

## **APPENDIX A.—Sampled beds or intervals and localities used in the main data set**

**(in geological order, oldest formation first)**

### **Oatka Creek Formation:**

- BR: Bridgewater Shale Member; sections along Swamp Road, near Morrisville, Madison Co., NY (Madison 7.5' Quadrangle)
- CA: Cardiff Shale Member upper 2 m transitional; sections at crossing of unnamed creek by Abbey Road, near South Onondaga, Onondaga Co., NY (South Onondaga 7.5' Quadrangle)
- CH: Chittenango Shale Member; undifferentiated upper meter, Oatka Creek, 0.1 mi north of NY Rte. 5, LeRoy, Genesee County, NY (LeRoy 7.5' Quadrangle)
- LR: Chittenango Shale Member; LeRoy bed (western facies of Halihan Hill bed); undifferentiated upper meter, Oatka Creek, 0.1 mi north of NY Rte. 5, LeRoy, Genesee County, NY (LeRoy 7.5' Quadrangle)
- HH: Otsego Member; Halihan Hill Bed cycle; Schoolhouse Creek along Gorge Road, 0.5 mi east of Middleburgh, Schoharie Co., NY (Middleburgh 7.5' Quadrangle)

### **Skaneateles Formation:**

- MV1: Mottville Member; Peppermill Gulf and adjacent unnamed tributary, 0.3 mi N of US Rte. 20 and adjacent to Hogsback Road, Amber, Onondaga County, NY (South Onondaga 7.5' Quadrangle)
- MV2: Cardiff Shale Member upper 2 m transitional; sections at crossing of unnamed creek by Abbey Road, near South Onondaga, Onondaga Co., NY (South Onondaga 7.5' Quadrangle)
- MVD: transitional Mottville-Delphi Station Member beds; 0.3 mi N of US Rte. 20 and adjacent to Hogsback Road, Amber, Onondaga County, NY (South Onondaga 7.5' Quadrangle)
- DS: Delphi Station Shale Member lower 2 m; Peppermill Gulf and adjacent unnamed tributary, 0.3 mi N of US Rte. 20 and adjacent to Hogsback Road, Amber, Onondaga County, NY (South Onondaga 7.5' Quadrangle)
- PY: Pompey Shale Member (undifferentiated); Peppermill Gulf and adjacent unnamed tributary, 0.3 mi. N of US Rte. 20 and adjacent to Hogsback Road, Amber, Onondaga County, NY (South Onondaga 7.5' Quadrangle)
- SR: Slate Rock Bed of basal Butternut Shale Member; Peppermill Gulf and adjacent unnamed tributary, 0.3 mi N of US Rte. 20 and adjacent to Hogsback Road, Amber, Onondaga County, NY (South Onondaga 7.5' Quadrangle)
- BUT: upper 5 m of Butternut Shale Member; ditch of Coon Hill Road ~0.5 mi east of intersection of East Lake Road (Rte. 41) south of Skaneateles, Onondaga Co., NY (Skaneateles 7.5' Quadrangle)
- PG: Peppermill Gulf Bed at base of Centerfield Member; ditch of Coon Hill Road ~0.5 mi east of intersection of East Lake Road (Rte. 41) south of Skaneateles, Onondaga Co., NY (Skaneateles 7.5' Quadrangle)
- LCF1: Levanna-lower Centerfield Member transition (York submember of Gray, 1991)

Browns Creek 0.1 mi north of York Road and 0.1 mi west of Conrail RR crossing; York, Livingston Co., NY (Geneseo 7.5' Quadrangle)

LCF 2: Levanna-lower Centerfield member transitional shales; ditch of Coon Hill Road ~0.5 mi east of intersection of East Lake Road (Rte. 41) south of Skaneateles, Onondaga Co., NY (Skaneateles 7.5' Quadrangle)

### **Ludlowville Formation:**

CF: middle to upper parts of Centerfield Member coral rich beds ("Triphammer Beds");

Triphammer Falls on Conesus Creek, 0.1 mi north of Triphammer Road, ~ 3 miles south of Avon, Livingston Co., NY (Geneseo 7.5' Quadrangle)

LCF-3 lower Centerfield Member; Fayette Town quarry, south of Poormon Road, ~ 1 mi west of intersection with NY 14; Fayette, Seneca Co., NY (Romulus 7.5' Quadrangle)

WG: upper Centerfield Member; Wheeler Gully submember; Slate Rock Falls, Wilson Gully, south of Geneva, Seneca Co., NY (Geneva South 7.5' Quadrangle)

UCF: upper Centerfield Member transition, Wheeler Gully submember; Wheeler Gully just north of confluence of tributary with Jaycox Creek, 0.1 mile north of Nations Road and ~1 mile west of NY Rte. 39, Geneseo, Livingston Co., NY (Geneseo 7.5' Quadrangle)

LL1: Lower Ledyard Shale Member; Alden beds; Eleven Mile Creek, 1 mi north of US Rte. 20, Darien Center, Genesee County, NY (Corfu 7.5' Quadrangle)

LL2: Lower Ledyard Shale Member; Browns Creek 0.1 mi north of York Road and 0.2 mi west of Conrail RR crossing; York, Livingston Co., NY (Caledonia 7.5' Quadrangle)

LOT: Lower Otisco Shale Member: Staghorn Point, Jenny Point and Halls Landing, Ten Mile Creek adjacent gullies along east shore of Skaneateles Lake, south of Borodino, Onondaga Co., NY. (Spafford 7.5' Quadrangle)

UL: upper Ledyard Shale Member; Cayuga Lake shore mouth of Sheldrake Creek, adjacent to Rte 139, Sheldrake, Seneca Co., NY (Sheldrake 7.5' Quadrangle)

UOT-2: upper Otisco Shale Member; Ten Mile Creek and adjacent gullies along east side of Skaneateles Lake, south of Borodino, Onondaga Co., NY. (Spafford 7.5' Quadrangle)

JS: Joshua coral beds; Otisco Shale Member; Ten Mile Creek and adjacent gullies along east side of Skaneateles Lake, south of Borodino, Onondaga Co., NY. (Spafford 7.5' Quadrangle)

MW1: middle Wanakah Shale Member, *Athyris* bed; Lake Erie shore; south of Eighteenmile Creek; North Evans, Erie Co., NY (Eden 7.5' Quadrangle)

MW2: middle Wanakah Shale Member, *Ambocoelia* beds; Cazenovia Creek, near Northrup Road, Spring Brook, Erie Co., NY (Orchard Park 7.5' Quadrangle)

MW3: middle Wanakah Shale Member, *Athyris* bed; Cazenovia Creek, near Northrup Road, Spring Brook, Erie Co., NY (Orchard Park 7.5' Quadrangle)

MW4: middle beds of Wanakah Shale Member; Kashong Glen, 1 mile east of Pre-emption Road, near Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)

MC: Wanakah Shale Member, Murder Creek ("trilobite") bed; Murder Creek, just south of Sharrack Road, Darien, Genesee Co., NY (Alexander 7.5' Quadrangle)

DC: Wanakah Shale Member, Darien Center coral bed; Murder Creek, just south of Sharrack Road, Darien, Genesee Co., NY (Alexander 7.5' Quadrangle)

BL1: upper Wanakah Shale Member, Blasdell Bed ("Demissa bed"); Cazenovia Creek, near Northrup Road, Spring Brook, Erie Co., NY (Orchard Park 7.5' Quadrangle)

- BL-2: upper Wanakah Shale Member, Blasdell-Bloomer Bed; Sheldrake Creek, adjacent to Rte. 139 and 0.5 mi west of mouth on Cayuga Lake, Sheldrake, Seneca Co., NY (Sheldrake 7.5' Quadrangle)
- IP: middle Ivy Point Siltstone Member (= Wanakah Shale equivalent); cuts along NY Rte. 38, along southwest side of Owasco Lake; Cascade, Cayuga Co., NY
- RM: Romulus shale submember or uppermost Wanakah Shale Member; Kashong Glen, 1 mile east of Pre-emption Road, near Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)
- SP: Spafford Shale Member, excavation of shale just west of Woodmancy Road at its cross of Fellows Falls, Vesper, Onondaga Co., NY (Tully 7.5' Quadrangle)
- HG: Jaycox Shale Member; Hills Gulch Bed, Jaycox Run, 0.3 mi west of NY 39, north of Geneseo, Livingston Co., NY (Geneseo 7.5' Quadrangle)
- JAY1: Jaycox Shale Member; middle shale "*Megastrophia* bed"; Jaycox Run, 0.3 mi west of NY 39, north of Geneseo, Livingston Co., NY (Geneseo 7.5' Quadrangle)
- JAY2: Jaycox Shale; Kashong Glen, 1 mile east of Pre-emption Road, near Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)

### **Moscow Formation:**

- DR1: Deep Run Shale Member: Jaycox Run, 0.3 mi west of NY 39, north of Geneseo, Livingston Co., NY (Geneseo 7.5' Quadrangle)
- DR: Deep Run Shale Member; Deep Run east side of Canandaigua Lake 0.3 mi east of fork near Rte. 364, Cottage City, Ontario Co., NY (Canandaigua 7.5' Quadrangle)
- LK1: lower Kashong Shale Member; Menteth Gully ~1 mi of West Lakeshore Road, Canandaigua Lake, Cheshire, Ontario Co., NY (Canandaigua Lake 7.5' Quadrangle)
- LK2: lower Kashong Shale Member; Kashong Glen, 1 mile east of Pre-emption Road, near Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)
- UK: upper Kashong Shale Member; Kashong Glen, 1 mile east of Pre-emption Road, near Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)
- RC1: Kashong Shale Member; *Rhipidomella-Centronella* (RC) bed; Menteth Gully ~1 mi of West Lakeshore Road, Canandaigua Lake, Cheshire, Ontario Co., NY (Canandaigua Lake 7.5' Quadrangle)
- RC2: Kashong Shale Member; Kashong Glen, 1 mile east of Pre-emption Road, near Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)
- BG1: unnamed member; Barnes Gully bed: Barnes Gully west of West Lake Road; Cheshire, Ontario Co., NY (Canandaigua Lake 7.5' Quadrangle)
- BG2: unnamed member; Barnes Gully bed: Kashong Glen, 1 mile east of Pre-emption Road, near Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)
- GR: Windom Shale Member, basal Geer Road beds (lower *Ambocoelia* beds equivalent); shale pit along Geer Road east of junction with Bradley Brook Road; Lebanon, Madison Co., NY (West Eaton Quad)
- AMB: Windom Shale Member; *Ambocoelia* Beds; Fall Brook 0.3 mi upstream (south) from crossing under Rte. 20A cliffs below falls; Geneseo, Livingston Co., NY (Geneseo 7.5' Quadrangle)
- BV-1: Windom Shale Member; Bay View Bed: Penn Dixie shale pit; NE of corner of Bay View and Big Tree roads; Blasdell, Erie Co., NY (Buffalo SE Quadrangle)

BV-2: Windom Shale Member; Bay View bed; Eighteenmile Creek, 0.3 mi east of NY Rte. 5, North Evans, Erie Co., NY (Eden 7.5' Quadrangle)  
FG1: Windom Shale Member; Fisher Gully beds; shale pit just west of NY Rte. 89 and immediately south of Barnum Gully; Ovid, Seneca County, NY (Sheldrake 7.5' Quadrangle)  
FG2: Windom Shale Member; Fisher Gully beds; gully opposite Bardeen Cross Road, south of Fabius, Onondaga Co., NY (DeRuyter 7.5' Quadrangle)  
FB1: Windom Fall Brook Bed: Fall Brook; 0.3 mi upstream crossing under Rte. 20A cliffs below falls; Geneseo, Livingston Co., NY (Geneseo 7.5' Quadrangle)  
FB2: Windom Shale Member; Fall Brook bed; shale pit just west of NY Rte. 89 and immediately south of Barnum Gully; Ovid, Seneca County, NY (Sheldrake 7.5' Quadrangle)  
TA-1: Windom Shale Member; Taunton beds; Fall Brook 0.3 mi upstream crossing under Rte. 20A cliffs below falls; Geneseo, Livingston Co., NY (Geneseo 7.5' Quadrangle)  
TA-1': Windom Shale Member; Taunton beds; Taunton Gully; west of NY Rte. 39; Leicester, Livingston Co., NY (Leicester 7.5' Quadrangle)  
TA-2: Windom Shale Member; Taunton; Kashong Creek, just east of Pre-emption Road in the village of Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)  
SP: Windom Shale Member; Spezanno beds; Taunton Gully; west of NY Rte. 39; Leicester, Livingston Co., NY (Leicester 7.5' Quadrangle)  
GG: upper Windom Shale Member; Gage Gully beds; gully opposite Bardeen Cross Road, south of Fabius, Onondaga Co., NY (DeRuyter 7.5' Quadrangle)

### **Tully Formation:**

TF: upper Tully Formation; Taughannock Falls bed; lose blocks in Portland Point Quarry, Portland Point Road; East Lansing, Cayuga Co., NY (Taughannock Falls 7.5' Quadrangle)  
WBR: upper Tully Formation; West Brook Bed; West Brook 0.5 mi east of NY Rte. 12 and south of Park Road, Sherburne, Chenango Co., NY (Sherburne 7.5' Quadrangle)  
BB: upper Tully Formation; Bellona Bed; ; Taunton Gully; Kashong Creek, just west of Pre-emption Road in the village of Bellona, Yates Co., NY (Geneva South 7.5' Quadrangle)