RARELY, A NEW INDUSTRY IS BORN AND WE ARE WITNESSING IT TODAY
THE PERMIAN BASIN
COMMERCIAL WATER RECYCLING IN THE PERMIAN BASIN
This oil and gas development is so new that most people haven’t heard of it yet.

• **Water Midstream**

• “Midstream” is not a new O&G term

• We are giving this term a brand new definition
MIDSTREAM IS A WELL-ESTABLISHED SEGMENT OF THE OIL AND GAS INDUSTRY THAT IS ALL ABOUT TRANSFER AND STORAGE OF HYDROCARBONS
WATER MIDSTREAM IS DIFFERENT

Water Midstream is all about transfer and storage of massive amounts of water for oil and gas industry use [read: fracking]
IT’S ALL HAPPENING IN THE PERMIAN BASIN, BUT THE INDUSTRY AND TECHNOLOGY IS EXPECTED TO SPREAD TO THE OTHER SHALE BASINS IN THE US
THE PERMIAN BASIN
THE PERMIAN BASIN
FRACKING HAS LED TO A BUSINESS EXPLOSION IN THE PERMIAN BASIN
FRACKING HAS LED TO A BUSINESS EXPLOSION IN THE PERMIAN BASIN

Texas, By Itself, Is Now The World’s Third Largest Oil Producer

5 Millions Barrels/Day
A NEW GOLD RUSH!
CONDITIONS ARE PRIMITIVE
CONDITIONS ARE PRIMITIVE...
TYPICAL FRACK FIELD
FASCINATING

SO WHAT'S THE PROBLEM?
WATER USE PER WELL IS RAPIDLY INCREASING

• First fracked wells required about 1 million gallons

• 10 million gallons per well is now common

• 100 million gallons is forecast
WHY IS PER-WELL WATER USAGE RAPIDLY INCREASING?

Laterals are growing in length....
WHY IS PER-WELL WATER USAGE RAPIDLY INCREASING?

ZIPPER FRACKING
2 WELLS AT THE SAME TIME
WATER USE IN THE US BY CATEGORY

Percentage of Water Used by Category

- Thermoelectric Power: 41%
- Public Supply: 12%
- Irrigation: 37%
- Livestock: 5%
- Mining and Oil & Gas: 1%
- Domestic: 1%
- Aquaculture: 2%
THIS IS HOW WATER TRADITIONALLY GETS TO THESE SITES
HOW IS THIS WATER DELIVERED?
AND CONSTANT TRUCK TRAFFIC THIS LEADS TO....
HIGHWAY 285 NORTH FROM PECOS TERMED “MOST DANGEROUS HIGHWAY IN US”
WHERE DO THE WASTES GO?
WHERE DO THE WASTES GO?

WASTE FLUIDS HAVE HISTORICALLY BEEN DISPOSED IN INJECTION WELLS
BASICS OF DEEP WELL INJECTION

Classes of Injection Wells

Class I Wells: Injection of industrial and municipal wastes to improve groundwater

Class II Wells: Injection of fluid into oil deposits to recover oil and natural gas and reduce seismic activity

Class III Wells: Injection of fluids to enhance oil and natural gas recovery

Class IV Wells: Injection of fluids to dispose of contaminated water

Class V Wells: Injection of fluids to dispose of non-hazardous waste

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Sources: R. Laurence Davis, Ph.D., University of New Haven, E.P.A.

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CLASS I/II REQUIREMENTS

Class I (~800)
- Location & well design
- AOR~2.5 mi
- Geologic siting info
- USDW protection
- Operating program
- Chemical compatibility
- Financial assurance

Class II (~175,000)
- Location & well design
- AOR~.25 mi
Class II Wells

*Production wells are not regulated by the UIC program.
AND INJECTION HAS LED TO ..........
INDUCED SEISMICITY

“EARTHQUAKES CAUSED BY HUMAN ACTIVITY”

Oklahoma: Earthquakes measuring > 3.0 surged from two in 2008 to about 900 in 2015

In the Permian Basin, earthquakes >2.5 have tripled to more than 60 in a year
2009–19 Oklahoma earthquake swarms

From Wikipedia, the free encyclopedia

This article is about earthquakes in Oklahoma and vicinity since 2009. For other pages related to Oklahoma earthquakes, see Earthquakes in Oklahoma.
Two quakes rattle parts of West Texas
FROM THE HOUSTON CHRONICLE OCTOBER 15

“Study linking fracking to Permian Basin earthquakes stirs public debate”

SO THE GOAL IS TO ELIMINATE EARTHQUAKES BY ELIMINATING INJECTION WELLS

Together
Everyone
Achieves
More
SO THE WATER MIDSTREAM INDUSTRY AIMS TO SOLVE THIS....
BY USING/CONNECTING EXISTING ABANDONED PIPELINES
THE IDEA IS TO STRATEGICALLY CONNECT **EXISTING PIPELINES** AND SURFACE IMPOUNDMENTS TO VASTLY IMPROVE WATER DELIVERY EFFICIENCY AND ALSO WATER RECYCLING.
THE IDEA IS TO STRATEGICALLY CONNECT PIPELINES AND SURFACE IMPOUNDMENTS TO VASTLY IMPROVE WATER DELIVERY EFFICIENCY AND ALSO WATER RECYLING
AND GET THE TRUCKS OFF THE ROAD!
ACTIVE PIPELINES—PERMIAN BASIN
SURFACE IMPOUNDMENTS ARE AN IMPORTANT PIECE OF THE PUZZLE
AND SO IS GRAVITY
INCREASED EFFICIENCY ACHIEVED THROUGH GRAVITY FLOW
INDUSTRY REFERS TO THIS SYSTEM OF PIPELINES AND IMPOUNDMENTS AS A “BATTERY”
THIS “BABY” IS SO NEW THAT REGULATORS AND REGULATIONS ARE RUNNING BEHIND...
BUT WHERE DOES SCS FIT IN ???
THIS BRAND NEW BABY IS OPTIMISTIC, FAST-GROWING, AND NEEDS SERVICES!
In our traditional market areas, growth requires.....

Yo! You WANT A PIECE OF ME?!!
Water Midstream is a Brand New Pie!!
WHAT’S REQUIRED TO BUILD THIS NEW INDUSTRY?
The surface impoundment liner designs are very similar to landfills.

Similar materials and designs using geosynthetics and sumps.

Related Services:
- Surveying
- CQA
- Construction Oversight
- Regulatory Liaison
- Engineer of Record
Permitting requires site characterization
WATER MIDSTREAM NEEDS GROUNDWATER MONITORING

• Well Installation is Required
• Sampling, analysis and reporting are required
TODAY...THE PERMIAN BASIN

Near Future: All US Shale Basins
THANK YOU FROM SCS ENGINEERS!

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