

Welcome!

Hydraulic Fracturing Forum

Denver Marriott West, Golden, Colorado



Purpose of the Forum

- Builds upon a DC public meeting held in Nov.
- Outreach to stakeholders to provide the Department a more in-depth technical review.
- Part of the Department's proactive effort to ensure that oil and gas development is taking place on public lands in a responsible and environmentally sustainable manner.

Agenda: Part 1

4:00 – 4:50 Introduction and background

- Welcome and Introductions
- Background presentation on hydraulic fracturing
- BLM's regulatory authority
- BLM's oversight responsibility

10 minute break

Agenda: Part 2

5:00 – 6:30 Oil and gas development perspectives: state regulators, industry and civil society

- Water management –frack water, flow-back water and produced water
- Protecting our drinking water resources
- Industry best management practices
- Disclosure of chemicals in the frack fluid
- Tribal considerations
- Sportsmen's perspectives
- Environmentalists concerns
- Balancing the risk and rewards of new oil and gas resources

10 minute break

Agenda: Part 3

6:30 – 9:00 Public Questions and Comments to a Panel of Experts

- Audience questions live or written on cards handed to the moderator
- Closing Remarks

End

Exchange of Ideas

- Courteous
- Everyone should get a chance to participate - no one dominates
- Rational
- Seek to understand
- Challenge the assertions not the person

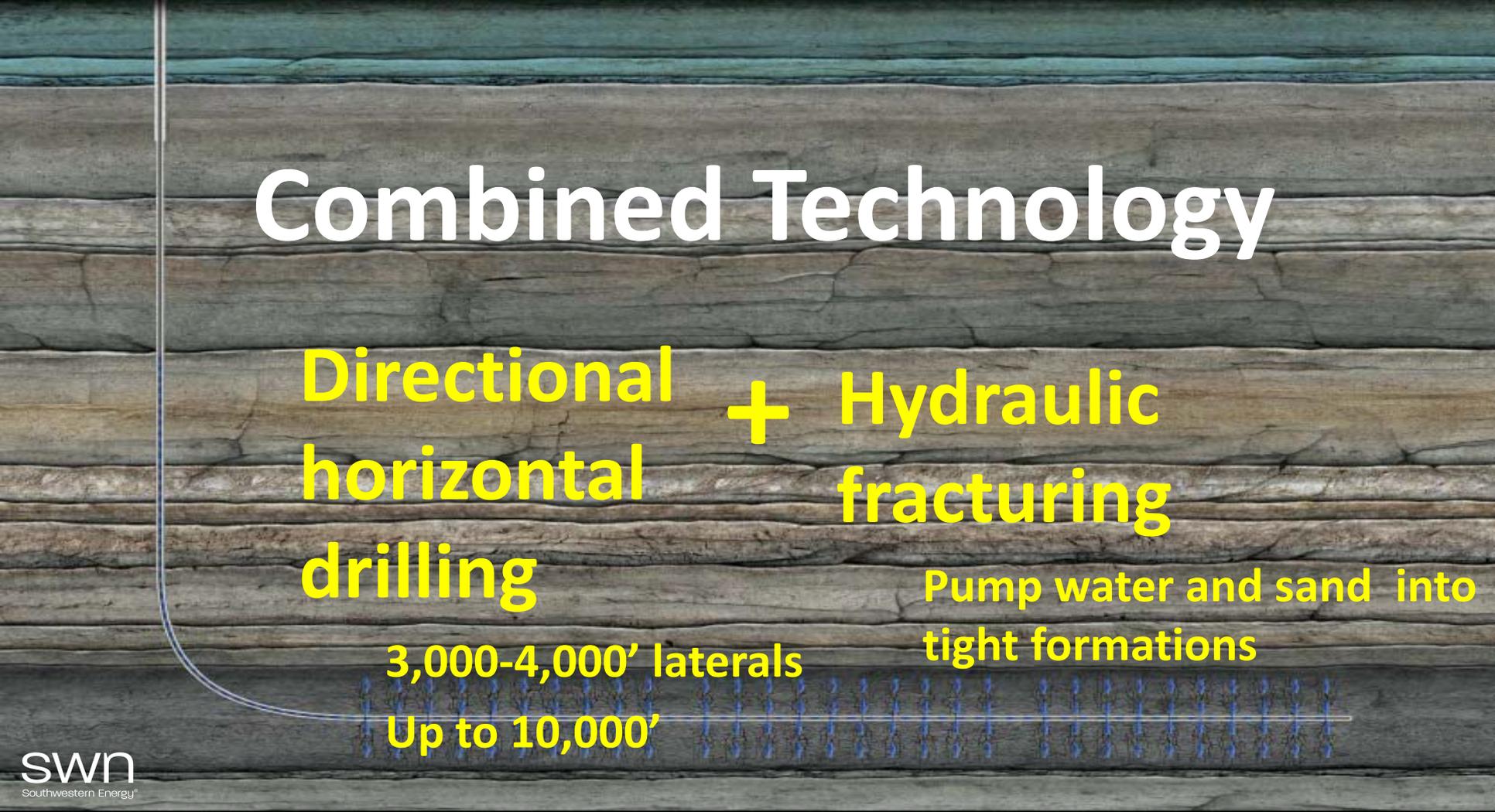
Hydraulic Fracturing 101

A grounding presentation

An Energy Game Changer



Combined Technology



**Directional
horizontal
drilling** + **Hydraulic
fracturing**

3,000-4,000' laterals

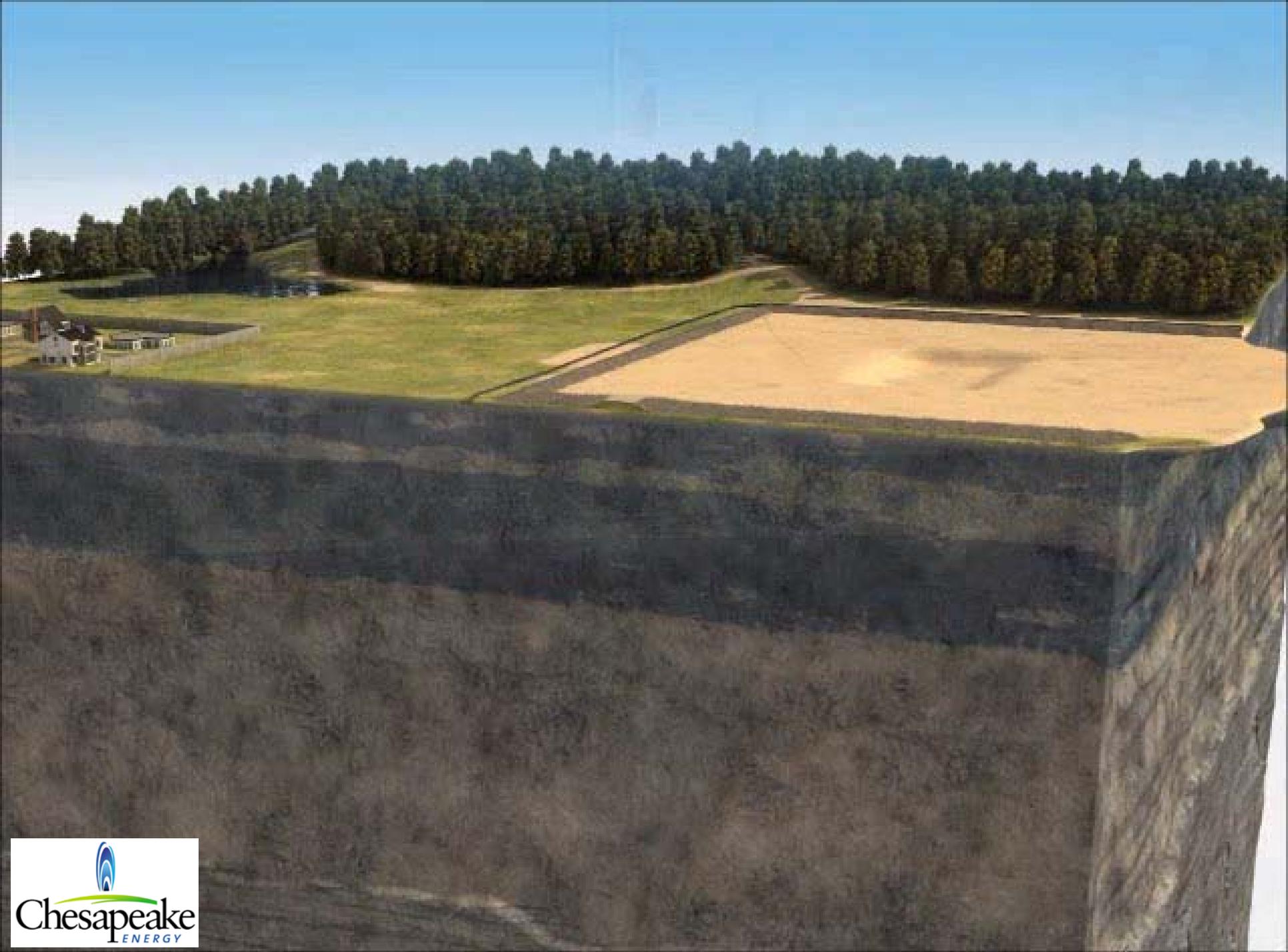
Up to 10,000'

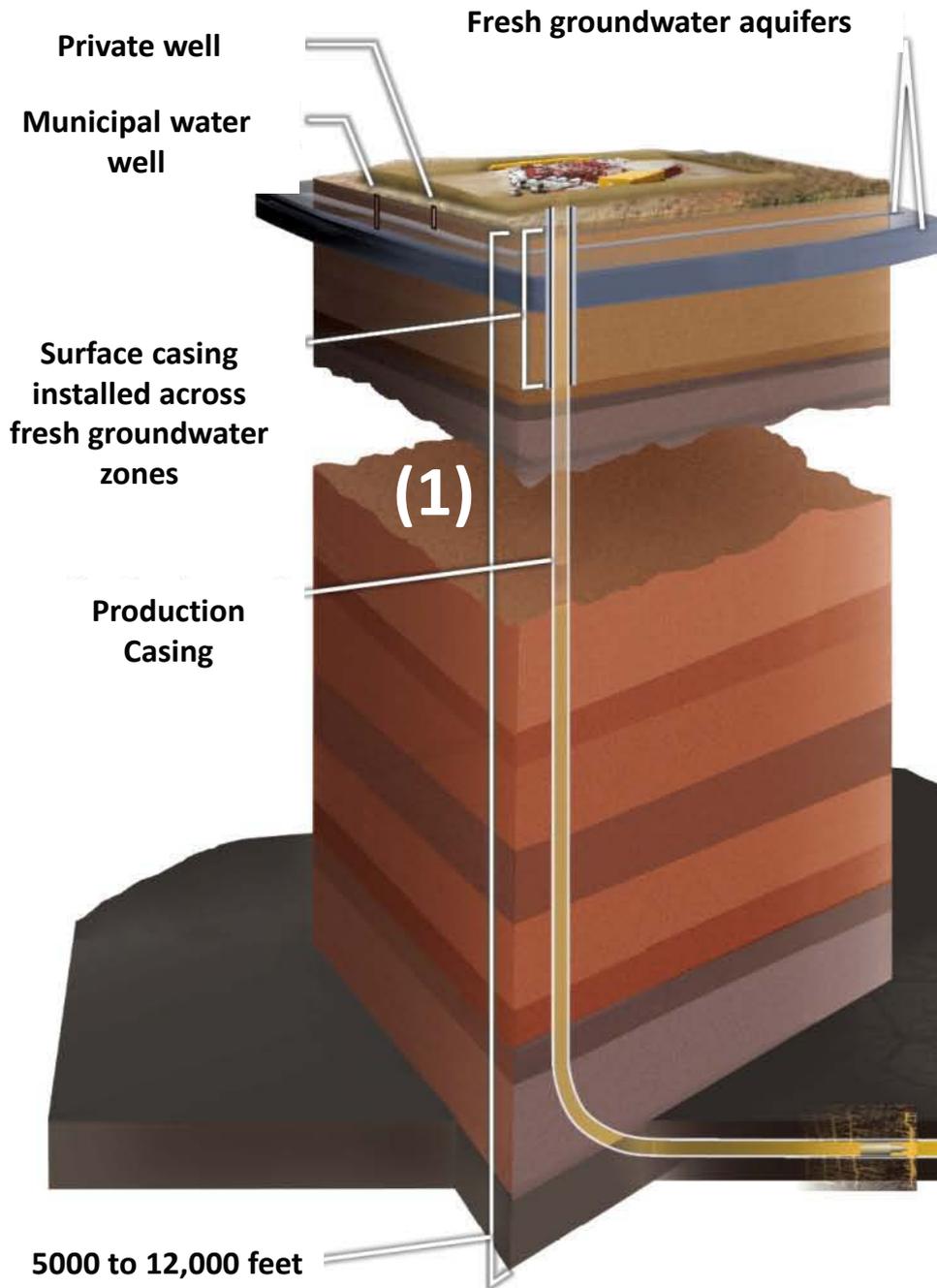
Pump water and sand into
tight formations

North American Shale Plays (as of March 2011)



Source: Energy Information Administration based on data from various published studies.
Updated: March 21, 2011



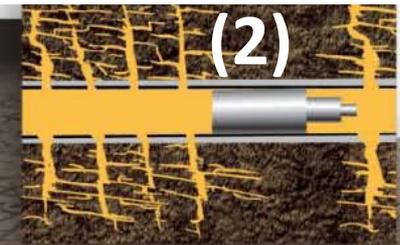


Subsurface- potential impact on groundwater.

- How to do it right?
- How it might go wrong?
- Where are the risks?

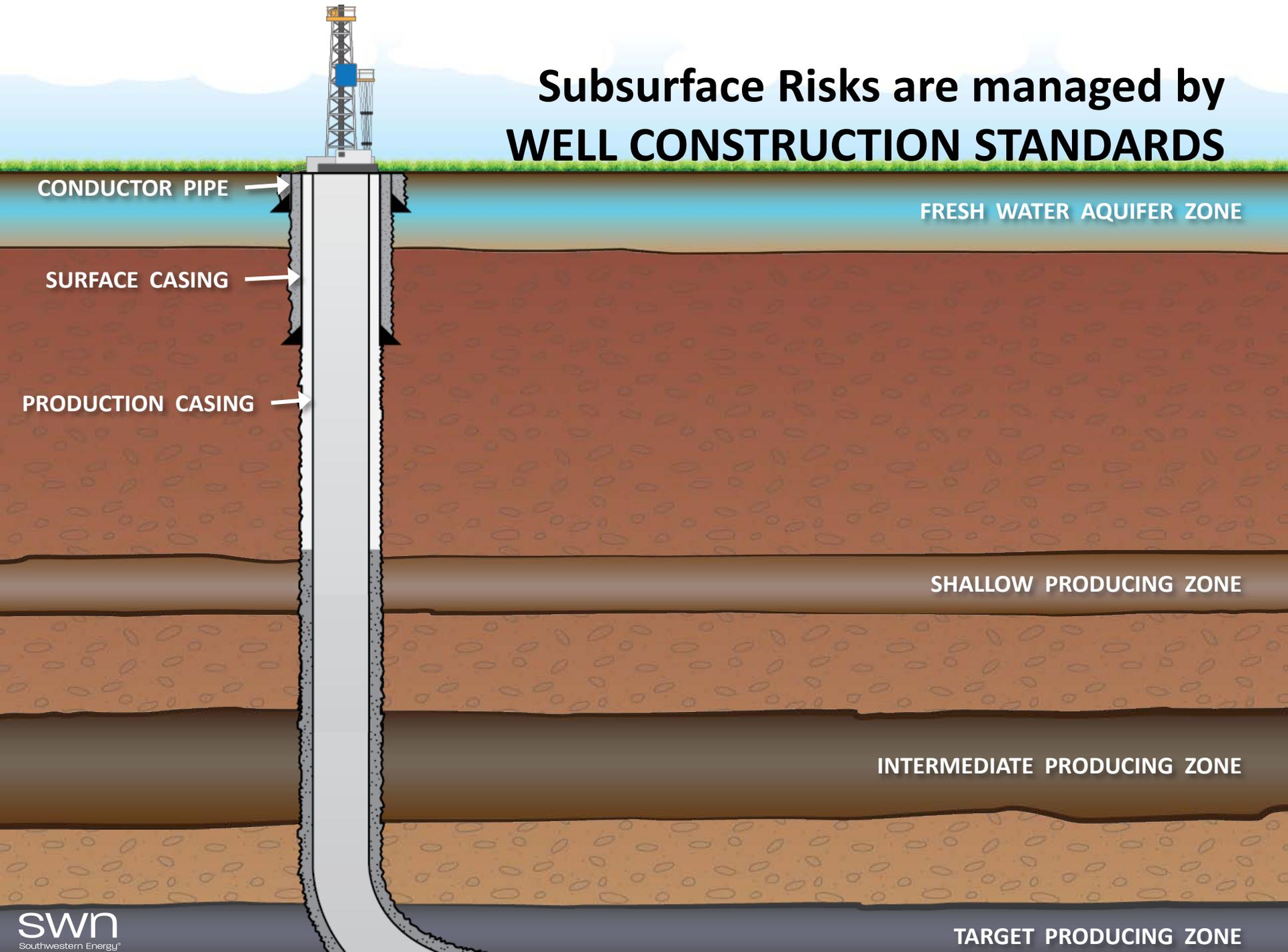
1. Drilling, well design or completion
2. Hydraulic Fracturing

Hydraulically fractured gas and oil formation



5000 to 12,000 feet

Subsurface Risks are managed by WELL CONSTRUCTION STANDARDS



CONDUCTOR PIPE

SURFACE CASING

PRODUCTION CASING

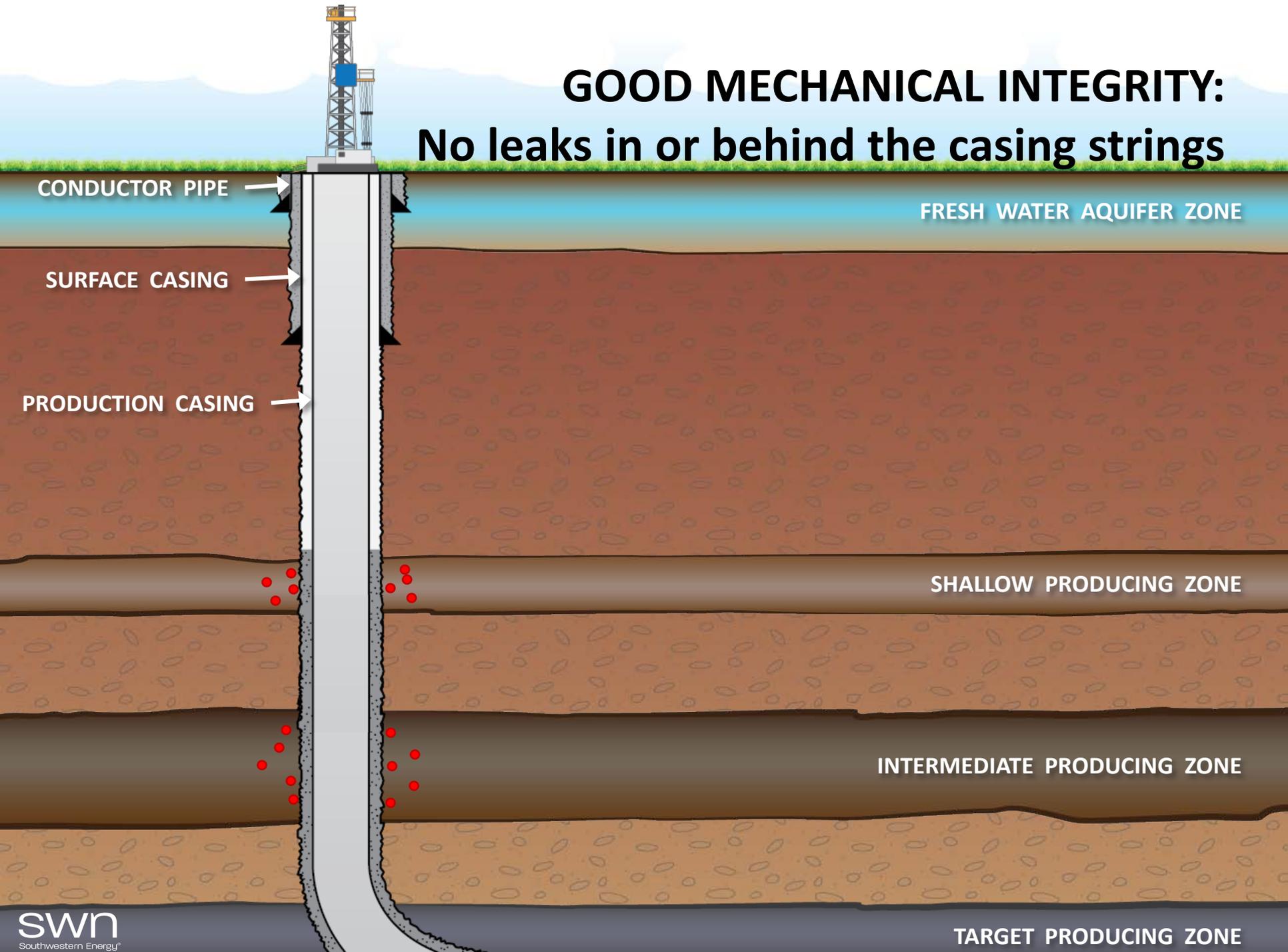
FRESH WATER AQUIFER ZONE

SHALLOW PRODUCING ZONE

INTERMEDIATE PRODUCING ZONE

TARGET PRODUCING ZONE

GOOD MECHANICAL INTEGRITY: No leaks in or behind the casing strings



CONDUCTOR PIPE

SURFACE CASING

PRODUCTION CASING

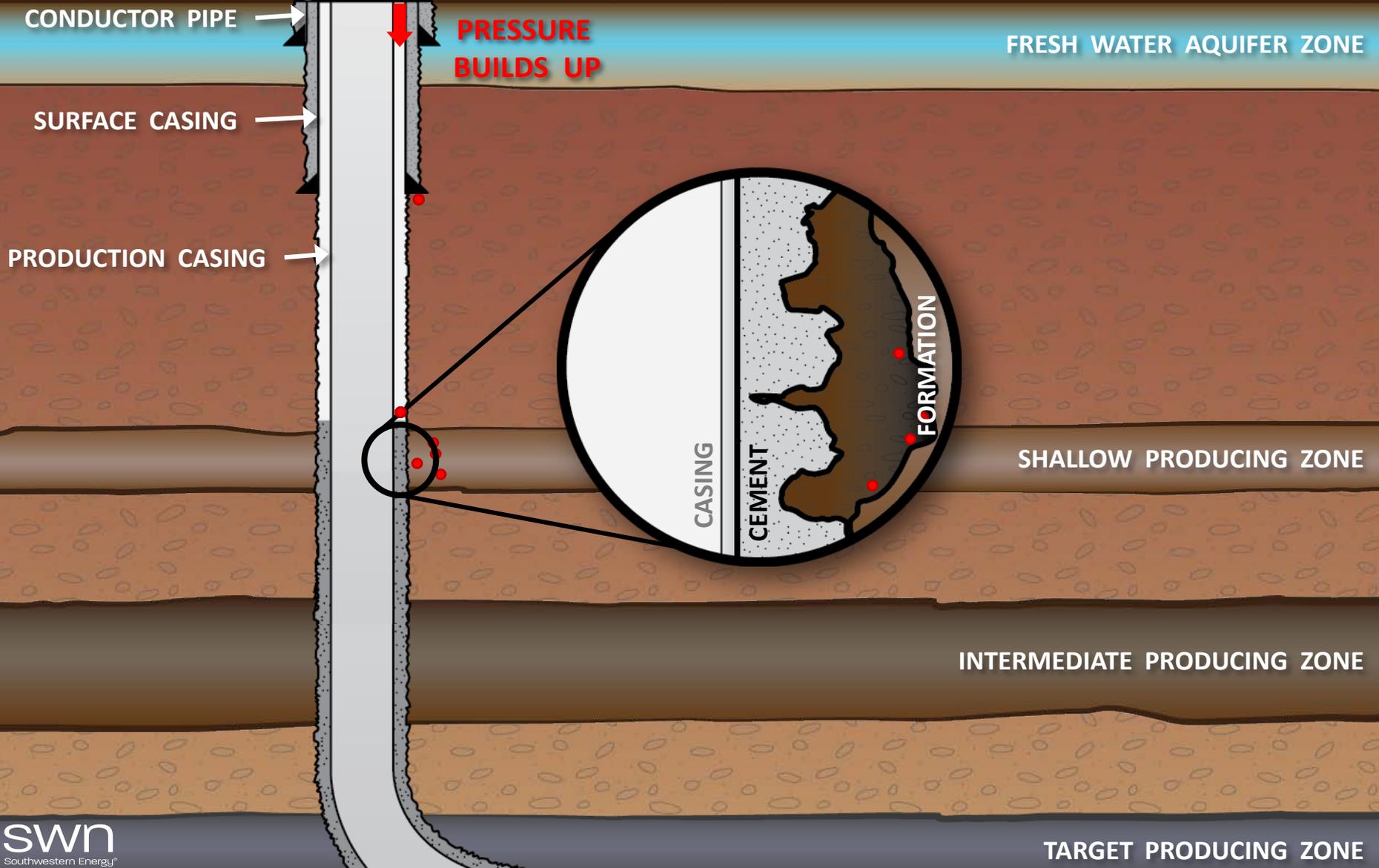
FRESH WATER AQUIFER ZONE

SHALLOW PRODUCING ZONE

INTERMEDIATE PRODUCING ZONE

TARGET PRODUCING ZONE

CEMENT CHANNELING behind production casing



INSUFFICIENT CEMENT COVER

CONDUCTOR PIPE

SURFACE CASING

PRODUCTION CASING

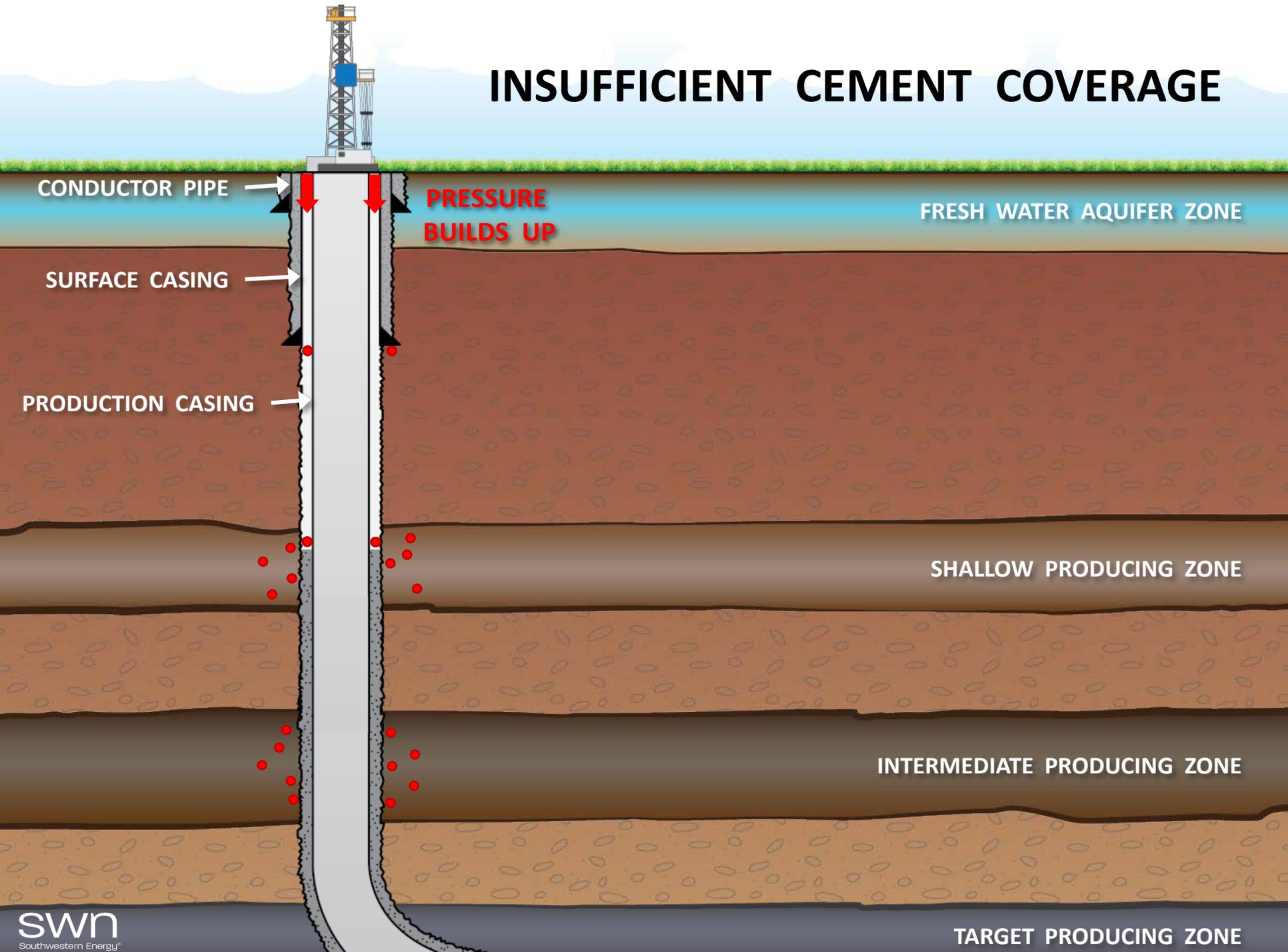
PRESSURE
BUILDS UP

FRESH WATER AQUIFER ZONE

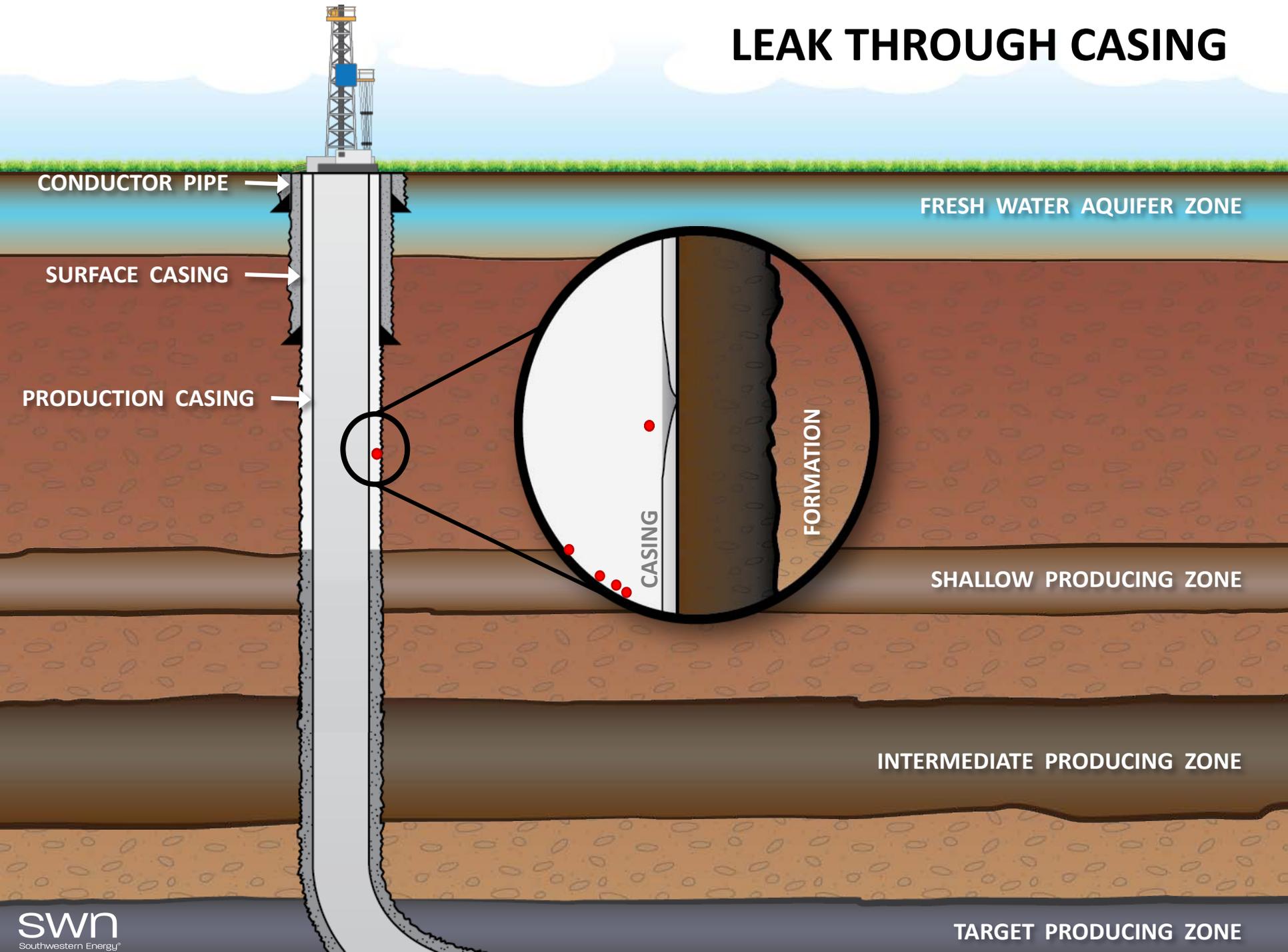
SHALLOW PRODUCING ZONE

INTERMEDIATE PRODUCING ZONE

TARGET PRODUCING ZONE



LEAK THROUGH CASING



CONDUCTOR PIPE

SURFACE CASING

PRODUCTION CASING

FRESH WATER AQUIFER ZONE

SHALLOW PRODUCING ZONE

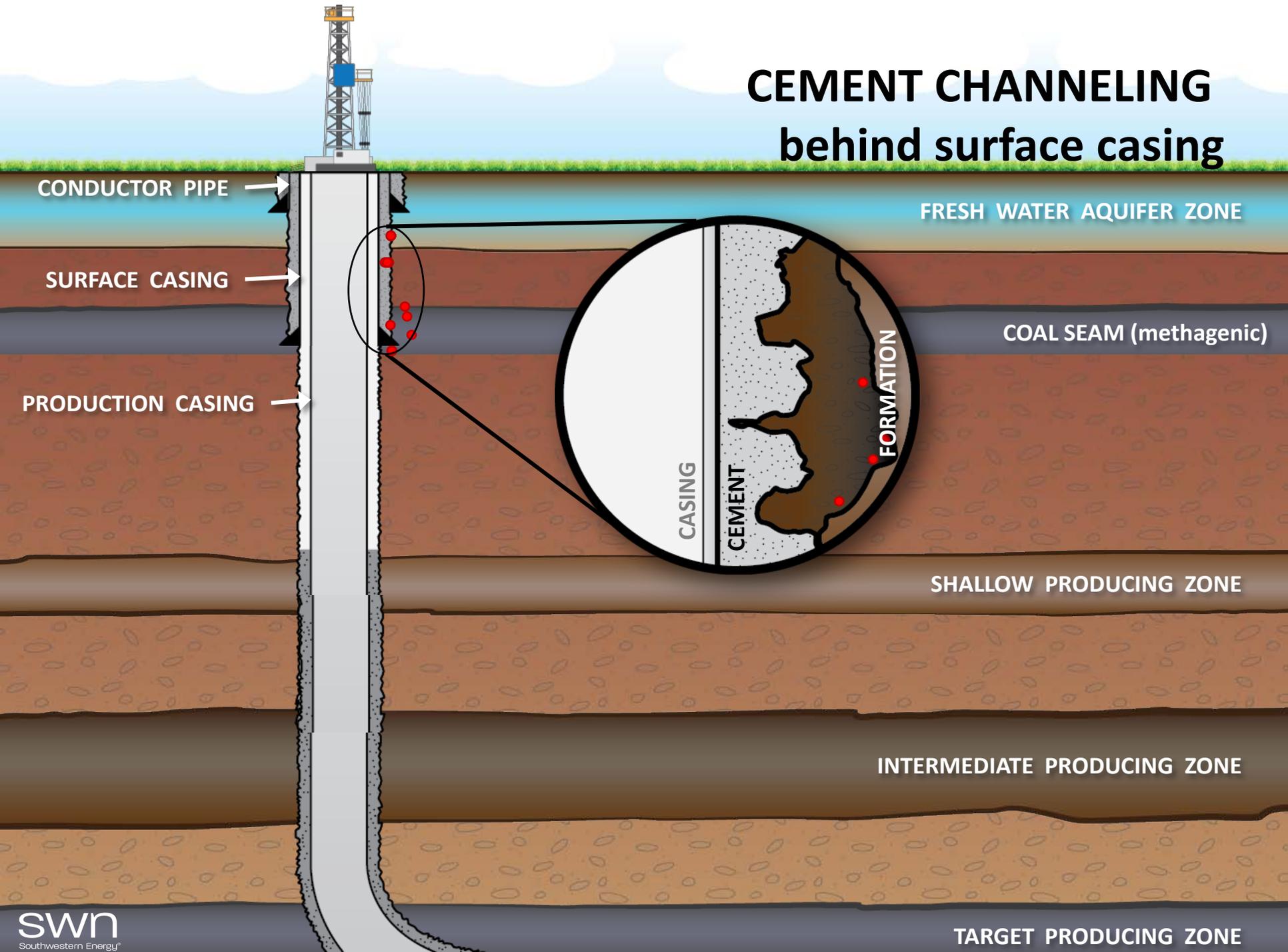
INTERMEDIATE PRODUCING ZONE

TARGET PRODUCING ZONE

CASING

FORMATION

CEMENT CHANNELING behind surface casing



CONDUCTOR PIPE

SURFACE CASING

PRODUCTION CASING

FRESH WATER AQUIFER ZONE

COAL SEAM (methagenic)

CASING

CEMENT

FORMATION

SHALLOW PRODUCING ZONE

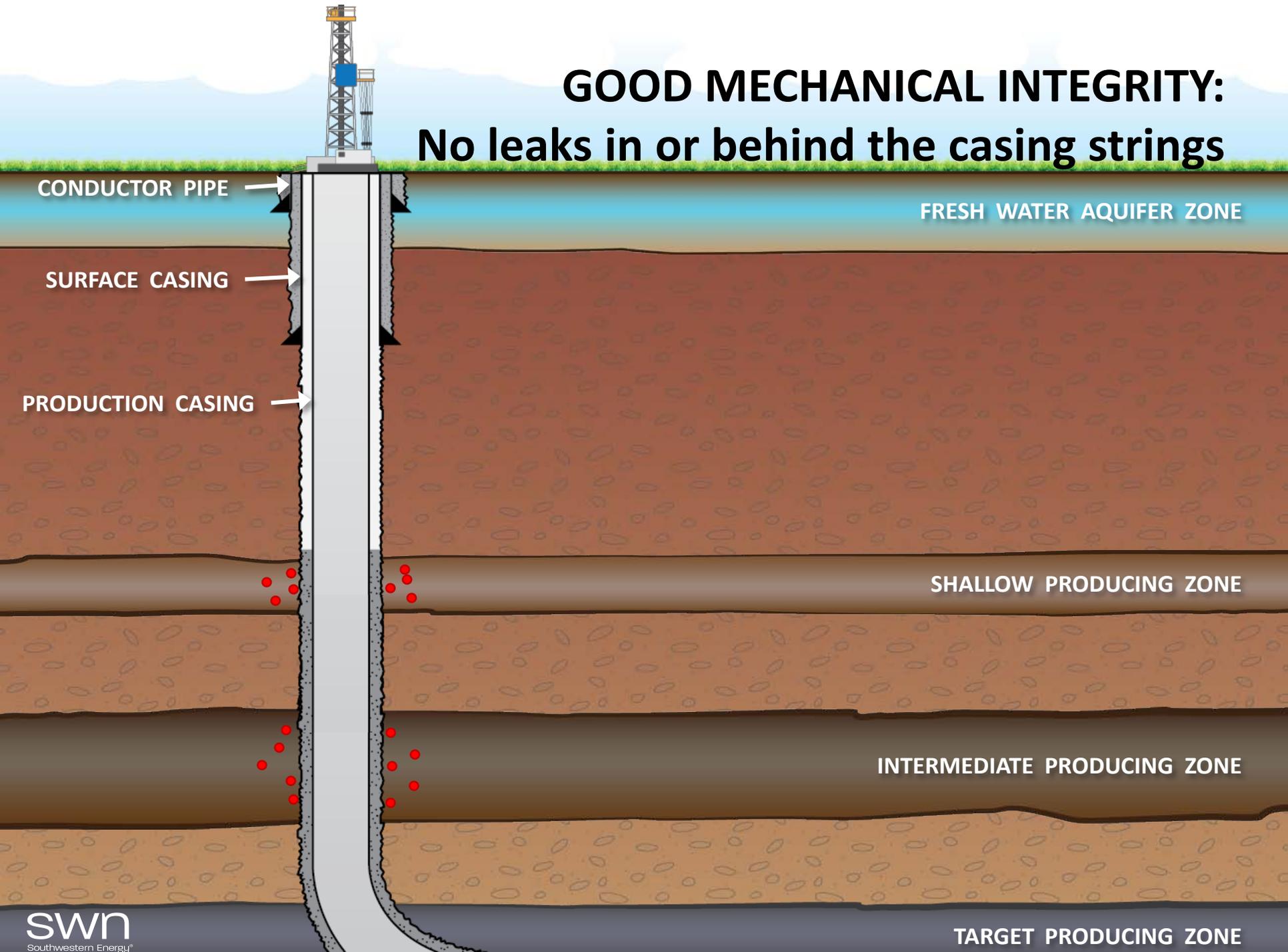
INTERMEDIATE PRODUCING ZONE

TARGET PRODUCING ZONE

Subsurface Considerations

**Well Integrity
Is the Key!**

GOOD MECHANICAL INTEGRITY: No leaks in or behind the casing strings



CONDUCTOR PIPE

SURFACE CASING

PRODUCTION CASING

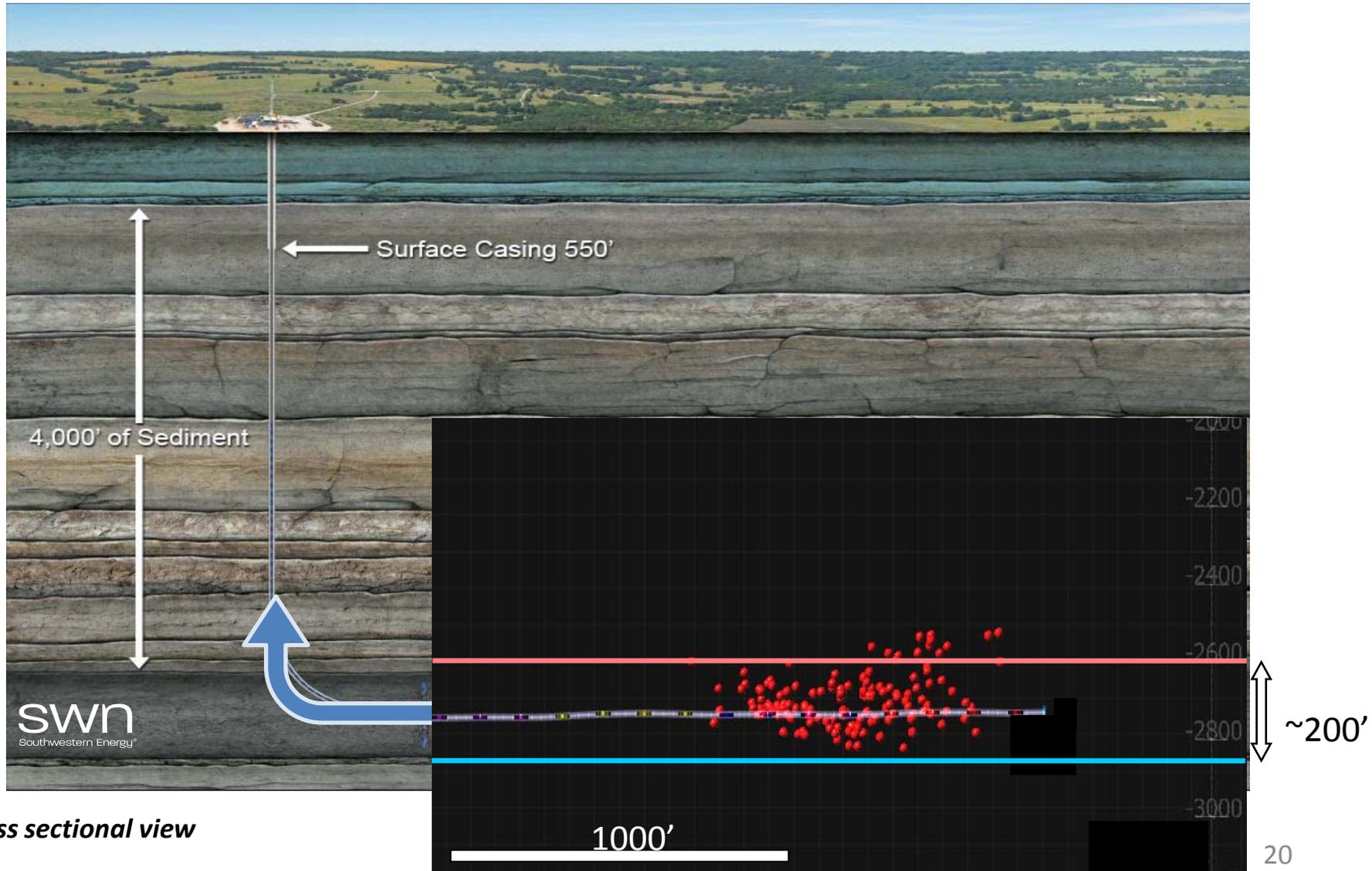
FRESH WATER AQUIFER ZONE

SHALLOW PRODUCING ZONE

INTERMEDIATE PRODUCING ZONE

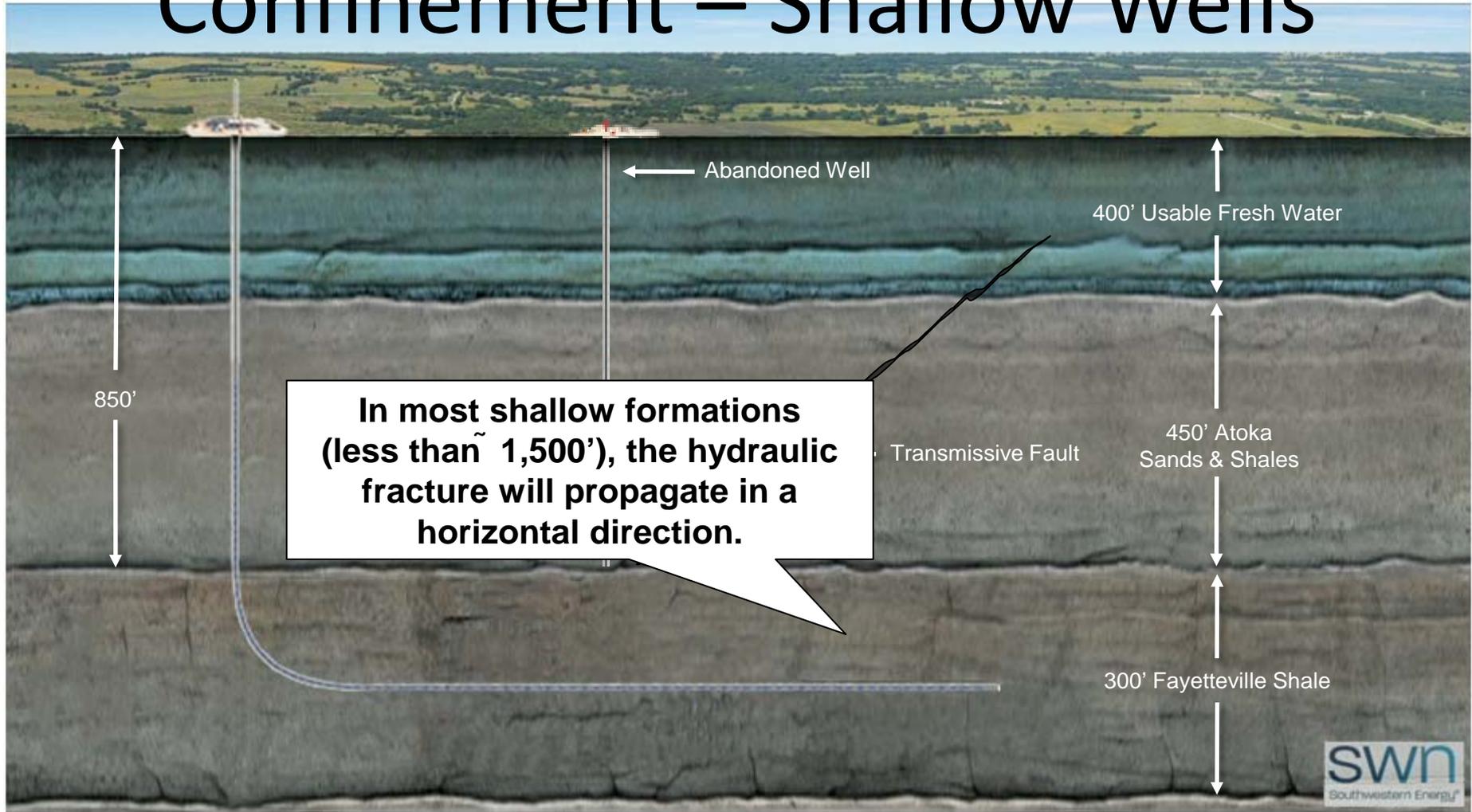
TARGET PRODUCING ZONE

Flow goes toward the well bore

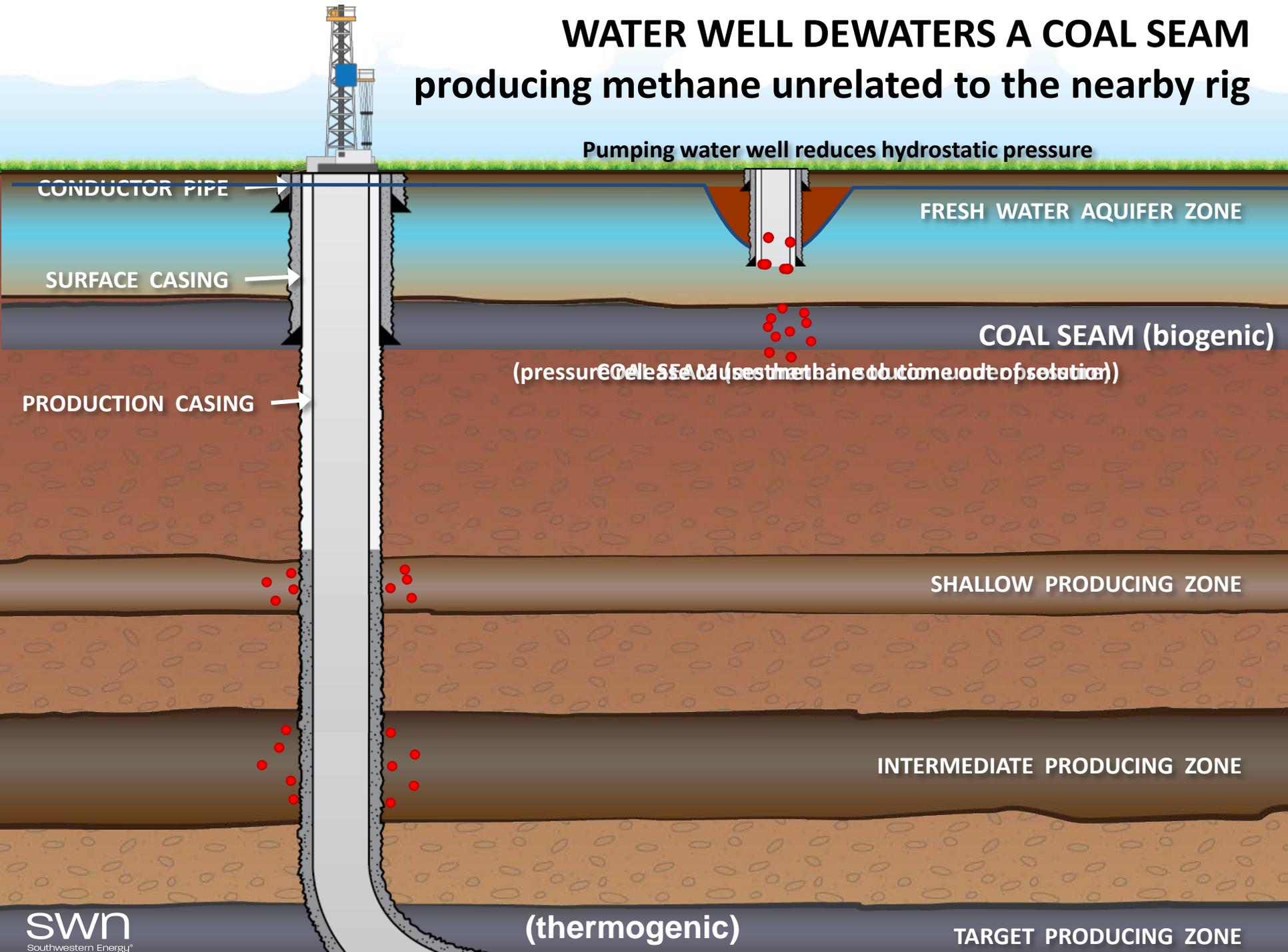


Cross sectional view

Evaluating Stratigraphic Confinement – Shallow Wells



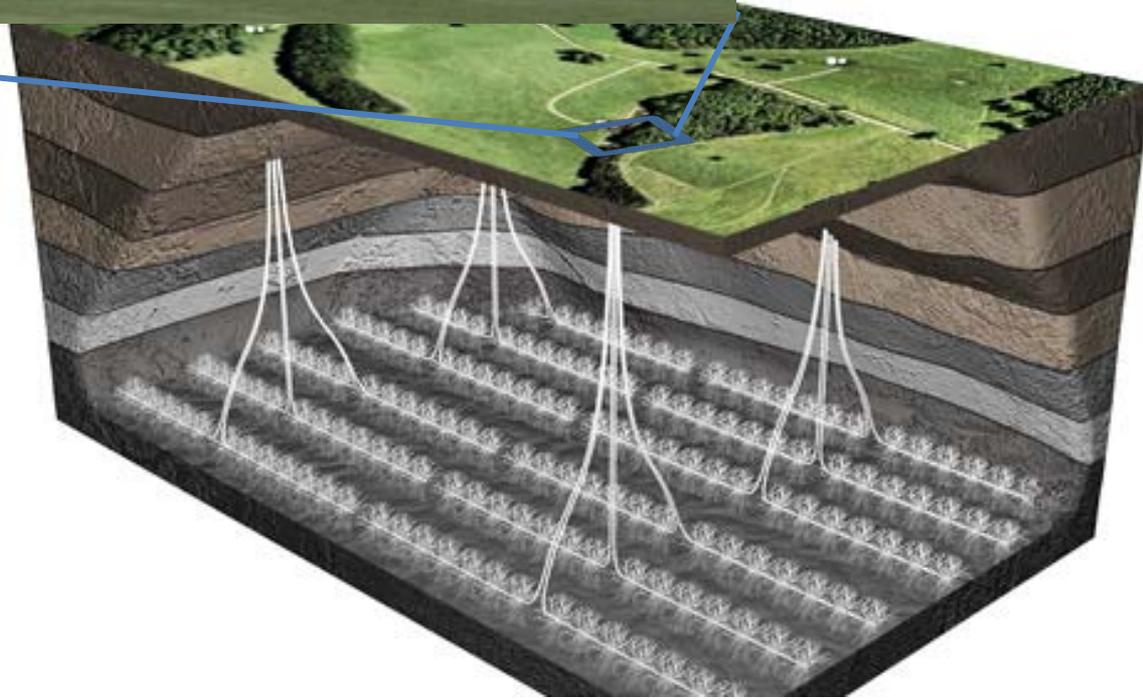
WATER WELL DEWATERS A COAL SEAM producing methane unrelated to the nearby rig



Surface Considerations



Multiple wells drilled per drill pad reduces surface disturbance



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