Hydrogeologic Appraisal of the Cayuga County Ground-Water Contamination Superfund Site near Auburn, NY

by

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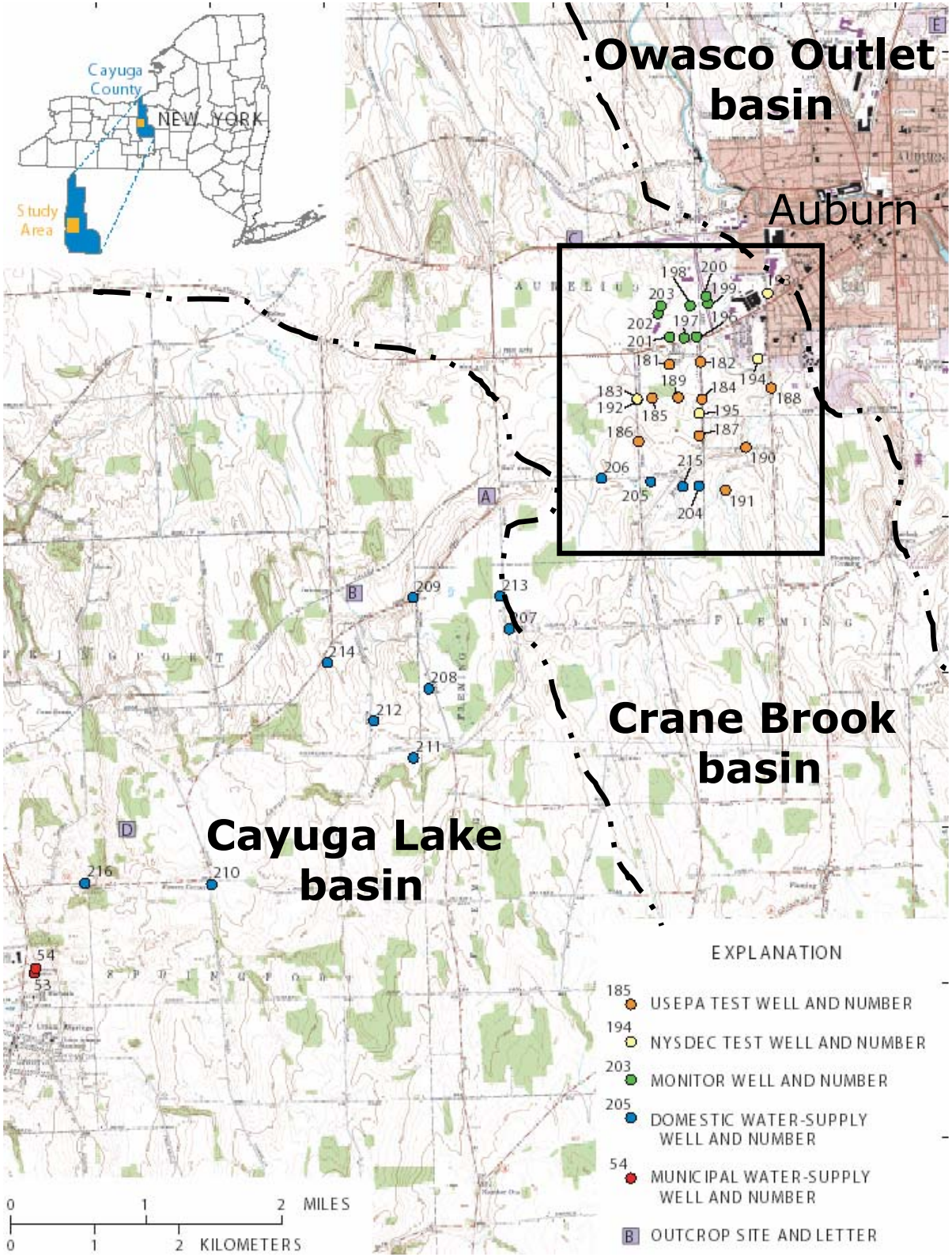
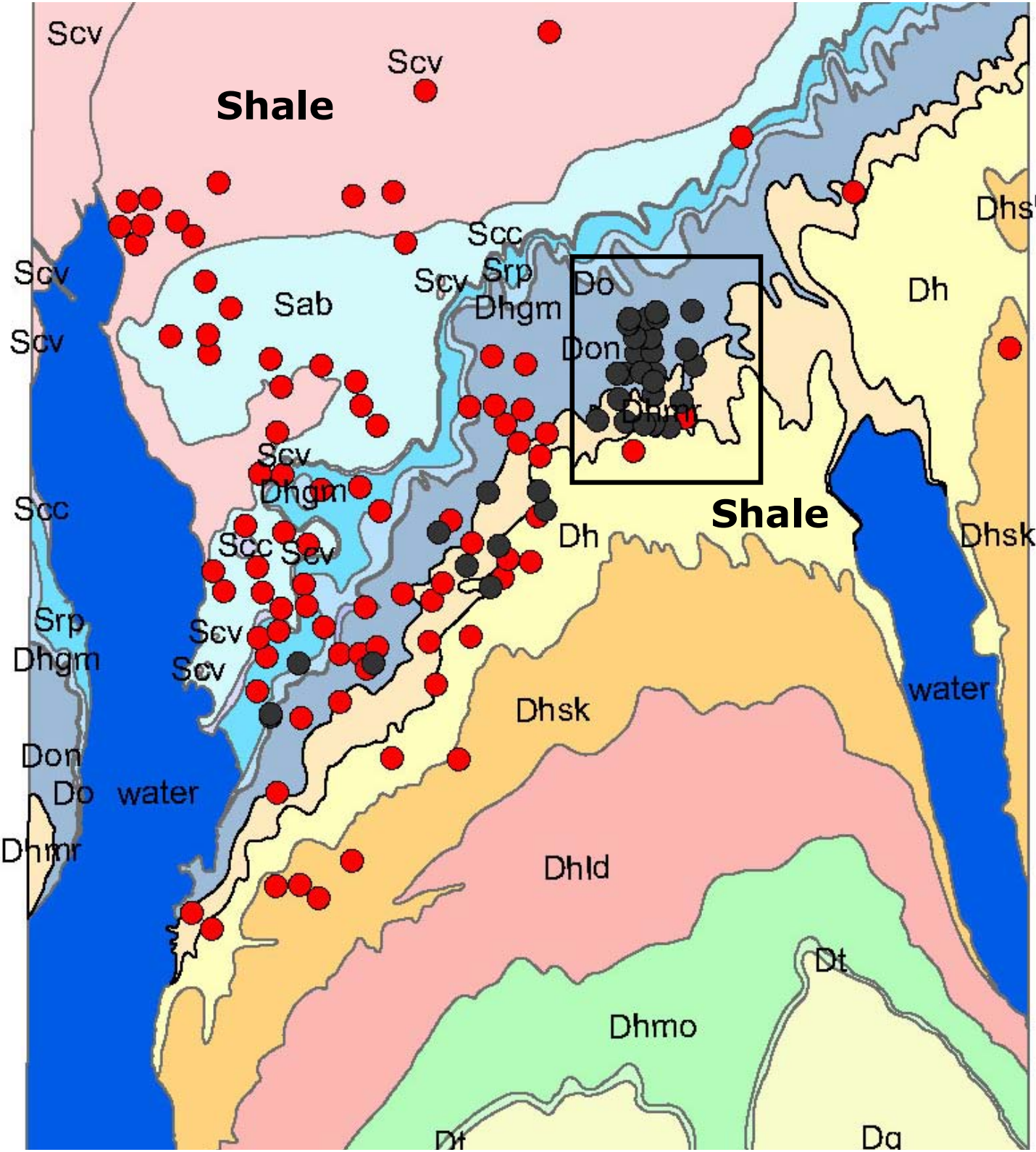
Location of wells at the Cayuga County site





Wells with borehole geophysical logs

- Gas well
- Monitoring well

0 — 2 Miles

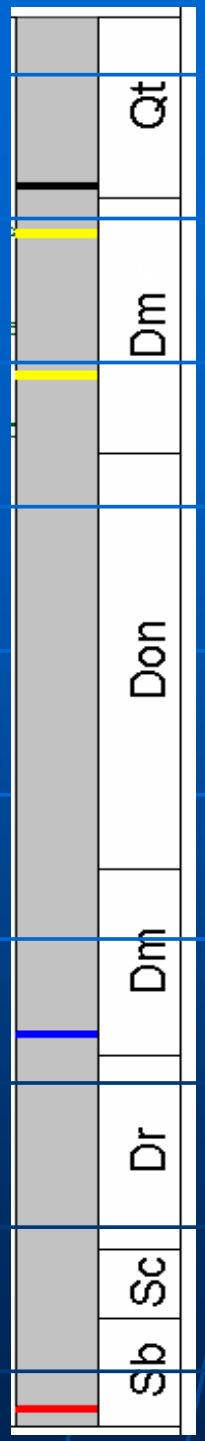
Don, Onondaga Limestone

Dhgm, Manlius, Rondout

Scc, Cobleskill Formation

Sab, Bertie Formation

Regional stratigraphic sequence and borehole flow in recharge areas



Base of casing

Flow zones with hydraulic head <u>above</u> composite head

Composite Hydraulic head

Flow zone with hydraulic head <u>below</u> composite head

Till

Marcellus Shale

Onondaga Limestone

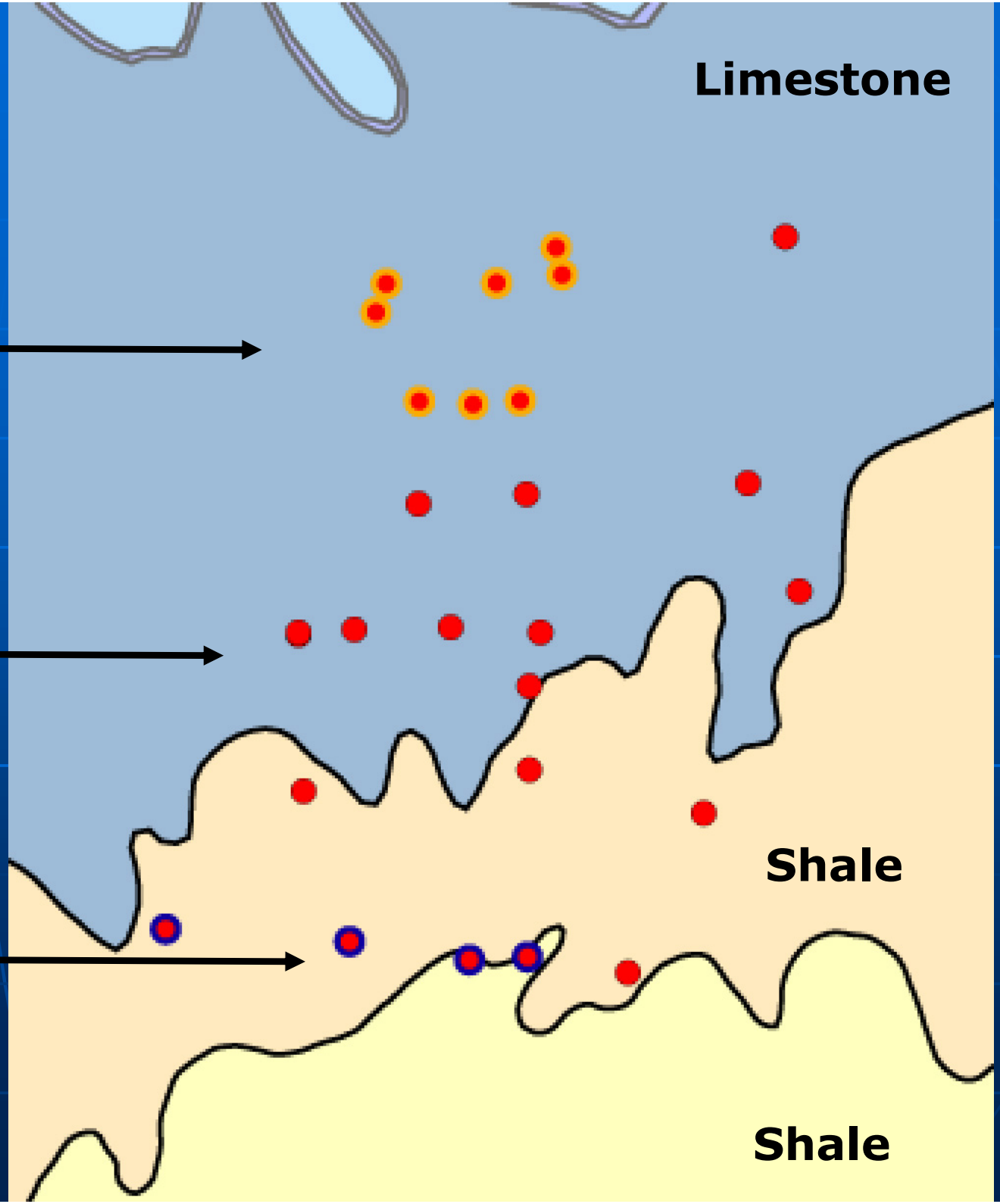
Manlius Fm.

Rondout Fm.

Cobleskill Fm.

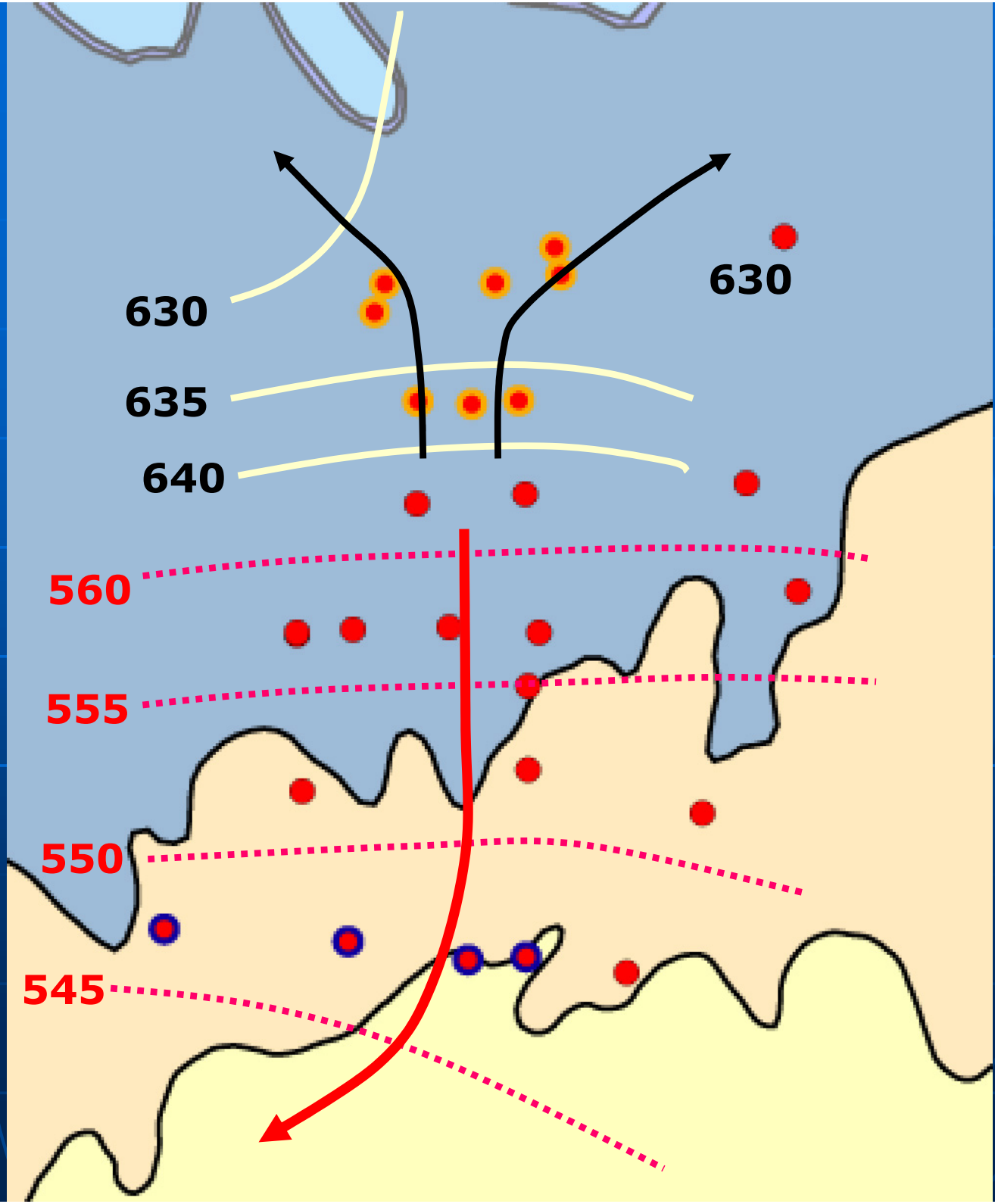
Bertie Fm.

Cayuga County Superfund site

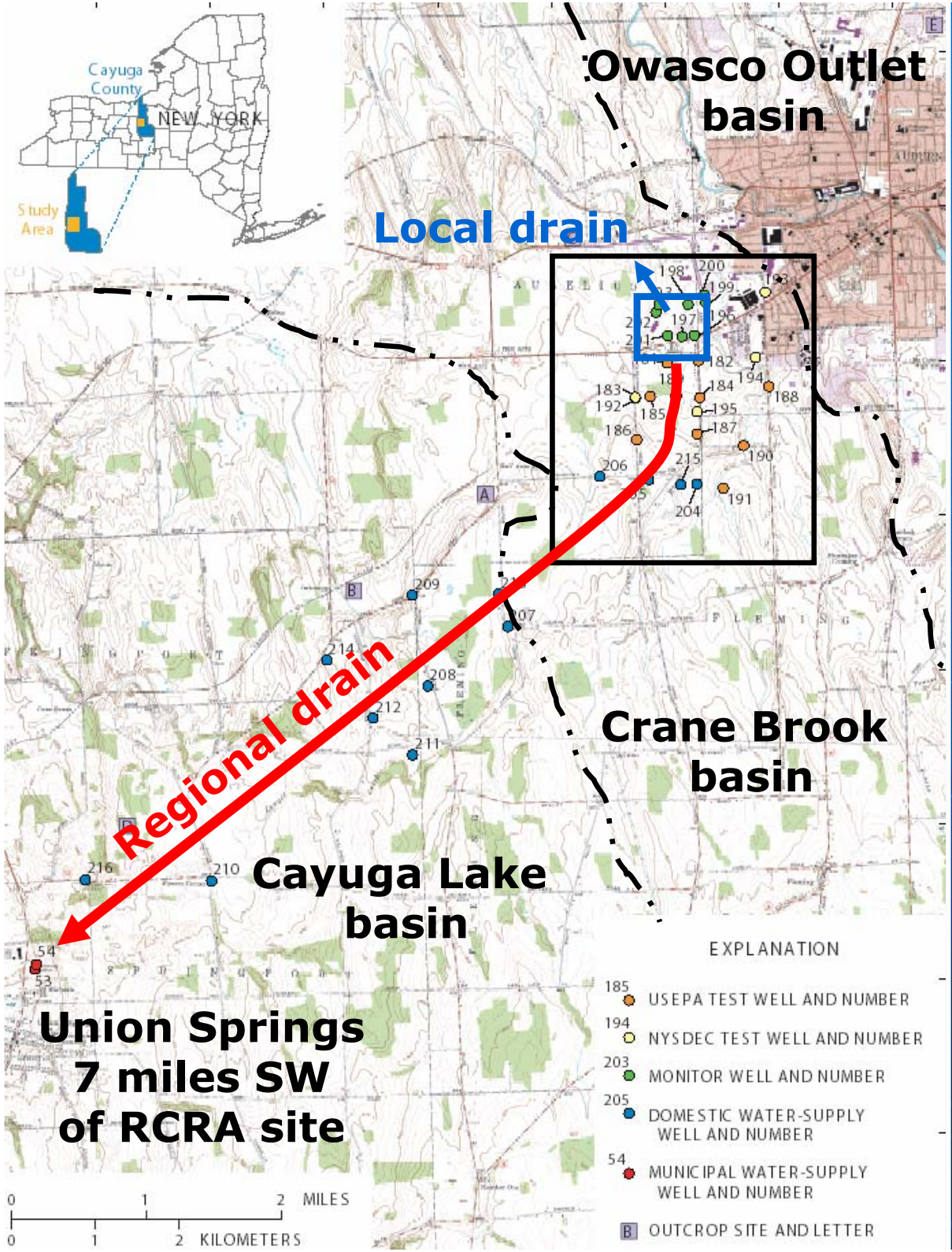


Ground water at the monitor wells in the Onondaga Limestone flows NW *and* NE

Ground water at the EPA test wells in the Bertie Fm. flows South *then* SW



High likelihood that the Bertie Formation is a regional ground-water drain that allows movement of water (and contaminants?) southwestward toward discharge points at Cayuga Lake near Union Springs



Technical Assistance to EPA

- Borehole geophysical logs
- Borehole-flow logs
- Stratigraphic analysis
- Hydrogeologic interpretation

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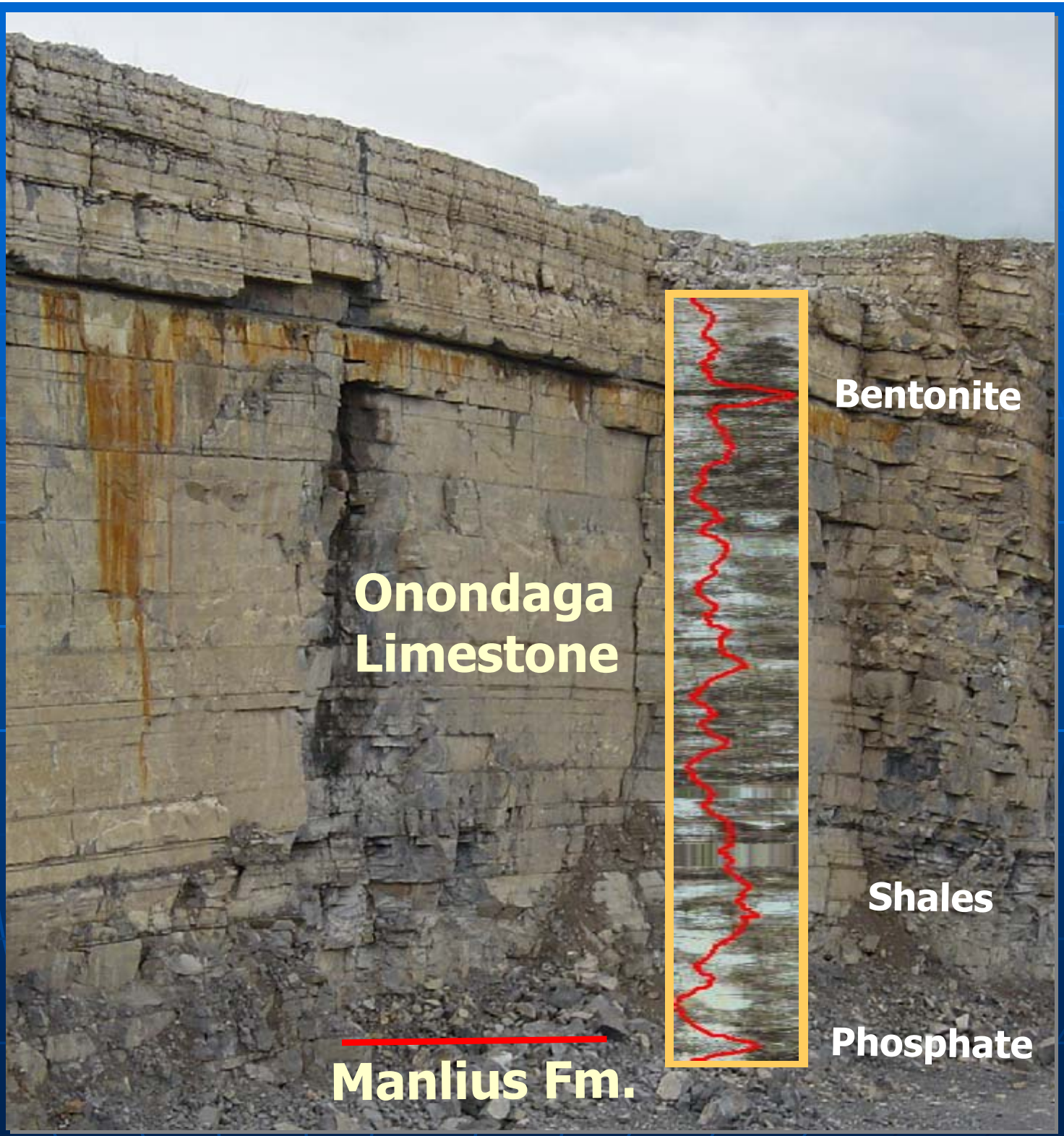
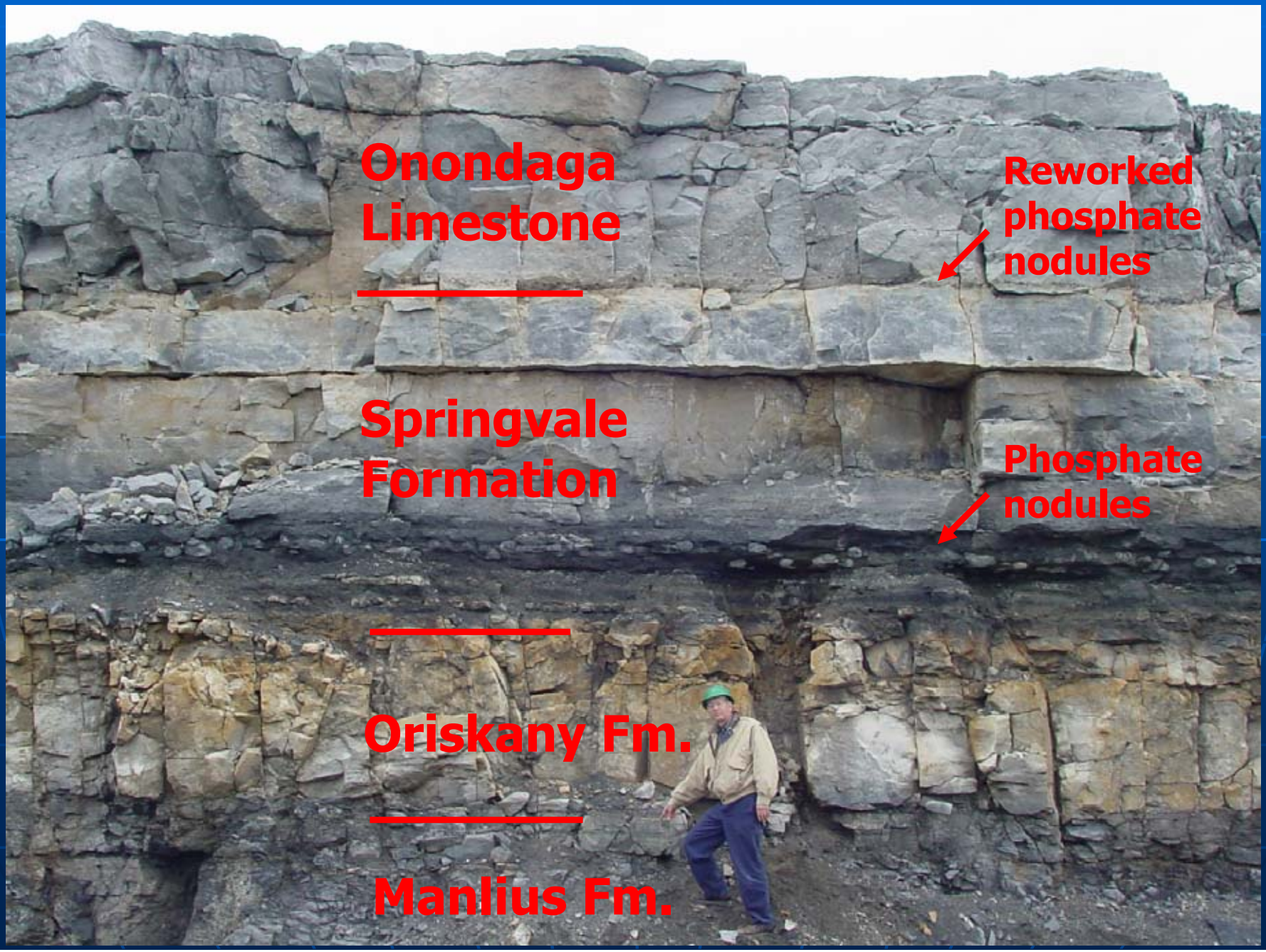
Use of typical stratigraphic marker beds that are easily identified in gamma logs

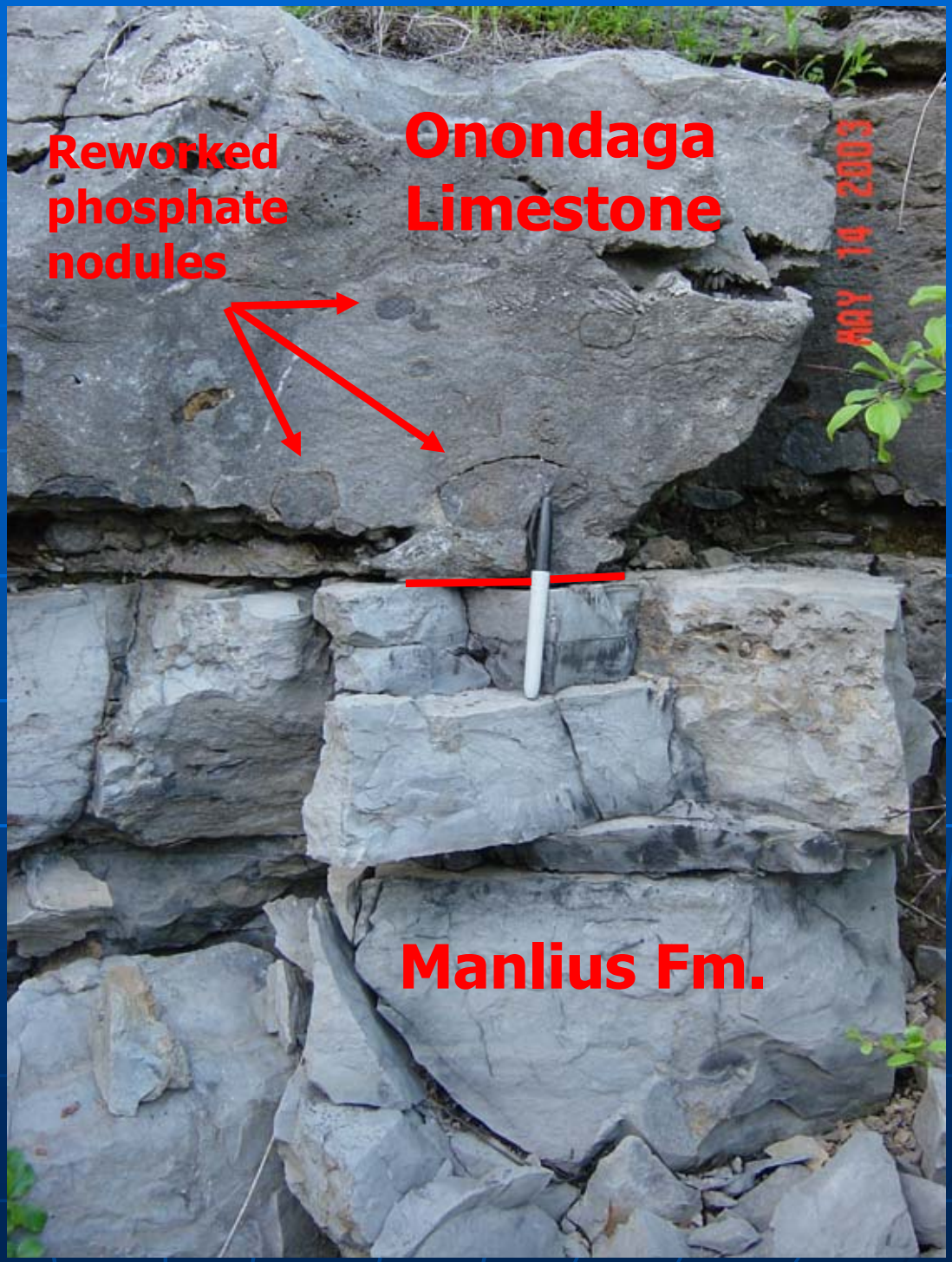


Phosphate marker beds at base of Onondaga
(in Skaneateles Quarry, 15 miles east of Auburn)



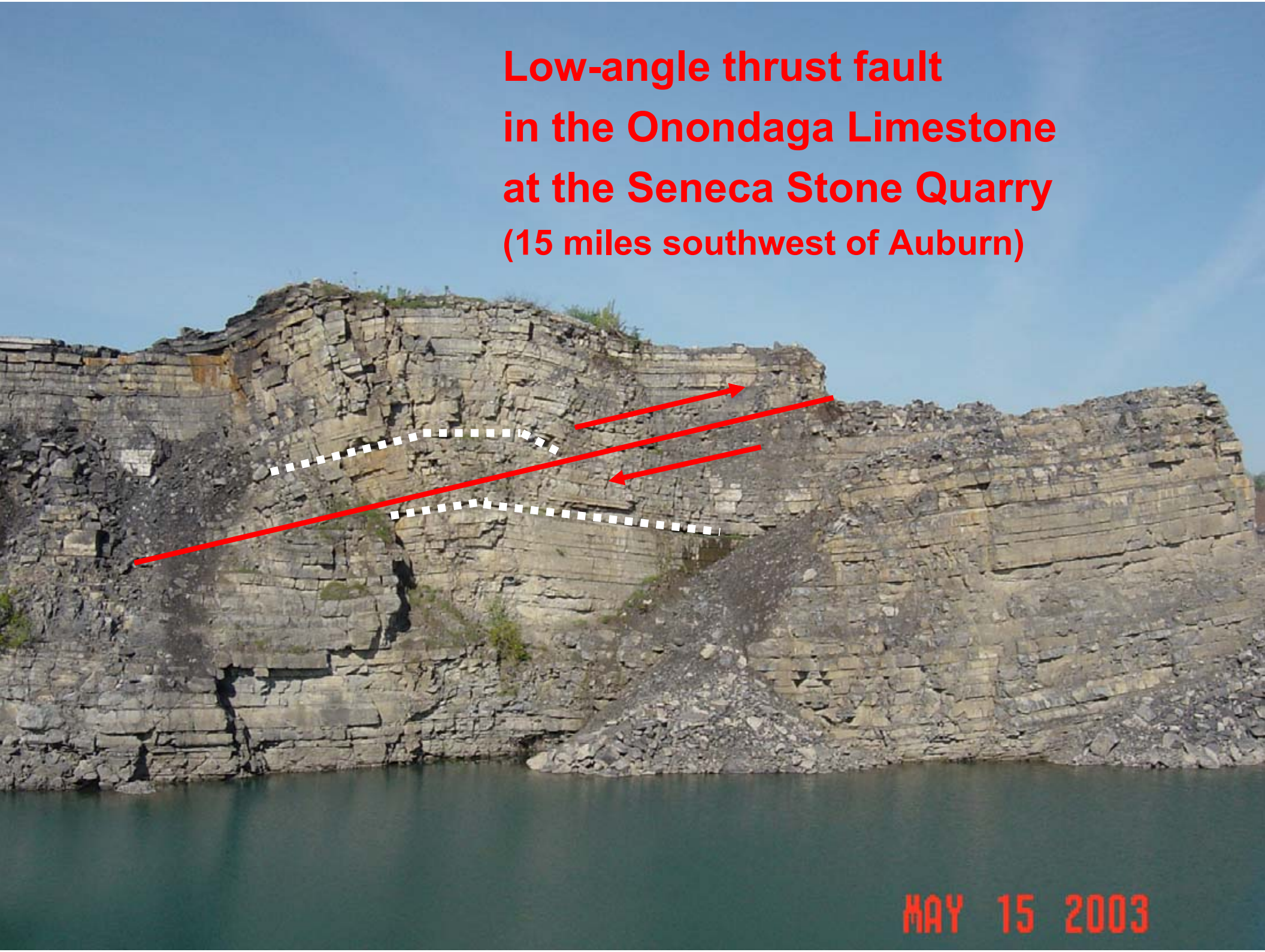
Phosphate marker beds at base of Onondaga to north of RCRA plant)

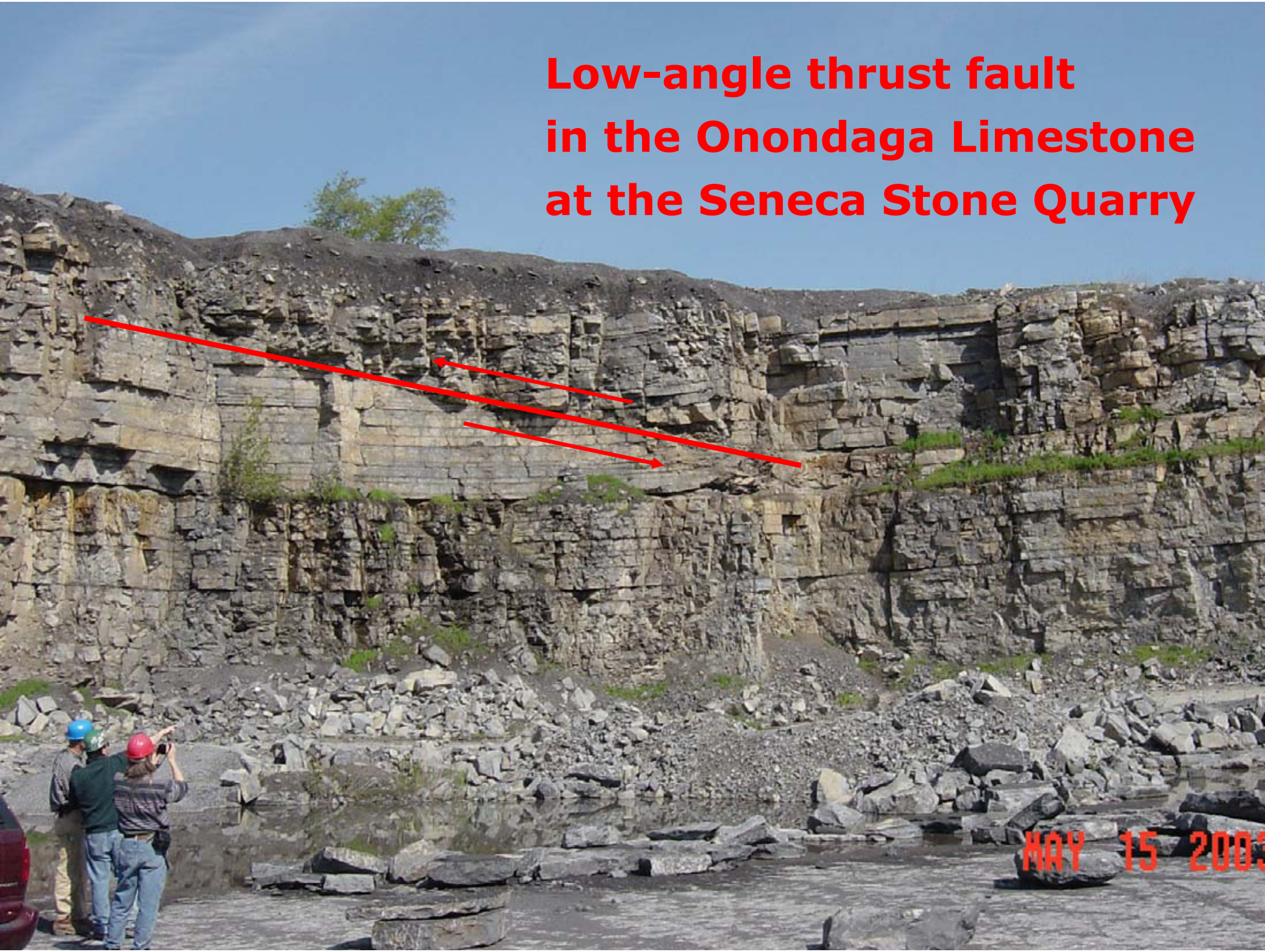
(Springvale and Oriskany beds not present)



Geological controls on pathways of water and contaminant movement

- Bedding-plane separations
- Vertical fracture sets
- Synclinal and anticlinal folds
- Low-angle thrust faults
- High-angle normal faults
- Enhanced solution cavities


Low-angle thrust fault
in the Onondaga Limestone
at the Seneca Stone Quarry
(15 miles southwest of Auburn)
MAY 15 2003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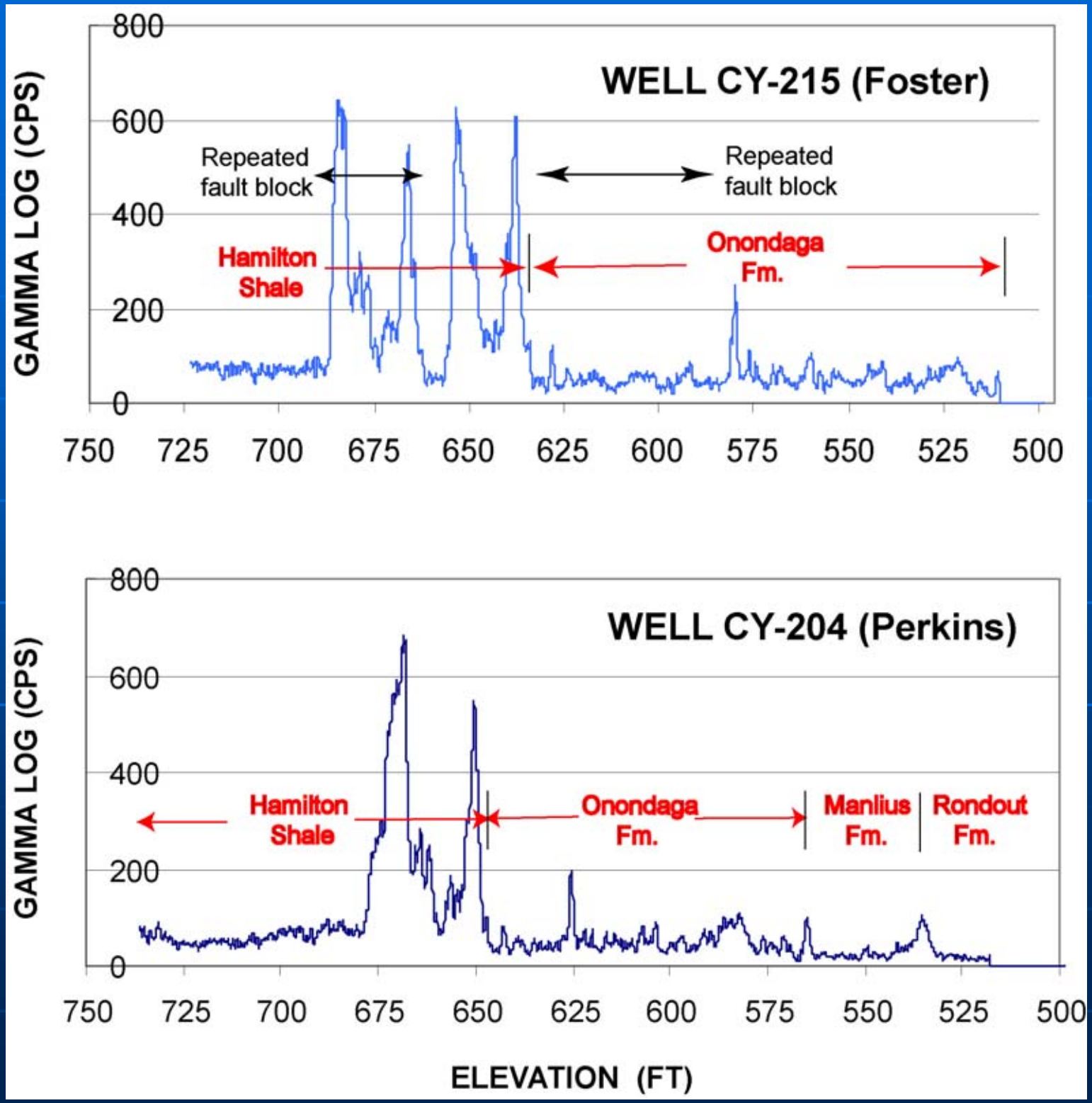
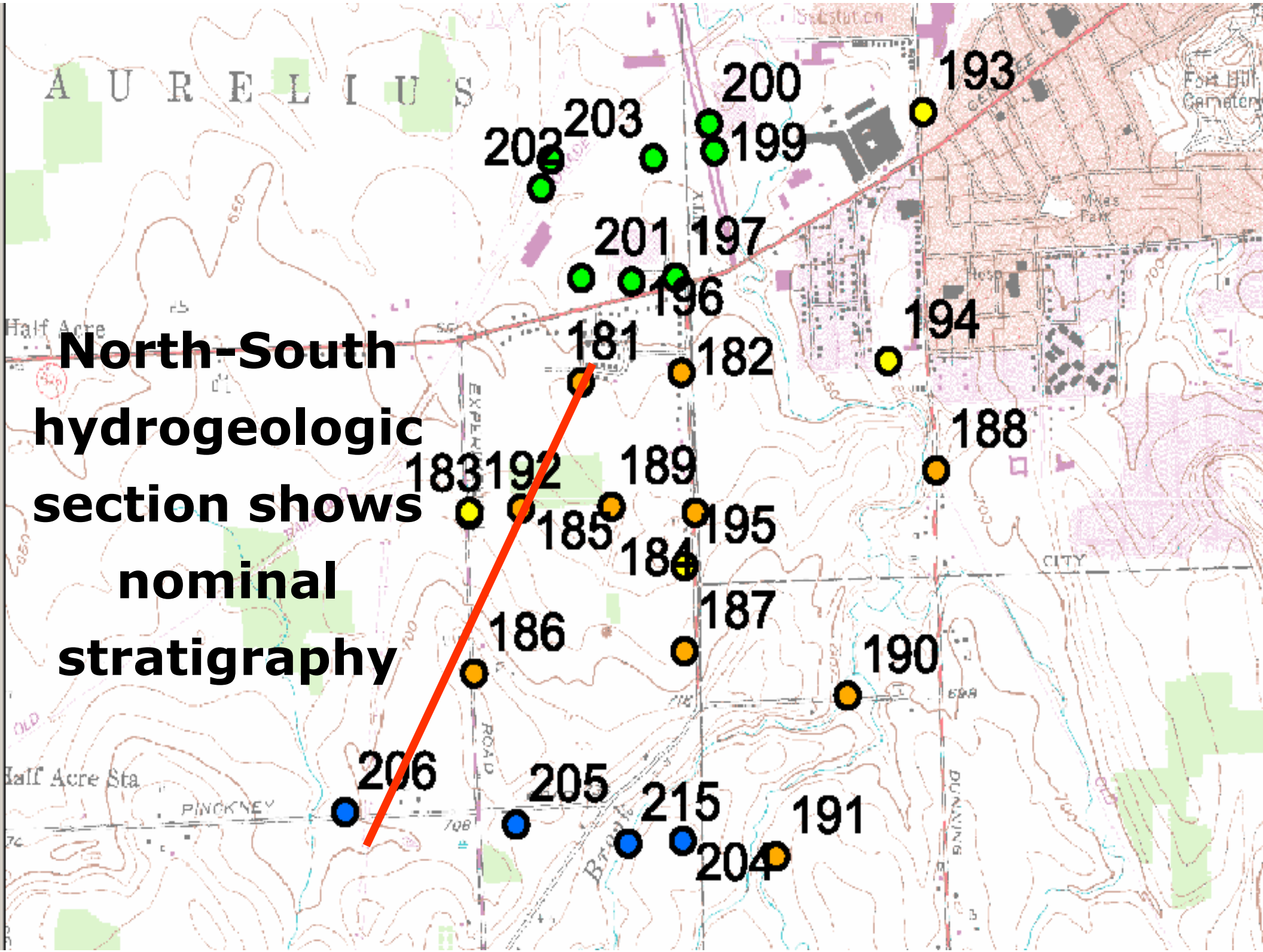
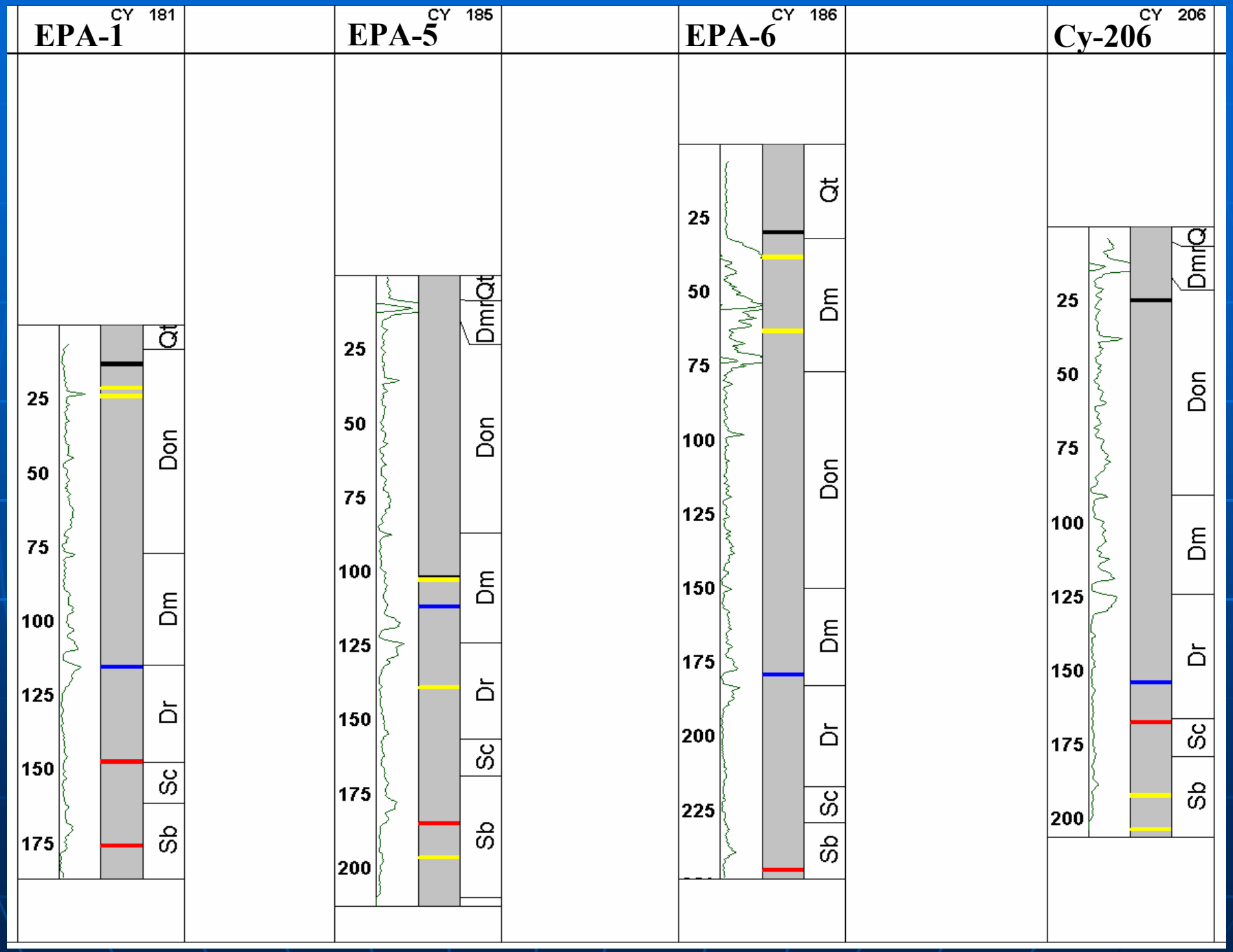

WELL CY-215 (Foster)
GAMMA LOG (CPS)
800
600
400
200
0
Repeated fault block
Repeated fault block
Hamilton Shale
Onondaga Fm.
750 725 700 675 650 625 600 575 550 525 500
WELL CY-204 (Perkins)
GAMMA LOG (CPS)
800
600
400
200
0
Hamilton Shale
Onondaga Fm.
Manlius Fm.
Rondout Fm.
750 725 700 675 650 625 600 575 550 525 500
ELEVATION (FT)


North-South hydrogeologic section shows nominal stratigraphy
AURELIUS
Half Acre
Half Acre Sta
PINCKNEY
CITY
ROAD
DUNNING
Fort Hill Cemetery
193
200
203
202
199
201
197
196
194
181
182
188
183
192
189
185
195
184
187
186
190
206
205
215
191
204

NORTH Elmhurst Dr. –– Pinckney Rd. SOUTH

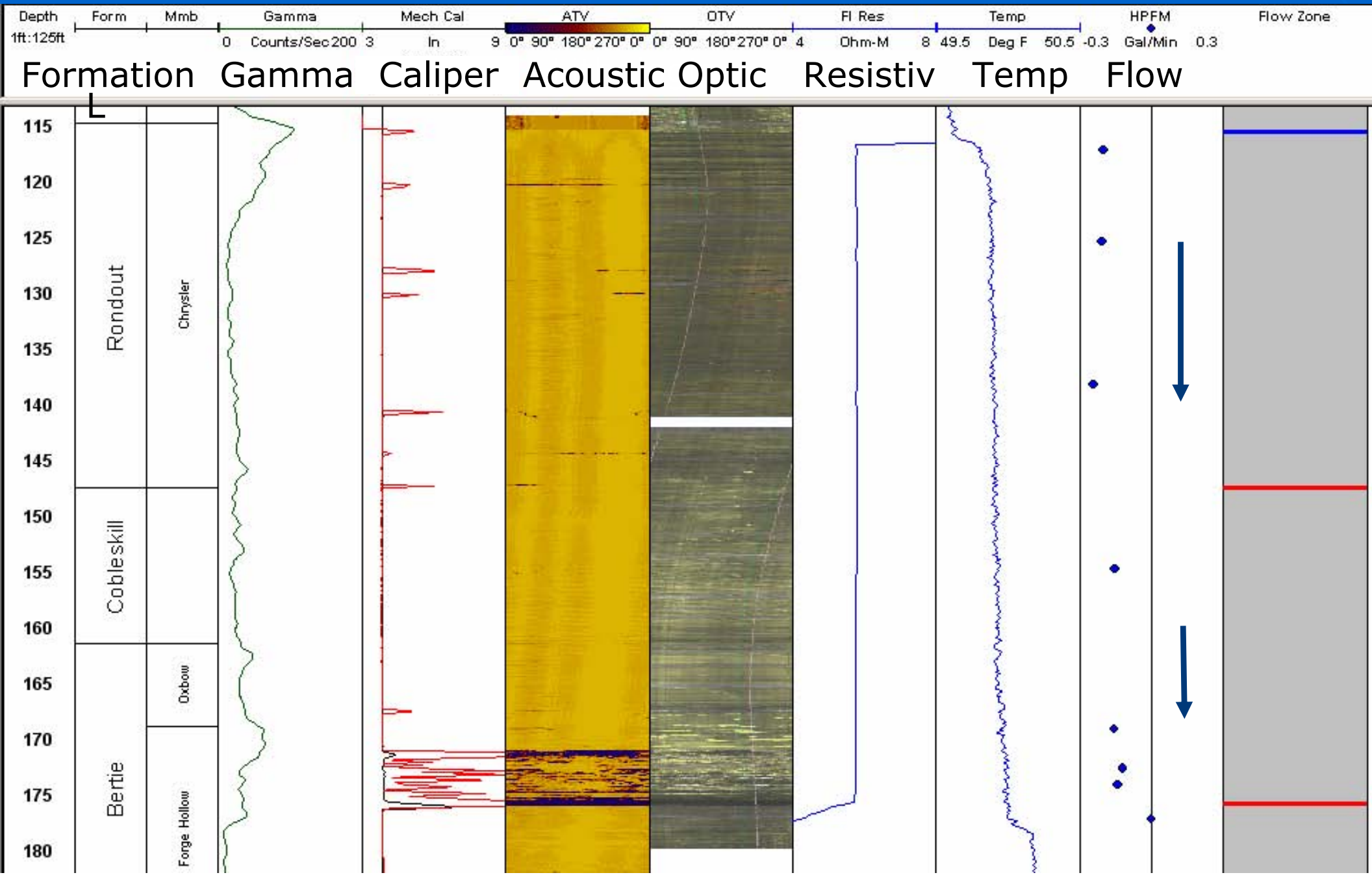
750

ELEVATION, IN FEET

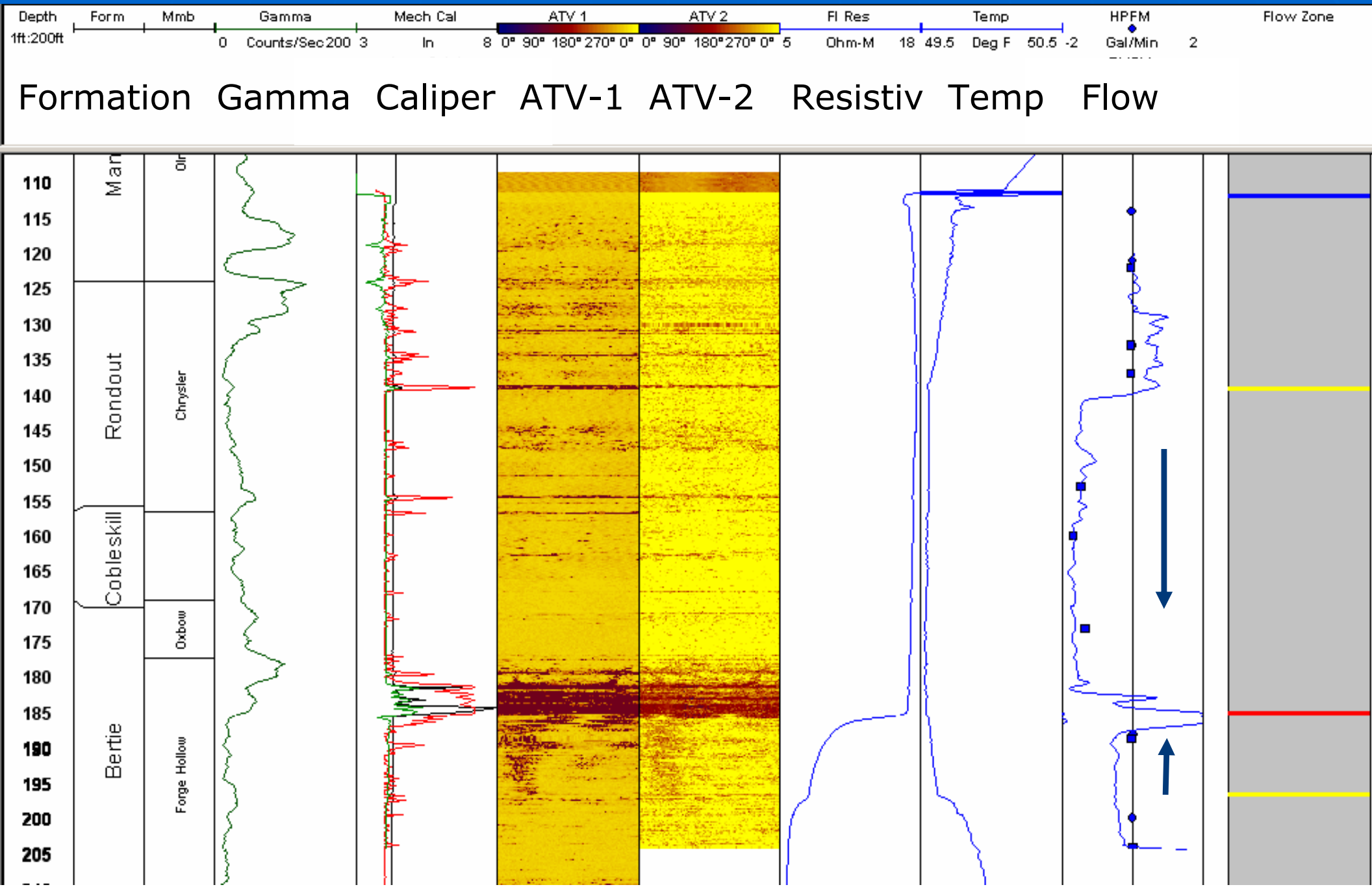


450

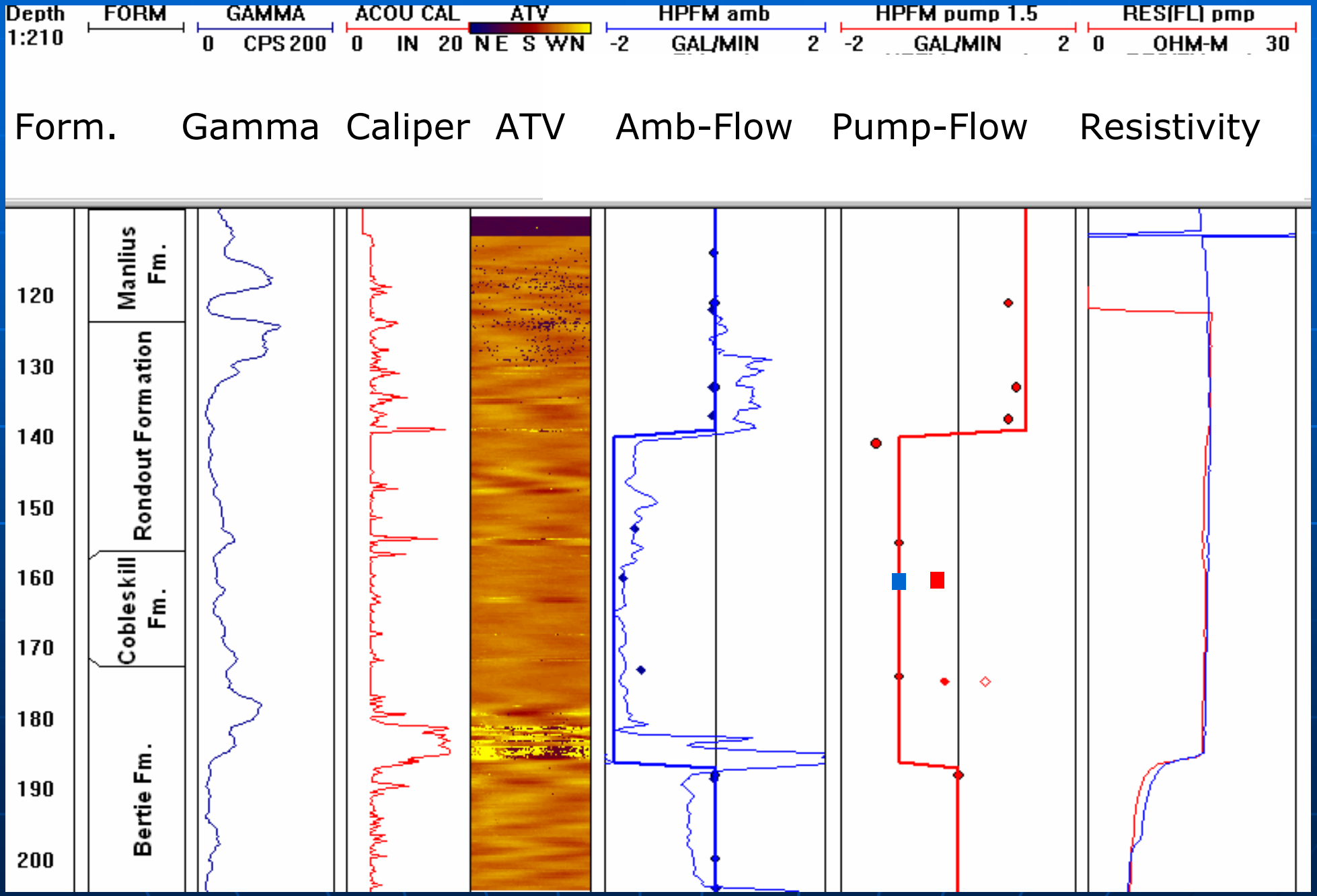
Geophysical, Stratigraphic, and Flow-Zone Logs
EPA-1



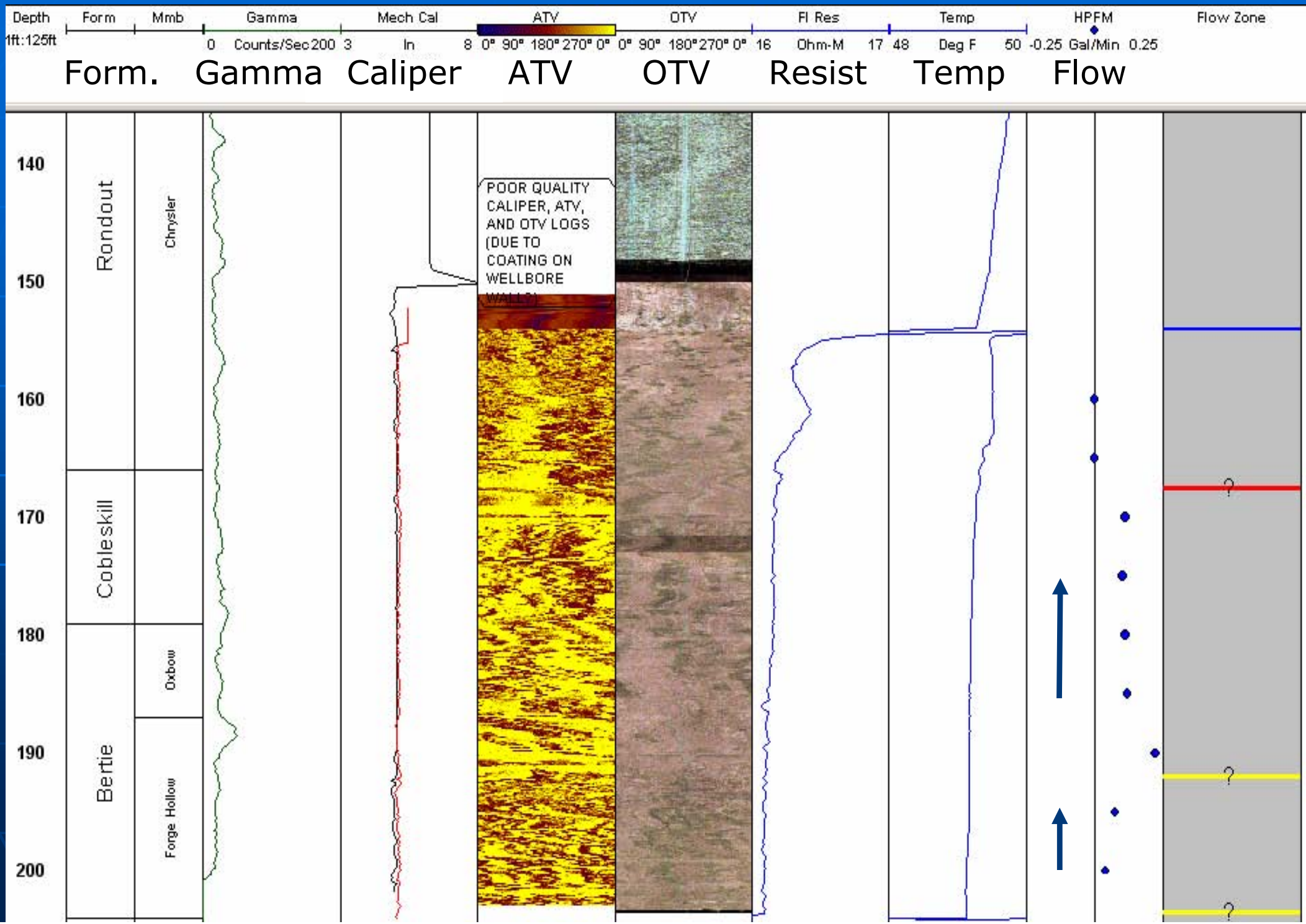
Geophysical, Stratigraphic, and Flow-Zone Logs
EPA-5



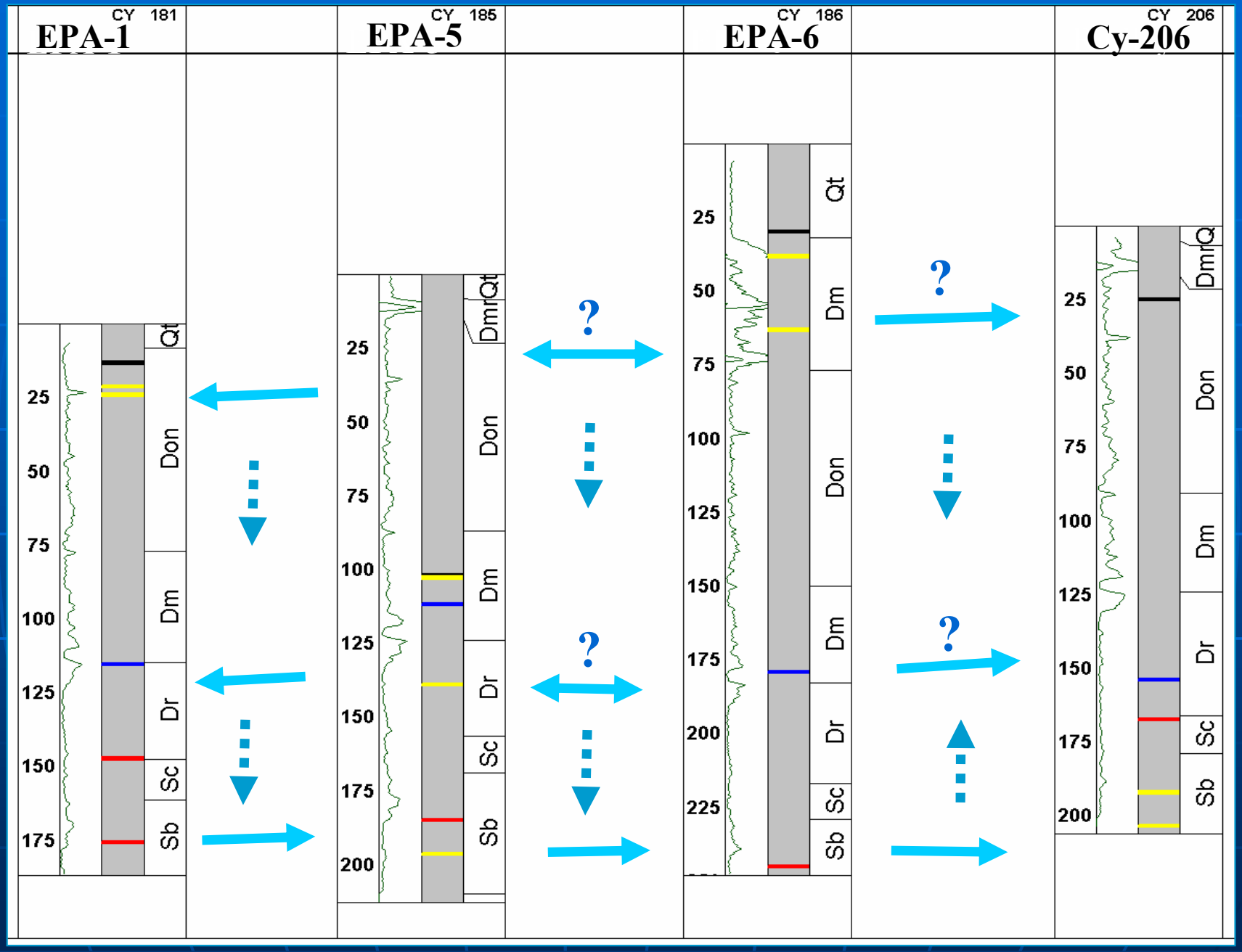
Geophysical, Stratigraphic, and Flow-Zone Logs
EPA-5



Cy-206 (Radley)

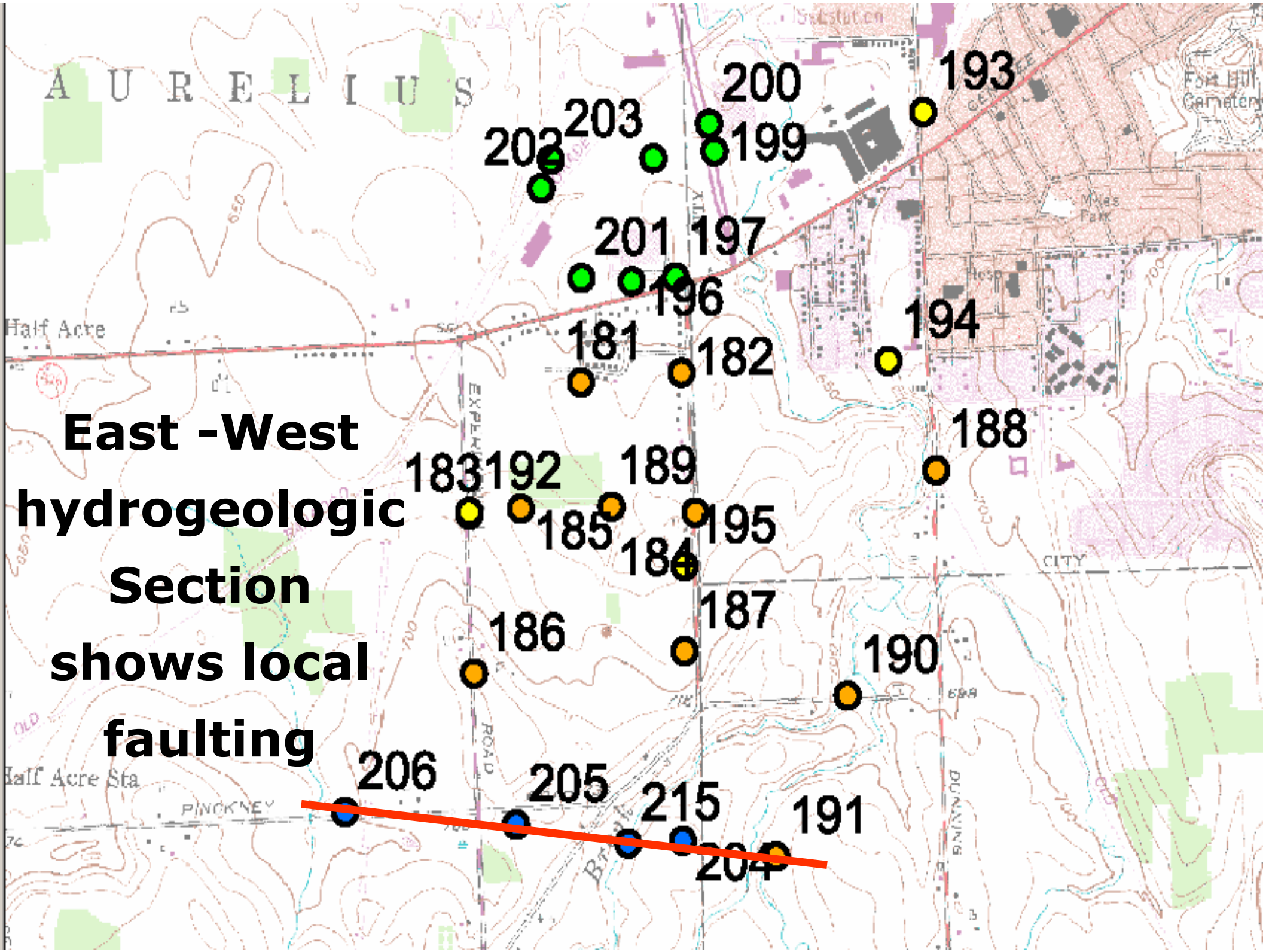


NORTH Elmhurst Dr. -- Pinckney Rd. SOUTH



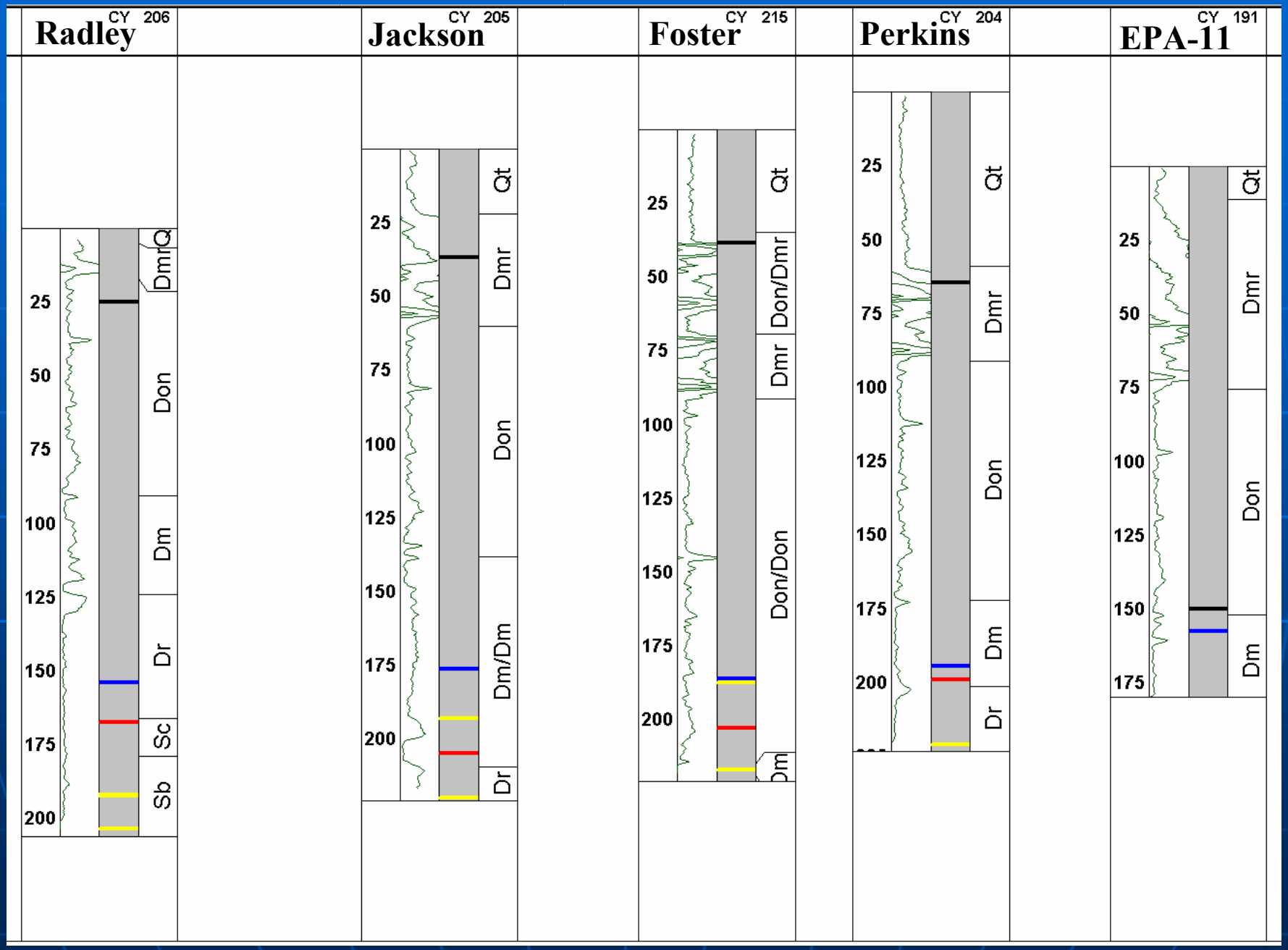
Horizontal flow

Downward gradient

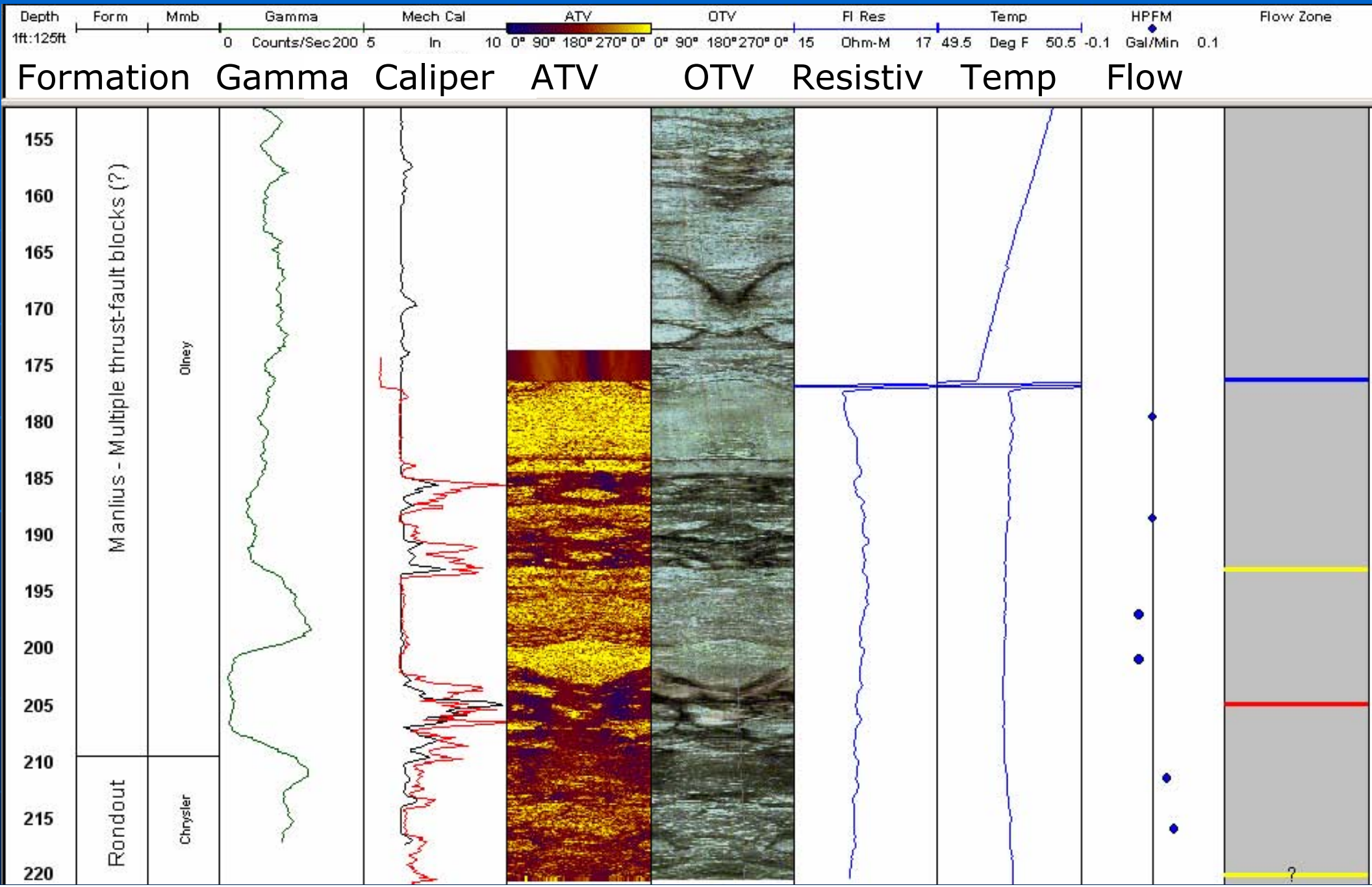


East -West hydrogeologic Section shows local faulting

WEST Pinckney Rd. – Overbrook Dr. EAST



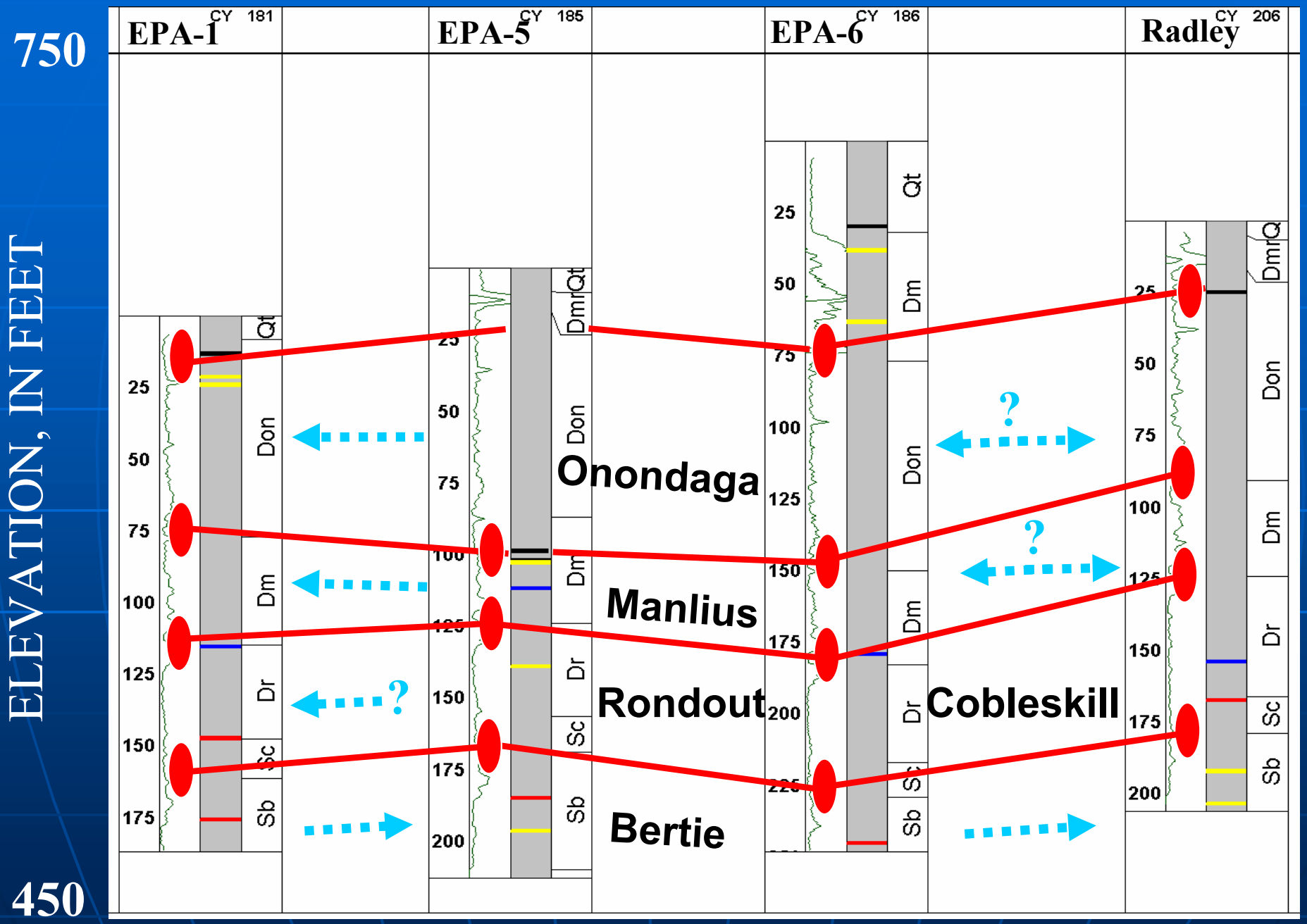
Cy-205 (Jackson)



Discrete-zone monitoring network

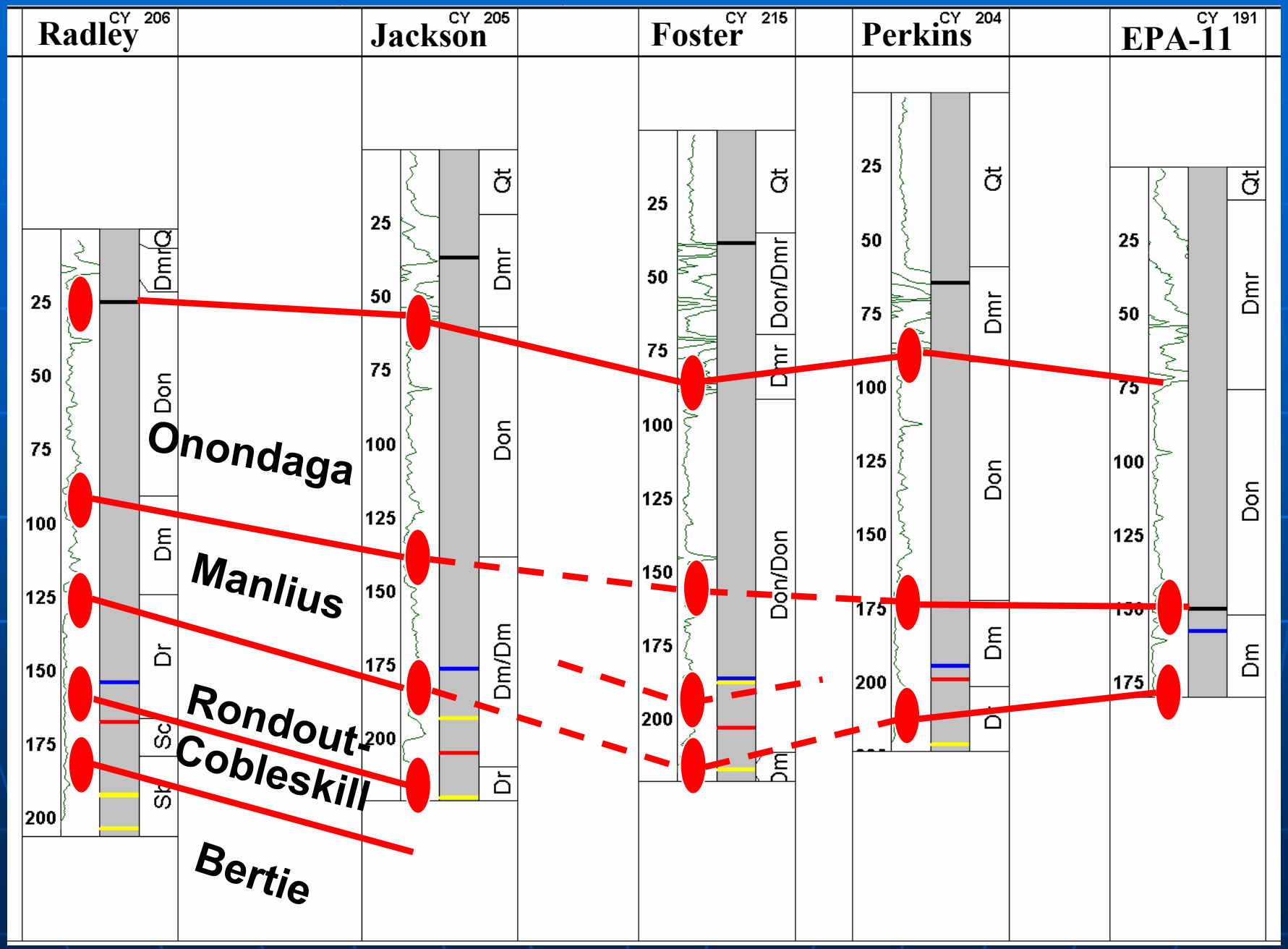
- Isolates and seals differential-head zones in boreholes
- Prevents short-circuit flows in boreholes
- Provides multiple-level flow-field maps
- Allows sample collection from discrete zones (small purge volume)

NORTH Elmhurst Dr. -- Pinckney Rd. SOUTH



Flow Packer Hydraulic-unit boundary

WEST Pinckney Rd. – Overbrook Dr. EAST



Packer Hydraulic-unit boundary

2004 – 2005 Workplan

- Install multi-zone monitoring network (14 wells)
- Monitor hydraulic heads in discrete zones (monthly)
- Sample water quality in discrete zones (quarterly)
- Develop multiple-level flow-field maps

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Geophysical, Stratigraphic, and Flow-Zone Logs of Selected Test, Monitor, and Water-Supply Wells in Cayuga County, New York

By J. Alton Anderson, John H. Williams,
David A.V. Eckhardt, and Todd S. Miller

Open-File Report 03-XXX

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