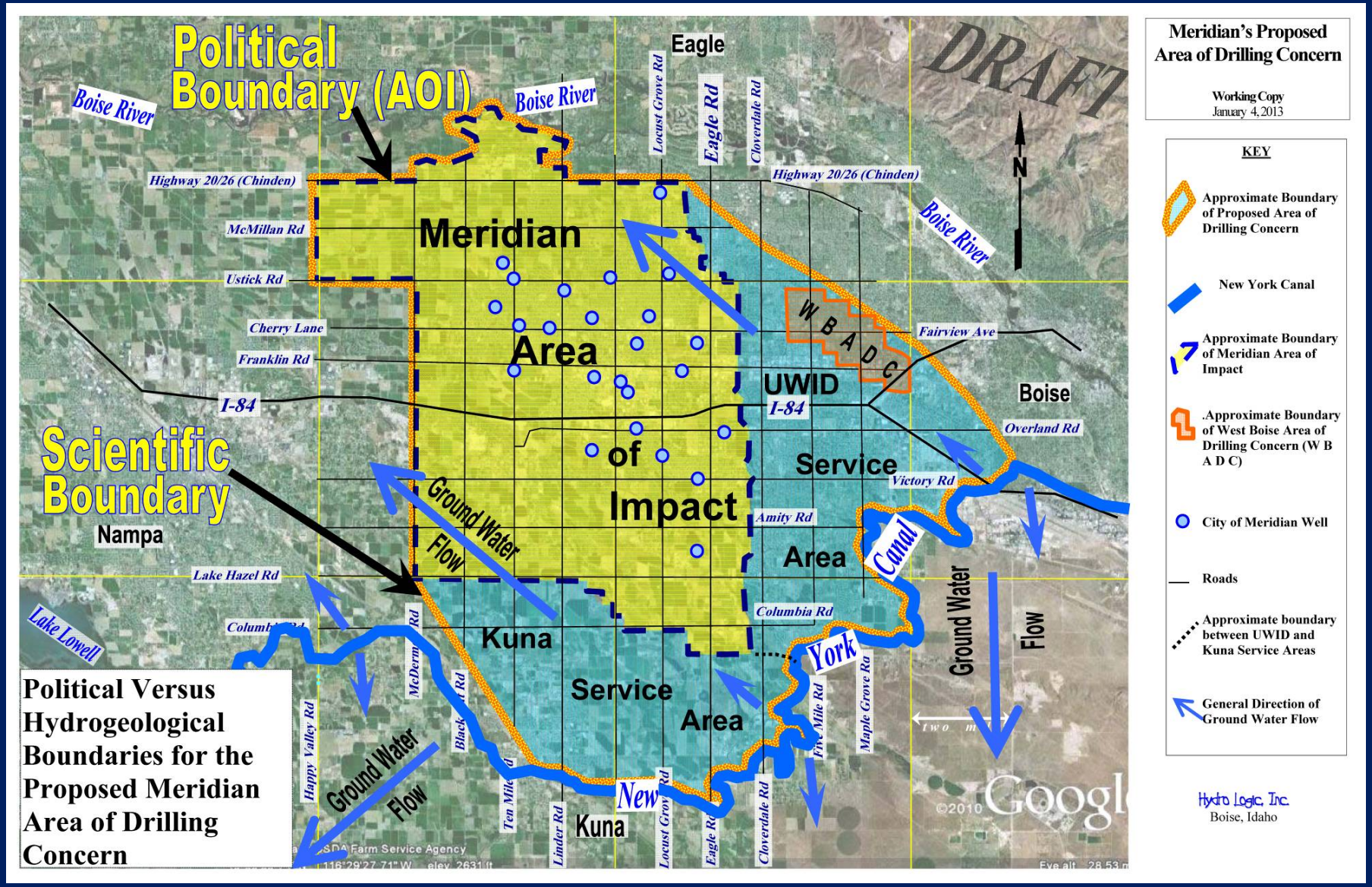
37.03.09 - Well Construction Standards Rules

040. Areas Of Drilling Concern (Rule 40)

01. General (7-1-93)

A. The Director may designate an “area of drilling concern” to protect public health, or to prevent waste and contamination of ground or surface water, or both, because of factors such as aquifer pressure, vertical depth to the aquifer, warm or hot ground water, or contaminated ground or surface waters. (7-1-93)

Solution: Political and Scientific Boundaries



Political Versus Hydrogeological Boundaries for the Proposed Meridian Area of Drilling Concern

Solution: Results of Petition (IDWR Order)

- Area Of Drilling Concern Denied Based On Lack Of Information
- Procedures And Standards Changed In Area (Area Of Groundwater Concern)
  - Start cards suspended. Permit application and prospectus required.
  - Domestic wells limited to 200 ft unless adequate water is not available and must be sealed through surface gravels.
  - Wells deeper than 200 ft require full depth seal with pumped grout.
  - SST or plastic screen required. Screened interval limited to 20 feet.
  - Perforation and pressure grouting required for well abandonment.

What’s Next?

- Monitor implementation of new procedures and standards
- Communicate with stakeholders
  - Drillers, Owners, Developers, Water Providers, Regulators, Elected Officials
- Improve source water protection by expanding higher standards to appropriate boundaries
  - Gather needed information
  - Work with IDWR

Questions / Discussion

https://idwr.idaho.gov/wells/areas-of-drilling-concern.html