

ASR Feasibility in Central Texas, USA

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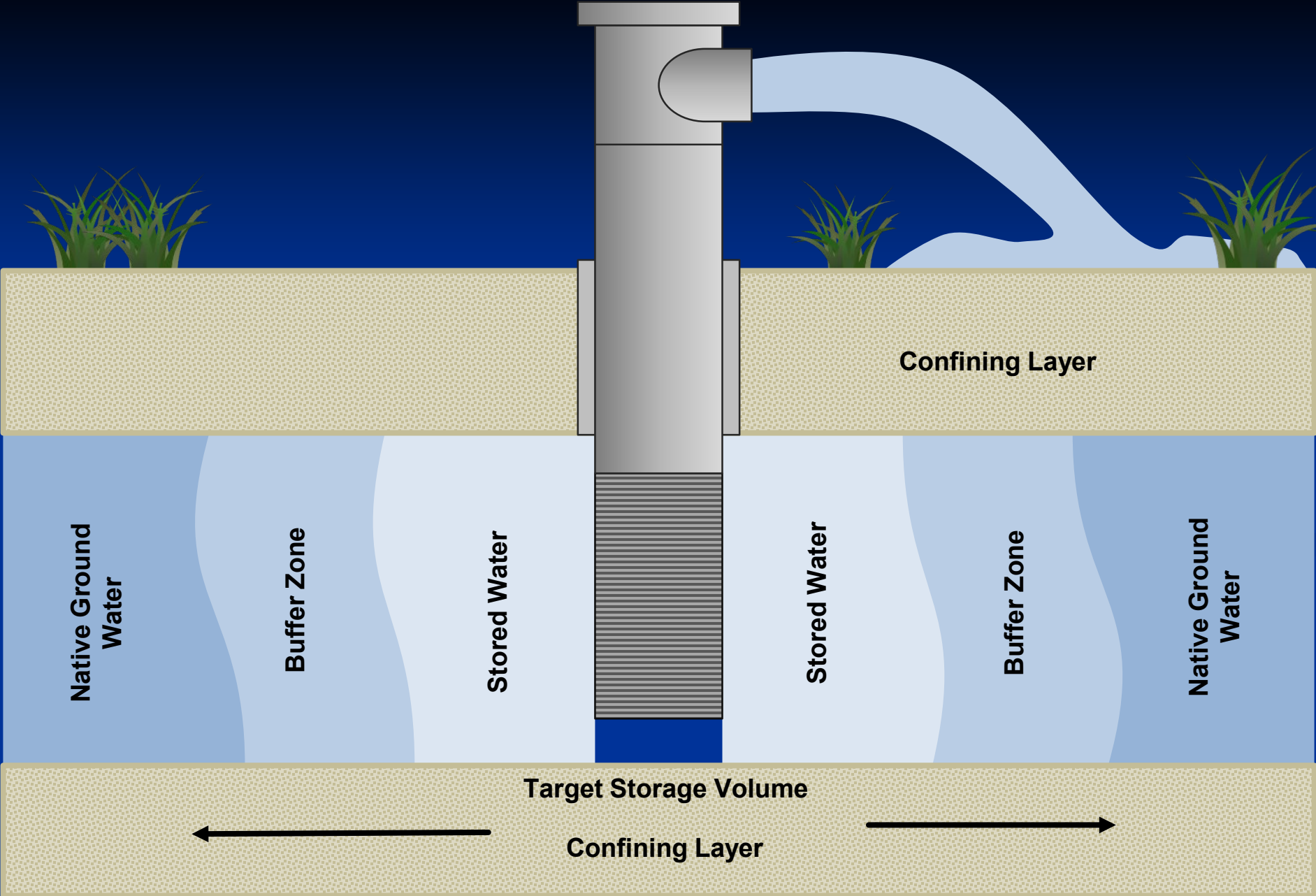
UIC Conference
San Antonio
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Barton Springs/Edwards Aquifer
CONSERVATION DISTRICT

ASR Systems in Central Texas

- SAWS- Twin Oaks facility
- Ruby Ranch- Hays County
- City of Buda- Hays County
- Saline Edwards- Travis and Hays Counties
- New Braunfels Utilities- saline Edwards



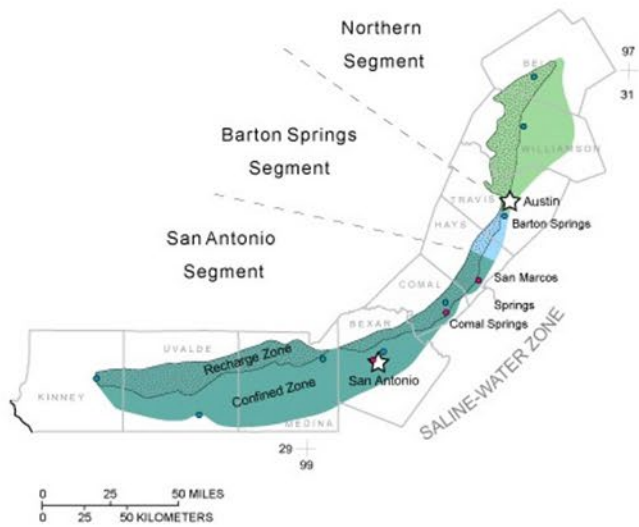
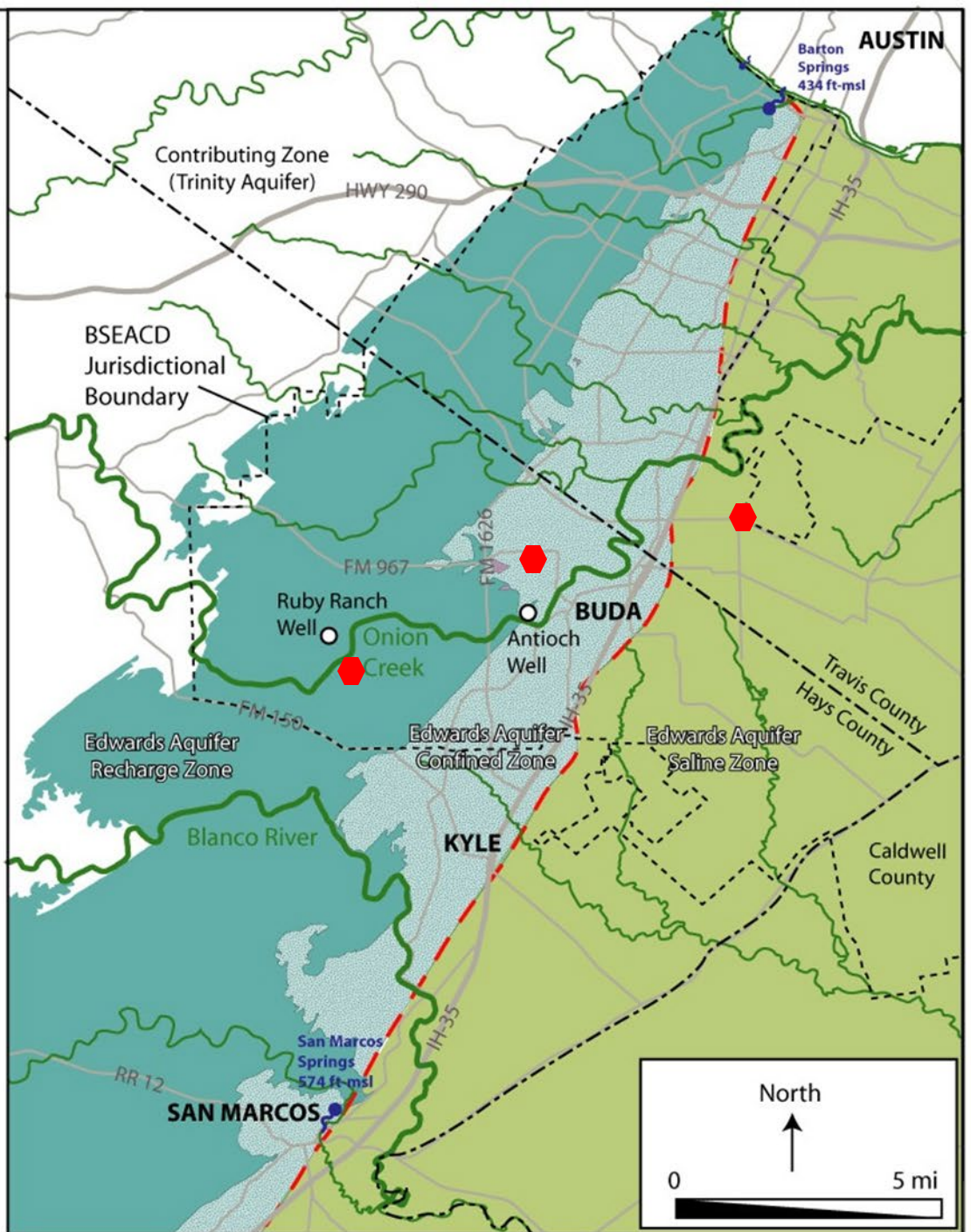
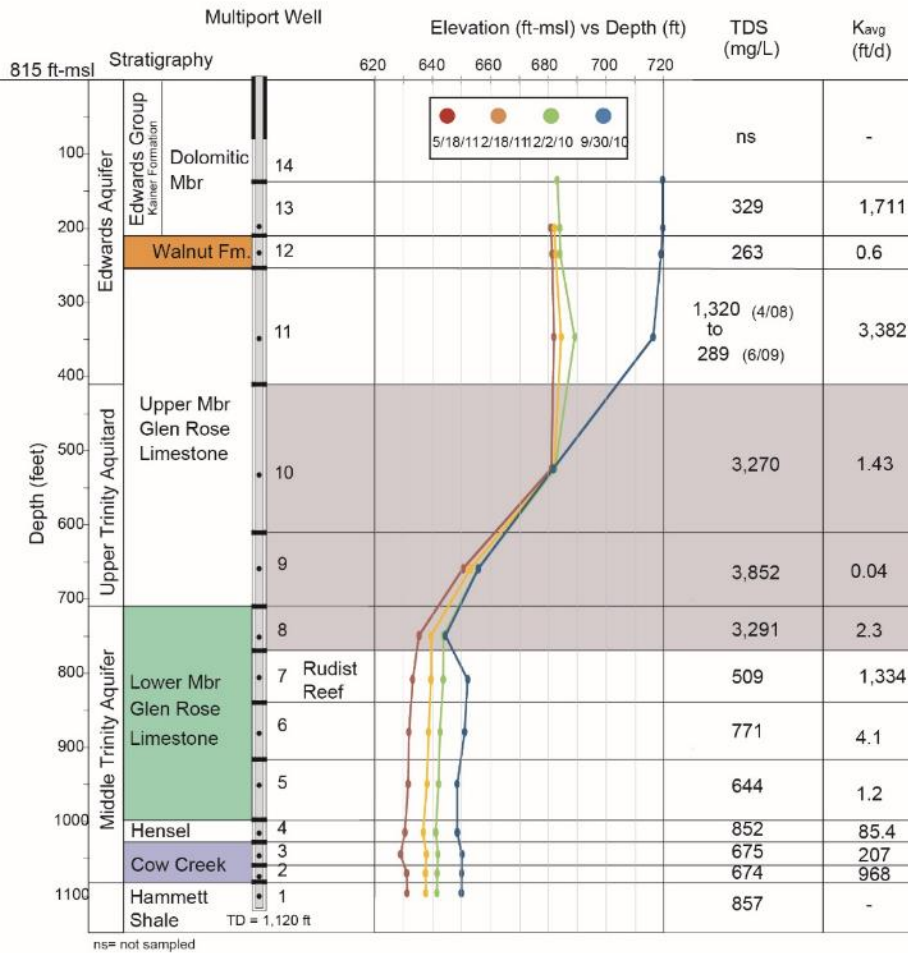


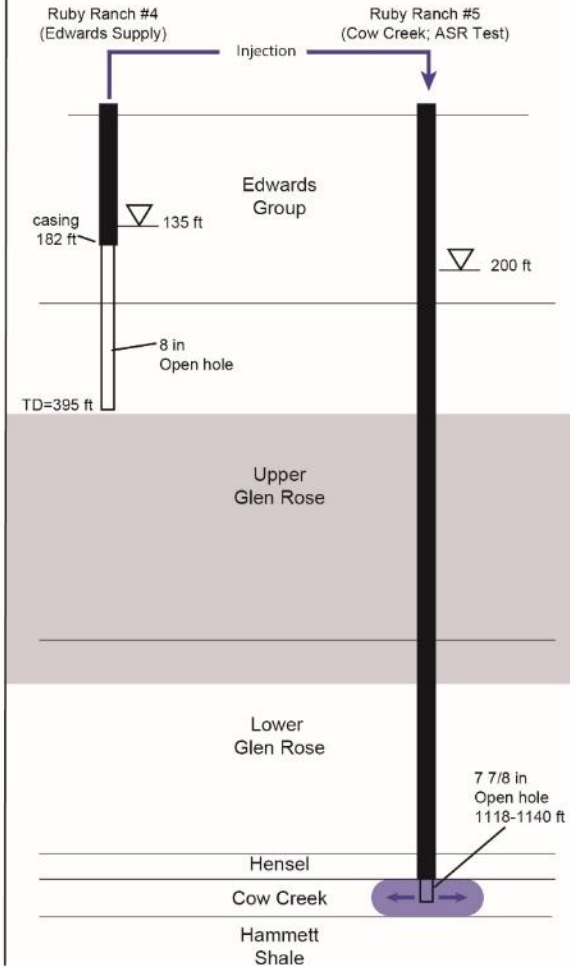
Figure modified from US Geological Survey Hydrologic Atlas 730-E (Ryder, 1996)



Ruby Ranch Multiport Monitor Well

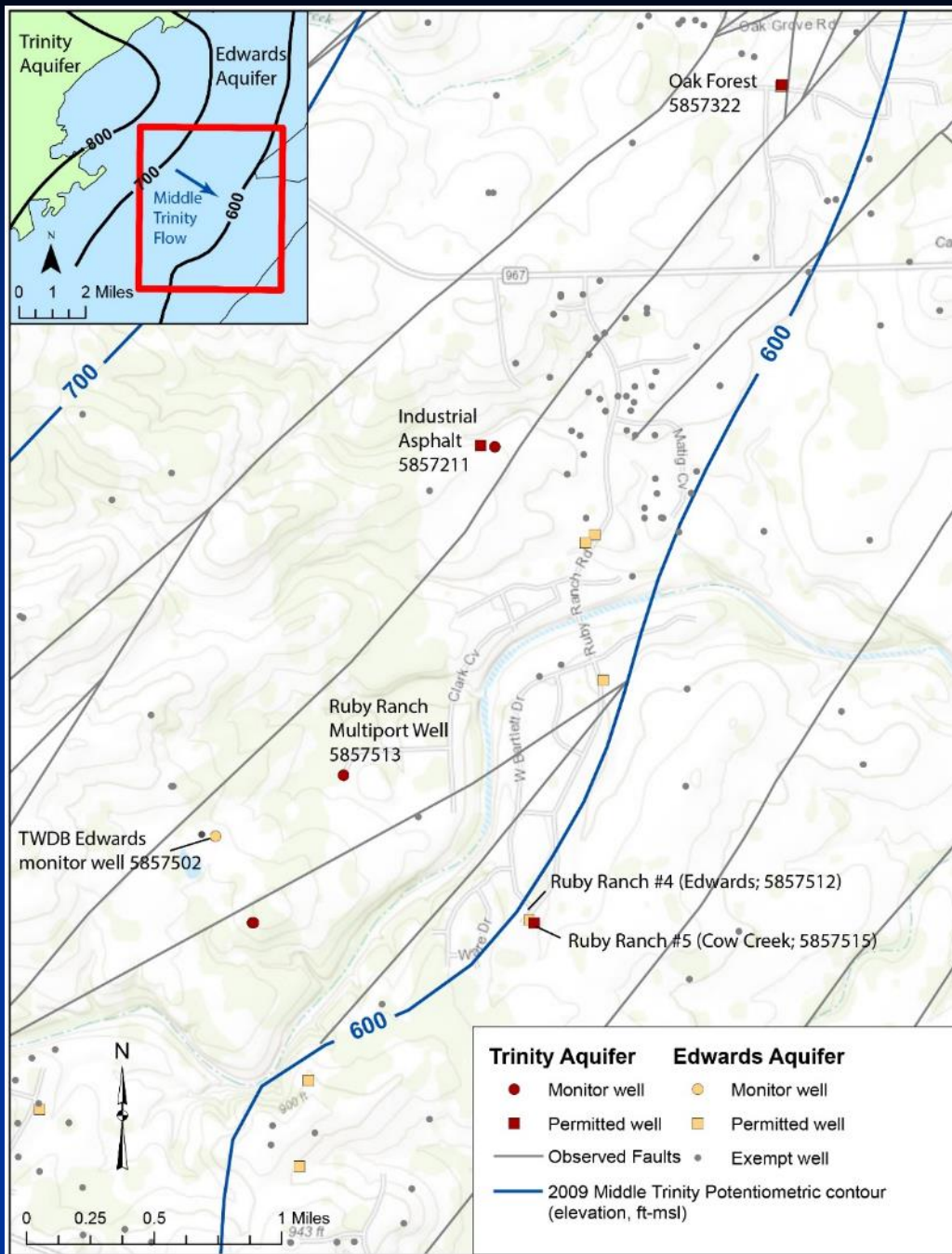


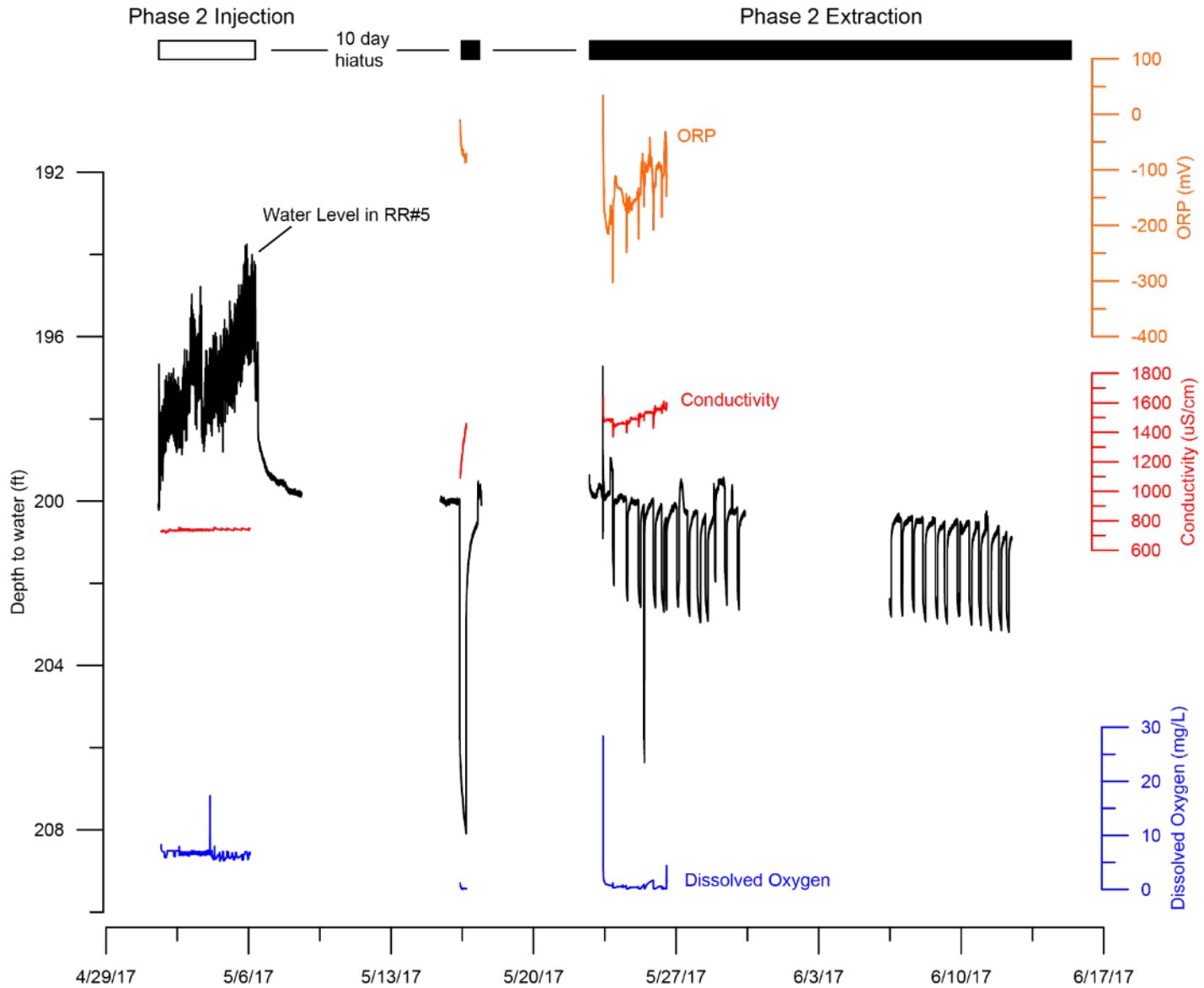
Ruby Ranch Supply & ASR Test Well

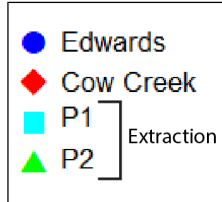
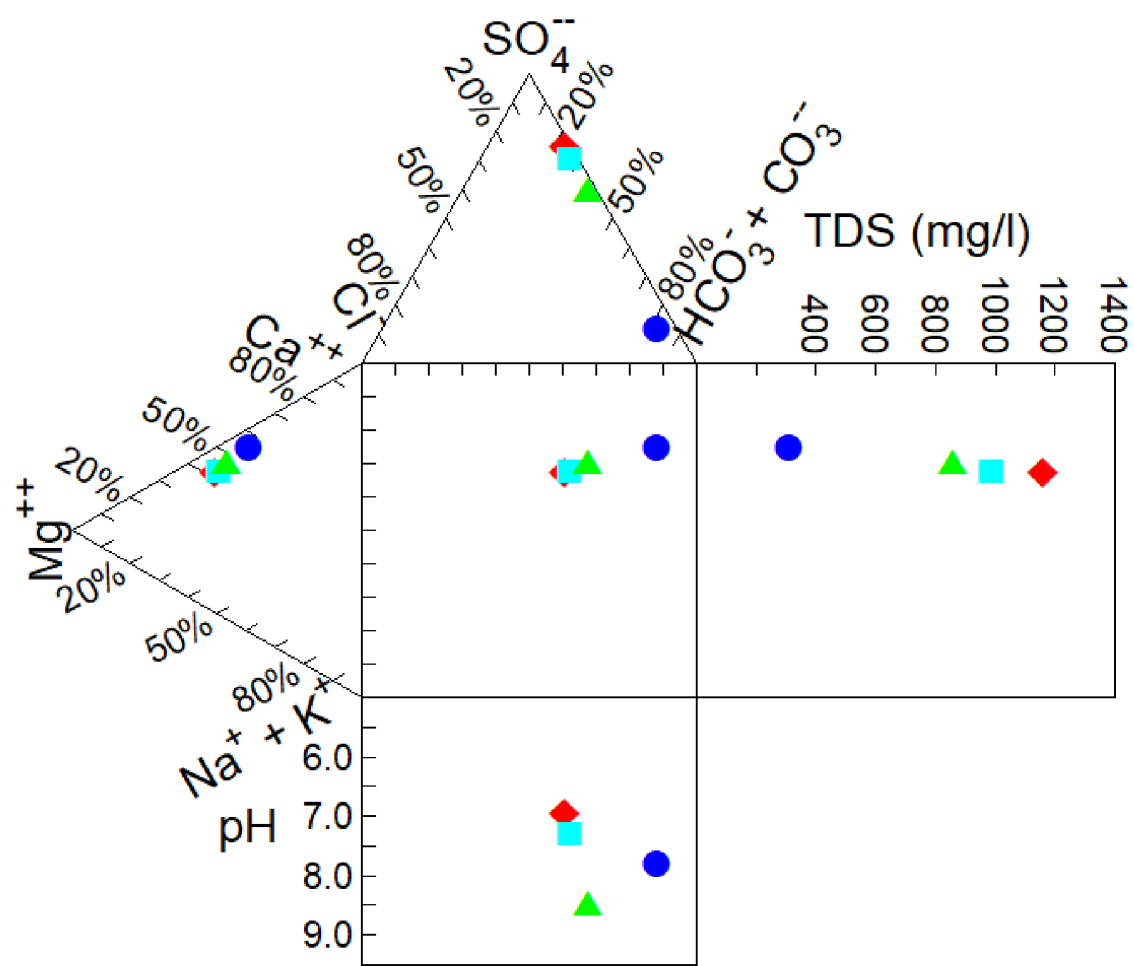


2001	Aquifer Test Year	2007
98 gpm	Yield (gpm)	220 gpm
250	Transmissivity (gpd/ft)	4,600
~250	Thickness (ft)	22
0.01e	Sy or Storativity	6.0x10-5
370	TDS (mg/L)	1,200







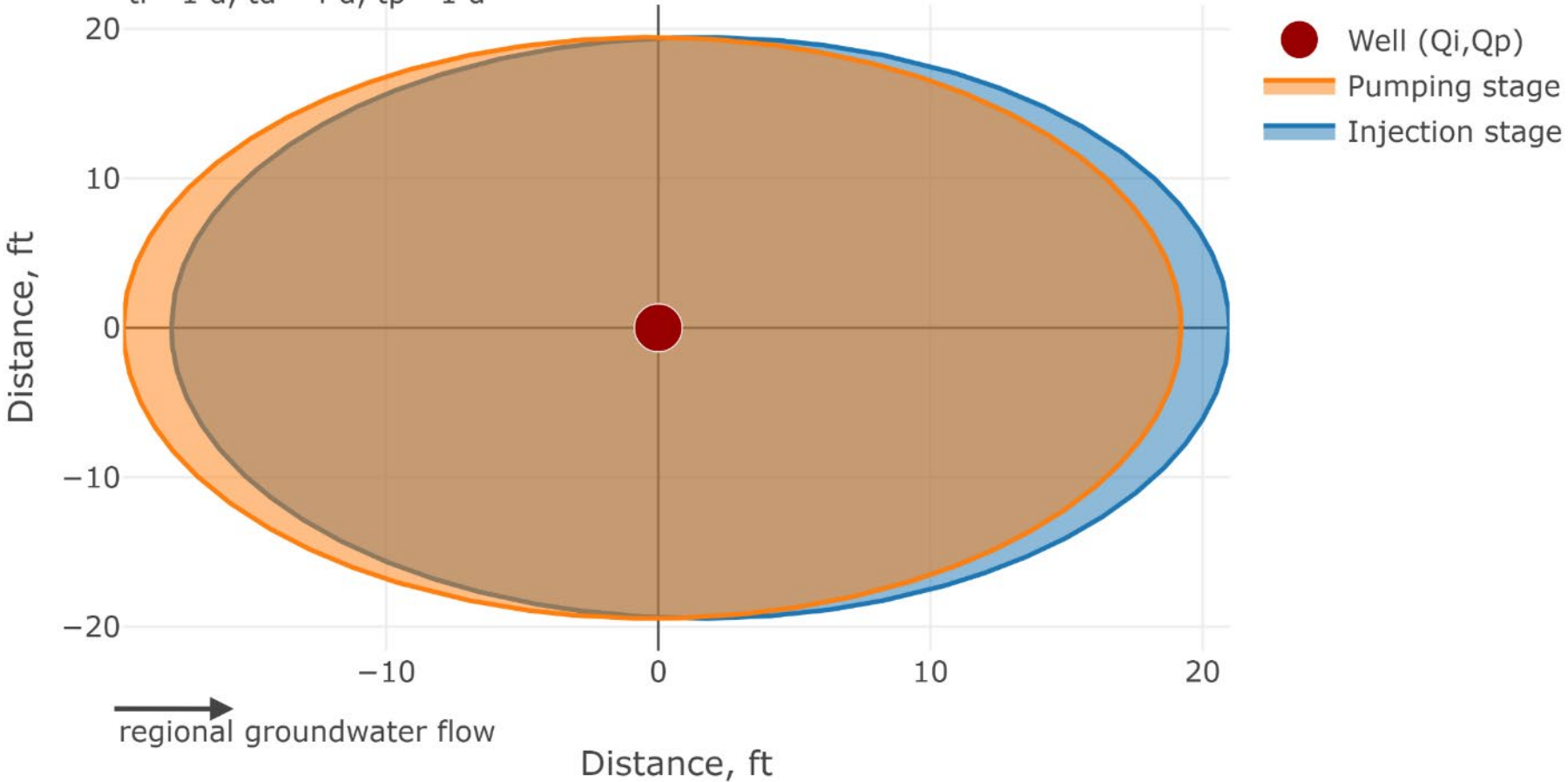


	Background				Phase 1 Extraction		
Well	RR#4 Edwards	RR#5 Middle Trinity	RR#5 Middle Trinity	RR#5 Middle Trinity	RR#5 Middle Trinity	RR#5 Middle Trinity	RR#5 Middle Trinity
Volume	n/a	n/a	n/a	n/a	20,000 gal pumped	40,000 gal pumped	65,700 gal pumped
Date	6/28/2006	6/23/2010	3/3/2017 8:30	4/19/2017 16:18	4/24/2017 12:30	4/24/2017 15:56	4/24/2017 20:30
Lab/ Data Source	ELS	ELS	ELS (Drinking water)	ELS	ELS	ELS	ELS
Conductivity (uS/cm)	590	1572	1560	1640	1351.54	1514.07	1617.92
pH	7.18	7.0	7.62	6.95	7.28	7.29	
DO (mg/L)						2.45	
Temp °C	21.62	27.93		27.12	26.8	26.7	
ORP (mV)	nd	nd	nd	nd	nd	nd	nd
Calcium (mg/L)	68.5	170	164	153		132	
Magnesium (mg/L)	35.4	114	109	111		92.5	
Sulfate (mg/L)	37	677	726	657		536	
Chloride (mg/L)	10	16	14.8	13.6		12.9	
Bicarbonate (mg/L)	323.4	313.6	256	261		254	
Sodium (mg/L)	6.1	23.9	25.2	24.2		20.7	
Potassium (mg/L)	1.5	12.4		13.6		11.5	
Fluoride (mg/L)	.03	2.11	2.22	2.06		1.89	
Iron (ug/L)	<30	603	284	1000		658	
Arsenic lab (ug/L)	<1	<2.0	<1.00	<1.00	2.29	2.36/2.2	2.69
Arsenic HACH Kit (ug/L)	nd	nd	nd	nd	nd	nd	nd
Strontium (ug/L)	11000	17,300		17700		15200	
Sillica (mg/L)	11.3	13.8		13.2		12.3	
TDS (mg/L)	342	1201	1210	1161		987	



Front Positions for a Single Well

Recovery Efficiency = 94.21%
Native Groundwater Recovery = 5.79%
 $t_i = 1$ d, $t_d = 4$ d, $t_p = 1$ d



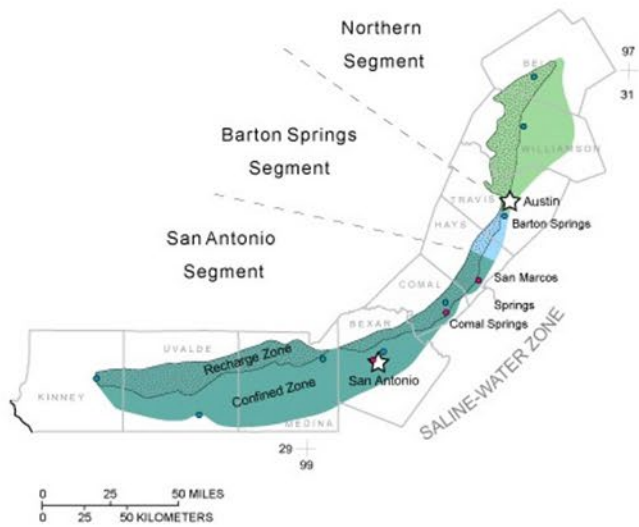
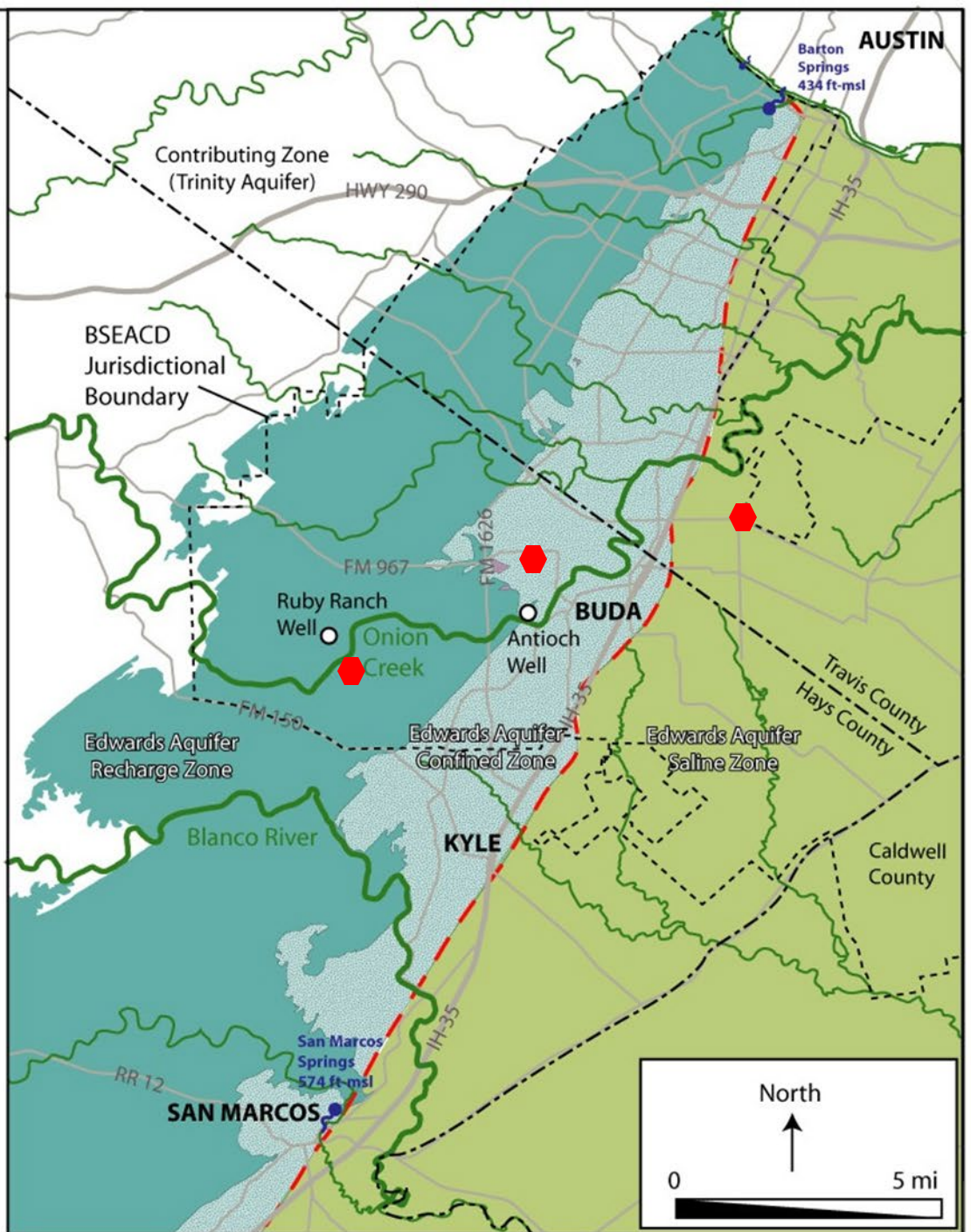
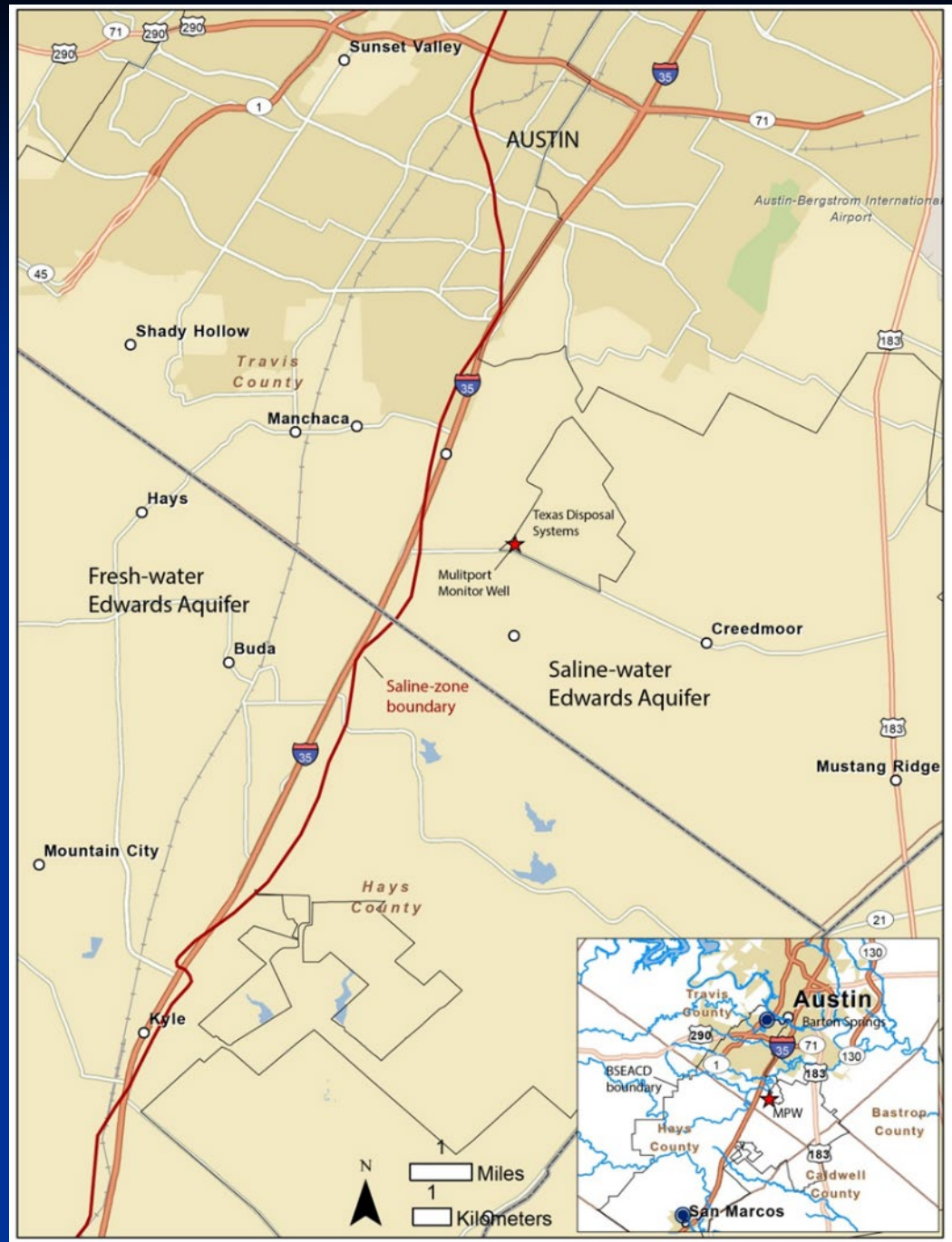
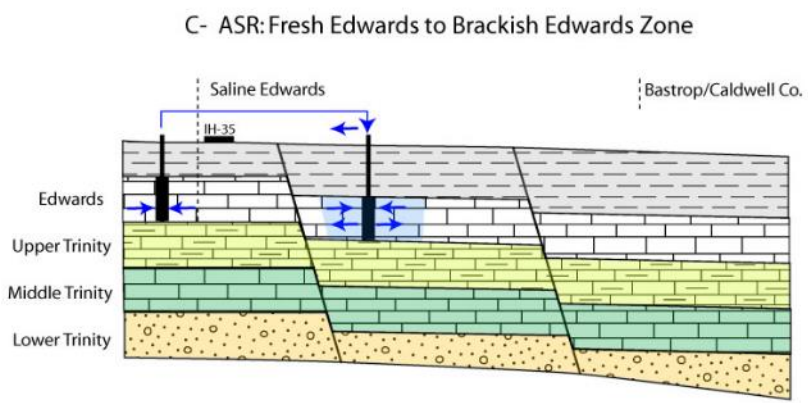
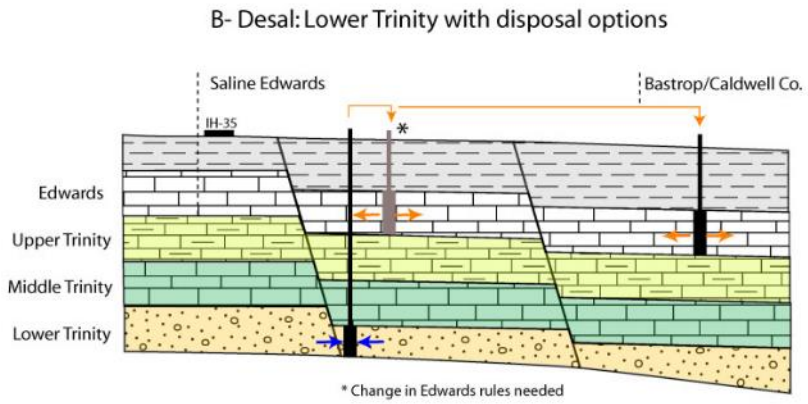
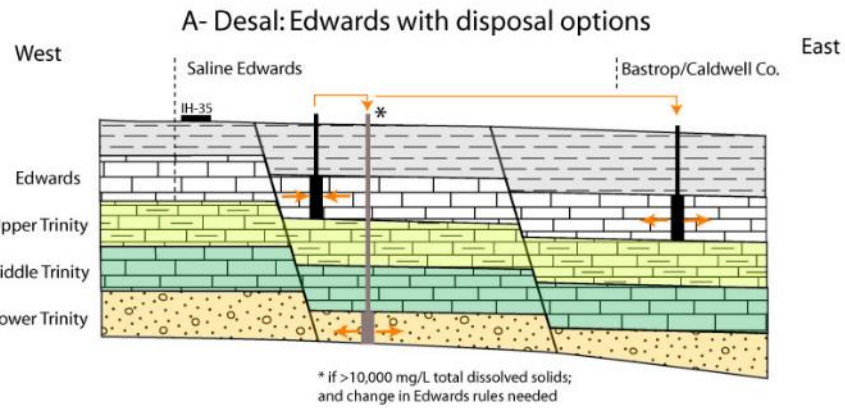


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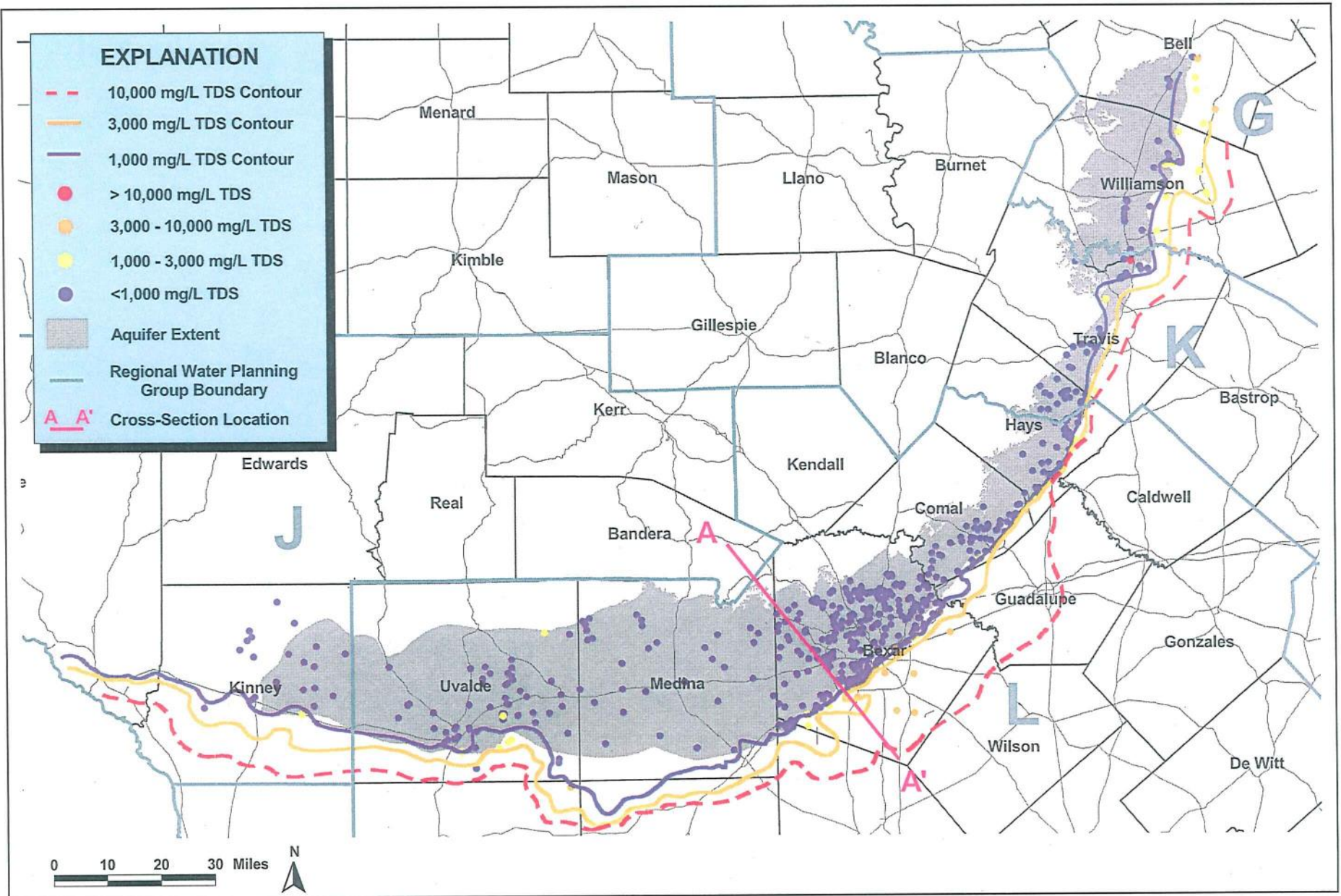


Potential for ASR and Desalination in the Saline Edwards Aquifer





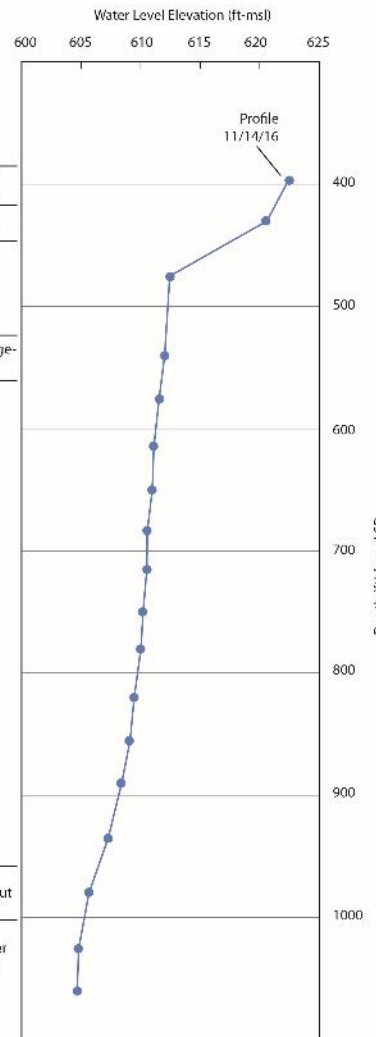
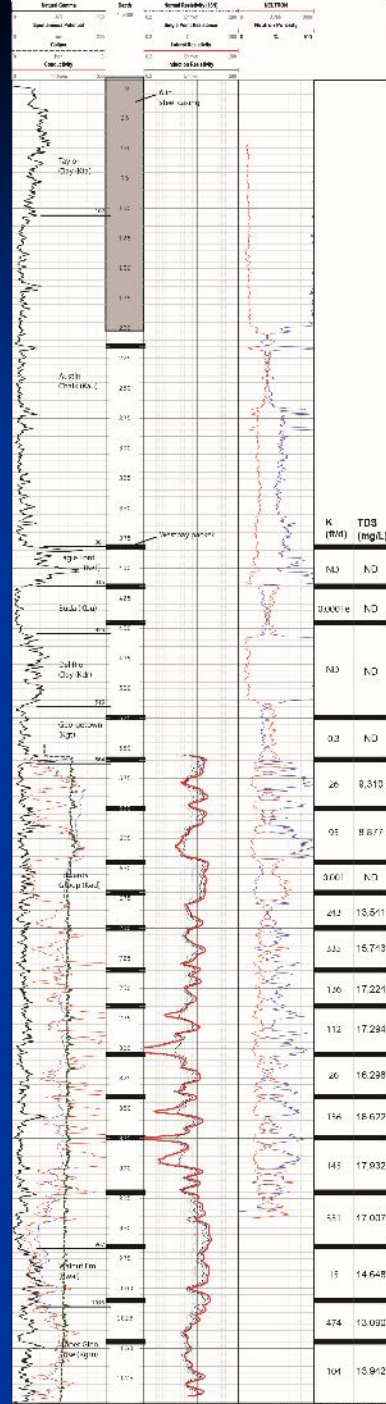
Not to scale



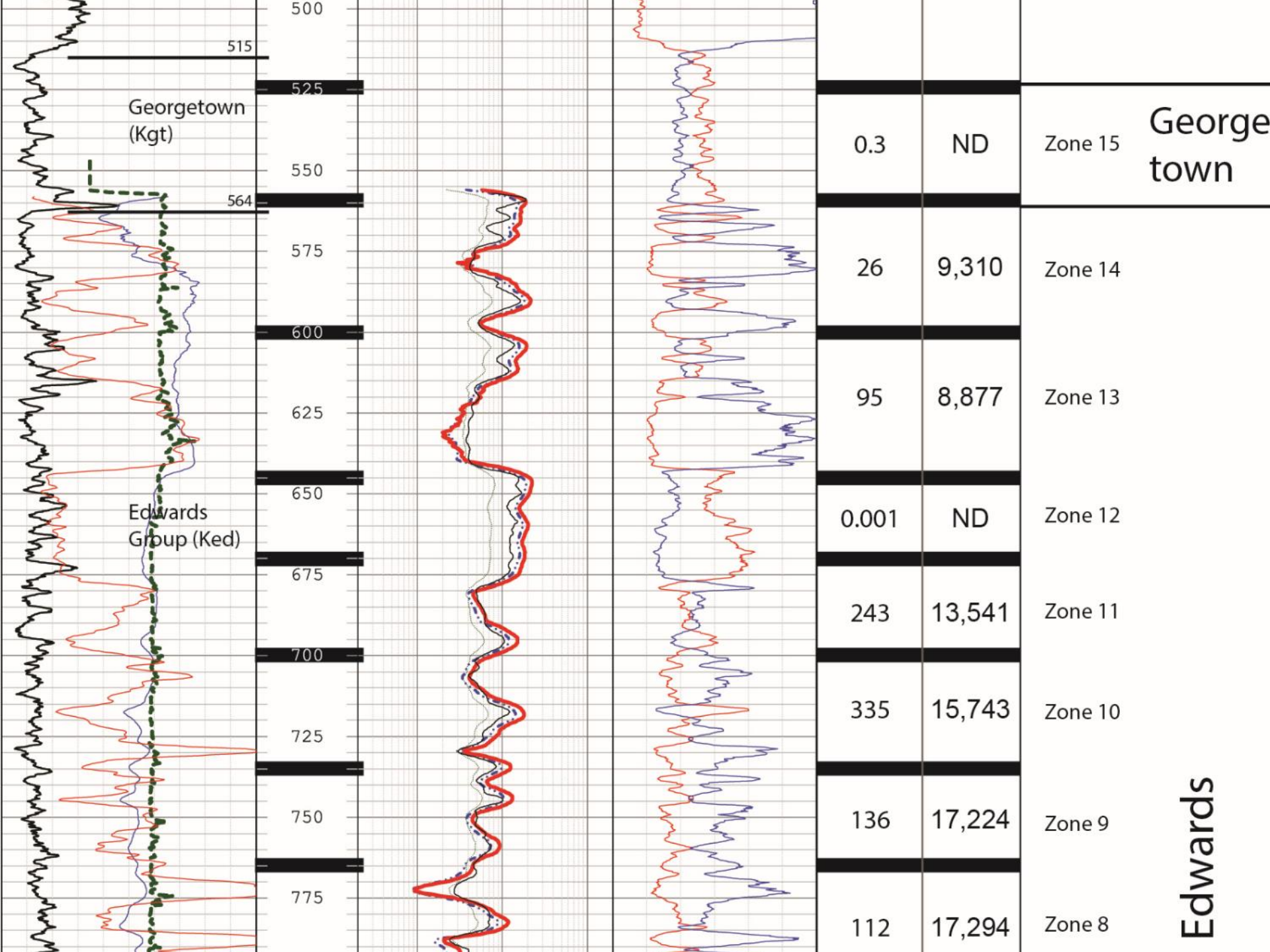
GROUNDWATER QUALITY IN THE EDWARDS (BALCONES FAULT ZONE) AQUIFER

FIGURE 13
LBG-GUYTON ASSOCIATES

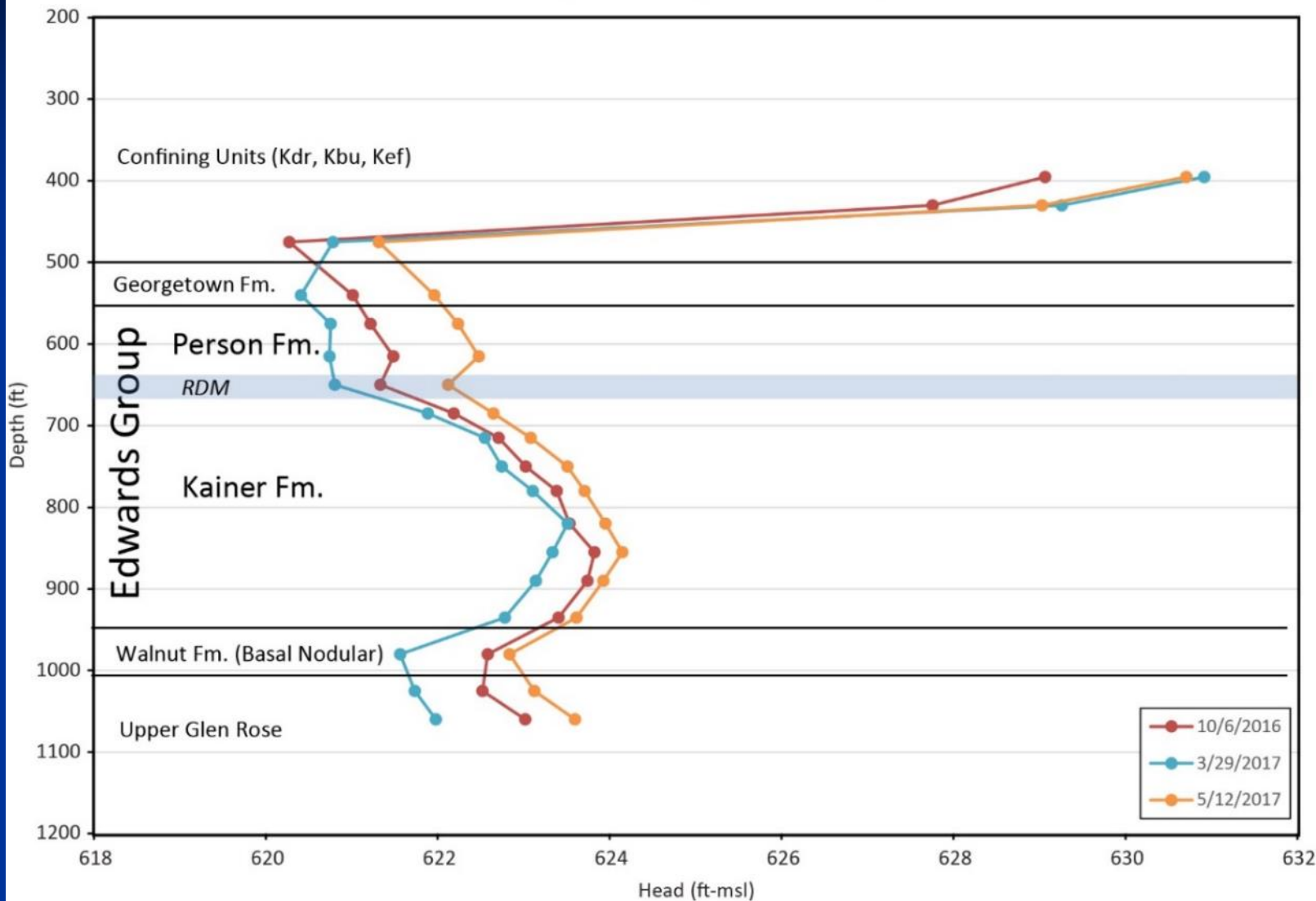
Samie-Edwards Multiport Monitor Well



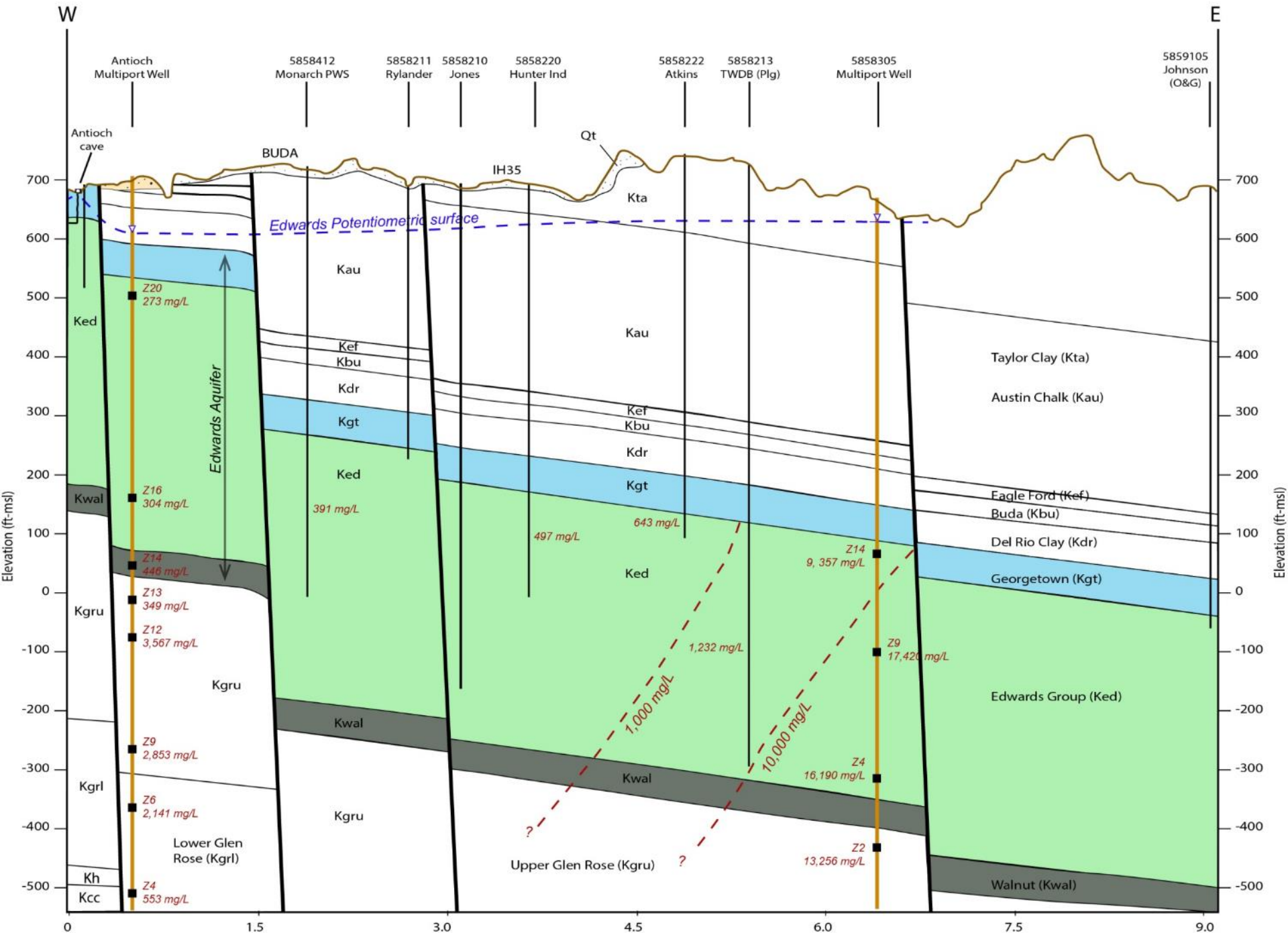
ND= not determined or measured



Head (corrected) Profile vs Depth



Hydrogeologic Cross Section: Fresh- to Saline-Water Edwards Aquifer



Questions?

