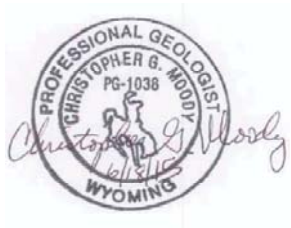
PHASE II – LARAMIE MONITOR WELL PROJECT REPORT

June 18, 2015

Submitted to:
City of Laramie
P.O. Box C
Laramie, Wyoming 82073



Prepared by:

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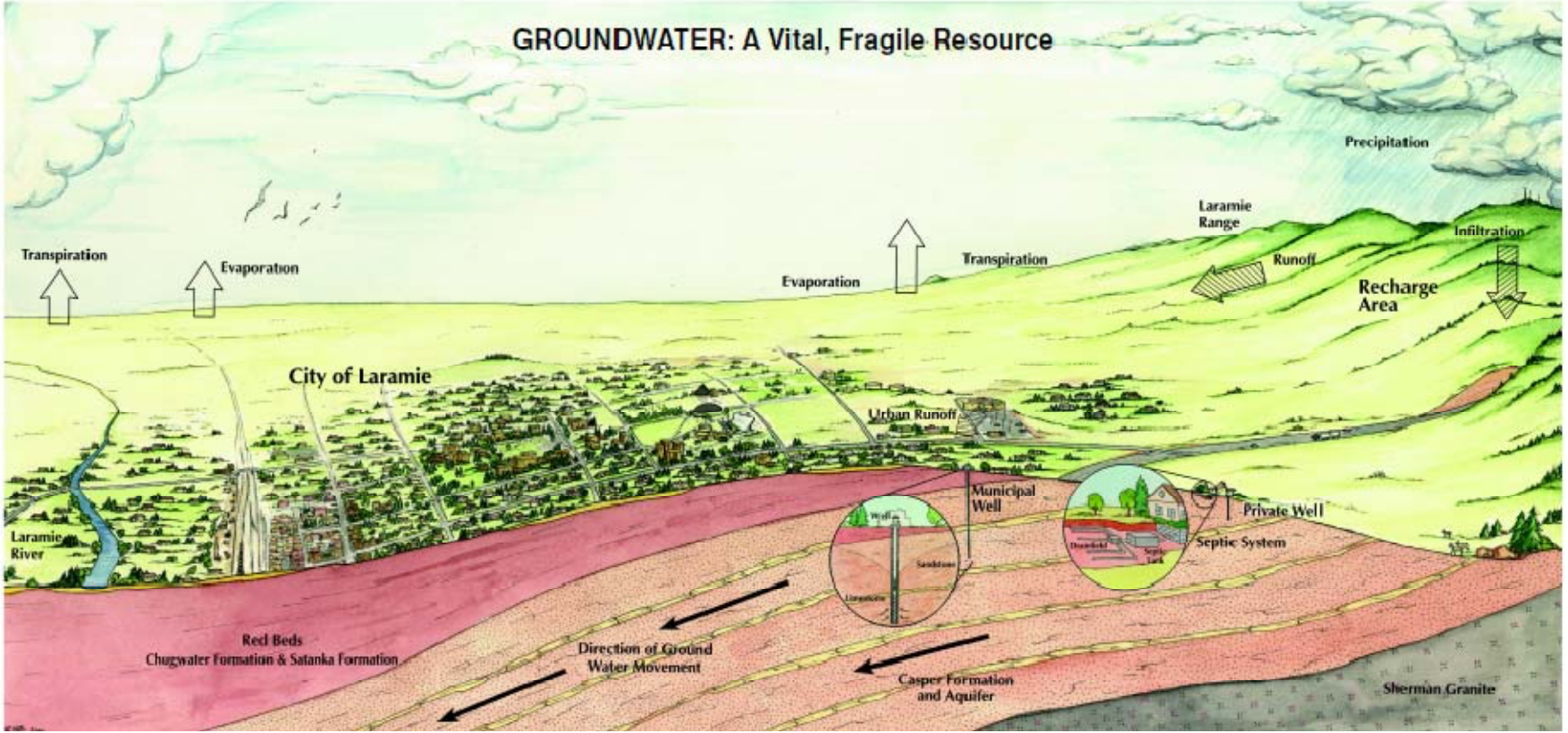
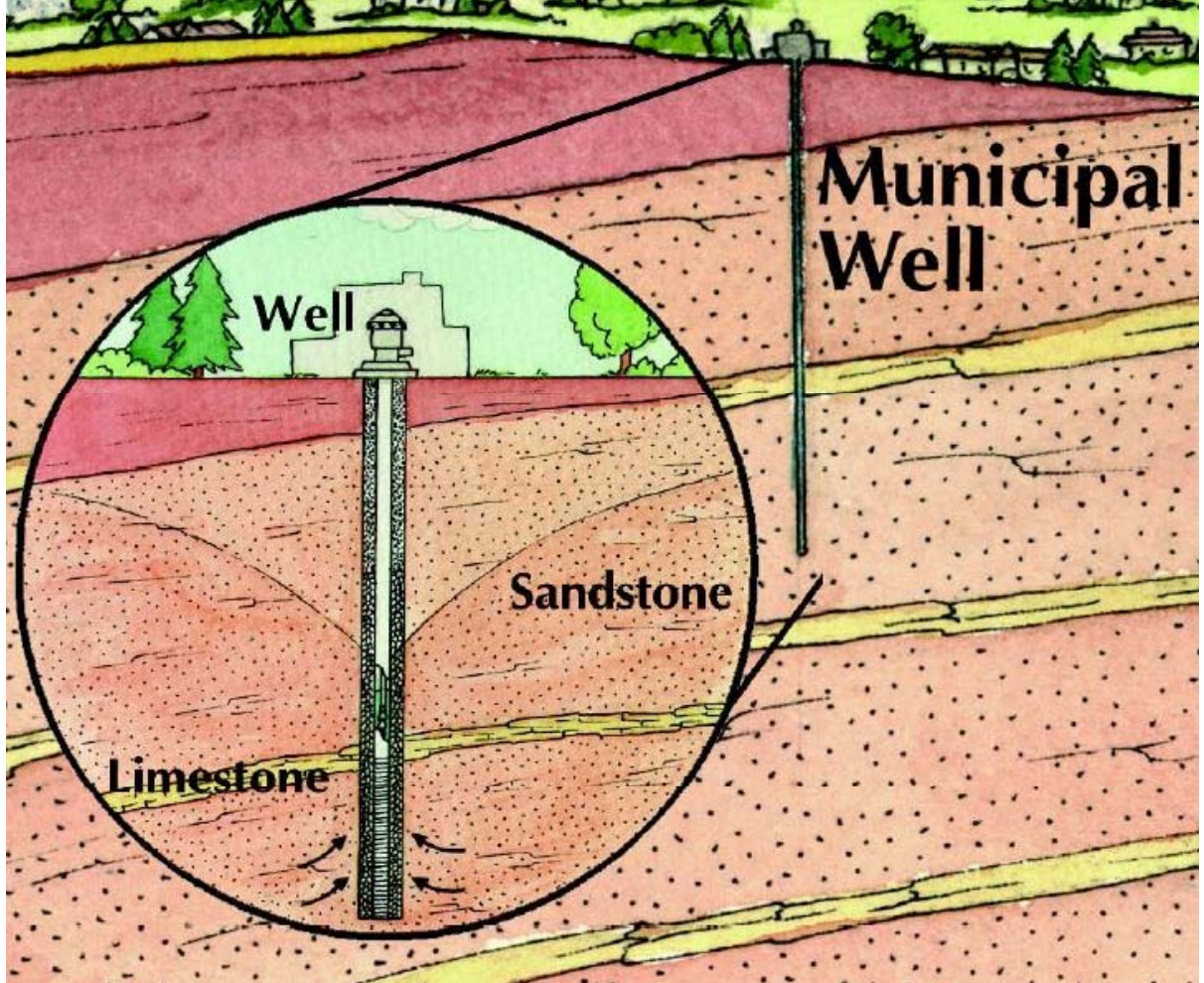
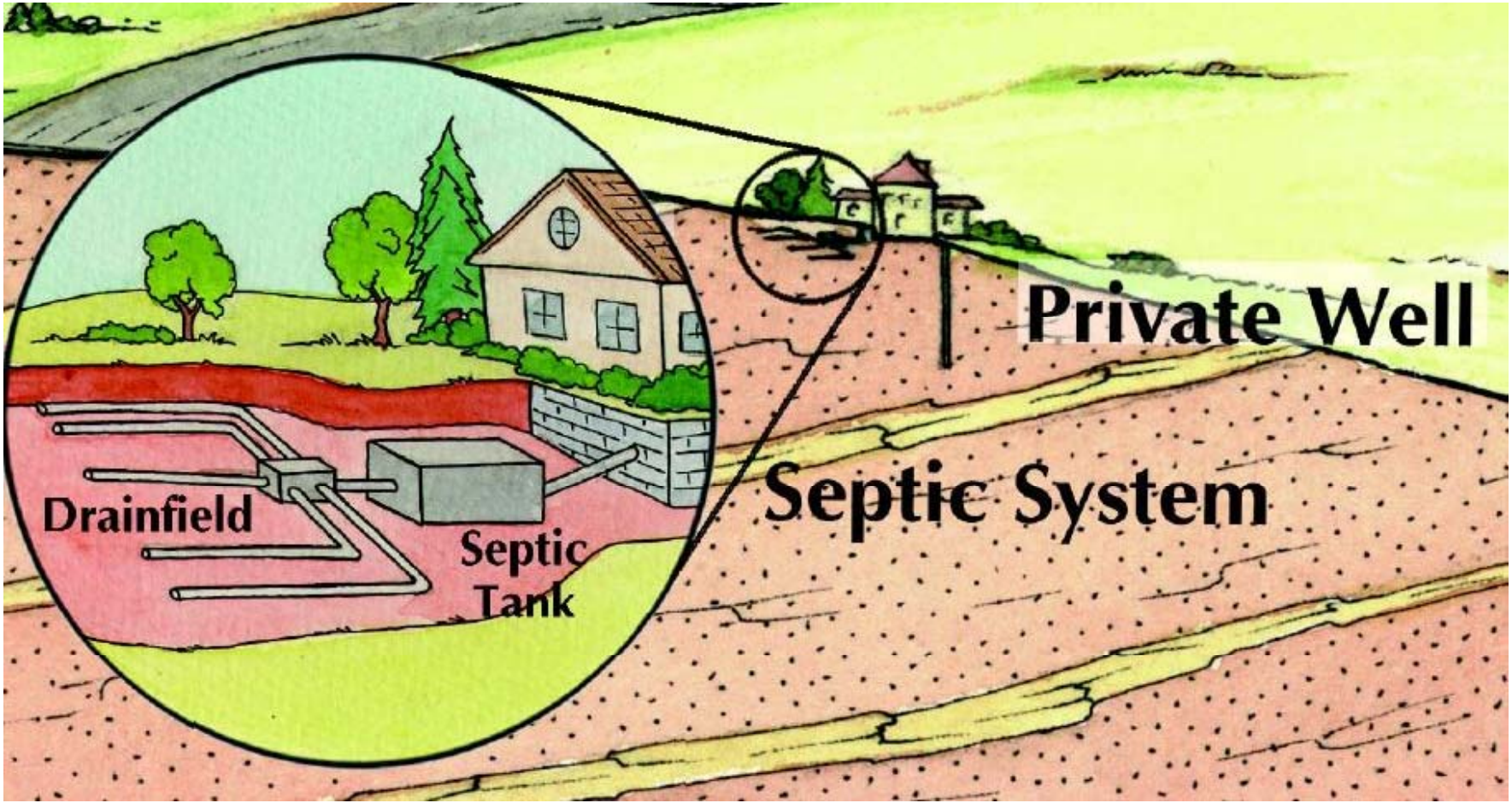
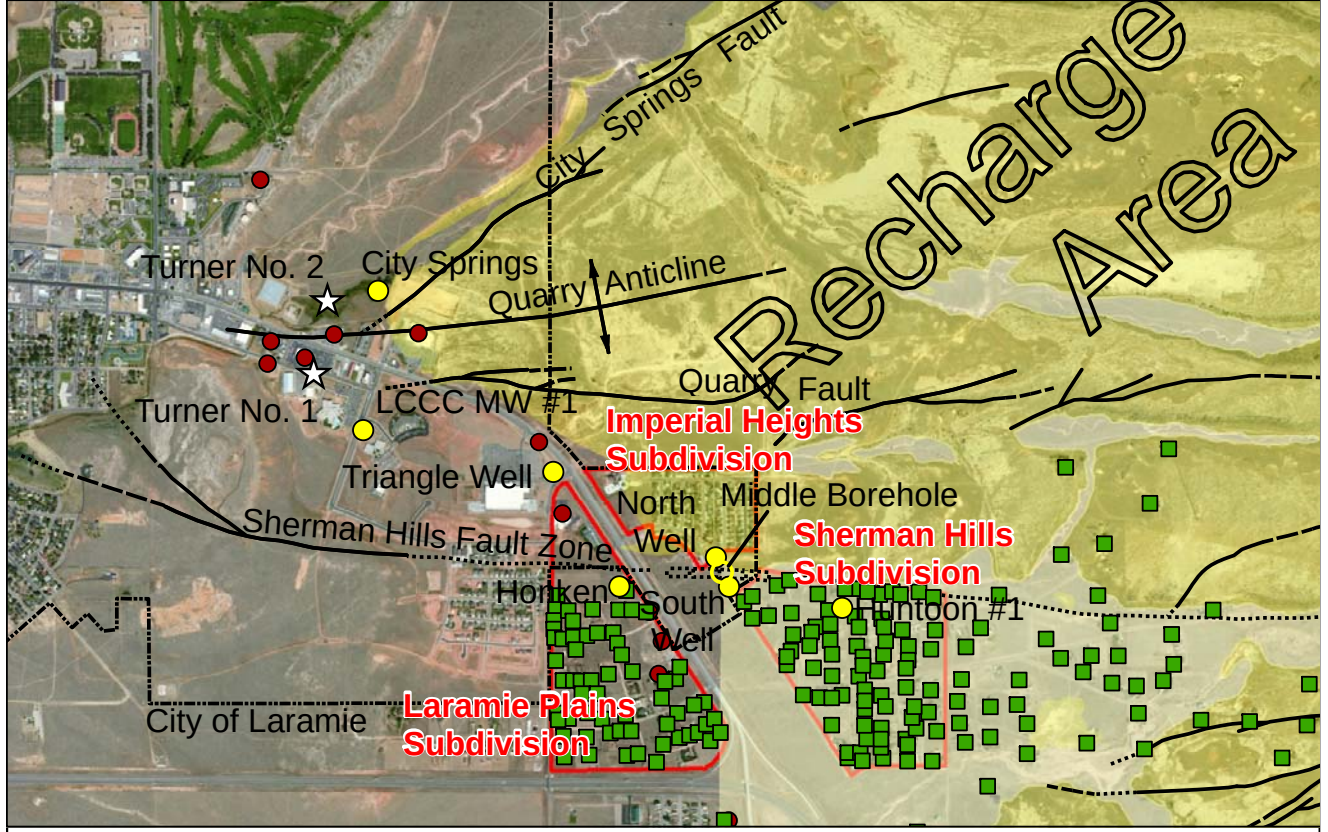
North Well at Imperial Heights Park

This report is available at http://www.cityoflaramie.org/CivicAlerts.aspx
Contact: Darren Parkin – Laramie Resources Manager – (307) 721-5213


GROUNDWATER: A Vital, Fragile Resource
Precipitation
Laramie Range
Infiltration
Transpiration
Evaporation
Evaporation
Transpiration
Runoff
Recharge Area
City of Laramie
Urban Runoff
Municipal Well
Private Well
Septic System
Laramie River
Red Beds
Chugwater Formation & Satanka Formation
Direction of Ground Water Movement
Casper Formation and Aquifer
Sherman Granite


Municipal Well
Well
Sandstone
Limestone

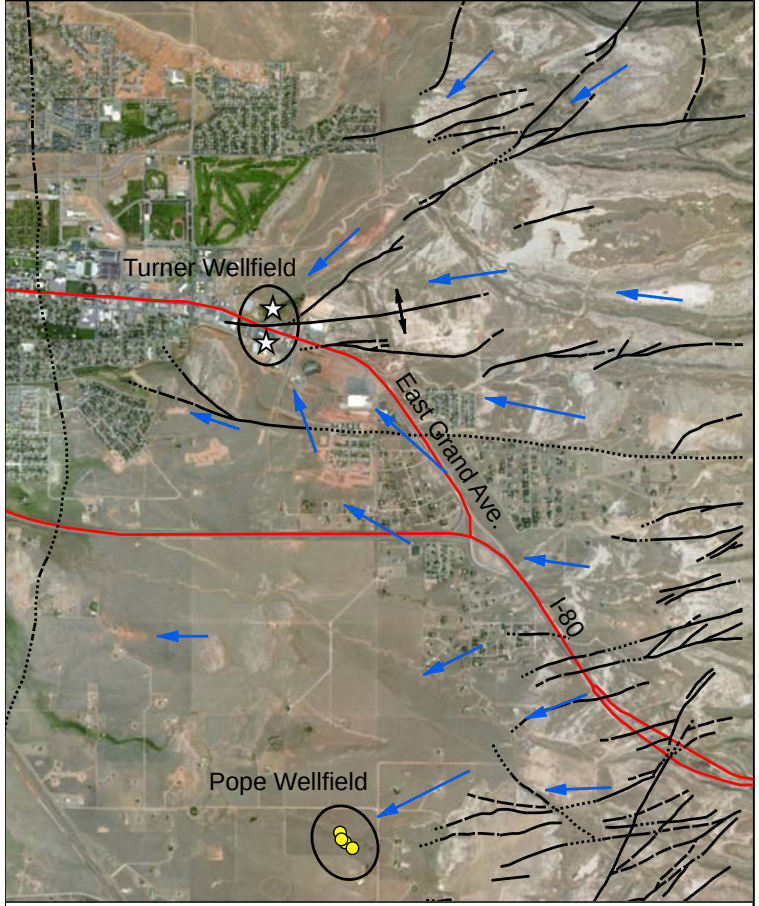

Private Well
Septic System
Drainfield
Septic
Tank



Septic Systems (2008 CAPP)

Potential Contamination Sources (2008 CAPP)

Location Map Laramie Monitor Well Project



Groundwater Flow Schematic
Laramie Monitor Well Project

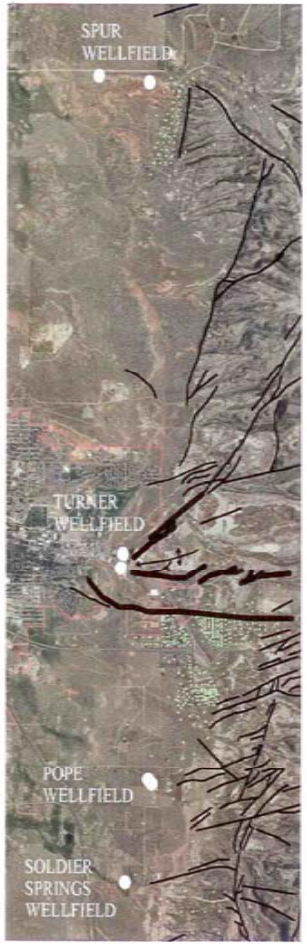
Casper Aquifer Protection Timeline

Late 1970s: U. Wyo. Geology Dept. Research
Huntoon, Lundy, Thompson
1993: Wellhead Protection Plan (WWC)
2002: First Casper Aquifer Protection Plan (City/County EAC)
2008: Most recent CAPP update – City and County versions
2009/2010: Well sampling
2013: East Laramie Wastewater Study
2008 - 2014: 53 Site Specific Investigations (SSI)

Casper Aquifer Protection Plan

Prepared by Wittman Hydro Planning Associates
May 2008

this report available at http://www.cityoflaramie.org/documentcenter/view/220



East Laramie Wastewater Feasibility Study

City Council Work Session

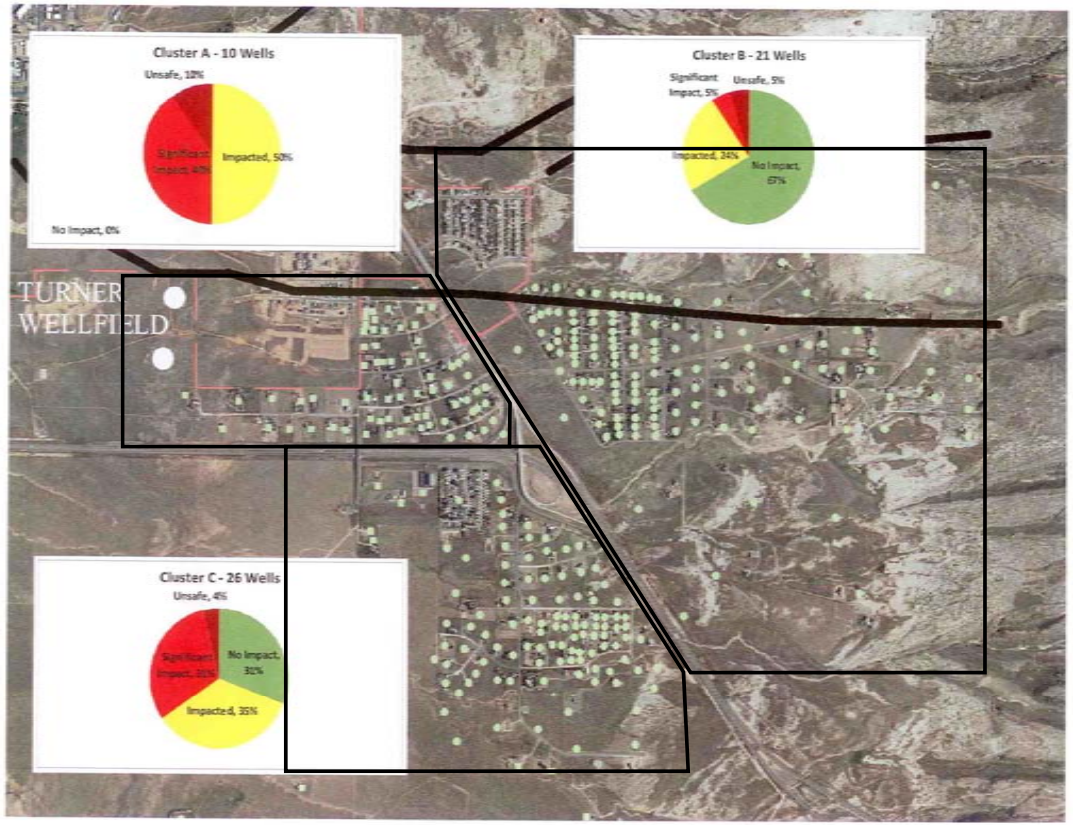
FINAL REPORT ISSUED
APRIL 1, 2013

Carrie Wiese, City
Murray Schroeder, WWC
Phil Brandhuber, HDR
Keith Thompson, Tetra Tech

WWC ENGINEERING

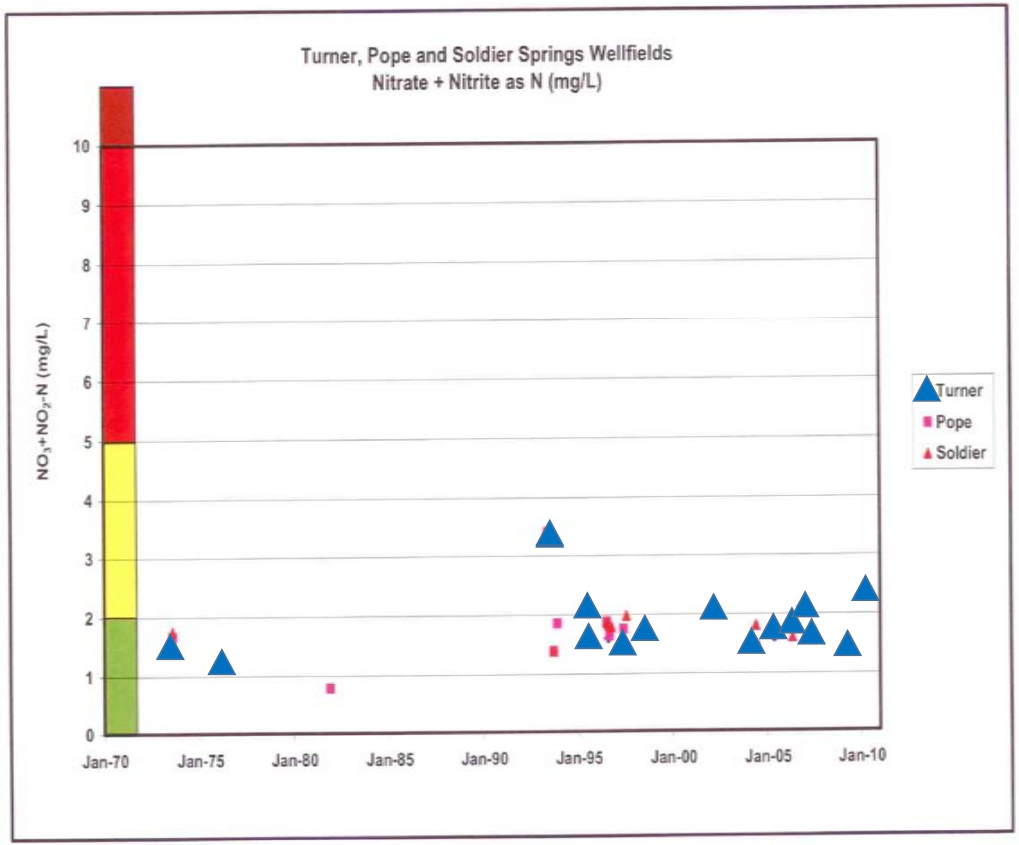
Guidelines for Nitrate Impact

Nitrate Impact Classification	Criteria (Nitrate as N)	Rationale
No Impact	< 2 mg/L	Unable to distinguish between natural and anthropogenic source (Background level)
Impacted	2 to < 5 mg/L	Natural nitrate concentration unlikely at this level, anthropogenic contamination present
Significant Impact	5 to < 10 mg/L	Level triggers increased monitoring by drinking water utilities
Unsafe	10 mg/L and greater	Exceeds drinking water Maximum Contaminant Level, considered unsafe for human consumption



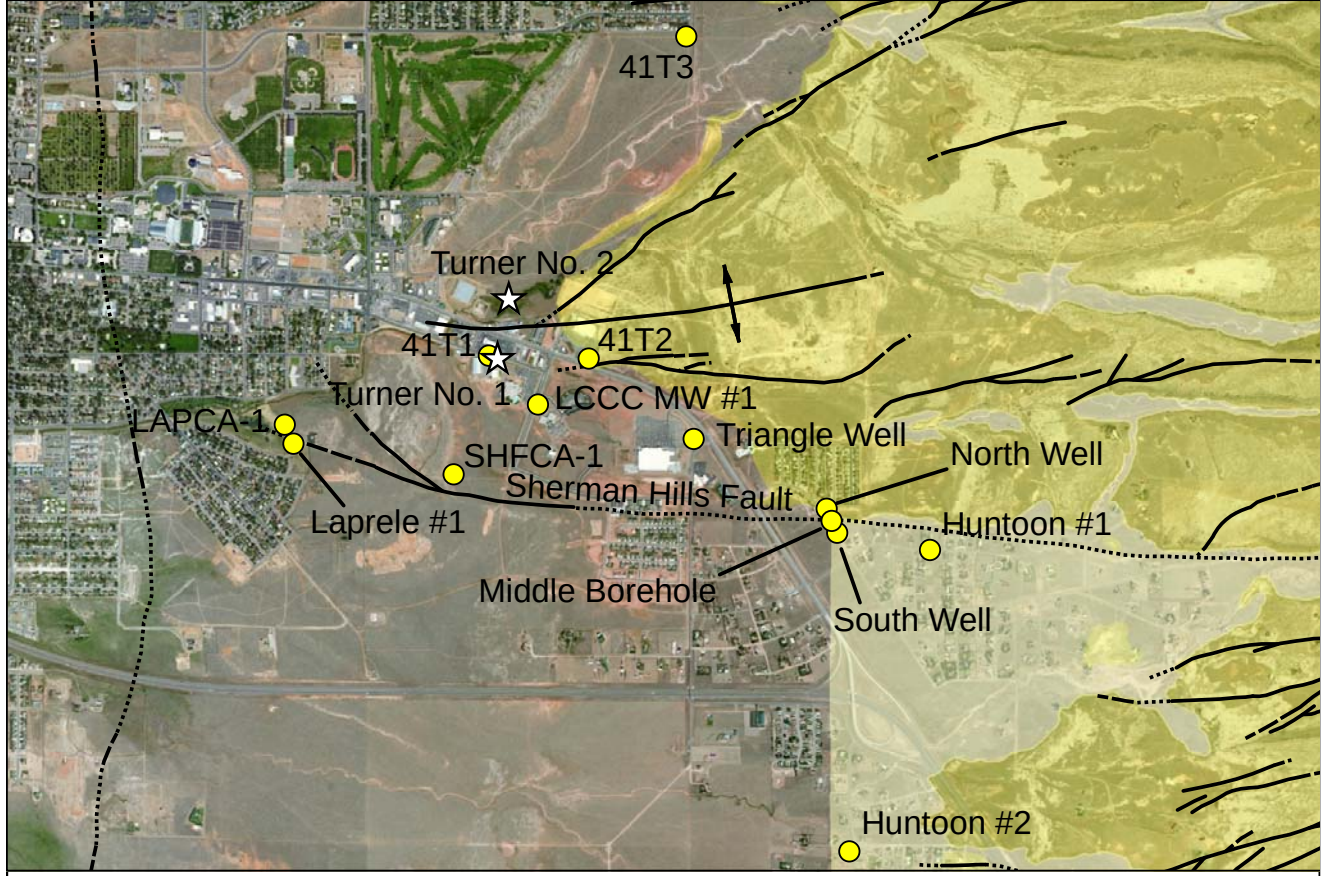
Data collected from domestic wells by City of Laramie 2009, 2010

WWC Engineering, 2013

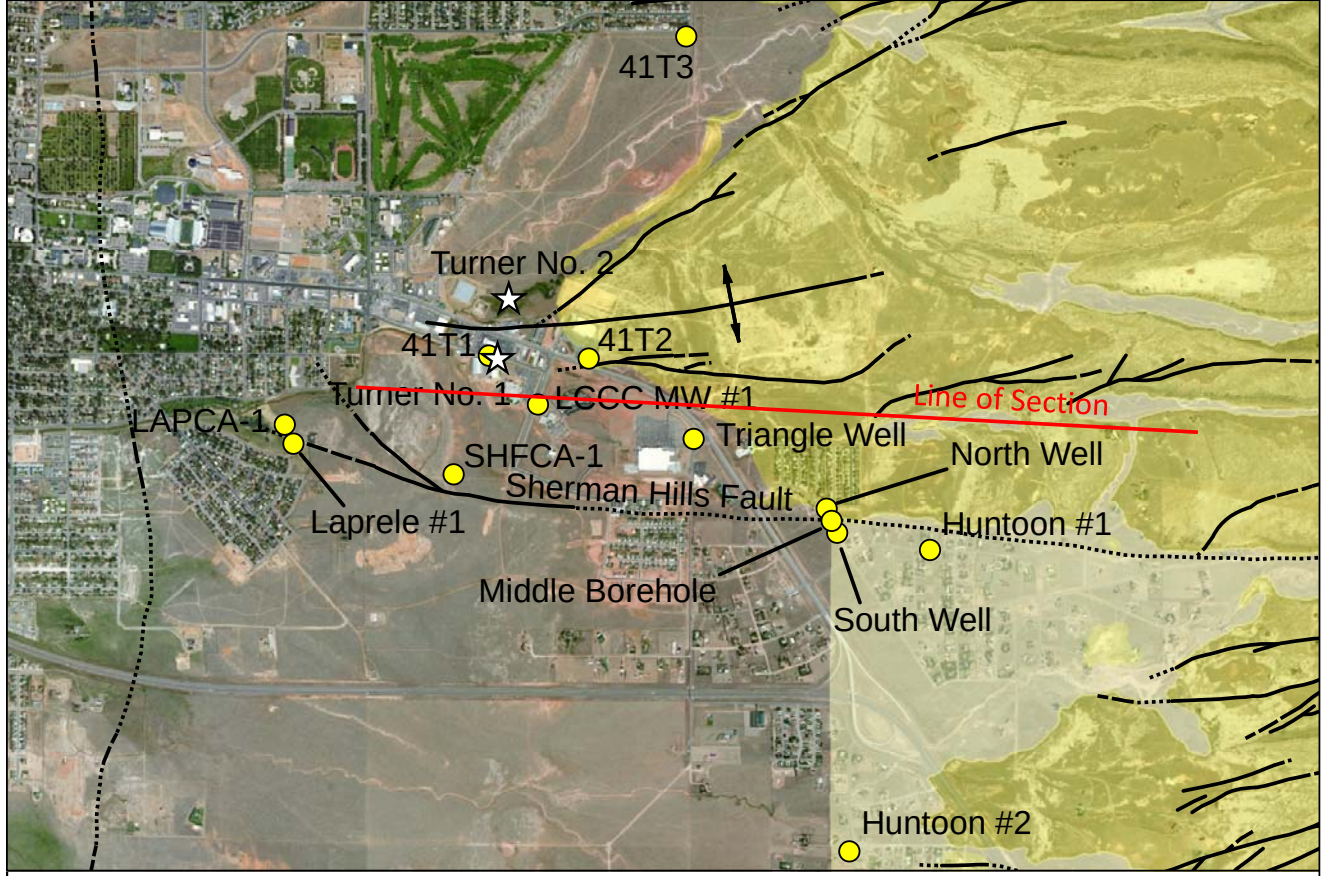


Conclusion:
"Risk to City Wells
- Low"

Modified from WWC Engineering, 2013

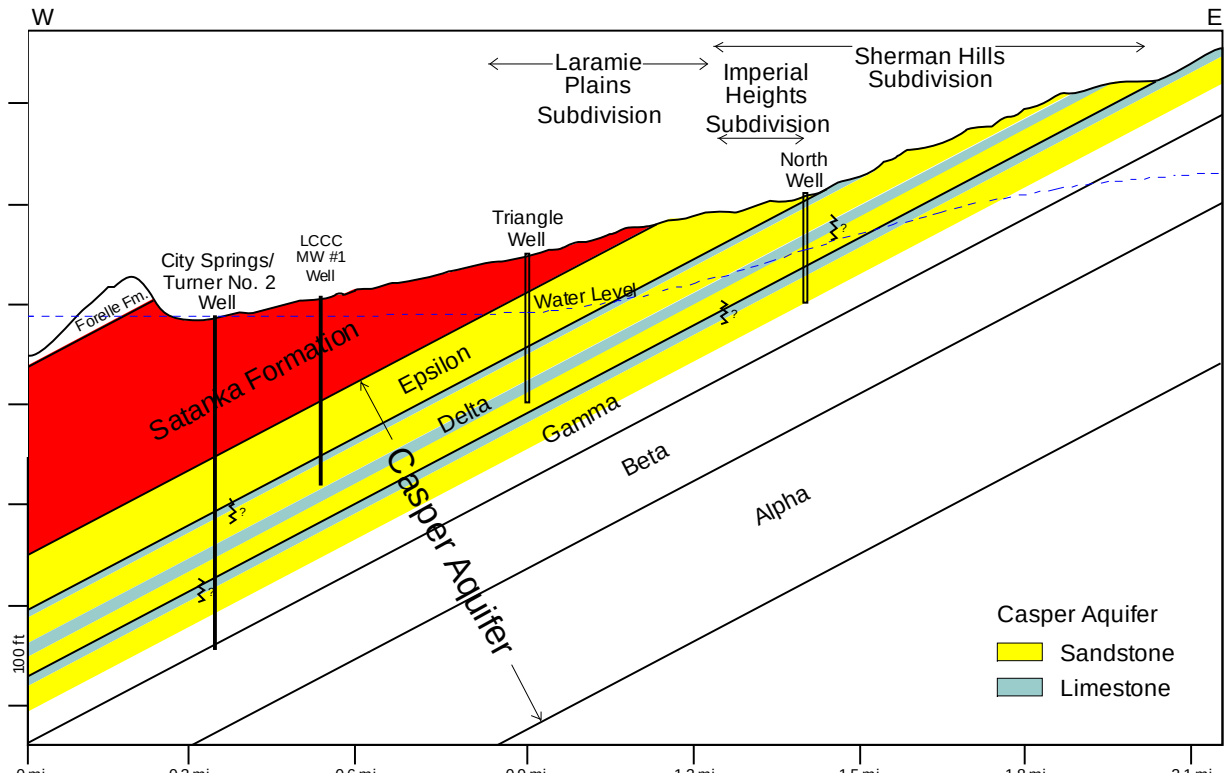


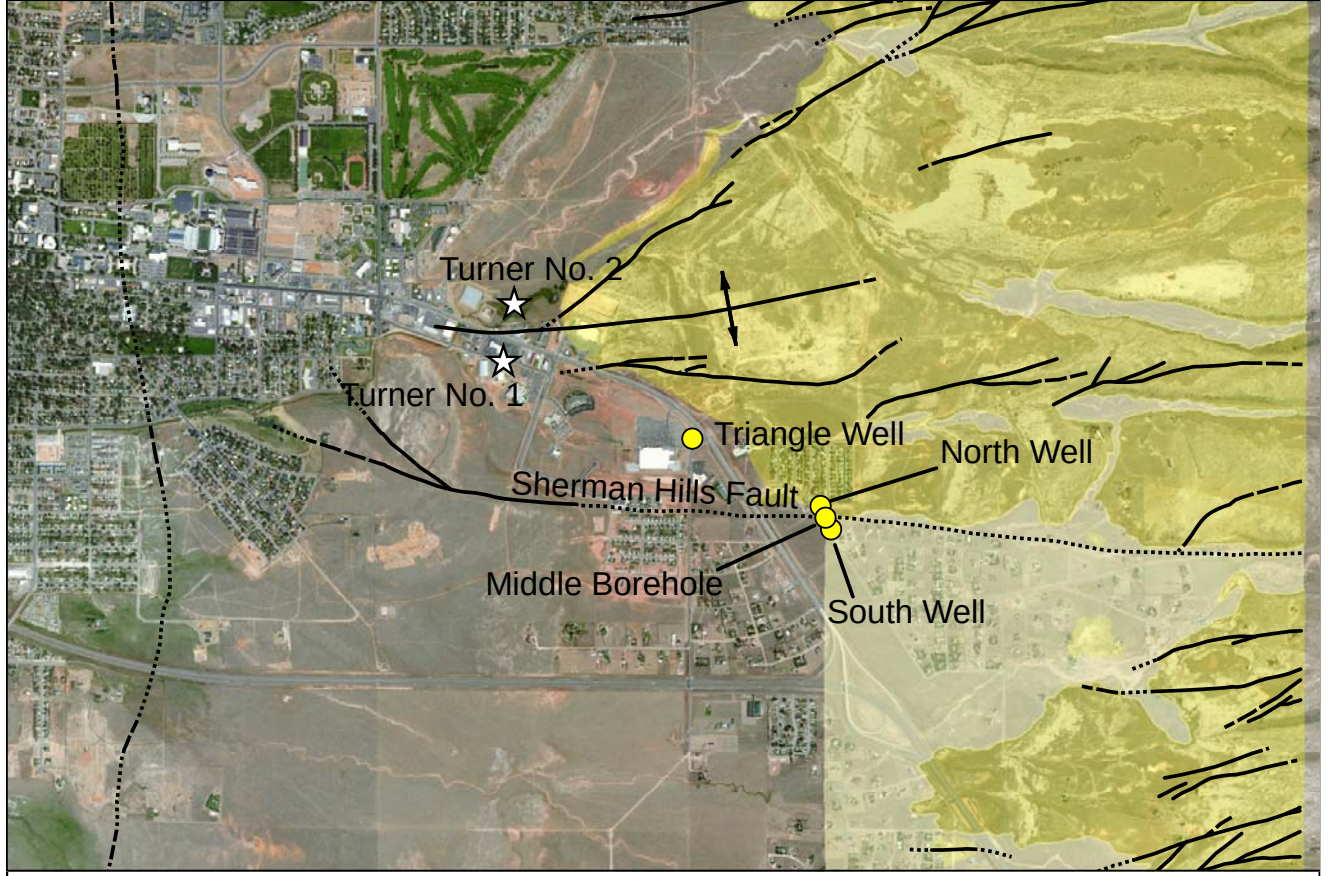
Monitoring Sites Laramie Monitor Well Project



Monitoring Sites Laramie Monitor Well Project

Casper Aquifer Schematic Cross-Section

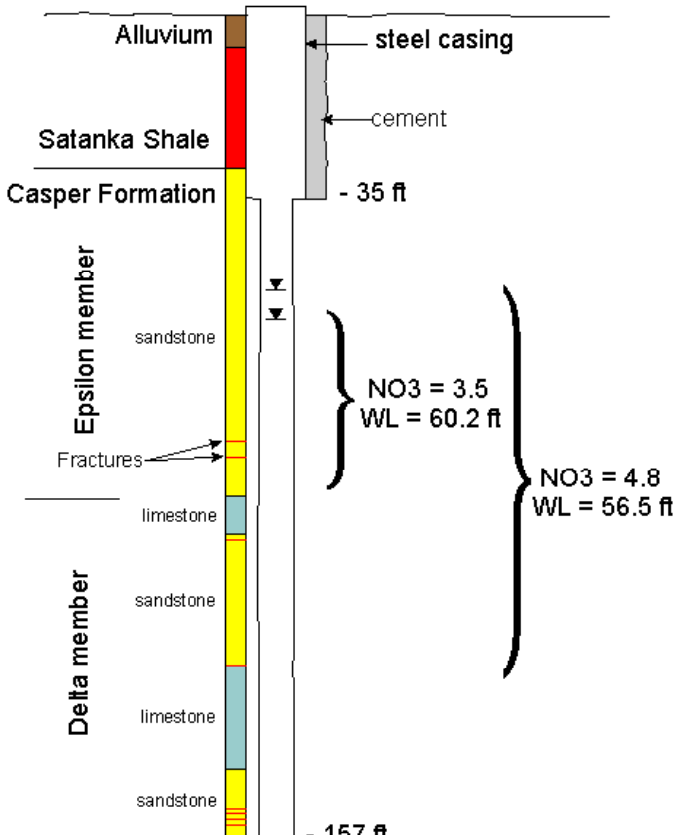


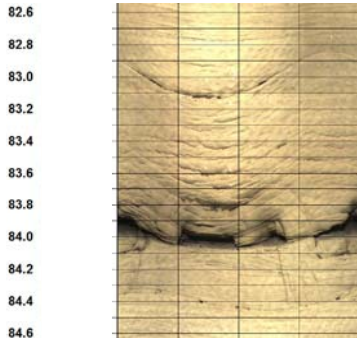


Monitoring Sites Laramie Monitor Well Project

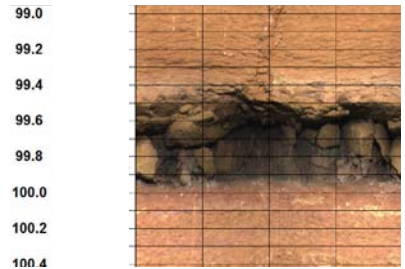
Triangle Well

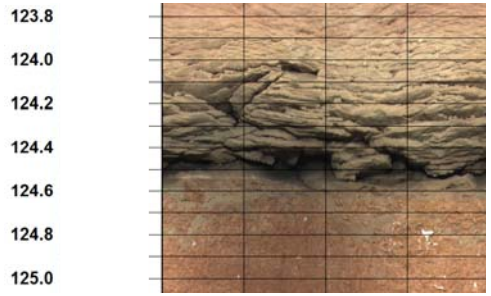
Triangle Monitor Well
380+ gpm Airlift





Bedding-plane openings in Triangle Well

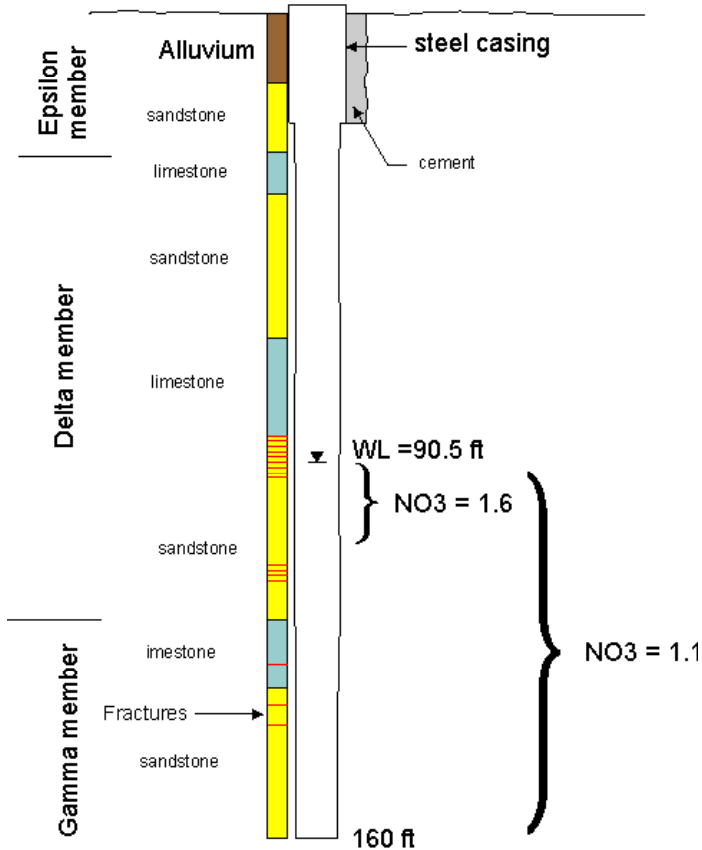


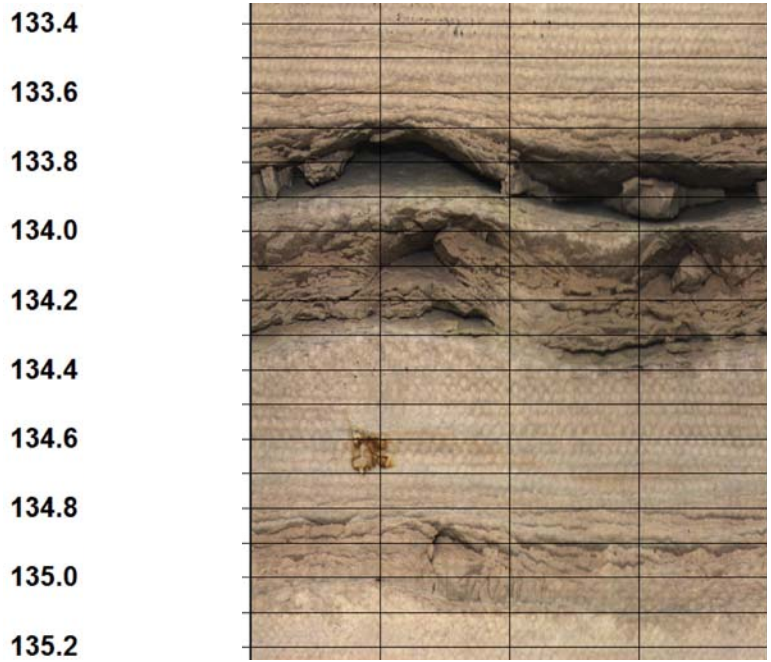


Down-hole images from Laramie Monitor Well Project - June, 2015 (vertical scale in feet)

North Well

Imperial Heights Park North Production Well
400 gpm Pump Test



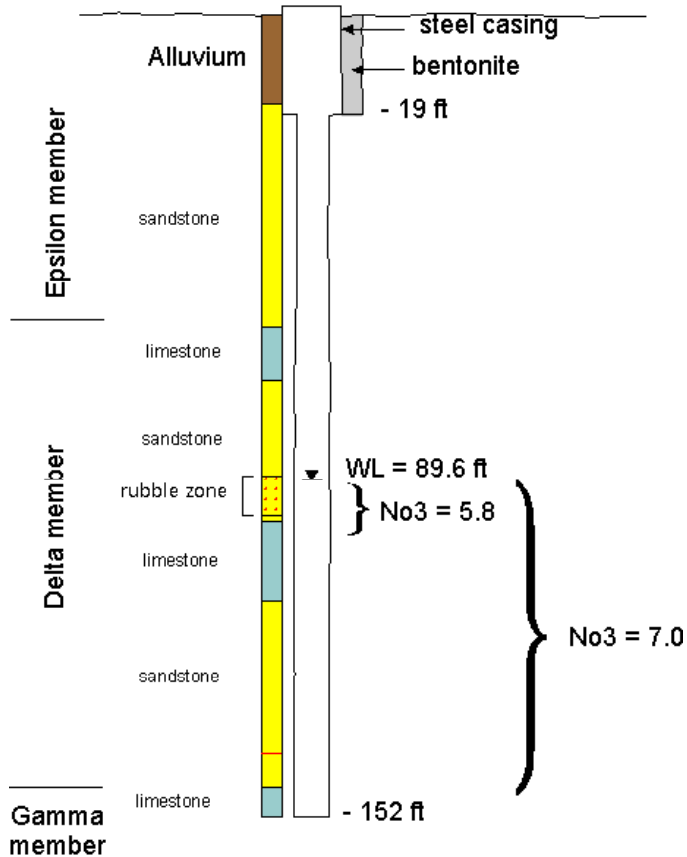


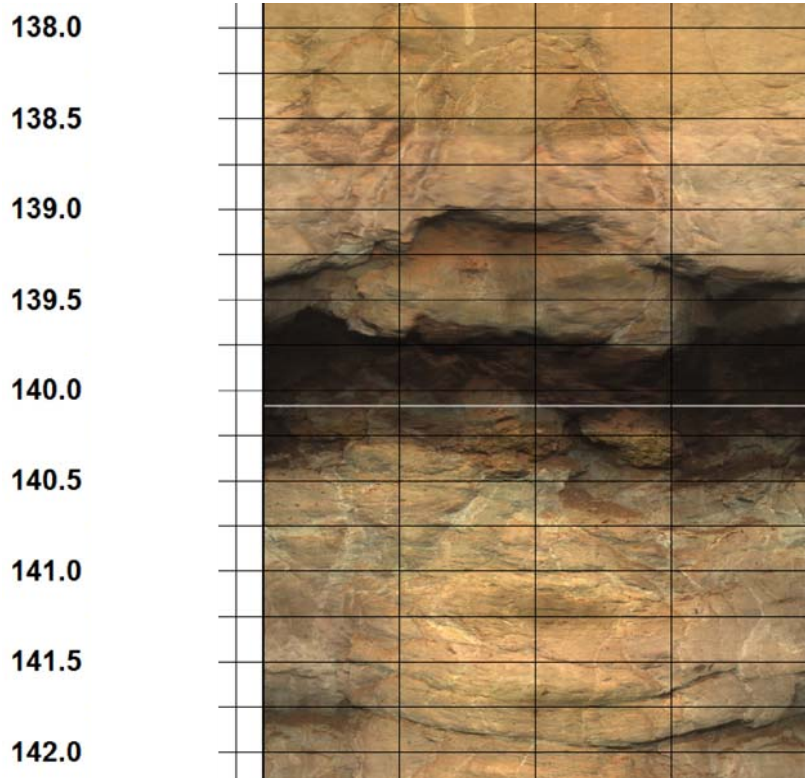
Bedding-plane opening in North Well

Down-hole image from Laramie Monitor
Well Project - June, 2015 (vertical scale in feet)

Middle Borehole

Imperial Heights Park Middle Borehole



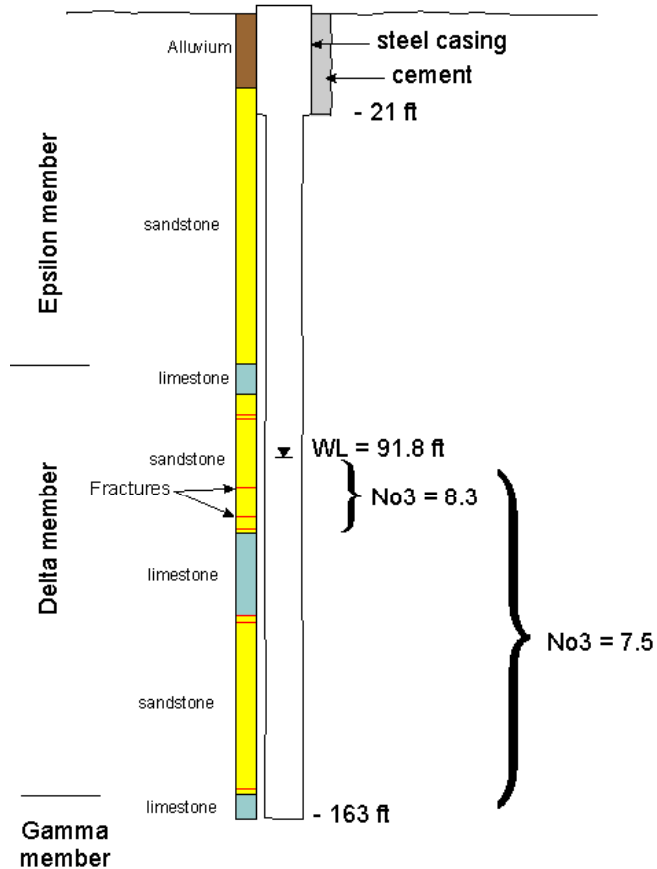


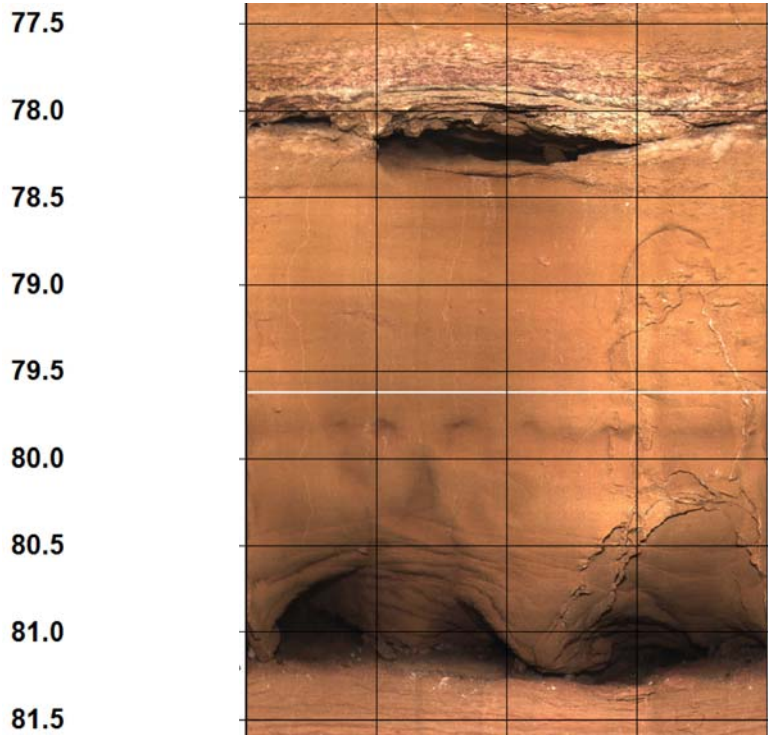
Thin shale layer in Middle Borehole

Down-hole image from Laramie Monitor Well Project - June, 2015 (vertical scale in feet)

South Well

Imperial Heights Park South Monitor Well
100 gpm Pump Test

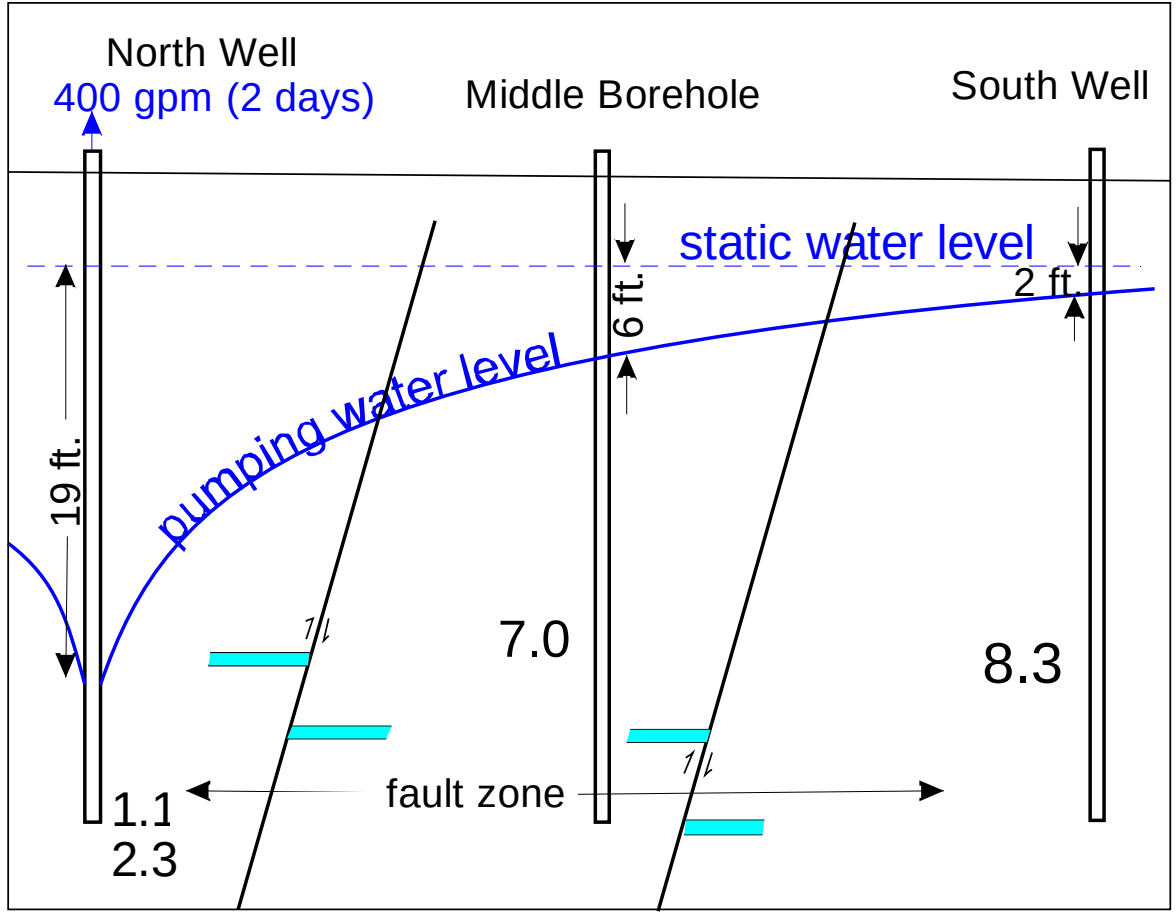




Bedding-plane opening in South Well

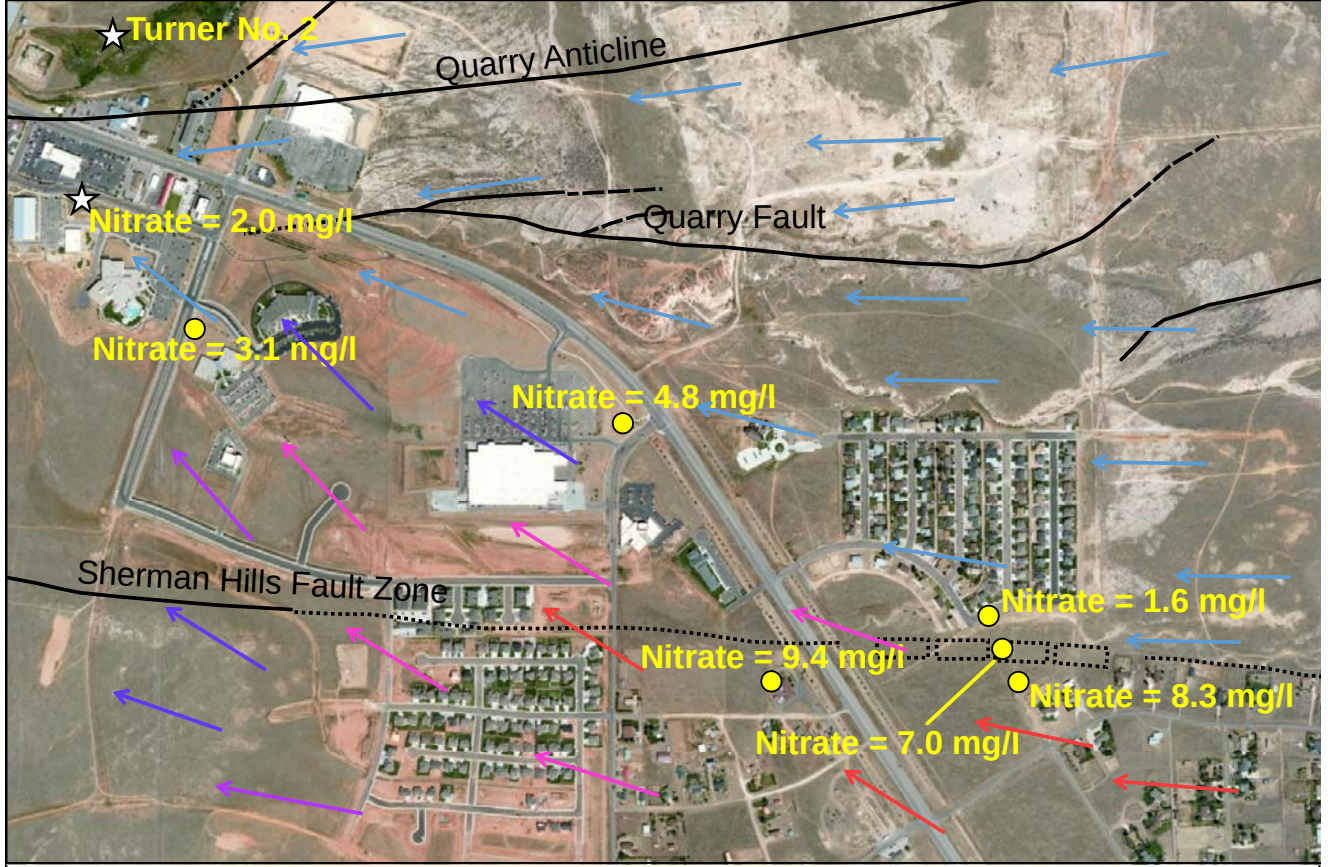
Down-hole image from Laramie Monitor
Well Project - June, 2015 (vertical scale in feet)

North Well 400 gpm
SWL = 7322 ft.
Middle Borehole (observation)
SWL = 7323 ft.
South Well (observation)
SWL = 7324 ft.



Laramie Monitor Well Project - North Well Pump Test

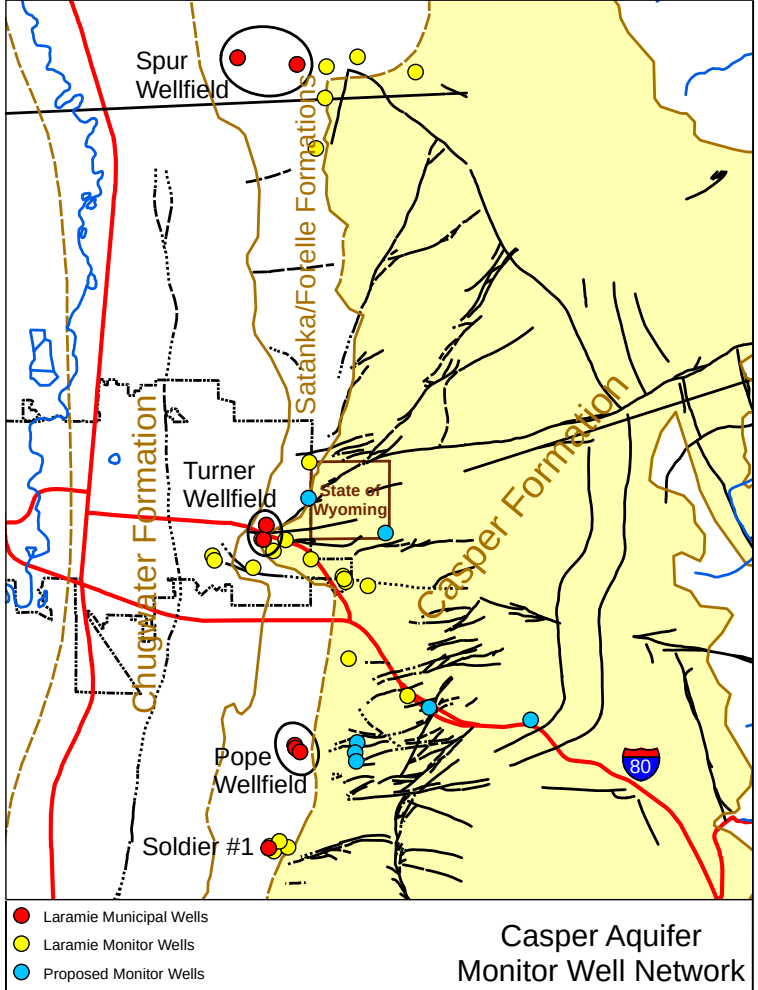
Groundwater Elevation Laramie Monitor Well Project



Nitrate Concentrations Laramie Monitor Well Project

Conclusions

- Residential activity in the East Grand subdivisions has impacted groundwater quality at Imperial Heights Park.
- The Sherman Hills Fault zone is not a barrier to groundwater flow.
- A portion of the discharge of City Springs and the Turner Wellfield is impacted by the East Grand subdivisions.
- Within this general picture, the details of groundwater flow and quality are complex.
- Groundwater level and quality monitoring should continue at available locations.


Spur
Wellfield
Satanka/Fortelle Formations
Chugwater Formation
Casper Formation
Turner
Wellfield
State of
Wyoming
Pope
Wellfield
Soldier #1
80
Laramie Municipal Wells
Laramie Monitor Wells
Proposed Monitor Wells
Casper Aquifer
Monitor Well Network