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McDonald, Jeffrey

From: Gilmore, Tyler J [tyler.gilmore@pnnl.gov]
nt: Friday, December 06, 2013 3:43 PM
: McDonald, Jeffrey
Subject: Salinity in Ironton Sandstone
Attachments: Computed_Data_Ironton-V2.png; Ironton-Galesville-TDS_Lloyd1995-mod-V2[1].png

Categories: Record Saved - Shared

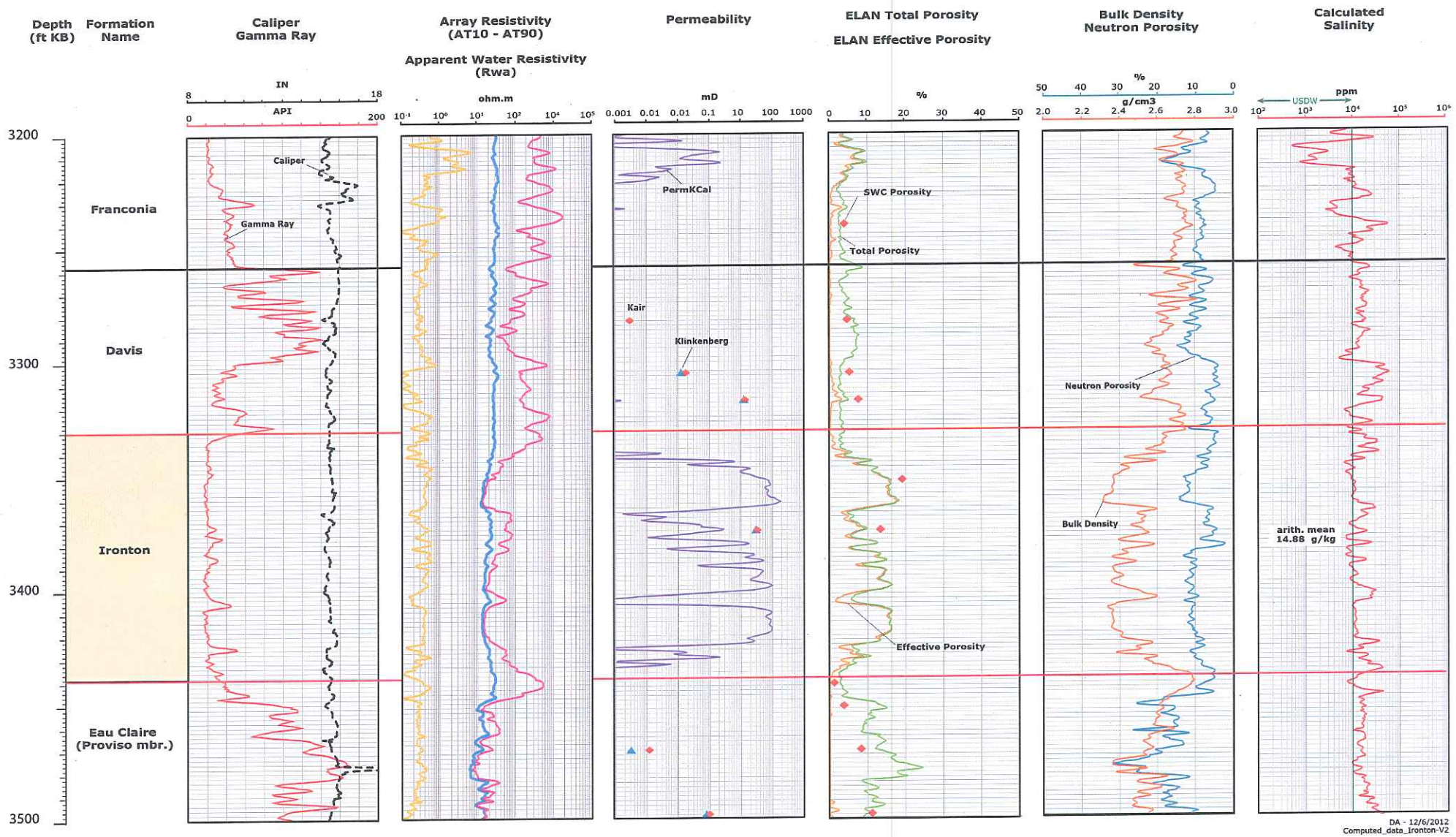
Jeff,
In follow-up to our phone conversation last week where you asked the question if we had a resistivity log for the Ironton-Galesville Fm and if we used the resistivity log to calculate salinity for the formation. The short answers are yes, and yes. Below is more information on how we derived salinity for the Ironton-Galesville Fm. A log derived value for salinity was determined and checked against literature values for verification.

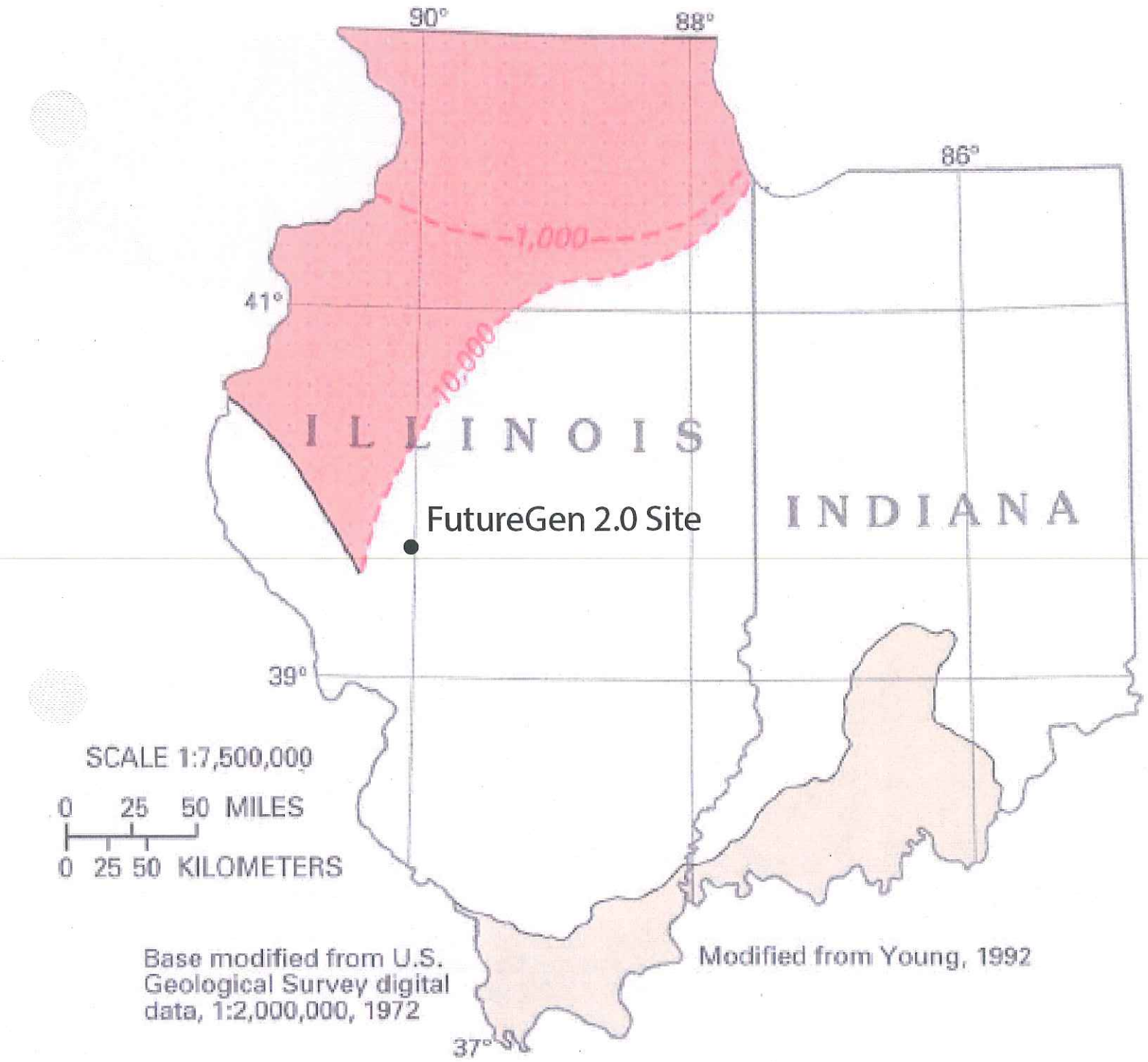
1) Schlumberger provided a salinity log from the stratigraphic well in what is called the "ELAN log". This "calculated salinity" log is computed from the resistivity and porosity (with a function of temperature). After discussions between experts from the FutureGen team and Schlumberger, it appears that the "calculated salinity" values need to be used cautiously since assigning specific salinity concentration levels for a particular formation could be an over-extension of wireline log information.

Since no other value is currently available for the Ironton-Galesville formation, an arithmetic mean of the Schlumberger "calculated salinity" was determined and reaches **14.88 g/kg** (depth 3330 to 3438.5 ft KB). The sistivity data from the ELAN log is included in an attached graphic along with several other geophysical log esults coming from the Schlumberger ELAN log along with plotted sidewall core data points.

2) Salinity data on the Ironton-Galesville aquifer in the literature in the vicinity of the FutureGen site is sparse. According to Kolata and Nimz (2010) and Lloyd and Lyke (1995), the Ironton-Galesville is the most consistently productiveaquifer in the northern third of Illinois. However, in the remainder of thestate, groundwater in the Ironton-Galesville **is too highly mineralized for most uses** (see attached map Ironton-Galesville-TDS_Lloyd1995_V1). The FutureGen 2.0 injection site is located to the southeast of the 10,000 mg/ldissolved-solids concentration line. The salinity value determined using Schlumberger computed log is consistent with what is known regionally.

Please call if you have any other questions.
Thanks
Tyler


Depth (ft KB)
Formation Name
Caliper
Gamma Ray
Array Resistivity (AT10 - AT90)
Apparent Water Resistivity (Rwa)
Permeability
ELAN Total Porosity
ELAN Effective Porosity
Bulk Density
Neutron Porosity
Calculated Salinity
IN
8
18
API
0
200
ohm.m
mD
0.001 0.01 0.01 0.1 10 100 1000
%
0 10 20 30 40 50
50 40 30 20 10 0
g/cm3
2.0 2.2 2.4 2.6 2.8 3.0
USDW
ppm
3200
3300
3400
3500
Franconia
Davis
Ironton
Eau Claire (Proviso mbr.)
Caliper
Gamma Ray
PermKCal
Kair
Klinkenberg
SWC Porosity
Total Porosity
Effective Porosity
Neutron Porosity
Bulk Density
arith. mean 14.88 g/kg
DA - 12/6/2012
Computed_data_Ironton-V2



EXPLANATION

Ironton–Galesville aquifer

1,000 Line of equal dissolved-solids concentration, in milligrams per liter

Erosional boundary of aquifer

DA - 12/6/2013
Modified after Lloyd and Lyke, 1995