

Forum 1 Summary Sheet

Erathem/ System	Unit(s)	Type Section (from Geolex)	Question/Conflict	Comments	Resolution?	
	Beekmantown Group	Named from exposures at Beekmantown, Clinton Co., northeast corner of NY (US geologic names lexicons, USGS Bull. 896, 1200).	Does this nomenclature change based upon location, or is this something that has been raised to a Group status and the Formation designation should no longer be used?	Where the Beekmantown has been mapped by Survey staff in Pennsylvania, it has been mapped as a group.	The Beekmantown is likely a group across Pennsylvania. However, if the need to use the formation designation arises, this use is still acceptable.	Nomenclature Issues
	Beekmantown Formation					
	Conococheague Group	[Type section]: along banks of Conococheague Creek in town of Scotland, [Scotland 7.5-min quadrangle], Franklin Co., central southern PA (Stose, 1908, 1909).	Does this nomenclature change based upon location, or is this something that has been raised to a Group status and the Formation and Limestone designations should no longer be used?	The Conococheague is well known as a group. The use of Formation and Limestone occurs in older literature only.	Leave the Conococheague as a group.	
	Conococheague Limestone					
	Conococheague Formation					
	Kittatinny Limestone	Not designated. First described in Kittatinny Valley, NJ (Rogers, 1840).	Not a lot of information on this unit within PAGS publications. Does this nomenclature change based upon location, or is this something that has been raised to a Supergroup status and the Limestone designation should no longer be used? Subunits on Geolex listed for PA are Allentown Dolomite, Beekmantown Group, and Leithsville Formation.	The Kittatinny is likely a Beekmantown equivalent. The use of Kittatinny in New Jersey (its type section location) is obsolete.	Look into officially abandoning Kittatinny if this has not already been done.	
	Kittatinny Supergroup					
	Buffalo Springs Formation	Type section: partial section measured along old trolley line about 0.7 mile southeast of Buffalo Springs, Lebanon Co., PA (Gray and others, 1958).	What is the relationship between these two formations? Some publications suggest the two are lithologically and chronologically equivalent.	The relationship between these two formations was not known within forum attendees. References that hold the answer to this may be found within the work of David McLachlan and Sam Root.	Further research will be required for this question.	
	Elbrook Formation	Elbrook, Franklin Co., south-central PA (Stose, 1906)				

Conococheague Limestone	[Type section]: along banks of Conococheague Creek in town of Scotland, [Scotland 7.5-min quadrangle], Franklin Co., central southern PA (Stose, 1908, 1909).	What is the relationship between these three formations? Some publications suggest that the Limeport and Allentown are lithologically and chronologically equivalent to the Conococheague. Others suggest a 1:1 equivalency of just the Allentown to Conococheague.	The relationship between these three formations was not known within forum attendees. No resources were given.	Further research will be required for this question.
Limeport Formation	Section in southernmost of two abandoned quarries at Limeport, at eastern tip of Buckingham Valley, Bucks Co., PA. Locality is 0.3 mi due west of PA Highway 32, 2.1 mi northwest of bridge across Delaware River at New Hope, PA (Howell and others, 1950).			
Allentown Formation	Named from exposures along Lehigh and Jordan Creeks in vicinity of Allentown, Lehigh Valley district, eastern PA (US geologic names lexicons, USGS Bull. 896, 1200).			
Kinzers Formation	Named from exposures in Pennsylvania RR cut at Kinzers, Lancaster Co., PA (Stose and Jonas, 1922).	What is the relationship between these four formations? Some publications suggest an equivalency of the Vintage, Kinzers, and Ledger to the Tomstown. Others suggest an equivalency of just the Ledger and the Vintage to the Tomstown.	The Ledger and the Kinzers are reflux facies of one another. The Kinzers is the primary version while the Ledger is the dolomitized version. This interpretation is widely accepted. Additional research can be conducted using the Great American Carbonate Bank publication.	More research will need to be conducted to establish the relationships surrounding the Tomstown and Vintage Formations.
Ledger Formation	Named from Ledger, Lancaster Co., PA (Stose and Jonas, 1922).			
Vintage Formation	Cut of Pennsylvania Railroad at Vintage, 15 miles east of Lancaster, Lancaster Co., PA (Stose and Jonas, 1922).			
Tomstown Formation	Type area: Tomstown, Franklin Co., PA (Stose, 1906).			
Elbrook Formation	Elbrook, Franklin Co., south-central PA (Stose, 1906)	All three of these formations have been used interchangeably throughout literature. Is there a true equivalency here both lithologically and chronologically?	The Elbrook and Tomstown Formations are distinct throughout Virginia and West Virginia. The Leithsville is also distinct from the Tomstown.	These three formations are likely not lithologically and chronologically equivalent. Therefore, we will keep these terms separate.
Leithsville Formation	Not designated. Origin of name not stated by author, but probably named from town of Leithsville, Northampton Co., eastern PA (Wherry, 1909).			
Tomstown Formation	Type area: Tomstown, Franklin Co., PA (Stose, 1906).			

Cambrian

Rose Run Sandstone	Type section (subsurface): Well no. 11 drilled by Judy and Young on property of Rose Run Iron Company, Bath Co., eastern KY. Property is drained by Rose Run Creek (McGuire and Howell, 1963).	Suggested by numerous publications to be lithologically and chronologically equivalent. What is the relationship here?	The Rose Run is the subsurface equivalent of the upper sandy member of the Gatesburg. Work conducted by the USGS (Michael Trippi) show the Rose Run and upper sandy member as equivalents across Ohio, Pennsylvania, and West Virginia.	Future work may need to be conducted to further establish the relationships and nomenclature standards between surface and subsurface units.
Upper sandy member of the Gatesburg	n/a			
Buffalo Springs Formation	Type section: partial section measured along old trolley line about 0.7 mile southeast of Buffalo Springs, Lebanon Co., PA (Gray and others, 1958).	Is the Buffalo Springs Formation part of the Conococheague Group?	The answer to this was not known amongst forum attendees. A recommendation was made to refer to David McLachlan reports.	Further research will be required for this question.
Conococheague Group	[Type section]: along banks of Conococheague Creek in town of Scotland, [Scotland 7.5-min quadrangle], Franklin Co., central southern PA (Stose, 1908, 1909).			
Stonehenge Formation	Type section: on Hoover Farm just north of U.S. Route 30, 2 mi southeast of center of Chambersburg, Franklin Co., PA (Sando, 1956).	Are we missing members of the Stonehenge Formation? The following members were found in varying PAGS literature: Spring Creek, Graysville, Baileyville, Logan Branch (all formal).	Where found in mining areas, the Stonehenge is thin. Edward Tester (NESL) has never seen the differentiation of members.	There is likely no need to differentiate the Stonehenge into different members in Pennsylvania. We will continue to use the formation without members for the time being.
Frederick Limestone	Type area: near Frederick, Frederick Co., MD (Keyes, 1890).	Minimal resources on this unit within PAGS publications. Does this exist in PA?	This does occur in Pennsylvania. It can be found in the Gettysburg Basin along the western margin. In previous publications, it has been referred to as Beekmantown and Paleozoic limestone. Reference USGS Folio and Carlisle 15-minute quadrangle publications.	We should include this unit in our modified stratigraphic framework.

Upper dolomite member of the Ledger Formation	n/a	Minimal resources on the members of the Ledger Formation within the PAGS. Willis Run is listed under the Kinzers Formation. Any information is helpful on these three members.	The Ledger has a facies relationship with the Kinzers which may be the reason for the inclusion of the Willis Run within the Kinzers. The members of the Ledger may or may not be useful. John Taylor has done work with the Ledger for further reference.	Further research will be required for this question.	Lack of Informatic
Willis Run Member of the Ledger Formation	Not designated. Occurs in the West York block of the Conestoga Valley at Delta Carbonate quarry, York Co., southeastern PA.				
Lower dolomite member of the Ledger Formation	n/a				
Theresa Formation	Type area: Theresa Twp., Jefferson Co., NY (Cushing, 1908).	No PAGS resources found on this formation. Does this exist in PA?	The Theresa Formation, according to the Field Conference Guidebook of 1981, appears to be a subsurface unit.	Further research will be required for this question.	
Beekmantown Group/Beekmantown Formation	Named from exposures at Beekmantown, Clinton Co., northeast corner of NY (US geologic names lexicons, USGS Bull. 896, 1200).	Varying ages for the Beekmantown have been found throughout PAGS resources. Ages found range from Late Cambrian to Middle Ordovician.	In Virginia, Dan Doctor (USGS) reports that the Beekmantown is entirely Ordovician. New Jersey also regards the Beekmantown as Ordovician. Resources for this issue include the Great American Carbonate Bank and John Taylor and Jim Loch's trilobite age dating.	Further research is probably required for this question. However, the Beekmantown is likely an Ordovician unit in Pennsylvania as well.	Uncertain Age
Ledger Formation	Named from Ledger, Lancaster Co., PA (Stose and Jonas, 1922).	Both Early and Middle Cambrian ages found in literature. The most recent PAGS source (Special Publication 1 - 1999) lists its age as Middle Cambrian.	The Ledger Formation is Middle Cambrian in age.	The Ledger Formation is Middle Cambrian in age.	
Warrior Formation	On Warrior Run, along river bluff, 1 mi west of Williamsburg, Blair Co., PA, and on Warrior Creek, east of Warriorsmark in northern part of Huntingdon Co., PA (Butts, 1918).	Both Middle and Upper Cambrian ages found in literature. The most recent PAGS resource (Special Publication 1 - 1999) lists its age as Middle to Upper Cambrian.	This will need more resources to determine.	Further research will be required for this question.	
Stonehenge Formation	Type section: on Hoover Farm just north of U.S. Route 30, 2 mi southeast of center of Chambersburg, Franklin Co., PA (Sando, 1956).	Originally listed as Late Cambrian to Early Ordovician. Majority of PAGS publications found state that this unit is Ordovician in age.	The Stonehenge Formation is likely Ordovician in age. As the lowest formation in the Beekmantown Group, the age of this formation will determine the age of the Beekmantown as a whole.	Further research will be required for this question.	

	Rickenbach Dolomite	Type section (composite): lower member in cut along west side of Reading RR tracks beginning about 1,000 ft south of crossing at Rickenbach, Berks Co., southeastern PA; upper member in southwest bank of Schuylkill River, 0.5 mi east by northeast of Epler School (Hobson, 1957).	Every PAGS resource found states this unit is Ordovician in age.	The Rickenbach Dolomite is likely Ordovician in age.	Further research will be required for this question.	
	Snitz Creek Formation	Type section: partial section measured along Cornwall Railroad tracks about 0.5 mi south of Midway Church, Lebanon Co., PA (Gray and others, 1958).	Most recent PAGS resource (Open File Report 90-01 - 1990) states this unit is Middle Cambrian in age. However, many other sources claim Upper Cambrian.	The age of this unit was unknown amongst forum attendees. There was a recommendation to refer to Bob Ganis for this question.	Further research will be required for this question.	
Precambrian	Pochuck Gneiss	Occurrences on east slope of Pochuck Mountain, Franklin Furnace quadrangle, northern NJ (Wolff and Brooks, 1898).	County Report 48 refers to the Hexenkopf Rock (a large rock on Hexenkopf Hill) as Pochuck Gneiss. Additionally, General Geology Report 16 comments that the top of Hexenkopf Hill is made entirely of Pochuck Gneiss. Should this be considered Pochuck Gneiss or part of the Hexenkopf Complex?	Bob Smith sampled Hexenkopf and did not see any lithology that resembled Pochuck. There are still three files with samples at the Survey that show the Hexenkopf is very different geochemically from Pochuck. It is, however, limited to Hexenkopf Hill. Bob suggests looking at Avery Drake's Easton and Riegelsville quadrangles and Sevinsky's 1968 GSA report.	Further research will be required for this question.	Relational Issues
	Hexenkopf Complex	Exposures on and near Hexenkopf Hill, Riegelsville quadrangle, Northampton Co., PA (Drake, 1984).				
	Franklin Marble	Franklin Mine, Franklin, Franklin quadrangle, Sussex Co., north-central NJ (Spencer, 1908).	Is there a variant of this marble in the Reading Prong region that has been misidentified? (Special Publication 1)	The answer to this question was unknown amongst forum attendees. However, references were made to Craig Johnson's thesis. In addition, the Neoproterozoic metavolcanics are currently being worked on by Lewis Zulli at Lafayette.	Further research will be required for this question.	
	n/a	n/a	The use of Precambrian vs. Proterozoic	Proterozoic is newer while older literature uses Precambrian.	Pennsylvania is following international standards moving forward.	

Open Discussion

Catoctin Formation	Named from Catoctin Mountain, Loudoun Co., VA, and Frederick Co., MD (US geologic names lexicons, USGS Bull. 896, 1200).	The Catoctin Formation was initially named for greenstones, but in Pennsylvania it's mostly rhyolitic. Should the Catoctin nomenclature be used here?	The Catoctin was divided into two groups using structural information. Since then, geochemical information has confirmed the existence of these groups. According to Bob Smith, one part does correlate with Maryland's Catoctin. The Pennsylvania Geological Survey will need to establish how we identify the units within state lines first. Once this is complete, we will sit down with Maryland and reconcile.	This will require further research and future collaboration and field mapping.
Chilhowee Group	Composes Chilhowee Mountain, Sevier and Blount Cos., eastern TN (Safford, 1856).	What is the age of the Chilhowee Group?	Neoproterozoic (?) to Cambrian. We have dates for the volcanics but the clastics need dating.	This needs confirmation via collaboration and/or research.
Loudoun Formation	Named for fact all of its varieties are well developed in Loudoun Co., northern VA (Keith, 1894).	Loudoun Formation - different lithologies have been included in PA MD VA, conglomerate, black shales, volcanics	Lithology and age are an issue within and outside of Pennsylvania. Dan Doctor says the Loudoun is early Cambrian and NOT correlative with Swift Run. Bill Burton is a helpful resource for this question.	This will require further research and future collaboration and field mapping.
n/a	n/a	Is there a summary of isotopic dating of Precambrian within Pennsylvania or elsewhere?	There is not a summary of these dates, as the PAGS does not yet have a central database for that data. Dates can be found in individual publications. In addition, the 2010 Pennsylvania Field Conference Guidebook should have a table of dates.	This will likely be completed in a future project.

Forum 2 Summary Sheet

Erathem/System	Unit(s)	Type Section (from Geolex)	Question/Conflict	Comments	Resolution?	
	Eyer Formation	Type section: continuous with type section of upper member of Rickenbach Formation, east of Epler Sch	Does this nomenclature change based upon location, or is this something that has been raised to a Formation status and the Member designation should no longer be used? It was listed as a Formation under the "Hatter Group" and as a Member under the "Hatter Formation"	Duff - Is it spelled Hatter or Halter? Original reference may have been Halter. Eyer may be one of the older names that is not still in use. Reference made to Kay (1944).	More research necessary	Nomenclature Issues
	Eyer Limestone Member	ool, near Reading, Berks Co., southeastern PA (Hobson, 1957).				
	Lowville Limestone	Notable exposures at Lowville, Lewis Co., NY (Clarke and Schuchert, 1899).	Does this nomenclature change based upon location? It is listed as a formation of the Black River Group in some publications, and as a standalone formation in others.	Look into informally abandoning this term	Look into informally abandoning this term	
	Epler Formation	Type section: continuous with type section of upper member of Rickenbach Formation, east of Epler Sch	Is the Bellefonte Formation partly correlative to the Rockdale Run? Is the Epler Formation completely correlated with the Rockdale Run?	Kristen - The Bellefonte is partly correlative to the Rockdale Run, but they are not stratigraphically and lithologically equivalent. Epler is age-equivalent with the Rockdale Run and Axemann. Paul Zell - The Rickenbach is below the Epler and the boundary is time-transgressive.	These formations are not lithologically and stratigraphically equivalent, but they are time-correlatives.	
	Bellefonte Formation	ool, near Reading, Berks Co., southeastern PA (Hobson, 1957).				
	Rockdale Run Formation	Named from exposures at Bellefonte, [Bellefonte 7.5-min quadrangle], Centre Co., central PA (Ulrich, 1911).				
		Type section: on Robinson and Seibert Farms just south of Rockdale Run btw. 1 and 1.5 mi west of Hicksville, Washington Co., northwestern MD (Sando, 1956).				

Utica Shale	Type area: well exposed in the Starch Factory Creek to the east of Utica. Named from City of Utica, Oneida Co., NY (Ruedemann, 1912).	<p>This question is something my colleagues have discussed with me, but I wanted to ask this question to the community as a whole, as I know many wonder the same thing. What is the relationship between the Utica, Reedsville, Martinsburg and Antes?</p>	<p>Kristen - In central PA, the Antes is at the base of the Reedsville as a member/formation. Here, the Antes is equivalent to the Utica stratigraphically and lithologically. Utica is the subsurface term for Antes.</p> <p>Duff - We need to have someone do in-depth research on the fossils of these formations to check their age relationships.</p> <p>Gale - There is a black shale member at the base of the Martinsburg. If we call this Antes, it would connect the smaller basins and would make it all one basin. Wherever you make that transition from carbonate to shale, there is a black shale at the transition. Additionally, the Reedsville is younger than the Martinsburg where they are found together.</p> <p>Aaron - In his work, he has seen the Reedsville at the top, the Martinsburg at the middle, and a black shale and interbedded black shale and calcareous facies at the bottom. He believes this to be the Antes and is of the opinion that the ripples of smaller basins are generally of a grander, bigger basin. The Antes has been correlated across these smaller basins. If the Antes and Utica are the same unit, Aaron believes we should abandon one of the names. When we start reconciling across state lines, we will need to decide on basal black shale or Antes usage.</p> <p>General Note - We are not changing the Utica or the Antes, we just need to define these units.</p> <p>Alan - The Antes is used in MD, PA, and WV. We may rely too heavily on depositional environments than we do on lithostratigraphy.</p> <p>Kristen - The subsurface industry gets very specific with its members of the Utica. These members can be correlated to the surface Antes.</p> <p>Gale - We could decide to use Utica in place of Antes at some point.</p> <p>Michael - References Berg (1993), where the Utica is considered to be equivalent to the Antes, Coburn, and Salona units in Tioga and Potter counties. Everywhere else in the state, Berg uses them separately, and in southern PA, he uses the term Martinsburg.</p>	<p>More research definitely needed for these complex relationships.</p>
Reedsville Formation	Exposures at Reedsville, Mifflin Co., central PA (Ulrich, 1912).			
Martinsburg Formation	Type area: Martinsburg, Berkeley Co., east-central WV (Geiger and Keith, 1891).			
Antes Formation	Type section: on east bank of Antes Creek in immediate vicinity of U.S. Route 44 and PA Route 880 intersection in northwest part of Nippenose Valley, [north of Rauchtown, approx. Lat. 41 deg. 09 min. 48 sec. N., Long. 77 deg. 13 min. 12 sec. W., Linden 7.5-min quadrangle, Lycoming Co., north-central PA] (see Faill and others, 1977).			

Cocalico Shale	Named from fact it is exposed on Cocalico Creek, Lancaster Co., southeastern PA (US geologic names lexicon, USGS Bull. 896, 1200).	What is the relationship between these four formations? (Asked on Forum interest sheet)	Gale - In her Great Valley work, the Cocalico is seen to be a phyllite carries up from Lancaster. In the past, equivalency was drawn between the Martinsburg and Cocalico. It was concluded that after this research and by looking at the allochthonous rocks (previously referred to as Helderberg, now called the Dauphin Formation, etc.), it seems as though the Cocalico is potentially related to the Dauphin Formation. It has more similarity to the allochthonous rocks than it does to the Martinsburg. Chris - The Mill Hill and Blue Conglomerate units are informal names for hornfels at Cornwall.	It is hypothesized that the Cocalico and Dauphin Formation may be related. The Mill Hill and Blue Conglomerate are informal units. The relationship between the Cocalico and Dauphin Formation may or may not be solved with additional research. The Cocalico should be called a Formation, not a shale or phyllite.
Mill Hill Slate	Not synopsized to date. [See US geologic names lexicon, USGS Bull. 1200]			
Blue Conglomerate	n/a			
Martinsburg Formation	Type area: Martinsburg, Berkeley Co., east-central WV (Geiger and Keith, 1891).			
Annvile Limestone	Type section: quarry at old Palmyra plant of H.E. Millard Limestone Company about 1.5 mi northwest of Palmyra, southeast PA (Prouty, 1959). Named from town of Annville, Lebanon Co. (Miller, 1925).	Are the Annville Limestone, Loysburg Formation, and the St. Paul Group all lithologically and stratigraphically equivalent?	The Loysburg should have no relationship with the Annville or the St. Paul Group, as they lie in different basins and have different characteristics. The Annville is part of the sequence with the St. Paul Group, but it may or may not be a part of that group. The Annville and the St. Paul are not equivalents.	None of these units are equivalents.
Loysburg Formation	Named from village of Loysburg, Bedford Co., central PA (US geologic names lexicon, USGS Bull. 1200).			
St. Paul Group	St. Paul's church, 2.2 mi west of Clear Spring, Washington Co., MD (Neuman, 1951).			

Relational Issues

Cocalico Shale	Named from fact it is exposed on Cocalico Creek, Lancaster Co., southeastern PA (US geologic names lexicons, USGS Bull. 896, 1200).	Are the Cocalico and the Martinsburg stratigraphically and lithologically equivalent?	Refer to comments above.	They may be partially equivalent, but it is hard to say.
Martinsburg Formation	Type area: Martinsburg, Berkeley Co., east-central WV (Geiger and Keith, 1891).			
Bobcaygeon Formation	Type section (composite): Nogies Creek roadcut, Little Bob quarry, and No. 36 highway roadcut south of the town of Bobcaygeon, Ontario, Canada (Liberty, 1969).	Is it appropriate to use the Bobcaygeon in Pennsylvania? This name was applied to the Linden Hall interval in the subsurface. Is this appropriate?	Duff - Has not seen the Bobcaygeon equivalent in his work. Gale - Suggests not using the term in PA	Take Bobcaygeon out of our lexicon.
Benner (Linden Hall) Formation	Type section: Oak Hill quarry, 2 mi east of Oak Hall, PA.			
Shippensburg Formation	Along Cumberland Valley, 2.1 miles southwest of Marion, Franklin Co., PA. Named from exposure at Middle Spring, 2.5 miles northwest of Shippensburg, Franklin Co., PA (Craig, 1949).	Does anyone use this nomenclature presently?	Probably not in use	Abandon informally
Mercersburg Formation	Along Cumberland Valley Railroad, 2 miles southwest of Marion, Franklin Co. Named from exposure along West Branch of Conococheague Creek, 2.5 miles southeast of Mercersburg, Franklin Co., PA (Craig, 1949).	Does anyone use this nomenclature presently?	Probably not in use	Abandon informally
Chambersburg Formation	Exposures west of Chambersburg, Franklin Co., central southern PA (Stose, 1906).	Does anyone subdivide the Chambersburg Formation into members? (Fannettsburg, Doylestown, Housum, Kauffman)	Probably not in use	Abandon informally

Ordovician

Black River Group	Named from exposures in cliffs of Black River, north-central NY (Vanuxem, 1842).	Which formations fall within the Black River Group? Every resource provides conflicting information on this.	Duff - The formations that lie within the Black River Group in PA are the Nealmont, Coburn, and Salona	The Black River Group may have been used in previous literature as a chronostratigraphic unit instead of a lithostratigraphic unit (the Trenton Group as well).
Martinsburg Formation	Type area: Martinsburg, Berkeley Co., east-central WV (Geiger and Keith, 1891).	Would anyone like to add input to the discussion of the internal division of the Martinsburg Formation in eastern PA?	See comments above	See comments above
St. Paul Group	St. Paul's church, 2.2 mi west of Clear Spring, Washington Co., MD (Neuman, 1951).	Is anyone using the term "Row Park"? Does anyone look at the St. Paul Group at formational level? If so, what nomenclature do you use?	Gale - Has never seen the St. Paul Group broken out into formations Alan - The New Market Formation is mapped in VA Aaron - A Franklin County report discusses the existence of the Row Park, but he does not believe they mapped it there. It is recognized in south-central PA, but likely not mapped.	More research necessary to validate the existence of the New Market and Row Park Formations at a formational status in PA.
Row Park Formation	Type section: In pastures 0.2 mi northwest of Row Park, Washington Co., northwest MD (Neuman, 1951).			
Oranda Formation	Type section: along State Highway 55 about 2.7 mi S. 40 deg. W. of Oranda and somewhat less than 0.5 mi west of U.S. Route 11 in north environs of Strasburg, Shenandoah Co., north-central VA. Named from hamlet near Strasburg (Cooper and Cooper, 1946).	Does anyone use this nomenclature presently?	No, do not revive this terminology.	Leave as informally abandoned.
	Named from exposures along the west bank of Maiden Creek north of Dreibelbis, Hamburg 7.5-min quadrangle, Berks Co., PA. (Lash and Drake, 1984).	Minimal resources on this unit and its members (Dreibelbis, Switzer Creek		

Windsor Township Formation	Named from exposures along Switzer Creek, Tipton and Kutztown 7.5-min quadrangles, Lehigh Co., PA (Lash and Drake, 1984).	members (Dreibelbis, Switzer Creek, Weisenberg) within PAGS publications. Do these exist in PA and where can I find information on them? What is its age? Both Early and Middle Ordovician ages found in literature. The most recent PAGS source (Special Publication 1 - 1999) lists its age as Middle Ordovician.	Gale - The Windsor Township Formation was mapped by Lash and Drake in the allochthonous rocks of PA. She does not know how exactly this formation and its members correlate eastward.	More field work and research necessary
	Named from exposures 1 km south of Weisenberg Church, Slatedale 7.5-min quadrangle, Lehigh Co., PA (Lash and Drake, 1984).			
New Tripoli Formation	Along north-south-trending road 2.4 mi west southwest of New Tripoli and 0.7 mi east southeast of Lynnport, Lehigh Co., PA (Lyttle and others, 1986).	Minimal resources on this unit within PAGS publications. Does this exist in PA and where can I find information on this unit? What is its age?	Gale - Unique formations exist in this area.	More field work and research necessary
Shippensburg Formation	Type section: exposure on south side of U.S. Route 30, 1 mile southwest of St. Thomas, Franklin Co., PA. Named from exposure at Binkley and Ober quarry at Dry Run, 4 miles southwest of Doylestown in Path Valley (Craig, 1949).	Minimal resources on this unit and its members (Doylestown, Fannettsburg, Pinesburg) within PAGS publications. Do these exist in PA and where can I find information on them? What is its age?	No current usage	Leave as informally abandoned.
	Type section: exposure on south side of U.S. Route 30, 1 mi southwest of St. Thomas, Franklin Co., PA. Named from exposure east of Pennsylvania Route 75, 2.6 mi southwest of Fannettsburg in Path Valley (Craig, 1949).			

	Type section: exposure on south side of U.S. Route 30, 1 mi southwest of St. Thomas, Franklin Co., PA. Named from exposures along the Western Maryland RR at Pinesburg Station, Washington Co., MD (Craig, 1949).			
Wells Creek Formation	Named from Wells Creek basin, [Stewart and Houston Cos.], northwestern part of middle TN (Lusk, 1927).	Minimal resources on this unit within PAGS publications. Does this exist in PA and where can I find information on this unit? What is its age?	No current usage	Leave as informally abandoned.
Collingwood Formation	Well exposed at Collingwood, on southern shore of Lake Superior, Ontario, Canada (Raymond, 1912).	Minimal resources on this unit within PAGS publications. Does this exist in PA and where can I find information on this unit? What is its age?	No current usage. The Geolex has the location of this type section incorrectly referenced, as Collingwood is not south of Lake Superior, it is south of the Georgian Bay, off of Lake Huron.	Leave as informally abandoned.
Juniata Formation	East Waterford Narrows in Tuscarora Mountain, Juniata Co., central PA (Swartz, 1957). Exposures in Plummer Hollow, in vicinity of Tyrone Gap, central PA (Swartz, 1957). Exposures in Run Gap in Tuscarora Mountain, along boundary of Juniata and Perry Cos., central PA. Extends from area of Jacks Mountain, north of Lewistown in Mifflin Co., to area of Shade Mountain at Lost Creek Gap (Swartz, 1957).	Minimal resources on the members of this unit within PAGS publications (East Waterford Member, Plummer Hollow Member, Run Gap Member). Do these members exist within PA? What is its age?	This formation is not typically broken into members, the members exist but are not used.	More mapping required
Sharps Mountain Sandstone	n/a	Minimal resources on this unit within PAGS publications. Does this exist in PA and where can I find information on this unit? What is its age?	This is a Hamberg Sequence term that can still be used in its original location.	More mapping required

Lack of Information

Spitzenberg Conglomerate	Spitzenberg, a conical hill in Hamburg quadrangle, Berks Co., PA, which is capped by this conglomerate (Whitcomb and Engel, 1934).	Minimal resources on this unit within PAGS publications. Does this exist in PA and where can I find information on this unit? What is its age?	This is a Hamberg Sequence term that can still be used in its original location. It may have been called the Bald Eagle Formation in previous studies.	More mapping required
Coburn Formation	Type section: about 1,250 ft north of Lat. 40 deg. 55 min. and about 9,750 ft west of Long. 77 deg. 45 min., in Bellefonte quadrangle, PA. Exposure is on north edge of town of Bellefonte in cut along east side of Route 53, which leads to Milesburg. (Thompson, 1963). Type section: about 9,750 ft west of Long. 77 deg. 45 min. W., and 1,250 ft north of Lat. 40 deg. 55 min. N., in Bellefonte quadrangle. Exposure is on northern edge of town of Bellefonte in cut along eastern side of Route 53 that leads to Milesburg, Centre Co., PA (Thompson, 1963).	Minimal resources on the members of this unit within PAGS publications (Milesburg, Coleville). Do these members exist within PA and where can I find information on them? What is its age?	This formation is not typically broken into members, the members exist but are not used.	More mapping required
Verulam Formation	South shore of Sturgeon Lake and roadcuts south of Kirkfield, central Ontario, Canada (Liberty, 1955).	Minimal resources on this unit within PAGS publications. Does this exist in PA and where can I find information on this unit? What is its age?	No current usage.	Leave as informally abandoned.
Bald Friar Metabasalt	n/a	Minimal resources on this unit within PAGS publications. Does this exist in PA and where can I find information on this unit? What is the age of this unit?	This unit is mostly a Maryland unit, with a few spots in York and Lancaster. It is associated with the Baltimore Mafic Complex. It is unknown as of now whether this unit is metabasalt or a blackwall contact. Its age is possibly Late Cambrian to Ordovician, and it exists within and/or is associated with rocks we call Cambrian	More mapping required

Bobcaygeon Formation	Type section (composite): Nogies Creek roadcut, Little Bob quarry, and No. 36 highway roadcut south of the town of Bobcaygeon, Ontario, Canada (Liberty, 1969).	Minimal resources on this unit within PAGS publications. Does this exist in PA and where can I find information on this unit? What is the age of this unit?	No current usage.	Leave as informally abandoned.
Axemann Formation	Notable exposures 1 mi east of Axemann, Centre Co., central PA (US geologic names lexicons, USGS Bulletin 896, 1200).	Both Early and Middle Ordovician ages found in literature. The most recent PAGS source (OFBM 09-01 - 2009) lists its age as Early to Middle Ordovician.	Paul Zell - The Axemann is entirely Early Ordovician based upon fossil evidence and its position with respect to the Bellefonte. Karen - The single specimen the museum has indicates Lower Ordovician.	Early Ordovician
Rockdale Run Formation	Type section: on Robinson and Seibert Farms just south of Rockdale Run btw. 1 and 1.5 mi west of Hicksville, Washington Co., northwestern MD (Sando, 1956).	Early, Middle, and Early to Middle Ordovician ages found in literature. The most recent source (Geolex) lists its age as Early to Middle Ordovician.	The Rockdale Run is below the Bellefonte as two separate formations in PA. It is correlative to parts of the Bellefonte and Axemann.	Early to Middle Ordovician.
Annaville Limestone	Type section: quarry at old Palmyra plant of H.E. Millard Limestone Company about 1.5 mi northwest of Palmyra, southeast PA (Prouty, 1959). Named from town of Annville, Lebanon Co. (Miller, 1925).	Middle, Late and Middle to Late Ordovician ages found in literature. The most recent source (Geolex) lists its age as Middle to Late Ordovician	n/a	Middle to Late Ordovician Gale will look into her Great Valley research to verify this age.
Lowville Limestone	Notable exposures at Lowville, Lewis Co., NY (Clarke and Schuchert, 1899).	Both Middle Ordovician and Middle to Late Ordovician ages found in literature. The most recent publication (Geolex) lists its age as Late Ordovician.	n/a	n/a
Ontelaunee Formation	Type section: along east bank of Schuylkill River 1 mi southeast of Leesport, Berks Co., southeastern PA (Hobson, 1957).	Lower, Middle, and Lower to Middle Ordovician ages found in literature. The most recent PAGS source (SP 1 - 1999) lists its age as Middle Ordovician.	No comments made	More research required
Pinesburg Station Formation	Type section: on Suffecool Farm about 0.8 mi northwest of Pinesburg Station, Washington Co., north west MD (Sando, 1956).	Lower, Middle, and Lower to Middle Ordovician ages found in literature. The most recent PAGS source (SP 1 - 1999) lists its age as Middle Ordovician.	No comments made	More research required

Uncertain Age

Shadow Lake Formation	Exposures in Shadow Lake quarry and roadcut near Coboconk, Ontario, Canada (Okulitch, 1939).	Ages found in literature range from Cambrian to Middle Ordovician. The most recent PAGS source (OFOG 19-01 - 2019) lists its age as Middle Ordovician.	No comments made	More research required
Shocary Sandstone	Shocary Ridge in northeastern Berks Co., and northwestern Lehigh Co., PA (Willard and Cleaves, 1939).	Both Middle and Middle to Late Ordovician ages found in literature. The most recent PAGS source (SP 1 - 1999) lists its age as Middle to Late Ordovician.	n/a	Most likely Middle to Late Ordovician
Chambersburg Formation	Exposures west of Chambersburg, Franklin Co., central southern PA (Stose, 1906).	Both Middle and Late Ordovician ages found in literature. The most recent PAGS publication (SP 1 - 1999) lists its age as Late Ordovician.	Karen has multiple specimens that indicate both Middle and Late Ordovician ages for the Chambersburg.	Middle to Late Ordovician
Rodman Limestone	Exposures at Rodman Station, Blair Co., central PA (Butts, 1918).	The ages found for this unit range from Early, Middle, and Late Ordovician, or some span between the three. The most recent PAGS source (A 86 - 1989) lists its age as Late Ordovician.	Duff - The Rodman is the upper member of the Nealmont	Late Ordovician
Stones River Limestone	Named from exposures on Stone River, in vicinity Nashville, TN. Although the river is now called Stone River, the name of the deposits is firmly entrenched in the literature as Stones River (US geologic names lexicons, USGS Bull. 896, 1200).	The ages found for this unit range from Early to Late Ordovician. The most recent PAGS publication (G 24 - 1949) lists its age as Middle Ordovician.	This is likely not a relevant unit	Look into informally abandoning this term
Beekmantown Group	Named from exposures at Beekmantown, Clinton Co., northeast corner of NY (US geologic names lexicons, USGS Bull. 896, 1200). Reference section: begins at top of group in Potomac River bluff, about 1,000 ft west of intersection with south west face of Pinesburg Station quarry, and continues westward along C&O Canal for 1 mi, Washington Co., MD (Sando, 1956).	Duff - What is the purpose of using these group names?	Alan - The Knox Unconformity (at the top of the Beekmantown) affects these units, but they are too small to map as formations/groups towards the south. They are therefore mapped as members there. Gale - These terms seem to be useful, as they have been referred to in a lot of literature (although possibly as time-stratigraphic units instead of rock-stratigraphic units)	More research required

Open Discussion

Black River Group	Named from exposures in cliffs of Black River, north-central NY (Vanuxem, 1842).		Kristen - They are typically used as "Trenton-Black River" sequence	
Trenton Group	Named from Trenton Falls, Oneida Co., NY (Vanuxem, 1838).			
Stonehenge	Type section: on Hoover Farm just north of U.S. Route 30, 2 mi southeast of center of Chambersburg, Franklin Co., PA (Sando, 1956).			
Larke	Named from Larke Post Office, 3 mi south of Williamsburg, [Huntingdon 15-min quadrangle], Blair Co., central PA (Butts, 1918).	Are these two equivalent (lithologically and stratigraphically)?	Michael - The 1966 Wagner publication (G 49) goes into depth on the Larke and Stonehenge. The Larke and Stonehenge are on same rock package as Mines Member of Gatesburg Formation. Duff - The Beekmantown Group consists of the Larke, Stonehenge, Nittany, Axemann, and Bellefonte. An unconformity marks the beginning of the Nittany. A second unconformity separates the upper and lower Bellefonte.	More research required
Cumberland sequence, etc.	n/a	Do the terms we use for the allochthonous sequence still hold true when we cross the state border into neighboring states? Is there any name reconciliation we need to do for sequences that cross the state border?	Gale - The allochthonous rocks do not cross state borders, they are different from the Taconic allochthon in NY and VT. The Cumberland Valley Sequence is an informal name that can be applied at will. Different states may use different shorthands, but formational names should remain the same if they cross state borders.	Different states may use different shorthands, but formational names should remain the same if they cross state borders.
Stickley Run	Type section: roadcut on southeast side of northbound lane of U.S. Highway 11, immediately east of Cedar Creek, about 2.5 miles southwest of Middletown, Frederick Co., and 3 miles northeast of Strasburg, Shenandoah Co., VA. Named from Stickley Run, a tributary of Cedar Creek near type section (Epstein and others, 1995).	Does this unit cross state boundaries?	Alan hasn't seen much north of WV; however he knows that it is mapped in VA and WV	Yes.

Open Discussion

Forum 3 Summary Sheet

Erathem/System	Unit(s)	Type Section (from Geolex)	Question/Conflict	Comments	Resolution?
	Helderberg Group	Basal part of Helderberg Mountains, Albany Co., east-central NY (Conrad, 1839).	Should we be using Helderberg nomenclature or Old Port?	PAGS staff has decided to use Helderberg nomenclature due to the origins of the Old Port and the use of Helderberg across state lines. Additional work will need to be conducted in order to formally abandon the term. Planning to keep Helderberg and Oriskany nomenclature <i>History :</i> Chuck - Hoskins used Old Port in two quads, but the terminology didn't apply anywhere else. Bob - Hoskins mapped Old Port because units became too thin to map.	PAGS staff has decided to use Helderberg nomenclature due to the origins of the Old Port and the use of Helderberg across state lines. Additional work will need to be conducted in order to formally abandon the term. Planning to keep Helderberg and Oriskany nomenclature
	Old Port Formation	Type section: along a stream and roadcut about 1.5 mi west of Old Port, Mifflintown quadrangle, Juniata Co., central PA. Beginning of section is 2,000 ft south of Lat. 40 deg. 13 min. 15 sec. N., Long. 77 deg. 25 min. 00 sec. W. (Conlin and Hoskins, 1962).			
	Elbow Ridge	Section is on south side of Licking Creek where it bends southward across MD line, and across northeastern end of Elbow Ridge. It is several hundred feet west of bridge crossing creek about 1 mi east of Warren Point and 1.5 mi southwest of Yeakle Mill, Franklin Co., southern PA (Swartz, 1939).	Found as a formation and a member. Which of these is accurate, or does this vary depending on geography?	n/a	Refer to literature.
	Mandata	Type locality: on highway to Berrysburg, 0.25 mi south of Mandata (Bull Run of Millersburg topographic sheet), Northumberland Co., PA (Swartz, 1938).	Found as a formation and a member. Which of these is accurate, or does this vary depending on geography?	Aaron - When the Mandata was in the Old Port, it was used as a member. It should also be a member of the Helderberg. We can possibly use the Helderberg as a group and formation. Mandata rank will depend on status of the Helderberg.	Depends on rank of the Helderberg.
	Stormville Formation	Reference section: Hartmans Cave near the top of Godfrey Ridge, less than 1 mi northeast of Stormville, Monroe Co., PA (White, 1882).	Found as a formation and a member. Which of these is accurate, or does this vary depending on geography?	This is a New Jersey term used in the Helderberg.	Talk to Don.
	Seneca	Type area: Geneva quadrangle, Seneca Co., NY.	Found as a formation and a member. Which of these is accurate, or does this vary depending on geography?	Chuck - In NY, the Selinsgrove is a member of the Onondaga. In PA it is the upper part of the Selinsgrove Member of the Needmore Formation, above the "Tioga B".	Refer to comments.

Nomenclature Issues

Tully	Exposures in town of Tully, Onondaga Co., central NY (Vanuxem, 1839).	Found as a formation and a member. Which of these is accurate, or does this vary depending on geography?	<p>Aaron - In most places the Tully is a member at the top of the Mahantango. Does anyone know if it being mapped as its own separate unit?</p> <p>Gordon - Tully is formation in NY and is probably a standalone formation as far as it can be traced. It is lithologically distinct from Mahantango and Hamilton beds, and represents lithologic anomaly.</p> <p>John Harper - In the subsurface of PA, the Tully gets up to 150 ft thick.</p> <p>Gordon - The Tully exceeds 200 feet in central PA and thins dramatically southeastward.</p> <p>Rose-Anna - The Tully is exposed in outcrop in central PA where it is 200 ft thick. It was lumped with the Mahantango because they were thinned to thin beds.</p> <p>Frank - Reach out to Phil Heckel (?) with this question.</p>	Depends if it's thick enough to be mapped independently; Aaron and Kristen support this solution. In the subsurface, the Tully is at the formation rank. It's called a limestone in subsurface but is a formation (Harper). It could probably be divided with members here.
Coeymans Formation	Exposed at Coeymans, Albany Co., NY (Clarke and Schuchert, 1899).	What is the relationship between the Coeymans Formation and the Old Port Formation?	<p>Chuck - The Coeymans is a formation within the Helderberg in NY.</p> <p>John Harper - We use the Coeymans and New Scotland as formations within the Helderberg.</p>	The Coeymans is a formation of the Helderberg.
Old Port Formation	Type section: along a stream and roadcut about 1.5 mi west of Old Port, Mifflintown quadrangle, Juniata Co., central PA. Beginning of section is 2,000 ft south of Lat. 40 deg. 13 min. 15 sec. N., Long. 77 deg. 25 min. 00 sec. W. (Conlin and Hoskins, 1962).			
Coeymans Formation	Exposed at Coeymans, Albany Co., NY (Clarke and Schuchert, 1899).	Does the Ravena Member of the Coeymans exist in PA?	<p>Chuck - The Ravena is a distinct facies within Coeymans and is probably not relevant when it comes to mapping purposes.</p> <p>Damon - NY is abandoning the Ravena Member.</p>	Probably not relevant to mapping in PA.
Ravena Member	Type section: abandoned limestone quarry just south of hairpin turn in road ascending escarpment 0.5 mi northeast of village of Ravena, just west of Coeymans in Cocksackie quadrangle, east-central NY (Rickard, 1962).			

Esopus Formation	Esopus and Esopus Creek, Ulster Co., NY (Darton, 1894).	Is the Esopus Formation a member/formation of the Onondaga Formation/Group? Or is the Esopus Formation an Onondaga equivalent?	Chuck - Gary Fleeger has fixed this issue and Chuck discusses this in his Devonian volume. An agreement was made a few years back that we will call what was previously referred to as the Onondaga (Esopus, Schoharie, and Onondaga equivalent) the Needmore Formation. The true Onondaga was called the Buttermilk Falls Formation.	An agreement was made a few years back that we will call what was previously referred to as the Onondaga (Esopus, Schoharie, and Onondaga equivalent) the Needmore Formation. The true Onondaga was called the Buttermilk Falls Formation.
Onondaga	Type area: Onondaga Co., NY (Hall, 1839).			
Shriver Chert	Type area: Shriver Ridge at Cumberland, Allegany Co., MD (Swartz and others, 1913).	Should we map the Shriver Chert with the Old Port/Helderberg or with the Oriskany?	<p>Chuck - The Glenerie in NY (cherty limestone) is what we call the Shriver in PA. The Helderberg is in the Lochkovian stage. The Port Jervis (similar to Shriver) with its famous trilobite layers, is in a different stage. The Oriskany has been lumped into the Deepark Stage with the Glenerie and Connelly</p> <p>Refer to Ridgeley/Oriskany comments below.</p>	More research will need to be conducted.
Old Port Formation	Type section: along a stream and roadcut about 1.5 mi west of Old Port, Mifflintown quadrangle, Juniata Co., central PA. Beginning of section is 2,000 ft south of Lat. 40 deg. 13 min. 15 sec. N., Long. 77 deg. 25 min. 00 sec. W. (Conlin and Hoskins, 1962).			
Helderberg Group	Basal part of Helderberg Mountains, Albany Co., east-central NY (Conrad, 1839).			
Oriskany Sandstone	Exposures at Oriskany Falls, Oneida Co., central NY (Vanuxem, 1839).			
Helderberg Group	Basal part of Helderberg Mountains, Albany Co., east-central NY (Conrad, 1839).	What is the relationship between the Helderberg Group and the Shriver Chert?	The Shriver is partly a unit within the Helderberg.	The Shriver is partly a unit within the Helderberg.
Shriver Chert	Type area: Shriver Ridge at Cumberland, Allegany Co., MD (Swartz and others, 1913).			

Kalkberg Limestone	Not designated. Well exposed on Catskill Creek, Greene Co., NY. Kalkberg (lime hill) is local Dutch name for Helderbergian Ridge (Chadwick, 1908).	Does the Kalkberg Limestone exist in PA?	The Kalkberg is a lithofacies, and it depends on if you want to map it.	Using the Kalkberg is up to the mapper.
Shriver Chert	Type area: Shriver Ridge at Cumberland, Allegany Co., MD (Swartz and others, 1913).	What is the relationship between the Shriver Chert and the Glenerie Limestone?	Chuck - The Shriver Chert has greater vertical variation than the Glenerie.	They are some sort of equivalents, but the Shriver has greater vertical variation.
Glenerie Limestone	Old quarry on east side of Route 9-W., 0.25 mile north of Glenerie Mills, 4 miles below Saugerties, Ulster Co., NY. Named from old Glenerie white-lead mills on Esopus Creek at Glenerie Falls (Chadwick, 1908, 1944).			
Helderberg Group	Basal part of Helderberg Mountains, Albany Co., east-central NY (Conrad, 1839).	What is the relationship between the Helderberg Group and the Manlius and Keyser?	The Keyser was placed as part of the Helderberg in its original locality and it can be mapped as a formation.	Keyser was mapped with the Helderberg, the Manlius was not discussed.
Manlius Limestone	Named from Manlius, Onondaga Co., NY (Vanuxem, 1840; see Smith, 1929).			
Keyser Formation	Named from exposures at Keyser, [Keyser 7.5-min quadrangle], Mineral Co., northern WV (Ulrich, 1911).			
New Scotland Formation	Exposures at town of New Scotland, Albany Co., NY (Clarke and Schuchert, 1899).	Are we missing a member of the New Scotland Formation? (Falling Springs Sandstone Member)	Unknown as of now.	Needs further research
Falling Springs Sandstone Member	n/a			

Bois Blanc Formation	Named from exposures on Bois Blanc Island situated in Lake Huron about 2.5 mi southeast of Mackinac Island, MI (Ehlers, 1945).	What is the relationship between the Bois Blanc Formation and the Onondaga?	The Bois Blanc is the equivalent of the Schoharie Formation in eastern NY and is sub-Onondaga. The Schoharie was applied down into Palmerton where they combined the Schoharie Formation and the Esopus. The Bois Blanc will only be found in subsurface in northwestern PA.	The Bois Blanc is sub-Onondaga.
Onondaga Formation	Type area: Onondaga Co., NY (Hall, 1839).			
Bois Blanc Formation	Named from exposures on Bois Blanc Island situated in Lake Huron about 2.5 mi southeast of Mackinac Island, MI (Ehlers, 1945).	What is the relationship between the Bois Blanc Formation and the Oriskany?	There is an unconformity between the two units where there is about 10 Ma between the deposition of the two. The Wallbridge Unconformity is below the Oriskany, not above in PA. The Oriskany is completely absent in northwestern PA, but people called the Bois Blanc Oriskany in the Erie area. They were confused by the sandstone at base with Oriskany, recognizable in drill cuttings because of glauconite. There is no Oriskany from western McKean County to Ohio. The "Oriskany" in this area is actually Bois Blanc sandstone, and a lot of phosphate is a good indicator that you're in post-Oriskany sands.	There was confusion about the Bois Blanc and the Oriskany in northwestern PA years ago, and people tended to call the Bois Blanc "Oriskany" by mistake. It has since been resolved.
Oriskany Sandstone	Exposures at Oriskany Falls, Oneida Co., central NY (Vanuxem, 1839).			
Corriganville Limestone	Type section: Railroad cut 0.3 mi southeast of Corriganville, Alleghany Co., MD (Head, 1972).	What is the relationship between the Corriganville Limestone and the New Scotland Limestone?	<p>Jon Harper - The Corriganville is partly equivalent to the New Scotland, and is more or less equivalent to the Coeymans.</p> <p>Bob - PA should stick with the non-Maryland nomenclature in this section.</p> <p>Aaron - The New Scotland and Corriganville seem to be a lateral facies change.</p> <p>Bob - There is no difference between the New Scotland and Corriganville.</p> <p>Chuck - In places with no Mandata above the New Scotland, the New Scotland is NY age.</p> <p>John Harper - The Licking Creek equivalent is the Mandata and Lower Shriver.</p>	The New Scotland and Corriganville are lithologically (?) and stratigraphically equivalent.
New Scotland Limestone	Exposures at town of New Scotland, Albany Co., NY (Clarke and Schuchert, 1899).			
Manlius Limestone	Named from Manlius, Onondaga Co., NY (Vanuxem, 1840; see Smith, 1929).	What is the relationship between the Manlius Limestone and the Keyser?	Damon - Both units seem to hold the Silurian-Devonian boundary. The Manlius seems to be a shallower water facies of the Keyser.	The Manlius is likely a shallower water facies of the Keyser.
Keyser Formation	Named from exposures at Keyser, [Keyser 7.5-min quadrangle], Mineral Co., northern WV (Ulrich, 1911).			

Needmore Shale	Named from exposures in southern Fulton Co., PA, between Needmore and Warfordsburg (Bradford, 1939).	Are we missing a member of the Needmore Shale? (Hare Valley Member)	Chuck - The Hares Valley Member is the middle member of Needmore everywhere from west of Auburn High down into MD, northern VA, and WV. It is a lateral equivalent of the Schoharie Formation in NY and the Bois Blanc. Underneath it is the Beaverdam Member and above it is the Selinsgrove Member. It does carry into PA, but it wasn't really taken up until Fleegeer stopped using the Onondaga.	Yes, we should use the Hare Valley Member in PA where we can map it.
Hare Valley Member	n/a			
Old Port Formation	Type section: along a stream and roadcut about 1.5 mi west of Old Port, Mifflintown quadrangle, Juniata Co., central PA. Beginning of section is 2,000 ft south of Lat. 40 deg. 13 min. 15 sec. N., Long. 77 deg. 25 min. 00 sec. W. (Conlin and Hoskins, 1962).	Which members does the Old Port Formation encompass?	Aaron - Keyser through Shriver, includes Licking Creek? Dan - Helderberg units differs depending on where you're located. In Maryland, Area 8 (of G 75) sounds like units they would recognize. Helderberg experiences many lateral facies changes.	Helderberg units differ depending on where you are mapping.

Devonian

Ridgeley Sandstone	Named from town of Ridgeley, Mineral Co., northeast WV (Swartz and others, 1913).	Are the Ridgelev Sandstone and the	<p>Chuck - The Ridgeley and Oriskany are essentially the same unit. Kristen had written to abandon the Ridgeley in the specific area they were mapping.</p> <p>Chuck and Aaron - Believe we should use Oriskany nomenclature.</p> <p>Dan - Ridgeley doesn't need to be applied, the Shriver could be applied in the Helderberg. Ridgeley ought to be abandoned, and the Shriver included in Helderberg.</p> <p>Chuck - Shriver goes all of the way up to the base of the Needmore in some places. The Shriver would cover Upper Helderberg in some places and parts of the Oriskany in others.</p> <p>Aaron - PAGS maps using lithology, but agrees that Shriver has great vertical range.</p> <p>Chuck - Should we use Shriver or Glenerie? The Shriver is not just a Helderberg-aged rock. Mapping solely with</p>	
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Relational Issues

Oriskany Sandstone	Exposures at Oriskany Falls, Oneida Co., central NY (Vanuxem, 1839).	Oriskany lithologically and stratigraphically equivalent? Or is the Ridgeley a member of the Oriskany?	<p>lithology doesn't account for chronology.</p> <p>John Harper - In the debate of lithostratigraphy vs. chronostratigraphy, we could separate the Shriver out of its own formation and forget about the Oriskany and Helderberg. It can be in either group or it can be a facies of both in some places. We can use interfingering to represent this on a chart</p> <p>Kristen - A general geology report could answer some of these questions. More research would be needed.</p> <p>Aaron - In general, in southern PA it's found in the Helderberg and in northern PA, it's part of the Oriskany. We need to see where that changes (it's relationships are more complex than this simplification - Chuck)</p> <p>Stephen - The name would need to be addressed on a correlation chart. It should have its own name, named after a clearly defined section. The use of the term "tongue" could be helpful.</p> <p>Dan - Cherts come and go as original stratigraphic units. They can also be the result of alteration of rocks above and below. This makes mapping this stratigraphically difficult.</p>	We need to conduct more research on this issue.
Onondaga Formation	Type area: Onondaga Co., NY (Hall, 1839).	What is the relationship between the Onondaga Formation and the Buttermilk Falls?	They are the same unit.	They are the same unit.
Buttermilk Falls	Crops out low on north side of Godfrey Ridge, at various places in vicinity of the Stroudsburgs, along railroad south of these boroughs, and in nearby quarries. Named from Buttermilk Falls on Marshall Creek, Monroe Co., PA (Willard, 1938).			

Stormville Formation	Reference section: Hartmans Cave near the top of Godfrey Ridge, less than 1 mi northeast of Stormville, Monroe Co., PA (White, 1882).	What is the relationship between the Stormville Formation and the Shriver?	Dan - The Stormville is a member of Coeymans, so they would not be equivalent.	Not equivalent.
Shriver Chert	Type area: Shriver Ridge at Cumberland, Allegany Co., MD (Swartz and others, 1913).			
Ludlowville Shale	Named from exposures at Ludlowville, Tompkins Co., west-central NY (Hall, 1839). Reference section: sequence on Paines Creek at Aurora beginning with Centerfield at Moonshine Falls and terminating with Portland Point beds at Black Rock, Erie Co., NY (Cooper, 1930).	What is the relationship between the Ludlowville Shale, Moscow, Marcellus, and Skaneateles, and the Mahantango?	<p>Chuck - The Mahantango is shallower Hamilton strata in PA. Farther north you may only include strata of Ludlowville and Moscow. The Mahantango is a lithostratigraphic term for shallower Hamilton.</p> <p>John - The Mahantango was brought over into western PA, but Skaneateles, Ludlowville, and Moscow can be differentiated here. The Mahantango is essentially all of the Devonian between the Marcellus and the Tully. It can be broken into members (Frame Member, etc.)</p> <p>Gordon - The Skaneateles, Ludlowville, and Moscow correlate with the Mahantango in central PA. As you move west, these become less discernible.</p>	The Skaneateles, Ludlowville, and Moscow correlate with the Mahantango in central PA. As you move west, these become less discernible.
Moscow	Type area: Moscow [now Leicester], Livingston Co., NY (Hall, 1839).			
Marcellus	Type section: Slate Hill, about 1 mi south of Marcellus. Complete section exposed in Jackknife ravine on northeast slope of hill. Named from exposures at village of Marcellus, Onondaga Co., central NY (Cooper 1936).			
Skaneateles	Skaneateles Lake, Ontario Co., NY.			
Mahantango	Exposures in valley, North Branch of Mahantango Creek, Snyder Co., central PA (Willard, 1935).			

Tully	Exposures in town of Tully, Onondaga Co., central NY (Vanuxem, 1839).	The Tully has already been indicated to be part of both the Hamilton and Mahantango via original research and numerous literature sources. Which of these is accurate, or is the Tully a part of the Harrell?	Did not address	Did not address
Hamilton	West Hamilton and Hamilton, Madison Co., NY (Vanuxem, 1840).			
Mahantango	Exposures in valley, North Branch of Mahantango Creek, Snyder Co., central PA (Willard, 1935).			
Union Springs Member	Type section: upper part of Woods quarry, 1 mi south of Union Springs, Cayuga Co., central NY (Cooper, 1930).	Should we still be using this nomenclature?	Did not address	Did not address
Windom	Exposures along Smoke Creek, near Windom, Erie Co., NY (Grabau, 1930).	What is the relationship between the Windom and the Frame Shale Member?	Did not address	Did not address
Frame Shale Member	n/a			
Tully	Exposures in town of Tully, Onondaga Co., central NY (Vanuxem, 1839).	What is the relationship between the Tully and the Sparrow Bush Formation?	Did not address	Did not address
Sparrow Bush Formation	Not synopsized to date. [See US geologic names lexicon, USGS Bull. 1520]			

Buttermilk Falls Limestone	Crops out low on north side of Godfrey Ridge, at various places in vicinity of the Stroudsburgs, along railroad south of these boroughs, and in nearby quarries. Named from Buttermilk Falls on Marshall Creek, Monroe Co., PA (Willard, 1938).	What is the relationship between the Buttermilk Falls Limestone and the Onondaga?	Did not address	Did not address
Onondaga	Type area: Onondaga Co., NY (Hall, 1839).			
Columbus Limestone	Named from exposures at Columbus, OH (Mather, 1859).	Does the Columbus Limestone actually exist in PA?	Did not address	Did not address
Columbus Limestone	Named from exposures at Columbus, OH (Mather, 1859).	Are the Columbus Limestone and Onondaga lithologically and stratigraphically equivalent?	Did not address	Did not address
Onondaga	Type area: Onondaga Co., NY (Hall, 1839).			
Millboro Shale	Millboro Springs, Bath Co., VA (Butts, 1940).	What is the relationship between the Millboro Shale and the Marcellus, Mahantango, and Harrell? Does the Millboro Shale include the Mahantango, Marcellus, and Harrell? Or just the Mahantango and Marcellus?	Chuck - The Millboro is largely considered to be the Hamilton where almost all of the group is considered to be dark shales; the Mahantango is middle to upper Hamilton Group. Dan - Hasn't seen the Millboro in PA John Harper- The Millboro was brought into PA in 1979. Harper disagrees with this.	Disregard Millboro
Marcellus	Type section: Slate Hill, about 1 mi south of Marcellus. Complete section exposed in Jackknife ravine on northeast slope of hill. Named from exposures at village of Marcellus, Onondaga Co., central NY (Cooper 1936).			
Mahantango	Exposures in valley, North Branch of Mahantango Creek, Snyder Co., central PA (Willard, 1935).			
Harrell	Harrell Station on Petersburg branch of the Pennsylvania RR, about midway between Hollidaysburg and Williamsburg, Blair Co., central PA (Butts, 1918).			

Palmerton Sandstone	Exposures on ridges in quarries north of Palmerton, Carbon Co., PA (Swartz, 1939).	Does the Palmerton Sandstone belong in the Onondaga?	Did not address	Did not address
Onondaga	Type area: Onondaga Co., NY (Hall, 1839).			
Flatbrookville Member	Type section: about 3.5 mi northeast of Flatbrookville, in woods and along northeast side of Flatbrookville-Wallpack Center Road, 3.2 mi (road distance) from intersection with Trans-Kittatinny Road joining it from the southeast, near southern edge of Lake Maskenozha 7.5-min quadrangle [approx. Lat. 41 deg. 07.7 min. N., Long. 74 deg. 54.86 min. W., Sussex Co., NJ (A.G. Harris, written common., ca. 1995)]. Named from Flatbrookville, Sussex Co., NJ (Epstein and others, 1967).	Listed as a member of the New Scotland Formation. Has anyone used this unit or have any knowledge of it?	Did not address	Did not address
Maskenozha Member	Type section: about 3.5 mi northeast of Flatbrookville, NJ, in woods and along northeast side of Flatbrookville-Wallpack Center Road, 3.2 mi (road distance) from intersection with Trans-Kittatinny Road joining it from the southeast, Lake Maskenozha quadrangle. Named from Lake Maskenozha, PA, 5.5 mi to northwest (Epstein and others, 1967).	One resource found for this unit (Geolex). Has anyone used this unit or have any knowledge of it?	Did not address	Did not address

Port Jervis Limestone	Named from occurrence at Port Jervis, Orange Co., southeastern NY (Chadwick, 1908)	Does this unit exist in PA? Only two resources found for this unit. Has anyone used this unit or have any knowledge of it?	Did not address	Did not address
Springvale sandstone member	Notable exposures near Springvale, in region around Hagerville, Ontario, Canada (Stauffer, 1913).	Does this unit exist in PA? Only three resources found for this unit. Has anyone used this unit or have any knowledge of it?	Did not address	Did not address
Kalkberg ash-bed zone	n/a	No resources found for this unit. Has anyone used this unit or have any knowledge of it?	Did not address	Did not address
Bald Hill Bentonite Beds	Type section: exposures in roadcut, north side of U.S. Route 22, 1.7 km east of Hollidaysburg, Frankstown Twp., Blair Co., central PA (Smith and Way, 1988).	Only two resources found on this unit. Has anyone used this unit or have any knowledge of it?	Did not address	Did not address
Manlius Limestone	Named from Manlius, Onondaga Co., NY (Vanuxem, 1840; see Smith, 1929).	Does this unit exist in PA? Only three resources found for this unit. Has anyone used this unit or have any knowledge of it?	Did not address	Did not address

Lack of Information

	Delaware Limestone	Delaware, Delaware Co., OH (Winchell, 1874).	Does this unit exist in PA? Only one resource (Geolex) found for this unit. Has anyone used this unit or have any knowledge of it?	Did not address	Did not address	
	Keefer Formation	Named from Keefer Mountain, [Cherry Run and Big Cove Tannery 7.5-min quadrangles, Franklin Co., southern PA], a few mi northeast of Hancock, MD (Ulrich, 1911; Stose, 1912; US geologic names lexicon, USGS Bull. 1200).	Should we be using lithologic names as a formation designation? An example of this is the Keefer Formation vs. the Keefer Sandstone.	<p>Aaron - Discourages use of lithology and leans towards use of Formation or Member. The Keefer is dominantly a sandstone, but other lithologies can be found within it. For example, sandy limestone can be found.</p> <p>Duff - Concurs with Aaron's opinion. The Keefer can also be iron-bearing,</p> <p>Bob Smith - Using Formation, Member, etc. is more commonplace. You can use lithodeme where necessary. He agrees with Aaron.</p> <p>Dan - These issues extend beyond PA. He also agrees with everyone above. Use of a lithodeme can be a good reason for a name to be changed if it's already been formalized. He discourages any informal changes of names.</p> <p>Chuck - The North American and International Strat Codes lay out how to revise and/or change the nomenclature of units. Chuck has written up a how-to and can send this out to attendees. Additionally, he will be releasing the NY Devonian publication soon. This publications uses unit ranks and NY in general also uses formal ranks. However, you can describe a unit's lithodeme in text</p> <p>Gordon - The tendency to use lithodeme is common in literature, and this makes it difficult to figure out if a unit has been moved up in rank or vice versa. It also makes it difficult to find reasonably current authority on a unit's status.</p> <p>Chuck - Once a unit's rank is established in text, you can refer to it as its lithology.</p> <p>Stephen Tom - We should refer to units as a name that keeps it the most straightforward in literature. We should use unit rank before lithology. Changing a name should be done with strat sections, photographs, etc. and good peer review. It should be clearly shown why it's being defined the way it is.</p> <p>Dan Doctor - Ultimately, you can refer to Geolex as an authoritative nomenclature source.</p>	Refer to unit rank over lithodeme.	
	Keefer Sandstone					

Nomenclature Issues

DeCew Dolomite	DeCew Falls on Twelve Mile Creek, western St. Catharines, Ontario, Canada (Williams, 1914).	Does this nomenclature change based upon location, or is this something that has been raised to a Formation status and the Member designation should no longer be used? It was listed as a standalone Formation and as a Member under the "Lockport Dolomite"	Chuck - In the Rickards, 1975 Silurian Chart, the Lockport is a group and the DeCew is indicated to be the top of the Clinton Group below the Lockport. In G 75, it is at the top of the Clinton Group. Stephen - There is a lot of conflicting info. The PAGS would need to talk to the experts and decide which one makes the most sense with all of the data. John Repetski - Bob Rider's USGS cross sections Siluro-Devonian reference can be used. Mike Trippi - Can send hard copies of the USGS cross sections. John Harper - In the subsurface, the DeCew has been traditionally included as the base member of the Lockport. However, looking at Geophysics by Laughrey, the Lockport appears to represent shales of the Clinton	Needs more research.
DeCew Member				
Landisburg Sandstone Member	n/a	Are these referring to the same unit? If yes, does this nomenclature change based upon location, or should it just be called a member?	Did not address	Did not address
Landisburg Tongue				
Bertie Dolomite	Named from exposures at Bertie (and in Bertie Twp.), Ontario, Canada, about 6 mi west of Buffalo, NY (US geologic names lexicons, USGS Bull. 896, 1200).	What is the relationship between the Bertie Dolomite and the Bass Islands Dolomite?	Chuck - Rickards (1975) notes the Bertie within the Salina Group. It laterally spreads out into different divisions, likely of formational rank. The Bass Islands is not indicated on this NY succession. John Harper - Unit H (uppermost Salina) is the Bertie. Refer to the 1976 subsurface strat charts (Heyman). These have the relationship between the two formations.	Needs more research.
Bass Islands Dolomite	Named from group of islands in western Lake Erie (Lane and others, 1909).			
Akron Dolomite	Named from exposures in village of Akron, Erie Co., western NY (Grabau, IN Sherzer and Grabau, 1909).	Is the Akron Dolomite part of the Bass Islands Group in PA?	G 75 separates the two units, but they are in the same stratigraphic position. Gordon - In NY the Akron overlies the Bertie and they are massive brown dolostone vs. laminated beds. Chuck - Larry Rickard put Akron as member of the Rondout Formation in 1975 in NY.	Needs more research.
Bass Islands Group	Named from group of islands in western Lake Erie (Lane and others, 1909).			

Castanea Sandstone	Named from Castanea, a suburb of Lock Haven, [Lock Haven 15-min quadrangle, Clinton Co.], central PA (Swartz, 1934).	Are the Castanea and Grimsby lithologic and stratigraphic equivalents? They occupy the same stratigraphic interval, but are they lithologically distinct?	Duff - For PA, the Castanea is the upper portion of the Tuscarora, and the Grimsby is up towards Niagara in the subsurface. John Harper - Based on gamma-ray neutron density correlations, the Whirlpool is equivalent to the entire Tuscarora and the Castanea and the Grimsby would be the same thing (Kris Carter supports these relationships).	Castanea is member of Tuscarora and a Grimsby equivalent.
Grimsby Sandstone	Exposures along east side of Niagara Gorge at Grimsby, Ontario, Canada (Williams, 1914).			
Lockport Dolomite	Named from exposures at Lockport, Niagara Co., NY (Hall, 1839).	Does the Lockport Dolomite have another member alongside the DeCew? (Eramosa Member)	Gordon - The succession is as follows: DeCew, major unconformity, Gassport (lower member of Lockport), Eramosa (higher member of Lockport). John Harper - The Lockport has always been a distinct, undivided formation (with exception of the DeCew). Chuck - In NY, the Lockport is considered a group.	DeCew is likely not part of the Lockport, but part of the Clinton Group. This needs more research.
Eramosa Member	Exposures along banks of Eramosa River between Rockwood and Guelph, Ontario, Canada (Williams, 1915).			
Guelph Formation	Exposures in neighborhood of Galt and Guelph, Ontario, Canada (Logan, 1963).	What is the relationship between the Lockport Dolomite and the Guelph Formation? In NY, it is a formation within the Lockport group. Does this hold up in PA as well?	Did not address	Did not address
Lockport Dolomite	Named from exposures at Lockport, Niagara Co., NY (Hall, 1839).			
Guelph Formation	Exposures in neighborhood of Galt and Guelph, Ontario, Canada (Logan, 1963).	Does the Guelph Formation have a member (the Oak Orchard Member)? We list it as having no members.	Did not address	Did not address
Oak Orchard Member	Outcrop along Oak Orchard Creek in western part of Orleans Co., western NY (Howell and Sanford, 1947).			
Guelph Formation	Exposures in neighborhood of Galt and Guelph, Ontario, Canada (Logan, 1963).	Are the Guelph Formation and the McKenzie lithologically and stratigraphically equivalent?	Duff - The McKenzie is part of Clinton Group (which also includes Rochester, Keefer, and Rose Hill). Clinton Group research would be a good starting point	Needs more research.
McKenzie Formation/Member	Exposures 9 mi southwest of Cumberland, Allegany Co., northwestern MD. Named from McKenzie Station on the Baltimore and Ohio RR (Ulrich, 1911).			

Thorold Sandstone	Exposures on Welland Canal, at Thorold, Ontario, Canada (Grabau, 1913).	Is the Thorold a member of the Clinton or Medina Group? It's listed as a member of the Clinton on G 75, but has historically varied.	<p>John Harper - Informal terminology by drillers used Clinton and Medina interchangeably.</p> <p>Gordon - Carlton Brett can assist with this.</p> <p>Chuck - Has seen the Whirlpool, followed by the Grimsby at base of Medina. This was in turn followed by prominent change across the phosphate boundary into marine shales and limestones and into the Clinton above. There is speculation that the Whirlpool may be an Ordovician unit, possibly recording a low-stand.</p> <p>Harper - The Thorold was included in the Medina in Laughrey's work. It is very possible it could be considered lowermost Clinton, as the Thorold is a dolomite.</p>	Needs more research.
Clinton Group	Clinton, Oneida Co., central NY (Conrad, 1839).			
Medina Group	Named from exposures in vicinity of Medina, Orleans Co., NY (US geologic names lexicon, USGS Bull. 1200).			
Irondequoit Dolomite	Town of Irondequoit, just north of Rochester, Monroe Co., NY (Hartnagel, 1907).	Does the Irondequoit exist in PA?	<p>Kris Carter - The Irondequoit, Dayton, and Reynales are all in northwest PA. They were identified using geophysical logs.</p> <p>Gordon - Central PA has an Irondequoit equivalent.</p> <p>Aaron - Are the Irondequoit and the Keefer equivalent/correlated? Mike also questions this relationship.</p> <p>Duff - Keefer looks like offshore bar and has tremendous variability.</p>	Yes.
Reynales Dolomite	Exposures at Reynales Basin, 8 mi east of Lockport, Niagara Co., NY (Chadwick, 1918).	Does the Reynales exist in PA?	Yes - NW PA	Yes - NW PA

Silurian

Rose Hill Formation	Exposures on Rose Hill, Cumberland, northwestern MD (Swartz, 1923).	Does the argument that the Castanea Member could be placed in both the Rose Hill and the Tuscarora have any merit?	Aaron - The Castanea should be in the Tuscarora. Duff endorses this and sees the Castanea as a fine-grained quartzite at top of Tuscarora. Kris Carter also agrees. Bob - Keep an eye out for good markers in the form of volcanic ash beds when looking at this interval. The Tuscarora becomes the Clinch Formation southward.	The Castanea should be placed in the Tuscarora.
Tuscarora Formation	Named from Tuscarora Mountain, PA, [which extends along border line of Juniata and Perry Cos., central southern PA] (Clark, 1897).			
Castanea Member	Named from Castanea, a suburb of Lock Haven, [Lock Haven 15-min quadrangle, Clinton Co.], central PA (Swartz, 1934).			
Springfield Granodiorite	n/a	Is the Springfield Granodiorite the proper name for this unit, or should it be called the Swathmore?	Did not address	Did not address
Swathmore Granodiorite	n/a			
Springfield Granodiorite	n/a	Is the Springfield Granodiorite a part of the Wissahickon Formation?	Did not address	Did not address
Wissahickon Formation	Not designated. Named from Wissahickon Creek, in Philadelphia, PA.			

Relational Issues

Salina Group	Not designated. Numerous exposures of Vernon, Syracuse, and Camillus rocks exist in northern part of Onondaga Co., (Syracuse quadrangle), NY. Salt wells at Salina, NY.	Is anyone familiar with how the subsurface "letter members" of the Salina fully correlate to surface units? For example, is the Camillus Shale lithologically and stratigraphically equivalent to the subsurface Unit G?	Chuck - Larry placed Unit G in the Camillus Shale.	This be further investigated in the future possibly.
Wills Creek Formation	Exposures on Wills Creek at Cumberland, Allegany Co., MD (Uhler, 1905).	Are the Wills Creek and/or Tonoloway Formations lithologically and stratigraphically equivalent to the Camillus Shale?	Aaron - The shales of the Wills Creek and Tonoloway differ. The Camillus is NOT black shale. The answer is that, perhaps, there would only be a partial equivalency. Duff - There is a mudstone shale, possibly of Wills Creek, at Charlie Hill.	There is perhaps a partial equivalency somewhere here.
Tonoloway Formation	Exposures on east flank of Tonoloway Ridge, along Cacapon near Rock Ford, Morgan Co., WV (Ulrich, 1911). [US geologic names lexicon, USGS Bull. 896, states the naming feature is located in Washington Co., MD.]			
Camillus Shale	Exposures at Camillus, Onondaga Co., north-central NY (Clarke, 1903).			
Poxono Island Formation	Exposures in bluff of Delaware River in Middle Smithfield Twp., opposite Poxono Island, PA (White, 1882).	What is the relationship between the Poxono Island, Bossardville, and Tonoloway units?	Bob Smith - Has been unable to apply central PA nomenclature out towards Delaware River. There, he has been unable to recognize the thinly laminated algal lithology and was unable to bring in Kalkberg. Chuck - The succession in NY is as follows: Poxono Island below (shales) and Bossardville above (dolostone) at the top of the Salina Group. Dan - The Sussex County map has a good border map (Don Monteverde). Chuck has his email.	Needs further research (?)
Bossardville Limestone	Bossardville, Monroe Co., PA (White, 1882).			
Tonoloway Formation	Exposures on east flank of Tonoloway Ridge, along Cacapon near Rock Ford, Morgan Co., WV (Ulrich, 1911). [US geologic names lexicon, USGS Bull. 896, states the naming feature is located in Washington Co., MD.]			

Decker Formation	Exposures near Decker's Ferry, below Flatbrookville, Sussex Co., northern NJ (White, 1882).	What is the relationship between the Decker Formation, Keyser, Rondout, and Manlius?	<p>Chuck - The lower Decker as in the very top of the Salina. The Rondout and most of the Manlius has been moved down in the Silurian, and the Manlius now holds the Siluro-Devonian boundary. The Keyser holds the same boundary.</p> <p>Gordon - The Keyser Formation contains large crinoid facies, and unique fossils. These are also found in Greenfetter Member in NY (sp?) The occurrence of these mark an event straddling Silurian-Devonian boundary.</p> <p>Chuck - The Czech Republic has these as well, which is partly why the boundary has been moved up into upper Manlius.</p> <p>Duff - There is a good section of Keyser in New Paris Quarry (in PA, Bedford County), that holds Silurian/Devonian boundary.</p>	The Keyser and Manlius are stratigraphically equivalent.
Keyser Formation	Named from exposures at Keyser, [Keyser 7.5-min quadrangle], Mineral Co., northern WV (Ulrich, 1911).			
Rondout Formation	Type area: cement quarries at and near Rondout Co. [line?], southeastern NY (Clarke and Schuchert, 1899).			
Manlius Limestone	Named from Manlius, Onondaga Co., NY (Vanuxem, 1840; see Smith, 1929).			
Bossardville Limestone	Bossardsville, Monroe Co., PA (White, 1882).	Are the Bossardville Limestone and the Tonoloway lithologically and stratigraphically equivalent?	Did not address	Did not address
Tonoloway Formation	Exposures on east flank of Tonoloway Ridge, along Cacapon near Rock Ford, Morgan Co., WV (Ulrich, 1911). [US geologic names lexicon, USGS Bull. 896, states the naming feature is located in Washington Co., MD.]			
Clinton Group	Clinton, Oneida Co., central NY (Conrad, 1839).	How should we be defining the Clinton Group in PA?	<p>Chuck - The Rose Hill correlates very well with the Rochester Shale, which is very important to the Clinton Group. The Rose Hill is a part of the Clinton Group.</p> <p>Aaron - In PA, the Mifflintown consists of the Rochester and the McKenzie. The McKenzie is not part of the Clinton Group. Therefore, the Mifflintown straddles the Clinton Group and the Lockport Group (Duff - good exposure of this section near Barree, near Charlie Hill area).</p> <p>Aaron - The McKenzie is not always present, more mapping is probably necessary, could be a nomenclature issue as well.</p>	More mapping needed.

Wolcott Limestone	n/a	Does the Wolcott exist in PA? If yes, is the Wolcott part of the Clinton Group in PA.	No. Chuck - The Wolcott is a very thin member; iron ore is Wolcott Furnace Hematite Beds.	No.	
Clinton Group	Clinton, Oneida Co., central NY (Conrad, 1839).				
Rochester Shale	Type area: exposures at Rochester, Monroe Co., west-central NY (Hall, 1839).	Is the Rochester still used in NY and PA? If yes, is it considered to be a formation, a member, or both?	Aaron/Chris - It has not been mapped separately in recent times. Rose-Anna - It is lithologically unique from the units below it. We can definitely identify it, and it should probably be included in stratigraphic column.	It has not been used recently, but should probably still be included in the stratigraphic column. It's rank was not discussed.	
Rochester Member					
Wawarsing Formation	Type section: Underground in shaft 2, south heading of Rondout-West Branch Tunnel at Wawarsing, Ulster Co., NY (Bird, 1941).	Has anyone used this unit or have any knowledge of it?	Chuck - The Wawarsing is equivalent to most of Poxono Island Member near where the three states meet (Port Jervis).	Unknown if this is used in PA, but is probably not relevant for mapping here.	
Turbotville Member	n/a	Not listed in Geolex. Listed in one publication within the PAGS (A 144cd). Indicated to be a member of the Tonoloway Formation. Has anyone used this unit or have any knowledge of it?	No, Hoskins may have referred to it informally.	No.	
Clove Brook Member	Type section: abandoned William Nearpass quarry, 1.8 mi southwest of Duttonville, Port Jervis South quadrangle, NJ. Section is on the southeast slope of Wallpack Ridge. Named from Clove Brook, 0.5 mi northeast of the quarry (Epstein and others, 1967).	Listed in publications as a member of the Decker Formation. Also indicated in Geolex to be used only in NY and NJ. Has anyone used this unit or have any knowledge of it?	No.	No.	

Wallpack Center Member	Type section: 1 mi northeast of Wallpack Center, Sussex Co., NJ, on the southeast slope of Wallpack Ridge, in Culvers Gap quadrangle (Epstein and others, 1967).	Listed in publications as a member of the Decker Formation. Has anyone used this unit or have any knowledge of it?	n/a	Reach out to Don Monteverde about this question.
Waterworks gneiss	n/a	Has one PAGS source (OFBM 08-05). Has anyone used this unit or have any knowledge of it?	n/a	Reach out to Hal Bosbyshell about this question.
Cosner Gap Member	Type section: along State Route 42 at the eastern end of Cosner Gap, about 1.6 km northwest of Maysville in Grant Co., east-central WV (Helfrich, 1975).	Listed in publications as a member of the Mifflintown Formation. Suggested use in Geolex is to replace the Rochester Member along the Allegheny Front. Has anyone used this unit or have any knowledge of it?	No.	No.
Williamson Shale	Named from exposures at Williamson, Wayne Co., western NY (Hartnagel, 1907). Type section: exposures on Salmon Creek West at Williamson, 30 km east of Rochester, NY (Gillette, 1947).	Listed in publications as formations within the Clinton Group. Does anyone have any knowledge of/has anyone mapped with these terms? Williamson listed in Geolex as solely NY terms.	Gordon - The Williamson Shale is a significant marker in NY and is famous for graptolites. Carl has mapped in central PA within the Rose Hill section and there does not seem to be any Williamson black shale signature there.	Probably does not exist in PA.
Sodus Shale	n/a			
Dayton Dolomite	Type area: vicinity of Dayton, Montgomery Co., OH.	Does anyone have any knowledge of/has anyone mapped with this unit? Listed in Geolex as an OH and KY term	Kris - We can see this in geophysical logs in the western PA subsurface.	Yes.

Lack of Information

	DeCew Dolomite	DeCew Falls on Twelve Mile Creek, western St. Catharines, Ontario, Canada (Williams, 1914).	Does anyone have any knowledge of/has anyone mapped with this unit?	Yes, it's still shown as member associated with the Lockport, but is likely within the Clinton Group.	Yes, it's still shown as member associated with the Lockport, but is likely within the Clinton Group.
	Power Glen Shale	DeCew Falls, Ontario, Canada (Bolton, 1953).	Listed in publications as a formation within the Medina Group. Does anyone have any knowledge of/has anyone mapped with these terms?	Kris - It is not shown as a unit in our strat chart, but drillers refer to it. The nomenclature was brought over from neighboring states.	Yes.
			Where does the Silurian-Devonian boundary lie?	Possibly at the top of the New Scotland/Corriganville (Bob Smith)	Possibly at the top of the New Scotland/Corriganville (Bob Smith)
			Is the New Scotland Formation in PA the deepest water facies in the lower part of the Helderberg Group? (Chuck)	In PA, the top of the New Scotland is replaced by Mandata and the deepening sequence in very different. It is very difficult finding graptolites in the Helderberg (you would need a magician like Bob Ganis). Even Bob Ganis could only find little fragments.	Refer to comments.
			Are there conodonts at the top of the Keyser?	Yes, but in its type section (WV) the top of the Keyser is Devonian.	More research needed as to dating?
			Where is the Silurian/Devonian boundary in PA?	Crinoids disappear globally at the boundary. 416.79 +/- 0.19 Ma ash bed dating. 419.0 (Becker et al, 2020) is Silurian/Devonian boundary. 2021 (Harrigan et al) - 419.62 Ma boundary date.	More research needed?
			Is the Mahantango a formation or a group in PA?	Aaron and Dan - It is a formation from PA and moving southward.	Formation.

		What are the members of the Mahantango?	<p>Dan - Cate (1960s) brought in the Clearville member based on subsurface information. Dennison tried to formalize that and others. The Clearville has been variably called a siltstone and sandstone. It is a mappable member and the USGS will be working on formalizing it. The Chaneysville has been formalized. Both are mappable, regional members of the Mahantango. Some work was done on conodonts in VA, and Dan has since looked at conodonts at other places in the basin that correlate with the Tully.</p> <p>Gordon - Tried following the Tully from southcentral PA through MD, and it pinches out as an observable unit near Bedford. There is a disconformity under the Burket, a shale unit below the Burket where the Tully is missing. This seems to be a transgressive division within the uppermost Hamilton/Mahantango interval. Could this be an unconformity cutting out the Tully southward?</p> <p>Aaron - In Franklin, Fulton, Huntingdon counties he can find the Tully. Here, it's no longer a limestone, and is turning into calcareous shale with fossiliferous nodules. It could be an unconformity or it could be a facies change.</p> <p>Dan - As you move from west to east, there are many name changes across the Mahantango.</p> <p>Aaron - Make sure you use the correct members based upon type sections.</p>	Clearville and Chaneysville are members of the Mahantango. There is more work to be done.
		Could the disconformity like under the Burket also occur at the base of the Dunkirk?	<p>Gordon - Yes, there is a diastemic surface that displays discontinuity moving eastward. There seems to be a pattern encountered at the base of many black shale units.</p> <p>Chuck - There are two tongues of marine strata that flooded out over terrestrial strata (lower Moscow transgression and Geneseo transgression) in the Catskill area.</p>	Yes (?)

Open Discussion

		<p>In the middle of the Marcellus in NY down through the basin, there are some changes of facies that happen where you get carbonates often. Sometimes they're calcareous shales to siltstone to fine sandstones and can even get sandy. What that interval has generally been called is the Purcell Member. Sometimes people try to apply Cherry Valley to take the place of Purcell, but the name Cherry Valley is the name of a specific thin limestone that goes into 10 meters of sandstone in Hudson Valley. Below Hudson Valley there's another thick unit called the Stoney Hollow, places of middle-Marcellus time that is undifferentiated in PA. Chuck strongly suggests these strata be called Purcell, particularly in PA, VA, WV, MD. He thinks we should retain the term Purcell for undifferentiated "mid-Marcellus" strata.</p>	<p>Kristen - When we drilled core, we found both Purcell and Cherry Valley.</p> <p>Chuck - Cherry Valley is lower limestone in NY of Marcellus Subgroup. There is also a limestone at the base of the Skaneateles called Purcell. Basinward this would be called Marcellus because you're out in a deeper facies.</p> <p>Bob - The Cherry Valley has been recognized around the Susquehanna River using sparse but existent barite.</p>	<p>Kristen and Chuck will chat.</p>
		<p>Is the Harrell recognized throughout PA?</p>	<p>In the Ridge and Valley, yes, and in the subsurface as well. There is a change in nomenclature from Burket to Geneseo.</p>	<p>Yes.</p>
		<p>Are there any places in southcentral PA or in general where the Burket pinches out?</p>	<p>Dan - Yes</p> <p>Gordon - Has seen very thin Burket in places. In the Ridge and Valley it is structurally sheared. In NY the Geneseo has a diachronous face to it. It may have a similar effect in the Appalachian region. The Mahantango/Harrell boundary may be a younger age than in central PA.</p> <p>Chuck - In saltwater systems, clays do not remain in suspension, they end up attaching to each other, forming little mud balls, and are slowly transported basinward. Sediment may not be reaching that far west.</p>	<p>Yes.</p>

Open Discussion

		Burket and Geneseo? Same rock?	<p>Gordon - We have difficulty correlating sections of the Genesee Valley in a 10 mile interval. The Geneseo is in the Genesee Valley and the units above it are difficult to map. This opens the possibility that shale southward may be an older division than the type Geneseo at Geneseo. This has not been proven, but it's a possibility.</p> <p>Chuck - It depends on whether or not you want to split the Geneseo into two parts. There seems to be a continual deposition event.</p>	Possibly?
		Does Old Port refer to a formation, a group, or both?	<p>Duff - I see it used both ways. Formation? Group? There is a well exposed section near Osterburg, and in the road-cut on I-99 at n ear Saint Clairsville, and on the country road to Osterburg. The published map FCoPG 2003.p 118-126 incorporated data from three diamond drill-holes drilled by New Enterprise. The Needmore Shale is exposed on the road to the south from Churchville. The New Paris Quarry is located less than 10 miles to the southwest. Here the Upper Keyser (probably Jersey Shore and LaVale Members are exposed, alone with the overlying New Creek, and Corriganville Limestones. Two drill-holes drilled to 300 feet captured the full section of the Keyser, as well as part of the Old Port(?) and upper Tonoloway.</p>	n/a
		n/a	<p>There are two well-exposed sections of the Lower Silurian strata in Barree area between Alexandria and Petersburg (AAPG Eastern Section Meeting, Pittsburgh, October 12-14, 1984, p 19-20, and 57-60). One (stop 7 on map) is a road-cut across the river from Barree (designated Leading Ridge anticline exposes Rose Hill Shale - Keefer Sandstone - Rochester Shale - McKenze Limestone for 810 feet in the bank adjacent to the County Road. The other is along the rail track (stop 13 on map) exposed Keefer Sandstone (hematitic) - Rochester Shale (with some meter scale algal balls for approx 130 feet) and on for another 300 to the east in McKenzie Limestone.</p>	n/a
		n/a	<p>Wills Creek cycles are exposed in the Road-cut at Charlie Hill (FCOPG 1985, p. 192-198) and update in FCOPG 2017, p 31-34). These have been interpreted as Late Silurian Shallowing upward cycles, and include unusual mudstone beds up to 2 meter thick, and vugs interpreted as evaporites.</p>	n/a

Erathem/ System	Unit(s)	Type Section (from Geolex)	Question/Conflict	Comments	Resolution?
	Rhinestreet Shale/Shale Member	Exposures along Rhinestreet north from Naples, Ontario Co., NY.	The Rhinestreet is found as both a standalone formation and as a member of the West Falls Formation in literature. Which of these is accurate, or does this vary depending on geography?	Chuck - In New York, the Rhinestreet is a formation within the West Falls Group. Frank - In Pennsylvania, the Rhinestreet was brought down from New York. Its rank was changed when it was brought down by Harper and Pietrowski. Harper - The Rhinestreet is only noticeable in subsurface and through drill cuttings and geophysical logs. It was called a member of the West Falls because we weren't able to go into detail like New York. Rhinestreet is mostly black shale, has a tephra bed. Difficult to subdivide. Too general of a section in PA to consider the West Falls more than a formation. Frank - PA sections match well with NY sections. Ranking is not the important thing, the important part is the rock body itself. Harper - Brought names down but not the ranks because they were rushed. Frank is right in that, if you look at the section in western PA, you can see the shale spikes. It can be done, it just was not done yet. West Falls can be called a group. Only issue is once you get away from the westernmost and northernmost parts of the state, you cannot recognize most of the formations within the West Falls.	Needs further discussion, the West Falls can be called a group in PA though.
	West Falls Formation	Along Cazenovia Creek in vicinity of West Falls and East Aurora, central Erie Co., NY.			
	West Falls Formation/Group	Along Cazenovia Creek in vicinity of West Falls and East Aurora, central Erie Co., NY.	Found as both a formation and a group in literature. Which of these is accurate, or does this vary depending on geography?	Refer to above.	Needs further discussion.
	Conewango Formation/Group	Valley walls and uplands bordering Conewango Creek, south of PA-NY State line, Warren Co., northwestern PA (Butts, 1910).	Found as both a formation and a group in literature. Which of these is accurate, or does this vary depending on geography?	Not discussed	n/a
Nomenclature Issues					

Brallier Formation	Named from railway station 6 mi northeast of Everett, Bedford Co., south-central PA (Butts, 1918).	What is the relationship between the Trimmers Rock Formation, the Brallier Formation, and the Lock Haven Formation? Are they solely facies equivalents?	<p>Aaron - Where the Brallier and Trimmers Rock are both present, the Trimmers Rock overlies the Brallier (from experience in central PA). The Trimmers Rock laterally interfingers into the Lock Haven</p> <p>Rose-Anna - The Trimmers Rock and Lock Haven were defined in different areas and they are lithologically different. What is the true relationship between them?</p> <p>Aaron - It's important to acknowledge that there is a problem that we need to figure out. In central PA there's no Trimmers Rock or Lock Haven, just Brallier. Brallier may cover that interval, and the Scherr and Foreknobs may lie in this interval as well.</p> <p>Frank - If you look at this through depositional environments, the three formations were deposited in similar environments (marine shallow shelf). The three are sub-depositions within this environment. They seem to be intercalated. The unit names are subjective and geographically restricted.</p> <p>Harper - Everything that's sub-Catskill in central PA are all facies and intermingle. Lock Haven is the northern-equivalent of the Venango, Bradford, and Elk Groups. You can recognize Elk and Bradford sandstones in the Lock Haven. To the south is the Foreknobs and Scherr, which are also facies equivalents with the Bradford and Elk Groups, not specifically time-equivalents. Oil and gas have recognized equivalent rocks in the Bradford and Elk Groups. The Brallier is below the Lock Haven, Foreknobs, and Scherr. They are partially laterally-equivalent. The Lock Haven, Foreknobs and Scherr become more siltstone-rich to the east and becomes the Brallier. The difference between the Lock Haven, Foreknobs, and the Scherr is a physical boundary (Tyrone-Mt. Union Lineament; major basement fault). The Trimmers Rock in central PA was called Lock Haven, Foreknobs, Scherr in the 60's.</p> <p>Dan - Williamsport shows the cut off between the Lock Haven and Brallier and the Trimmers Rock. Altoona has the Foreknobs and Scherr boundary that we could look into. The Foreknobs and Scherr end and the Lock Haven begins in Altoona.</p> <p>Frank - The relationship between these three rock bodies also applies moving eastward, across Potter, Susquehanna, Wayne, and Pike counties. Woodrow and Fletcher encountered the issue where the rock body between the Tully and the basal red beds of the Catskill did not look like the Trimmers Rock, so they split it into Newport and Sparrow Bush. These shifts in depositional environment are very common, and make matching through stacking geographically local areas troublesome.</p>	Needs further research.
Lock Haven Formation	Type section: exposure along Queens Run Road, from borrow pit 1.5 km northwest of Susquehanna River (West Branch) bridge at Lock Haven, 1.5 km northwest to lower slopes of Simcox Mountain, north of junction of Queens Run and Swissdale Roads, Lock Haven quadrangle, Clinton Co., PA (Faill and Wells, 1977)			
Trimmers Rock Formation	Not designated. Named from hill 1.5 mi east of Newport, Perry Co., south-central PA (Willard, 1935).			

Harrell Formation	Harrell Station on Petersburg branch of the Pennsylvania RR, about midway between Hollidaysburg and Williamsburg, Blair Co., central PA (Butts, 1918).	Are we missing a member of the Harrell Formation? (Standing Creek Member)	Harper - Harrell was misprint of Horrell, which is shown in an old USGS map.	Needs further research and mapping.
Standing Creek Member	n/a		No comments made on the member. Misinterpretation of text, the Standing Creek Member is actually inferred to be a member of the Brallier.	
Harrell Formation	Harrell Station on Petersburg branch of the Pennsylvania RR, about midway between Hollidaysburg and Williamsburg, Blair Co., central PA (Butts, 1918).	What is the relationship between the Harrell Formation, the Genesee Formation, the Burket Shale, and the Geneseo?	<p>Aaron - The Geneseo and the Burket are probably the same black shale. Harper - Correct, they are the same. The Harrell and the Genesee are pretty equivalent. We put in an arbitrary cutoff to separate the two of them based on overlying formations. If the Rhinestreet was recognizable in the subsurface, it's Genesee/Geneseo. If the Rhinestreet was not recognizable and you see the Brallier instead, it's called Burket/Harrell.</p> <p>Chuck - The Genesee in NY is one of the groups and the lower formation in it is the Geneseo. The Middle-Upper Devonian boundary falls a little above the Geneseo.</p> <p>Aaron - In the Harrell, the Burket is the lowest member, and the upper member is an unnamed black shale.</p> <p>Gordon - Route 322 west of Susquehanna River, there is a covered interval that corresponds with the Burket-Harrell, capped by a heavily bioturbated unit. This unit corresponds with the Lodi unit in NY (the highest Middle Devonian unit), coming into the Brallier above it. (Losh Run?)</p> <p>Aaron - Is the Geneseo/Genesee still used in NY?</p> <p>- YES, Genesee is a group and Geneseo is a formation. There are possible revisions on the Geneseo, as the base of it is a notably diachronous, westward-younging unconformity. There's a possibility that this refinement could lead to the changing of member nomenclature of the lower Geneseo. It may turn out in future work that the lower Geneseo could equate to the Burket in PA. This is pending future dating.</p> <p>Chuck - At the formation and group level, there is no significant change in the new chart</p> <p>Harper - Also sees this diachronous boundary in the subsurface.</p> <p>Dan - Has seen a thick sandstone package at the base of the Brallier in Bedford County (Chaneyville), in the section that Dennison proposed as a type section for the Clearville Member of the Mahantango.</p>	The Geneseo and Burket are probably the same unit. No comments on the equivalency of the Genesee and Harrell. Probably needs further discussion.
Genesee Formation	Named from abundant exposures along Genesee River and Valley, NY, especially in gorge of River below Portage (Vanuxem, 1942). Reference section: At Beards Creek, near Leicester, western Livingston Co. (deWitt and Colton, 1959).			
Burket Shale	Named from exposures at Burket, a suburb of Altoona, Blair Co., central PA (Butts, 1918).			
Geneseo Shale	Named from exposures at Fall Brook, 1.5 mi south of Geneseo, Livingston Co., NY (Chadwick, 1920). Reference section: Menteth Gully, west side of Canandaigua Lake, 14 mi north of Naples, Ontario Co., NY (deWitt and Colton, 1959).			

Berea Sandstone	Named from Berea, Cuyahoga Co., OH (US geologic names lexicons, USGS Bull. 896, 1200).	What is the relationship between the Berea Sandstone, the Murrysville, the Corry, the Knapp, the Cussewago Formation, and the Pocono Formation?	<p>Harper - Murrysville is an informal name and has not been formally defined as of yet. Uses it as "Murrysville".</p> <p>Gordon - Murrysville: A large somewhat channelized system of sands that reaches the outcrop belt of Ohio/PA border. The Cussewago thins eastward toward Meadville. Going westward it becomes less differentiable from Berea of Ohio. The Cussewago may be best example of channelized system of sands that may be linked to glaciation and Spechty Kopf. The Cussewago links into the Berea of Ohio, connects into two or three definable units to the east. Knapp and Drake Well (proposed by Harper) is probably in part equivalent to the Cleveland Shale in Ohio. Black shale unit passes eastward into interbedded siltstones and shale and passes into a thicker wad of sandy rock, rich in shells, seen in Crawford, Venango counties. Drake Well passes eastward into a less well-characterized unit, known in older literature as the Knapp. Includes conglomeratic and non-conglomeratic sandy rock, known as near-shore facies. Pocono has been restricted. It used to be what we now call Huntley Mountain, but was restricted to higher Mississippian beds in PA.</p> <p>Aaron - The Pocono in the past included the Huntley Mountain and the Burgoon. Now, we correlate the Pocono with the Burgoon, not the Huntley Mountain.</p> <p>Cliff - Agrees with Aaron. In the PA 1960s state map, everything in western PA was called Pocono. In the 1980s state map, we restricted Pocono to Burgoon. Cliff has worked with the Knapp and, based on outcrop and subsurface data and using geophysical logs, the Corry Sandstone going eastward merges into the top of the Knapp Formation. The Knapp is a marine unit with lots of flat-pebble conglomerate. It is fairly coarse-grained. Its type area in Knapp Creek, NY is terrible. It's overlain there by an unconformity, and there is no complete section. The Knapp thickens locally up to 200 feet thick in Forrest and Elk Counties, north into Warren and McKean County. The Drake Well is an informal term based on work in Warren County that should be formalized to a mappable unit that can be readily identified in the surface and subsurface.</p> <p>Gordon - The Drake Well is a replacement for Kushaqua. Caster defined the Kushuqua biostratigraphically, violating some views of what a unit is. John came up with a suggestion of a different name for this division.</p> <p>Harper - Believes Drake Well Formation is mappable in the subsurface. Can delimit formation in the subsurface to the southern part of the northern-tiered counties, as far south as Clarion and Butler. Can be mapped. (Cliff did map in Warren County, limited there only by the project).</p> <p>Chuck - The Knapp on the old NY chart was put into the lower Carboniferous and Mississippian, but Gordon has now placed it into the Devonian.</p> <p>Gordon - Working strictly from the surface, working on the Knapp is frustrating. The type section is almost gone and unavailable for viewing. Other type sections have degraded. One good key section is the Johnsonburg section, south of the Transport Authority at the south edge of Johnsonburg.</p> <p>Aaron - Is the Knapp laterally correlated to the Cedar Run Conglomerate?</p> <p>Cliff - Believes the top of the Knapp is correlated with the Cedar Run.</p>	Read through comments; not every unit was discussed.
Murrysville	Not synopsisized to date. [See US geologic names lexicon, USGS Bull. 1350]			
Corry	Colgrove quarry [now abandoned], 1 mi south of Corry, Erie Co., PA (White, 1881).			
Knapp	Not designated. Easternmost exposure is at Knapp's Creek Station, Cattaraugus Co., NY.			
Cussewago Formation	Named from exposures in Cussewago Valley, Crawford Co., PA. Exposed in Bartholomew quarry, Hayfield Twp. (White, 1881).			
Pocono Formation	Not designated. Later workers assume type area to be in Pocono Mountains, northeastern PA.			

Huntley Mountain Formation	Type section: southeast slope of Huntley Mountain, northwest of village of Waterville, between Lat. 41 deg. 19 min. 09 sec. N., Long. 77 deg. 22 min. 20 sec. W. (top) and Lat. 41 deg. 18 min. 35 sec. N., Long. 77 deg. 21 min. 19 sec. W. (base), Waterville quadrangle, Lycoming Co., north-central PA (Berg and Edmunds, 1979).	Is the Huntley Mountain Formation the modern Oswayo replacement?	<p>Aaron - Partially, yes. When you lose the marine interval at the top of the Catskill, that becomes the Huntley Mountain. It interfingers above - how do we handle this? Conversation for later :) The Oswayo is the top of the Catskill and is a marine to terrestrial succession with some interfingering occurring. The marginal marine and terrestrial unit is the Huntley Mountain. Somewhere between Elk and Clinton County is the transition from Oswayo-dominant to Huntley Mountain-dominant, and the two are laterally equivalent.</p> <p>Cliff - Huntley Mountain is not the modern Oswayo replacement. Marine vs. nonmarine.</p> <p>Gordon - In central PA and MD, the Oswayo is a gray, sandy shale, equated in time to the Cleveland Member in Ohio. Up in NY, there is an Oswayo (type Oswayo), Rickard correlated to the Riceville Member of the Conewango further to the west (correlates with upper part of Chagrin in Ohio). Are there two Oswayos?</p> <p>Cliff - South NY State Oswayo is the eastern equivalent of the Riceville. Cannot comment on southern Oswayo.</p> <p>Harper - There is a formation between the Murrysville and the top of the Venango in western PA. Correlated from Ohio to West Virginia. Along Route 64? 68? there's a big outcrop with a syncline and visitors center. There should be write-ups about why the Oswayo was used down there. It was possibly a matter of convenience in western PA. Another outcrop in Conemaugh Gorge is good.</p> <p>Chuck - tongues of marine extending into the terrestrial shouldn't be a surprise, that's when glaciation is strong.</p> <p>Frank - We have to stop thinking of facies changes as shazam lines, they are deep intercalations of tongues that reach for 10s to 100s of kilometers. Sideling Hill outcrop is good (Harper's outcrop mention).</p> <p>Aaron - Does the Oswayo line up well across the PA/NY border? PA and NY may line up well, do PA and MD line up?</p> <p>Gordon - The Oswayo in NW PA is essentially type-Oswayo. Going down to the Allegheny Front, are you still in the same place? Old US Route 40 has a good place to study this.</p>	They are laterally equivalent, but differ lithologically (marine vs. nonmarine)
Oswayo Formation	Exposures in vicinity of Oswayo Creek, Cattaraugus Co., southwestern NY (Glenn, 1903).			

Conewango	Valley walls and uplands bordering Conewango Creek, south of PA-NY State line, Warren Co., northwestern PA (Butts, 1910).	What is the relationship between the Conewango, Venango, and Oswayo?	<p>Harper - Venango Formation vs. Venango Group: the Venango Formation is used west of the Allegheny and Monongahela Rivers. Consists of anywhere from 3 to 7 or 8 sandstone units with interbedded shales that have been named by drillers. The Venango Group is composed of three basic formations with the Catskill in the middle. We have tried to divide the group into nameable and mappable formations; Shaulis used Maple Summit Formation for the lower sandy formation of Venango Group which originates from Laird. This formation is well-defined and mappable. The Venango Formation is composed of members, the Venango Group is composed of formations. They are NOT completely correlateable.</p> <p>Cliff - The Venango Formation was defined by key beds (Woodcock (Venango First Sand) is the top, Panama (Venango Third Sand) is the base. Farther south, the Venango becomes more complex, thicker, and can be divided into formations. NW it is defined by key beds.</p> <p>Aaron - The interval that was the same as Shaulis' Maple Summit was defined by WV. Aaron encourages switching to that terminology.</p> <p>Gordon - There is a difference.</p> <p>Cliff - The Oswayo overlies the Venango.</p>	The Venango overlies the Oswayo. No comments made on the Conewango.
Venango	Type area: Venango Co., northwestern PA.			
Oswayo Formation	Exposures in vicinity of Oswayo Creek, Cattaraugus Co., southwestern NY (Glenn, 1903).			
Waverly Group	n/a	Is the Waverly Group a valid lithostratigraphic name in PA? If yes, what is the correct subdivision?	<p>Aaron - Based upon north-central/northwest PA experience, the succession is Catskill, Oswayo, and the base of Oswayo is part of Waverly. The Knapp wasn't present. There was a series of marine rocks, he knew there was Huntley Mountain but wasn't able to map it well. The Waverly is Oswayo through Shenango, undivided. Thinks more research is needed.</p> <p>Gordon - Waverly was used by early workers, then wasn't used for a long time, has come to mean units that are Mississippian in age. Included units from Caster's Kushaqua and marine units above it. Named for Waverly, Ohio. Generally has not used the Waverly.</p> <p>Cliff - The Waverly was Mississippian, but since we have redefined it, it is now uppermost Devonian. The sequence was named on a series of sandstones. When the key beds fall apart as you get into eastern McKean County, rather than rename since we cannot define the formations, Waverly still seems like a valid unit since you can define groups differently in different locations. Defined as the interval above the Catskill up to the Burgoon. May need more discussion and refinement. Gets into transition zone between marine and non-marine.</p> <p>*Please email Aaron Bierly if you have more thoughts on this topic!</p>	Needs more discussion.

Bradford Group	Type locality not stated. Occurs in subsurface of northwestern PA.	Bradford Group seems to be an informal designation in PA. Has this changed, or should we use the lowercase “G” in “Group”?	<p>Karen - Has 15 specimens, all showing the Bradford as a bed instead of a group going back to the Second Survey.</p> <p>Harper - The Bradford, Elk, and Venango were named by Second Survey geologists for the oil sandstones that were in specific facies of packages. These units should be considered to be formal names</p> <p>Gordon - "Bradfordian" is a time-rock term (Butts, Caster, etc.) and defines a fauna. Waverly was also often used to define a fauna, defining rock of a certain age. NY has Canadaway and Conneaut that are rock terms, and the Bradford Group overlies parts of each. Essentially a bunch of terms with different meanings.</p> <p>Cliff - No problem with calling them formalized groups based on long history. When mapping between McKean and Cameron County, discovered more amplitude on one anticline and the bottom of the valley had a little Bradford Group exposed. Doesn't have a problem formalizing.</p> <p>Harper - Venango and Bradford are two distinct groups.</p>	Bradford can be formalized.
Elk Group	n/a	What is the relationship between the Elk Group and the Brallier?	No comments made.	Needs more research.
Brallier Formation	Named from railway station 6 mi northeast of Everett, Bedford Co., south-central PA (Butts, 1918).			
Elk Group	n/a	What is the relationship between the Elk Group and the Scherr?	<p>Dan - The Scherr was a greater abundance of sand moving upwards in the Brallier. Dennison placed state-line boundary as an arbitrary cutoff. Lithologically, the first appearance of pebble conglomerates or pebbles within the section is the demarcation between the Brallier and the Foreknobs. Quartz pebbles note you are in the Foreknobs.</p> <p>Aaron - Need to discuss the differentiation between the Foreknobs, Irish Valley, and Scherr later on.</p>	Needs more research.
Scherr Formation	Type section: along WV Highway 42, Lat. 39 deg. 11 min. 45 sec. N., Long. 79 deg. 10 min. 48 sec. W., Grant Co., east-central WV (Dennison, 1970).			

Relational Issues

Late Devonian

Chemung Formation	Named from exposures in valley of Chemung River and in town of Chemung, Chemung Co., central NY. Well exposed at Chemung upper narrows, about 11 mi below Elmira (Hall, 1839).	The Chemung has long been abandoned. What terminology has replaced this formation?	<p>Frank - This depends on where you're at geographically and in the basin.</p> <p>Dan - On the G 75, lumped within several different formations, the Chemung is a magnafacies that encompasses numerous units. It is the Foreknobs coming up from Maryland.</p> <p>Chuck - The way Chemung has been used for a long time in NY, Chemung was name applied to all shallow marine facies, then crossed over to terrestrial facies. It lumped all lithobiofacies that were deposited in the shallow marine facies. The Portage is the turbiditic facies. The storm influenced delta platform is Chemung. Catskill is the red stuff. The Chemung was a large facies tract.</p> <p>Aaron - Everything from Brallier (including Brallier, but Brallier may be Portage?) to underneath the Catskill was Chemung.</p> <p>Frank - Given the differences in mapping techniques between NY and PA, it's difficult to resolve magnafacies with formation names. Use Chemung as a facies name.</p>	Dependent upon geography.
Rockwell Formation	Exposures at Rockwell Run, Morgan Co., east-central WV (Stose and Swartz, 1912).	<p>What is the relationship between the Rockwell, Burgoon, Pocono, Huntley Mountain, and Oswayo Formations?</p>	<p>Not discussed</p>	<p>n/a</p>
Burgoon Sandstone	Exposures in valley of Burgoon Run, above Kittanning Point, Blair Co., PA (Butts, 1904).			
Pocono Formation	Not designated. Later workers assume type area to be in Pocono Mountains, northeastern PA.			
Huntley Mountain Formation	Type section: southeast slope of Huntley Mountain, northwest of village of Waterville, between Lat. 41 deg. 19 min. 09 sec. N., Long. 77 deg. 22 min. 20 sec. W. (top) and Lat. 41 deg. 18 min. 35 sec. N., Long. 77 deg. 21 min. 19 sec. W. (base), Waterville quadrangle, Lycoming Co., north-central PA (Berg and Edmunds, 1979).			
Oswayo Formation	Exposures in vicinity of Oswayo Creek, Cattaraugus Co., southwestern NY (Glenn, 1903).			

Allegrippis Sandstone Member	Notable exposures: forms Allegrippis [Allegrippis] Ridge, Huntingdon Co., central PA (White, 1885).		<p>Dan - Named by Butts in a folio, these two conglomeratic sands can be traced from central PA south through MD, WV, VA, as two intervals of sand within the Foreknobs Formation. Dan thinks we ought to adopt Briery Gap (lower) and Pound Sandstone (upper) nomenclature for these. He recommends adopting these as members of the Foreknobs. The Briery Gap forms the contact between the Foreknobs and Brallier.</p> <p>Alan - The Allegrippis and Saxton fit the lithologic characteristics of the Foreknobs sands.</p> <p>Aaron - At the eastern edge of Broad Top, Aaron can't find the Pound/Saxton. The Briery Gap/Allegrippis will be hard to trace because of similarities with other sands.</p>	
Saxton Conglomerate Member	Not synopsisized to date. [See US geologic names lexicons, USGS Bull. 896, 1200]	Has anybody worked with these units? Are they still considered to be members of a formation, or are they now considered to be informal marker beds?	<p>Chuck - Conglomerates can be fairly widespread and sometimes when approaching terrestrial, conglomerates can prograde during a drop in base level. When you have a low-standing sea level, conglomerates can be concentrated in a valley where they narrowly fit.</p> <p>Frank - Chuck and Frank mapped conglomerates as a single unit for simplicity. The conglomerates north of Port Jervis are lenses, lumped together called the Lackawaxen. Lens shape would suspect Chuck's description of the origin is what is happening. Be careful tracing these laterally, particularly the thinner ones.</p> <p>Dan - Has seen the lenses that come and go, pinch from being channel accumulations of lots of quartz pebbles to thinning out to being granules. Mapped as packages, stacking sequences. The way that we can map and follow them is within the LiDAR data. Topographic expression is very distinct.</p>	May now be considered members of the Foreknobs under different names (Briery Gap and Pound Sandstone). Needs more mapping in PA to determine applicability of names.
Catskill Formation	Not designated. Named from Catskill Mountains, Greene Co., east-central NY (Mather, 1840).	What is the relationship between the Hampshire and Catskill Formations?	<p>Aaron - At the southern boundary of PA with MD and WV, they are the same unit. Through most of PA, the upper contact is also the same. Gets confusing when you include interfingering marine zones within the Irish Valley Member. May need to change definitions when you get to this point in the Catskill. There is a relationship that needs more detailed mapping.</p> <p>Dan - Butts brought up the Hampshire Formation nomenclature into the Hollidaysburg and Huntingdon quads. Questions for PA on whether or not to use the Hampshire.</p>	Needs more detailed mapping.
Hampshire Formation	Type area: Hampshire Co., east-central WV.			
Knapp	Not designated. Easternmost exposure is at Knapp's Creek Station, Cattaraugus Co., NY.	What is the correct subdivision of the Knapp Formation?	Cliff - The Knapp and Owayo can't really be subdivided in their type location, we should leave them as formations.	Leave as formation.
Owayo Formation	Exposures in vicinity of Owayo Creek, Cattaraugus Co., southwestern NY (Glenn, 1903).	What is the correct subdivision of the Owayo Formation?	Cliff - The Knapp and Owayo can't really be subdivided in their type location, we should leave them as formations.	Leave as formation.

Venango Formation	Type area: Venango Co., northwestern PA.	What is the relationship between the Venango and the Cattaraugus?	<p>Gordon - Cattaraugus is the eastern, coarser version of the Venango. The Cattaraugus is facies term to some degree. Informally, the eastern Venango is Cattaraugus facies or interfingering with red beds. Above that, you pick up into the Oswayo (grayish, marine stuff). The Cattaraugus underlies the Oswayo and this can be seen nicely south of Olean and in the Knapp Creek area.</p> <p>Dan - Continuing the use of Cattaraugus can become confusing because it is a magnafacies and a unit name.</p> <p>Chuck - Cattaraugus is a formal name. Cattaraugus was used as a magnafacies in a broad sense. It was used as a formation and as a facies. Using it as both a facies and formation name may not be the best thing to do.</p> <p>Gordon - Lewis Run PA, could see thick, gray sandstones, whole successions of them, containing sparse fossils, very coarse. Intuitively would say nearshore marine. Looks very different from Venango sections. One is very coarse and nearshore, one looks like underlying Chadakoin. Is okay with Venango being a spectral unit, and becoming more like massive sandstones before passing into the red beds.</p>	The Cattaraugus is a facies equivalent of the Venango.
Cattaraugus Formation	Cattaraugus Co., southwestern NY.			
Catskill Formation	Not designated. Named from Catskill Mountains, Greene Co., east-central NY (Mather, 1840).	What is the relationship between the Cattaraugus and the Catskill?	Gordon - The Cattaraugus passes into red, Catskill-like sediment.	The Cattaraugus passes into red, Catskill-like sediment.
Cattaraugus Formation	Cattaraugus Co., southwestern NY.			

Foreknobs Formation	Type section: along WV Highway 42, measured section 1, 0.48 km northwest of Scherr, Grant Co., east-central WV (Dennison, 1970).	<p>What is the correct subdivision of the Knapp Formation? The members to the left are those found in literature.</p>	<p>Dan - Consider these members as part of the Foreknobs for the time being. The Mallow Member will disappear [in the newest USGS map - Greenland Gap stratigraphy revision], but other members are still recognized and mappable in the type section locality. Unsure if we should apply in Pennsylvania. Anything called Mallow Member will be in upper Brallier.</p> <p>Gordon - Caster included in the Wetmore lower Conglomerate and the Cobham upper Conglomerate, and a shale in between (Kane Shale); considered regional terms with am unknown regional extent.</p> <p>Cliff - Advises caution in identifying units Caster talked about as he didn't have much to work with in the 30s. The Knapp and Oswayo can't really be subdivided in their type location, we should leave them as formations.</p> <p>Aaron - Agrees with Cliff, it's concerning to bring these names up to NW PA. The odds of sandstones holding up over that distance is improbable.</p>	<p>May now be considered members of the Foreknobs (with the exception of the Mallow Member). Needs more mapping in PA to determine applicability of names.</p>
Blizzard Member	Type section: beside Briery Gap Run near Judy Gap, along road from U.S. Highway 33 toward Spruce Knob, Pendleton Co., east-central WV (Dennison, 1970).			
Briery Gap Sandstone Member	Beside Briery Gap Run near Judy Gap, along road leading from U.S. Highway 33 toward Spruce Knob, Pendleton Co., east-central WV (Dennison, 1970).			
Mallow Member	Type section: along road beside Briery Gap Run near Judy Gap, leading from U.S. Highway 33 to Spruce Knob, Pendleton Co., east-central WV (Dennison, 1970).			
Pound Sandstone Member	Type section: beside Briery Gap Run, near Judy Gap, along road from U.S. Highway 33 to Spruce Knob, Pendleton Co., east-central WV (Dennison, 1970).			
Red Lick Member	Type section: along the road beside Briery Gap Run, Pendleton Co., extending from U.S. Route 33 toward Spruce Knob, east-central WV (McGhee and Dennison, 1976).			

Java Formation	Type section: exposures along Beaver Meadow Creek above Angel Falls, near Java Twp., Wyoming Co., NY (de Witt, 1960).	What is the correct subdivision of the Java Formation? The members to the left are those found in literature.	Chuck - In NY the Java is a group in the new strat, within it there are three formations - the Pipe Creek Shale (black shale tongue at bottom), Hanover Shale (more basinal environments), to the east, the Wiscoy shale and sandstone Gordon - Revision of this information, Bush and colleagues Pipe Creek correlates with a section above the type Wiscoy at Wiscoy Creek, strata above that are an interval that is fuzzy to match, Canasaraga Sandstone, Angola Shale below Pipe Creek incorporated into Wiscoy, summarized revisions in NYSGA paper. Wiscoy is now at the top of the West Falls Group.	Unsure of subdivision in PA. Needs further mapping.
Hanover Shale Member	Type exposure: on Silver Creek, Hanover Twp., Chautauqua Co., western NY (Hartnagel, 1912; Chadwick, 1933).			
Center Hill Ash Bed	At proposed standard locality of Chattanooga Shale, along east approach to Sligo Bridge, DeKalb Co., central TN. Named from exposures near Center Hill Reservoir in DeKalb, Putnam, and White Cos., TN (Conant and Swanson, 1961).			
Wiscoy Sandstone Member	Not synopsized to date. [See US geologic names lexicons, USGS Bull. 896, 1200]			
Scherr Formation	Type section: along WV Highway 42, Lat. 39 deg. 11 min. 45 sec. N., Long. 79 deg. 10 min. 48 sec. W., Grant Co., east-central WV (Dennison, 1970).	Should we be using the Scherr Formation?	Once USGS has formally abandoned the term, no.	Once USGS has formally abandoned the term, no.

Catskill Formation	Not designated. Named from Catskill Mountains, Greene Co., east-central NY (Mather, 1840).	What are the members of the Catskill Formation?	<p>Frank - There are different sets of members depending upon your location in the state - all of which have been defined on local stratigraphic sections, and then extended laterally. The issues begin at the margins while field mapping. When you get into the terrestrial beds, those members don't travel far. Lateral continuity gets you into trouble. To assume these units will carry lithologically or chronologically is tricky.</p> <p>Aaron - Very big clastic wedge. What the members represent are subtle facies changes. in central PA you can find the Irish Valley, Shermans Creek, and Duncannon Members. These will carry for some distance (Map 1 reflects this) before they get fuzzy, then you get another member system. Currently, our job is to test these member systems to see if they hold up. If not, does an adjacent system work? If not, do we create a new system, lump, undifferentiate? Member system mapping is a working hypothesis, decades long.</p>	There are different sets of members depending upon your location in the state. Needs further research.
Lanesboro Member/ Formation	Not synopsisized to date. [See US geologic names lexicons, USGS Bull. 896, 1200]	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Not discussed	n/a
Cotton Formation	Named from Cotton Creek in Bingham and Genesee Twps., Potter Co., north-central PA (Chadwick, 1936).	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Not discussed	n/a
Germania Formation	Type outcrop: on south flank of Marshfield anticline, near Germania, Potter Co., north-central PA. Can be traced over most of Wellsville quadrangle, Allegany Co., NY (Woodruff, 1942).	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Not discussed	n/a
Dexterville Shale	Named from the brick quarries south of Chadakoin River in East Jamestown, a district formerly known as Dexterville, Chautauqua Co., west-central NY (Caster, 1934).	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Not discussed	n/a

Laona Siltstone	Not synopsisized to date. [See US geologic names lexicons, USGS Bull. 896, 1200]	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Gordon - The Laona is the lower unit of the Gowanda Formation. It is a bundle of thick turbidites and is a mappable unit eastward into western Cattaraugus County. It marks the boundary between the Gowanda and Westfield Shale. Slope deposits edging into black shale. Seen in NY.	Needs further mapping and/or research in PA.
Shumla Siltstone	Not synopsisized to date. [See US geologic names lexicons, USGS Bull. 896, 1200]	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Gordon - The Shumla is the upper unit of the Gowanda Formation. Its type section is along Canadaway Creek (so is the Laona). The Shumla is thicker and coarser than the Laona, still largely unfossiliferous. The Northeast Shale/Northeast Formation unit above this. Seen in NY.	Needs further mapping and/or research in PA.
Gardeau Formation	Not stated. Exposed along Gardeau Reservation, [Livingston and Wyoming Cos.], west-central NY. Named from Gardeau Reservation (Hall, 1840).	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Dan - The name applied to units below the New Milford. Nearshore marine environment, tightly laminated sands, don't see any indication of terrestrial exposure until you get into New Milford-type heterolithic lithologies.	Needs further mapping and/or research in PA.
Ohio Shale	Ohio River hills, in the neighborhood of Rockville, Adams Co., OH (Andrews, 1870).	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Gordon - Technically a formation, includes all the black shale from the Huron and Dunkirk to the top of the Cleveland Member in northeast Ohio. 1600 feet thick. Includes the Huron, Chagrin, and Cleveland Members.	Needs further mapping and/or research in PA.
Millers Sandstone	Not synopsisized to date. [See US geologic names lexicons, USGS Bull. 896, 1200]	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	Not discussed	n/a

Lack of Information

	New Milford	Not synopsisized to date. [See US geologic names lexicons, USGS Bull. 896, 1200]	Has anybody worked with this unit? I could not find much information on it. Does it exist in PA?	<p>Chuck - Area of interest for Dan (Binghamton) has not been looked at in forever. Someone would need to focus on this area for years to reconcile all of the information from this area. Needs more research.</p> <p>Rose-Anna - Saw typical Lock Haven in this area, mapped Thompson, Hartford, Montrose East, Great Bend, Susquehanna quads. Was asked to break Catskill into members but was unable to do it.</p> <p>Frank - A formation named by I. C. White in 1881, subsequent work by Woodrow, Sevon, Fletcher, Willard, etc. As the supposed formation comes up on the Delaware River side, it disappears. Does not think we should use this nomenclature.</p> <p>Gordon - Thinks he has seen it south of Binghamton.</p> <p>Frank - Yes, it is seen south of Binghamton, but Frank found it difficult to distinguish from others. Why did White call it a single unit, then have it disappear into the Lackawanna Basin and into the Delaware River? Used Shohola (?) in its place (A 223). Check out Pike County report by Berg, Sevon, and Kroll for more info.</p>	PA/NY state line needs more research and field work.	
	Chadakoin	Quarries at Dexterville (Jamestown) on Chadakoin River, Chautauqua Co., western NY (Chadwick, 1924).	Aaron - As you get into Potter and McKean Counties, facies-wise, there is a rock unit that looks like the Lock Haven that was mapped as the Chadakoin. Near the NY border, where you lose the Lock Haven it is mapped as the Chadakoin. The Lock Haven and Chadakoin may be partial facies equivalents.	<p>Harper - In the subsurface, the Chadakoin pinches out to the east. In McKean County, it is called the "Pink Rock" by drillers. It has been measured up to 300 feet and is found throughout western PA. Harper has not carried it farther east than the Laurel Hill anticline. At that point, the Bradford Sands expand upward and the Venango sands expand and the Chadakoin gets sandy instead of shaly and siltstone-y. Isn't sure if the "upper Bradford" is Chadakoin equivalent.</p> <p>Gordon - Early work with the Chadakoin saw upper 25%-33% of Chadakoin is different from lower portion of the unit. Turns into pinkish-weathering, shale dominated, characterized by load-casts and sparse faunas. Unsure what happens to this going east, but can see some of this in outcrop.</p> <p>Harper - Wonders if the pink rock in Erie that Gordon saw is equivalent to the Tanners Hill of McKean County, possibly in Kinzua or Warren quad reports.</p> <p>Gordon - East of Warren there is a thick shale with a bright red band, wonders if this is Tanner Hill. May be in the Venango part of the section.</p>	Needs further mapping and/or research in PA.	
	Lock Haven Formation	Type section: exposure along Queens Run Road, from borrow pit 1.5 km northwest of Susquehanna River (West Branch) bridge at Lock Haven, 1.5 km northwest to lower slopes of Simcox Mountain, north of junction of Queens Run and Swissdale Roads, Lock Haven quadrangle, Clinton Co., PA (Faill and Wells, 1977)				

Open Discussion	Mahantango	Exposures in valley, North Branch of Mahantango Creek, Snyder Co., central PA (Willard, 1935).	Member unit names of the Mahantango differ from east to west in the state. Turkey Ridge, Dalmatia, Montebello, Sherman Ridge, etc.	<p>Gordon - Mahantango seems to be dominated by a depocenter somewhere in the direction of Harrisburg, fanning outward into progressively shalier/distal rock, going to the west, north and east.</p> <p>Dan - Agrees with Gordon's interpretation. Two different lobes. One is in PA.</p> <p>Chuck - Started in Selinsgrove Member, sometimes had limestones, sandstones, thin volcanic tephra underneath the Turkey Ridge. That tephra would be lower Marcellus in NY (Union Springs). The Mahantango comes down into the Marcellus-age rocks. Sees that Turkey Ridge was upper lower to middle Marcellus-aged rock and the overlying shale unit, into Dalmatia, in the Mahantango type area.</p>	Needs further mapping and/or research in PA.
	Catskill Formation	Not designated. Named from Catskill Mountains, Greene Co., east-central NY (Mather, 1840).	Do you find that the Catskill lithofacies coarsens upwards almost everywhere you look throughout the section? Regardless of where you're mapping or what members you're looking at.	<p>Aaron - Not necessarily. For most of the Catskill, it likely does. Some of the distal edges though, Aaron says no.</p> <p>Frank - Sometimes. We keep searching for a general law, which will not happen within the Catskill facies. Sometimes we get it with the transgression facies and sometimes with the regression facies.</p> <p>Chuck - Has been working along 35 mile transect and, overall, the facies is coarsening upwards. At the medial scale, it depends, and so on. It depends what scale you're looking at. It also depends where you're at in the basin.</p> <p>Frank - Don't look for regional laws. Look for local laws.</p> <p>Chuck - We clearly see two major marine transgressions that flood the terrestrial and then retreat. Thinks there is a third one lower in the succession. This makes a good marker when you're thinking about time.</p> <p>Retrogradation and progradation are distinct patterns that will occur throughout the succession as well.</p> <p>Gordon - The Sunfish Formation from Woodrow has a type section near north-central PA that is 1600 feet thick. Almost connects all the way down to the marine tracts below. Could be an important marker regionally.</p> <p>Frank - Sunfish isn't used anymore because it is a large zone of rocks that can be easily broken down. The base of the Sunfish is the base of the ridge. In age, that is much higher than the base of the Hamilton at the base of the ridge that Chuck was discussing. Changes with age, progrades westward, up into section. Need datum to tie it to.</p>	It depends what scale you're looking at. It also depends where you're at in the basin.

Open Discussion

Forum 4 Summary Sheet

Erathem/ System	Unit(s)	Question/Conflict	Comments	Resolution?
	Freeport	What is the relationship between these two units?	Helen - Has a copy of a cross section adapted from Map 42 which shows the Freeport as the upper formation of three units in the Allegheny, above Lower Freeport coal, including Upper Freeport coal, up to the Mahoning. Bill - The Glen Richey is one of Edmunds' names for the Upper Freeport (?) from the top of the Lower Freeport to the top of the Upper Freeport in Clearfield County. This also has Mill Run, etc. The Upper Freeport could also be from Lower Freeport to Upper Kittanning. Helen- The cross section gives each a formation status in the Allegheny Group. Bill - As originally defined, the Allegheny Group went from the top of the Brookville coal to the top of the Upper Freeport (this matches Helen's cross section). The Freeport, Kittanning, and Clarion take up most of Allegheny Group.	Reach out to Cortland Eble of the Kentucky Survey to get more information on this interval.
	Glen Richey		Cecil - Cortland Eble of the Kentucky Survey has palynology on all of the coals we've discussed, which may help out with the ages of these. Cortland Eble is one of last remaining expert palynologists on Carboniferous stratigraphy in North America. He could shed a lot of light on this info. Cliff should have his contact info. Bob Smith - If we can get into contact with Cortland, ask him about the Hazard Tonstein (#5?) in W PA.	
	Llewellyn	Could a type section be designated for the Llewellyn at this point? Has one been designated?	Aaron - Isn't sure if one has ever been designated. Finding a good type section would be challenging (in the anthracite region). We have core of most of the Llewellyn that we could check. Most of the Llewellyn outcrops are in very stripped areas.	Needs more research
	Freeport	What is the age of the Freeport?	Not discussed.	n/a
	Cushing	Has anyone ever heard of or used this unit?	No comments made.	n/a
	Butler Sandstone Member	What is the age of this unit?	Geolex says Middle Pennsylvanian, nobody disputes this.	Middle Pennsylvanian
	Schuylkill Member	Has anyone ever heard of or used this member of the Pottsville?	Aaron - Yes, this is a member in the anrthracite region. The USGS map has it. GQ-692 is an example	Yes

Pennsylvanian

Pottsville	What is the age of this unit?	Depends on where you are.	Depends on where you are
Olean	What is the relationship between these two units?	Aaron - The Olean is largely a conglomerate found at the base of the Pottsville. You have major stream channels running through and depositing gravel. Thinks Sharon is stratigraphically higher. Cliff may know more. Bill - Agrees with comments on Olean. Cross-bed studies have been done which show that the Olean had a northern source. Does not think the Sharon and Olean are equivalents and thought the Sharon was under the Olean. Chris O - On Edmunds revision (OF 96-49) it shows that the Sharon and Olean occupy same stratigraphic position Aaron - Hypothesizes that the Olean is gravel and the Sharon is everything else???	Needs more research
Sharon			
Connoquenessing	Does the Connoquenessing have formal member names? If not, should it?	Bill - In Clearfield County, Williams was using term "Lower Connoquenessing" for the Mississippian part of the Connoquenessing and "Upper Connoquenessing" for the Pennsylvanian portion. However, at the type section they were both Pennsylvanian. Cecil - Pottsville in PA is a highly condensed section. If you follow it chronostratigraphically south, you have the Pocohontas, New River, etc. formations in the Pocohontas Basin. Aaron - In most of the Appalachian Basin, the Pottsville is a Group. However, in PA it's condensed enough to where we question if it should be a formation. The Connoquenessing shouldn't be a formal member and a lot more research and careful correlation is needed before something like that is decided. Bill - Agrees with Aaron. Was told that the time interval of the Miss-Penn unconformity is on the order of 12-14 Ma in northern PA. The amount of time it took to make Mercer clay was equivalent in at least part to the Pocohontas etc. interval of WV. Chris - The amount of time missing may not be equal to the time it took to form the unconformity. 12 - 14 Ma in missing time may not take that much time to erode. Cecil - Agreed, but there is lots of time missing elsewhere and it takes a lot of time weathering to get to the clays you get.	It does not, and more research needs to be conducted before further decisions are made here.

	Elliott Park	What is the relationship between these three units?	<p>Chris S - WV Survey shows Connoquenessing as a formation of the Pottsville Group in PA (publication V 25 - Atlas of Appalachian Gas Fields, 1996)</p> <p>Aaron - This is a nomenclatural issue. In most places where we're mapping, we keep the Pottsville at a formation level and the Connoquenessing is a member.</p> <p>There are questions about carrying the units as far as we do.</p> <p>Bill - The Olean has a northern source as opposed to the Connoquenessing. He is under the impression that the Connoquenessing sandstone is named for two sandstones at the confluence of the Connoquenessing Creek where it empties into the Allegheny River (Upper and Lower Connoquenessing, named at type section). Under the impression that those names were carried throughout western PA. One is equivalent to the Burgoon, and the other is a Pennsylvanian sandstone with coaly fragments. He is not comfortable with the name Connoquenessing and thinks that the name has been overused and over-extended.</p>	
	Connoquenessing			
	Mauch Chunk			
	Pottsville	What is the relationship between these two units?	<p>Bill - The Elliott Park was a name Edmunds came up with for the Pottsville. They are the same unit, Edmunds just redefined it in Clearfield County. By the time he left the Survey, we didn't really use those names any further than Clearfield County. The names could be confusing, every coal in the Allegheny had their own name. Cliff could elaborate further.</p>	They are the same unit.
	Elliott Park			

<div>Miss-Penn Unconformity</div>		<div>Chris S - Global unconformity. Rocks below the unconformity are associated with carbonates. Rocks above it are more fluvial, coalbeds, seems to be a big climate change. Don't see each in the other place. Wet/dry climate change. Difficult to get diagnostic fossils from red beds of the Mississippian</div> <div>Aaron - In eastern Elk County, western Cameron County the Miss-Penn unconformity has probably eroded the entire Mississippian section. Has core that goes from the Pottsville down into non-Pottsville rock, about 50 feet down into rock they have Late Devonian aged units. Cliff would know this, but it seems as though you most west in the state, it seems there's more and more downcutting into the section.</div> <div>Cecil - Has looked at unconformity across the country, no question that it's there, only question would be distinguishing between erosion and non-deposition. It seems there may be a lot of the Mississippian that was never deposited.</div> <div>Chris - Major global unconformity, present throughout much of the world. There may be smaller areas where it's not present (aka the PA Anthracite field). Where subsidence exceeds exposure and weathering it is lacking.</div> <div>Bill - In the northern Anthracite field the Pennsylvanian as mapped is sitting on the Devonian. The unconformity increases to the north as opposed to east to west. As you go north in PA, the unconformity sits on older and older strata (unfamiliar with southern Anthracite field)</div> <div>Cecil - Area around Pottsville considered as section for section as he thought it had no unconformity</div> <div>Aaron - Agrees with Bill and Blaine. The area Aaron was speaking about was the middle Anthracite field.</div> <div>Bill - Did thesis on unconformity in Clearfield County where clays point to a humid climate. The unconformity there is substantial. The clay itself represented several million years of time (wasn't deposition or erosion, just sat there). ;</div> <div>Cecil - Equivalent to high aluminum clay in Kentucky and clay in Missouri, and a formation in Colorado; very extensive exposure to a very humid climate that varied considerably from the Mississippian climate</div> <div>Aaron - Check with Rose-Anna on her knowledge with the unconformity, interesting paleotopography</div>		<div>See comments</div>
	Savage Dam Member	<div>Has anyone ever heard of or used these members of the Greenbrier in PA?</div>	<div>Dave - Savage Dam Member is the clastic interval that separates the Loyalhanna and Wymps Gap, does indeed extend into PA, red clastic interval, marine, was historically called Mauch Chunk of PA in older reports up through Flints 1960's report</div>	<div>See comments</div>
	Cameron Red Shale Member			

	Greenbrier	What is the relationship between these three units?	<p>Dave - Refer to illustration mentioned by Dave in Wymps Gap row, Maryland calls Greenbrier for Loyalhanna, Deer Valley, clastic unit, Wymps Gap, all overlain by Mauch Chunk, as you move north you see interfingering of members</p> <p>Aaron - Agrees with Dave. If we were to follow definitions in PA, we could probably carry Greenbrier farther north and east, the marine beds pinch out and we lose those marker beds. The Loyalhanna is the furthest extending one, as far as Sullivan County. Contact of Mauch Chunk needs more mapping to jive more accurately with what MD and WV have.</p> <p>Dave - The Greenbrier is termed in subsurface of SW PA, you lose red clastics of Mauch Chunk as you move west in the state, as you lose those red clastics, the Loyalhanna and Wymps Gap sit on top of each other which is where it is called the Greenbrier</p>	See comments
	Mauch Chunk			
	Loyalhanna			
	Wymps Gap	How old is the Wymps Gap?	<p>Dave - The Wymps Gap Chesteran (Late Mississippian, not latest though, towards end of Visean age) based on conodont dating. Equivalent in age to WV units in Summer 2022 PA Geology Mag Figure 2</p>	See comments
	Greenbrier	Are we missing a member of the Greenbrier? (Pencil Cave shale)	No comments made.	n/a
	Greenbrier	What is the relationship between these four units in PA?	<p>Chris S - Loyalhanna belongs in Mauch Chunk in PA and Greenbrier in MD? But is called the Loyalhanna Formation on cross-section. More recently still called member of Mauch Chunk in PA.</p>	See comments
	Mauch Chunk			
	Wymps Gap			
	Deer Valley			
	Rockwell	What is the relationship between these two units?	<p>Aaron - The Rockwell is straddling Mississippian/Devonian line, Shenango is fully Mississippian. Suspects Shenango overlies the Rockwell. Shenango is marine, Rockwell is hodge podge.</p> <p>Mike Trippi - Bob Ryder cross section, the Rockwell (SC/SE PA) is laterally equivalent to a number of formations from SW and WSC PA (base - Murrys ville zone, Oswayo Formation; Cuyahoga Group above that; above that, the Squaw/Shenango)</p> <p>Bob - Riddlesburg overlies Rockwell and has been demonstrated to be Mississippian</p> <p>Aaron - Thought Riddlesburg was in the Rockwell</p> <p>Dave - Riddlesburg is in the Rockwell as well as Oswayo and Murrys ville</p>	See comments
	Shenango			

	Silkmill Run Member	Has anyone ever heard of or used this member of the Rockwell?	No comments made.	n/a
	Bear Mountain Member	Has anyone ever heard of or used this unit? If so, is it a member of the Rockwell Formation or the Catskill?	No comments made.	n/a
	Patton	What is the relationship between these two units?	Needs more research	Needs more research
	Burgoon			
	Patton	What is the relationship between these two units?	Kristen - Patton used as marker bed up in Troy area, delineation between Huntley Mountain and Pocono Aaron - Refer to Cliff and prepare yourself. In NC PA there were attempts to correlate the red beds (Patton shale in Huntley Mountain). Cliff doesn't think it exists, Aaron thinks its a weak correlation. Patton red shales should not be used. Karen - One record on the Patton as a member of the Burgoon (note that says sometimes it's Pocono)	See comments
	Hempfield			
	Abrahams Creek Member	Has anyone ever heard of or used this member of the Pocono?	Needs more research	Needs more research
	Huntley Mountain	What is the relationship between these two units?	Aaron - Refer to Cliff. Considers Huntley Mountain to be stratigraphically lower than the Pocono, so the Pocono is equivalent to the Burgoon. May or may not ever know this correlation well.	
	Pocono			
	Pocono	How old is the Pocono?	Aaron - Variations in age change depending on time of publication. Since Pocono has shrunk, time range has shrunk. All Mississippian.	

Mississippian	Spechty Kopf	Does the Spechty Kopf belong in the Pocono as a member?	<p>Aaron - Depends on who you talk to. Spechty Kopf has been lumped into the Catskill as an upper member. It may be a member of the Pocono also. As its currently mapped, it's its own formation.</p> <p>Dave - This interval was discussed by Berg in SP 1. Includes equivalents of the rocks at Devonian-Mississippian transition.</p> <p>Frank - Inners PAGS publication in Berwick Quad mapped on lithology (no age besides stratigraphic position), could be a good reference. The Pocono continues to shrink!! The whole fluvial succession of strata is interesting.</p> <p>Aaron - Plans to drill through upper Catskill, if this doesn't go through, has an outcrop. Future palynology pending.</p>	
	Pocono			
	Rockwell	What is the relationship between these three units in PA? It has been proposed in MD that the Rockwell and Purslane be used in place of the Pocono.	<p>Dave - The Purslane and Rockwell come from USGS folio. Rockwell extends into PA as far as the Horseshoe Curve. Purslane is equivalent to Burgoon; essentially a name change. WV does not recognize the Purslane (even though it was named there). The Pocono was recommended to abandoned and replaced from the Hancock folio. Just a name change issue from PA to MD.</p> <p>Aaron - Agrees with Dave. The Purslane and Burgoon are the same. Pocono is a very old term. Used to lump a lot of different rocks. As we've mapped, we've knocked it down to a narrower definition and regional area. Makes sense that Pocono was lumping the Rockwell and Purslane. Modern-day Pocono is in NE PA, Pocono = Burgoon, Rockwell = Purslane? What is the equivalency between the Rockwell and the Spechty Kopf?</p> <p>Bob Smith - Glaciogenic cobbles in the Rockwell in multiple states, has been unable to find any definitive connection with the Spechty Kopf. It is a reasonable hypothesis to equate the two for practical purposes.</p> <p>Dave - Spechty Kopf-Rockwell glaciogenic sequences discussed in USGS Bulletin in 2010. The two were equated. Riddlesburg and Sunbury were also equated. Disagrees that the Spechty Kopf tilloids are not glaciogenic - they are glaciogenic.</p>	
	Purslane			
	Pocono			
	Pine Knob Sandstone	Has anyone ever heard of or used this unit?	Not synopsized	n/a

	Mauch Chunk	What is the age of the Mauch Chunk? Does its deposition extend from the Early Mississippian into the Pennsylvanian?	<p>Aaron - In most places, the Mauch Chunk is only Mississippian because the unconformity eroded it. In the anthracite region, the Mauch Chunk may actually get into the Pennsylvanian.</p> <p>Ron - Agrees with Aaron.</p> <p>Chris S - In cross-section, huge unconformity at top of Mauch Chunk, all Mississippian</p> <p>Frank - In NE part of state, how do you divide the Miss from the Penn. Boundary is difficult to identify because the sediments that were deposited are very similar and the location of discontinuities is very difficult to define. Sedimentation probably does extend beyond Mississippian at least in the NE part of the state.</p> <p>Karen - Most Museum records list age mostly as Middle Missippian, a few Lower and Upper</p> <p>Bob Smith - Publication with samples of limestones of importance. Top of Mauch Chunk, red bed nature doesn't help with palynology. The Pottsville has cut down through the Mauch Chunk and deposited quartzite conglomerates with calcite matrix. If there is an unconformity there, it did not remove a huge amount of material, or else the quartz pebble conglomerates would not be there as a channel cutting through the Mauch Chunk.</p> <p>Frank - Taking a local stratigraphic section and extend and try to trace laterally, in this fluvial sedimentology you run into all kinds of problems. Complicated by transgression and regression cycles. Agrees with many of Aaron's comments.</p>	See comments
	Benezette Limestone Member	Has anyone ever heard of or used this member of the Huntley Mountain?	<p>Aaron - Has not heard of this member. Ask Cliff. Getting close to where Huntley Mountain pinches out. This could be something that's part of the Oswayo-Knapp equivalency.</p>	See comments
	Hopwood Conglomerate	Has anyone ever heard of or used this unit?	Needs more research	Needs more research
	Griswold Gap Member	Has anyone ever heard of or used this unit? If so, is it a member of the Pocono, Rockwell, or Huntley Mountain?	<p>Frank - Griswold Gap defined by I.C. White as the basal unit of the Pocono, quartz pebble conglomerate. Local lithofacies. Defined in the 1800s. So many units have been defined in local sections and are difficult to traced, if they can be traced at all. You can find this lithology all through the coarser-grained material that's encompassed by the Pocono in this part of the state. So many lithofacies within the units in the NE part of the state and elsewhere. It's very difficult once you get into the Upper Devonian and Lower Mississippian to trace units very far. They're all defined locally. Lack of lateral continuity and age identification are extremely difficult.</p>	See comments

	Chestnut Ridge Sandstone	Has anyone ever heard of or used this unit?	More research	Needs more research
	Burgoon	What is the relationship between the Burgoon and the Pocono?	<p>Aaron - They are in the same stratigraphic unit, both fluvial, look identical, may be identical? Burgoon is used in the western half of the state, Pocono is used NE and NC PA. This changes when you cross state boundary lines.</p> <p>Bill Bragonier - Blaine Cecil is very interested in the age of the Burgoon, circle back to this.</p> <p>Cecil - 2008 published one of most recent papers on age of Burgoon, listed as Kinderhookian, uppermost part is transition between Kinderhook and Oseagean. Modifying upper age would require palynology, would anyone be interested in obtaining shale units in uppermost part of Burgoon? Kentucky Survey has agreed to do the palynology. Loyalhanna unconformably sits on Burgoon in many places. Time missing in upper Burgoon. Top of Burgoon had weathered surface from paleo-weathering. There should be some places where the uppermost part is preserved from the weathering.</p> <p>Aaron - May have a core from around 2018-ish near Clinton County. Aaron has core hole planned. Drilling down through upper Pocono (Burgoon-equivalent)</p> <p>Cecil - Lower part of Burgoon is definitely Kinderhookian. Interested in dating the upper part only. Wants to know when the climate changed from being a very humid climate during the Kinderhookian to a very arid climate during the Oseagean. Some papers suggest the upper part of the Burgoon was a braided stream. Was lower part a meandering stream and the upper part a braided stream?</p> <p>Aaron - Thought entire Burgoon was braided stream.</p> <p>Cecil - The coalbeds and the underclays are clearly humid climate paleosols. Can get the climate and age up to the level of the coalbeds. Above those coalbeds where something changed dramatically with regard to the climate</p> <p>Bill - Large outcrop of Burgoon going up Port Matilda. Looks like upper part of sand is braided and lower part is not braided. There are darker, coaly streaks in lower part. Was going to look for shaly places in upper part. Directly overlain by the Loyalhanna. Bill will look into shales. John Neubaum will look into cores.</p>	See comments
	Pocono			
	Carl Sandstone Member	Has anyone ever heard of or used this member of the Shenango?	No, NW PA term	See comments
	Shenango	What is the relationship between these two units?	<p>Chris S - Burgoon on top of Shenango</p> <p>Aaron - The Shenango is a marine unit while Burgoon is fluvial</p>	See comments
	Burgoon			

	Shaws Sandstone Member	Has anyone ever heard of or used either of these members of the Cuyahoga?	Squaw sandstone may need revised, same with Big Injun West Mead is outdated term Mike Trippi - Squaw is just a drillers term (CC') and informal, same with the Big Injun	See comments	
	West Mead Limestone Member				
	Shenango	What is the relationship between these three units?	Aaron - Cliff would know a lot about this. The Pocono as currently used is an E PA term that is equivalent with deposition of Burgoon. Pocono and Burgoon are fluvial deposits while Cuyahoga and Shenango are marine units. At one point, the Pocono was carried throughout most of these units, but is out of date terminology at this point. Chris S - Bob Ryder used Cuyahoga Group in SW PA. He placed Shenango Formation right about Cuyahoga Group in W PA. Cross section sent went through long review with the Geologic Names Committee	See comments	
	Cuyahoga				
	Pocono				
Devonian-Mississippian boundary		Frank - In the Valley and Ridge you have the Spechty Kopf and Huntley Mountain. In the northern part of the state you have a major discontinuity. What is the nature of this contact? How is the boundary between the two determined? Is it strictly using plant fossils? Bob Smith - The best exposure of this boundary is on Corridor H in Bismark, WV. There did not seem to be any disconformity or significant break here. In MD, Skema and Bob suspected a major fire had created erosion and preservation of carbonaceous material. All of this follows Brezinski's schema. Rockwell, Pocono, Spechty Kopf, Huntley Mountain all part of this. Chris Swezey - John Harper published 1993 article in PA Geology about Devonian-Mississippian boundary that the USGS currently uses as the latest info. He places it between the Spechty Kopf and Pocono. Bob Smith - Base of Huntley Mountain and top of Catskill, 10 cm or so residual layer that may suggest disconformity. Chris S - Cecil and Brezinski did some work with the Spechty Kopf and glacial deposits. Glaciogenic interval was in the Rockwell in the Devonian, close to the Mississippian. (Bob Smith) Chris though that the glacial deposits were equivalent to the Spechty Kopf Frank - Why do some rocks belong in the Upper Devonian and the next rock belongs in the Mississippian? Is it fossil evidence? Chris S - John Harper's paper discusses this, certain fossils place the boundary in different places. Bob Smith - The Riddlesburg palynology has been worked out for a number of locations. Glacial features that have been seen in the Rockwell have not been seen in the Spechty Kopf. Frank - Sevon had an article in a Field Guidebook, had a feature called a tilloid at the base of the Pocono. If you look at the geologic maps for this area, there doesn't seem to be a clear distinction between the sedimentology between rocks of Upper Devonian and Mississippian. The base of the Pocono is usually discussed as being one of the indicators. Uncertainty of this boundary will need to be further talked about. Dave Brezinski - Spechty Kopf and equivalent Rockwell of C PA, the glaciogenic material in Spechty Kopf and Rockwell correlated with marine shale associated with a flooding event worldwide, correlated with the Riddlesburg and basal Mississippian. Where there is no Riddlesburg Shale, there is an issue identifying this border. Bob - Look at Corridor H near Bismark, WV. Sevon in NE PA and the Spechty Kopf, once said it was a tilloid but then renounced it. One needs to be very careful interpreting stratigraphy in Carbon County because you're on the edge of the distributary that give the illusion of separate members.			n/a

Open Discussion	Huntley Mountain	Has anyone looked into the transition zones between this interval? Any advice to telling these apart?	Pennsylvanian Limestone study included a lot of locations of marine and non-marine locations in PA. Smith, Shaulis, Dodge, etc. Some could be good local marker beds.	n/a
	Rockwell			
	Spechty Kopf			

Forum 5 Summary Sheet

Erathem/ System	Unit(s)	Question/Conflict	Comments	Resolution?
Permian	Greene Formation	What is the age of this formation and its members? Geolex lists the age as controversial - Late Pennsylvanian to Early Permian.	Bill B - Attended meeting at WVGS in 1972 over the age of the Dunkard with Edmunds. The meeting was attended by many paleontologists. The following was discussed; there are two fossils in the Permian of Europe (this is the type section of Permian), one of the fossils can be traced to the top of the Pennsylvanian, the other can be traced from the start of the Permian up. In PA, the two fossils overlap. One of the fossils has been found to exist down into the Conemaugh in PA. Still uncertain what to do with this. One theory is that we don't have any Permian in PA. Karen - None of the discussed fossils have been listed in Greene Formation. Bill B - George Love would be a good point of contact for this question.	More research needed.
	Greene Formation	What are the members of this formation in Pennsylvania? Members found in literature included the following: Aults Run Sandstone Member, Claysville Limestone Member, Dilles Bottom Limestone Member, Dunlap Sandstone Member, Gilmore Sandstone Member, Taylor Sandstone Member, Windy Gap Limestone Member	Bill B - Put together a list of all the names in the Pennsylvanian main bituminous coal field (PA/E OH/MD/N WV) and has given this chart to Hailey. Tons of names were listed for the Dunkard; check the list to see what is there. All the names he could find in the Pennsylvanian are in this list, including for coal seams, sandstones, marine zones, etc.	Check the list Bill Bragonier created of Pennsylvanian names. More mapping may be necessary.
	Nineveh	Is this a member of the Greene Formation?	Bill B - The Nineveh coal, Nineveh sandstone, and Nineveh limestone are all part of the Greene Formation and are likely informal designations.	Informal member, yes.
	Washington Formation	Does the Washington Formation span the Pennsylvanian-Permian boundary?	No comments made	n/a
	Washington Formation	What are the members of this formation in Pennsylvania? Members found in literature included the following: Blacksville Limestone Member, Brier Hill Sandstone Member, Davistown Sandstone Member	No comments made	n/a
	Waynesburg Formation	What is the age of this unit?	No comments made	n/a

	Waynesburg Formation	The Waynesburg has been considered throughout literature to fall within the Monongahela and the Washington, as well as being considered its own standalone formation. Which of these is our most current understanding of the Waynesburg?	No comments made	n/a
	Monongahela			
	Washington			
	Waynesburg Formation	What are the formal members of the Waynesburg? We have listed the Cassville, Colvin Run, Mannington, Mount Morris, and Wegee members.	No comments made	n/a
	Monongahela	Is this unit considered to be a formation, a group, or does it vary depending on geography?	Dave - Incredibly valuable formation out towards Pittsburgh. It has many coals, affects land development, etc. The Pittsburgh coal seam lies within the Mongahela and is pretty consistent (unlike some of the other coal seams). The Mahoning is used as a formation in Pittsburgh	A formation.
	Glenshaw Formation	What are the formal members of this unit? We have found the Albright, Ames, Bakerstown, Buffalo, Mahoning, Nadine, Saltsburg, and Uffington members.	Dave - The Glenshaw is an important unit. It has a number of claystones in it, but he has never heard of the Albright. The Ames is a key marker bed, and the Bakerstown, Buffalo and Mahoning are large sandstones (Mahoning above Upper Freeport coal). He has heard of Saltsburg, but is unsure about the Nadine and Uffington. Bill K - Has never considered the names listed as members. They have been considered important key beds in his experience in Westmoreland County. Bill B - Agrees with Bill K and has never seen any of these names as formal members. The Ames splits Glenshaw and Casselman; the Saltsburg is a sandstone that comes and goes, apparently a channel sandstone, and its name is carried throughout the state whether or not the sandstones correlate; the Uffington is a shale; the Mahoning is an interval of coal seam and sandstone, this would be the only one that could be considered a member; the Buffalo is a sandstone; is unfamiliar with the Albright	Likely informal members.
	Casselman Formation	What is the age of this unit?	Dan - Upper Pennsylvanian?	Upper Pennsylvanian?

	Carnahan Run Shale	Has anyone ever heard of or used this unit before?	<p>Bill B - This is a little marine zone that shows up here and there, located above the lower Bakerstown coal. There is a marine zone above it called the Woods Run marine zone which is very small and local. The Carnahan Run is not a marker bed, but someone may have believed it is a split of the Woods Run. Some of these marine zones are where you get fossils thrown up a tidal channel.</p> <p>Dave - Has stratigraphic column for the units in the Pittsburgh area. He will try to send this (sent).</p> <p>Bill K - <i>Is the Carnahan the same as the Nadine?</i> They seem to be in the same spot. Maybe it is the shale associated with it?</p> <p>Bill B - No, they are similar, but they are two different things. The Nadine is a lot lower and is called the Cambridge in Ohio. The Nadine is more consistent than the Carnahan Run.</p>	Yes, likely a small, informal unit.
	Conemaugh	Is the base of the Conemaugh considered to be the Upper Freeport coal or the base of the Mahoning?	Both	Both.
	Pittsburgh	The Pittsburgh is listed as a formation of the Monongahela, however some literature sources place it in the Allegheny. Is its placement in the Monongahela our most current thinking on the formation?	<p>Bill B - The Pittsburgh coal is at the bottom of the Monongahela. There is also a local Pittsburgh coal (name from up around Venango County) that is a minor, hit or miss coal seam, down in the section.</p> <p>Dave - Agrees with Bill.</p>	More research needed.
	Conemaugh	<p>What are the formal members/formations of the Conemaugh? Those listed where is considered a formation include the Jane Lew, Summerhill, and Wilmore. Where it is considered a group, the Glenshaw and Casselman are listed.</p> <p>Additionally, likely informal divisions were found throughout literature, including the Mahoning, Buffalo, Saltsburg, Grafton, Barton, Morgantown, Lonaconing, and Connellsville.</p>	<p>Bill B - In PA, it's considered a group with the Casselman and Glenshaw. The member names listed are West Virginia names. Mitch Blake would know more about the West Virginia names.</p> <p>Dave - Agrees with Bill. Hasn't seen Jane Lew used here but has seen it in WV.</p> <p>Bill K - Agrees with Bill B and Dave.</p> <p>Bill B - Informal names are the names of sandstones, Lonaconing is a coal.</p> <p>Karen - All of the collections at the State Museum show Conemaugh as a group.</p>	Refer to comments section.

Pennsylvanian	Conemaugh	Is the Conemaugh now considered a formation, a group, or does it vary based upon geography?	Refer to above	Refer to above.
	Conemaugh	What is the age of the Conemaugh?	Bill K - Could possibly get age determinations from the marine zones (fusulinids). Bill B - Can discuss this with Mitch Blake as well, huge plant guy. If you use the Desmoinian/Virgilian times, there is a huge break at the Mahoning boundary (a change in plant fossils). He was thinking of changing the Allegheny Group to the base of the Mahoning coal because there is a major unconformity there that shows up in the plant fossils and there is a color change (nonred to red). Bill K - Check with John Harper, there have been some ash beds under the Pine Creek marine zone that we may be able to get some age dates from. Dan - Mapped as group in WV.	More research needed.
	Pottsville	What is the age of the Pottsville?	no comments made	n/a
	Curwensville	What is the age of this member of the Pottsville?	Bill B - Edmunds used this name for the Clearfield County Atlas. It is synonymous with something else within the Pottsville and has not been carried out of Clearfield County.	Refer to Clearfield County Atlas.
	Mercer	What is the relationship between these two units?	Bill B - Believes the Curwensville is an equivalent of the Mercer. The Pottsville of E PA is Lower Pennsylvanian, defined on plant fossil zones and some of these were carried to W PA. Called everything below the Brookville coal "Pottsville" based on the plant zones traced to the anthracite. In Bill's opinion, everything below the Clarion coal seams are things that come and go. What is called Pottsville in W PA is an infilling of the swales and hills along the Miss/Penn unconformity, so the coal seams do not go far which makes them difficult to correlate (also due to lack of data). The Mercer type section is in Mercer County. There is a unit called the lower Mercer fireclay which is a marker bed right on the unconformity. This unit is special because lithologically it contains a lot of clay minerals that you don't see very many places in the world - it defines the unconformity. The unit should not be called Mercer and should have been given a local name. Stratigraphy is the triumph of nomenclature over common sense (Kyrnine).	Likely equivalents.
	Curwensville			

	Kittanning	What is the relationship between these two units?	Bill B - The Llewellyn is a formation in the anthracite and the Kittanning is a formation in the main bituminous field; they are roughly equivalent to each other based upon plant fossils. People have been interested in what coal seams correlate between the bituminous field and the anthracite region. Bill K - Needs further research.	More research needed.
	Llewellyn			
	Millstone Run	What is the relationship between these three units?	Bill B - Lots of Edmunds' names.	All Bill Edmunds' names for other units; check Clearfield County Atlas.
	Mineral Springs			
	Worthington			
	Kittanning	What is the relationship between these units?	The lower to middle Kittanning is equivalent to the Millstone, Mineral Springs, and Lauren Run. These are all Edmunds' names.	The lower to middle Kittanning is equivalent to the Millstone, Mineral Springs, and Lauren Run. These are all Edmunds' names.
	Millstone Run			
	Mineral Springs			
	Laurel Run			
	Kittanning	What is the relationship between these members of the Allegheny? Their definitions all seem to overlap.	Glen Richey is an Edmunds' name.	Bill Edmunds' name; check Clearfield County Atlas.
	Glen Richey			
	Clarion			
	Freeport			
	Vanport	What is the relationship between these two units?	Clearfield Creek is an Edmunds name. The Vanport is a limestone.	Clearfield Creek is an Edmunds name. The Vanport is a limestone.
	Clearfield Creek			
	Allegheny Formation	What are the formal members of the Allegheny Formation? We have listed the Butler, Clarion, Clearfield Creek, Freeport, Glen Richey, Kittanning, Laurel Run, Millstone Run, Mineral Springs, Nicely Run, Vanport, Westernport, and Worthington members.	Bill B - The Clarion, Kittanning, and Freeport intervals could be called Kittanning, Clarion, and Freeport Formations. From the Clarion down to the Brookville is problematic. The Brookville is a channel-fill coal and is considered boundary of Allegheny. It should not have been. The Pottsville should have been taken up to Clarion coal. Dave - Has drilled into the Mahoning, it's not very widespread.	Needs further collaboration.
	Allegheny Formation	Is this still considered to be at formation rank statewide?	Bill B - It is presently called a group, but Bill Edmunds was of the opinion that it should be downgraded to a formation. it has a lot of minable coals so its an important unit, economically. It's thickness is about 350 feet. Bill kind of agrees with Edmunds. Should be discussed further; needs further collaboration.	Needs further collaboration.

	Allegheny Formation	What are the boundaries of this formation? IC 61 states that "The term "Allegheny" has been generally stabilized in Pennsylvania as including those rocks between the base of the Brookville underclay and the top of the upper Freeport coal. Various suggestions have been made to modify this usage, but none has been adopted in practice."	Bill B - Technically the Brookville, but that is problematic. Boundaries of the Allegheny ought to be changed. Would put the base of it at the lower Clarion coal. Should be moved up to the base of Mahoning coal.	Needs further collaboration.
Open Discussion	n/a	How do we define a formation, member, etc.? Are there guidelines?	Mostly based upon mappability. The NASC leaves their definitions vague purposefully in some ways, but can lead to issues over time. What is key to keep? How was the unit originally mapped? Lithostratigraphic vs. chronostratigraphic. How do you intend to map it? Depositional environment vs. lithologic characteristics. NASC does not have cutoff on thickness or strict definitions. Article 23 of the NASC states that <i>boundaries of lithostratigraphic units are placed at positions of lithic change</i> .	Refer to comments section.
	Greene Formation	Dan - The placement of Greenbrier Formations that have been named in WV and brought up into PA along with PA units put into Mauch Chunk?	Further discussion pending on this question.	Further collaboration pending.