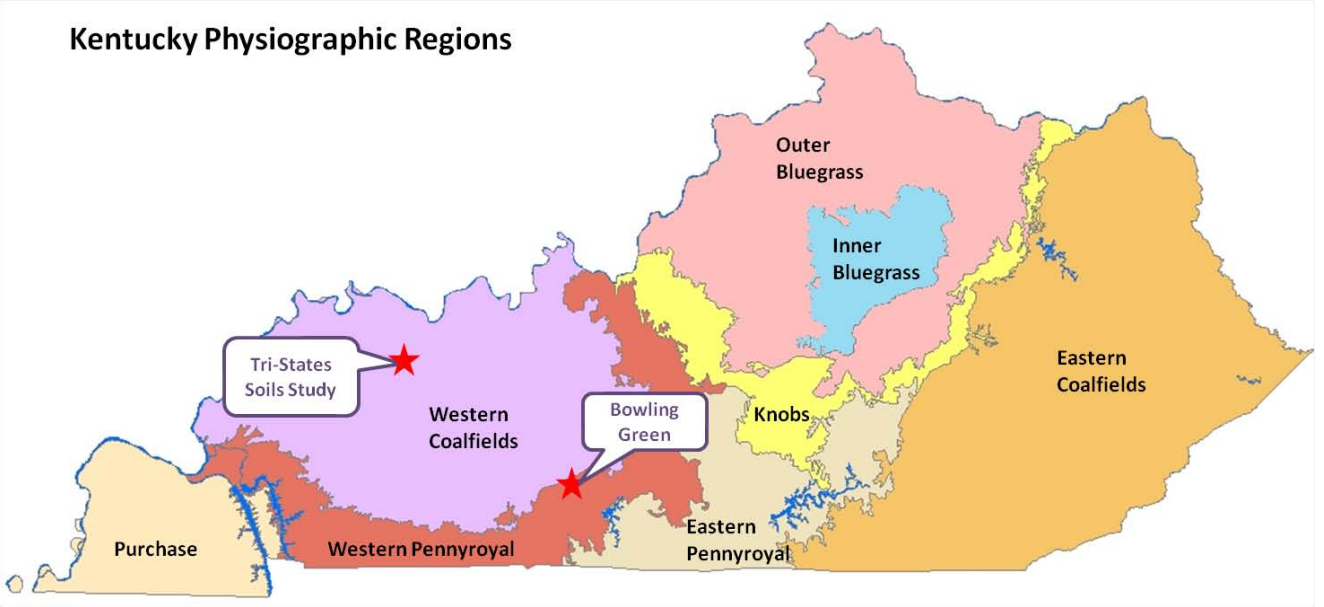
South Regional NCSS

Work Planning Conference

Bowling Green, KY 2012

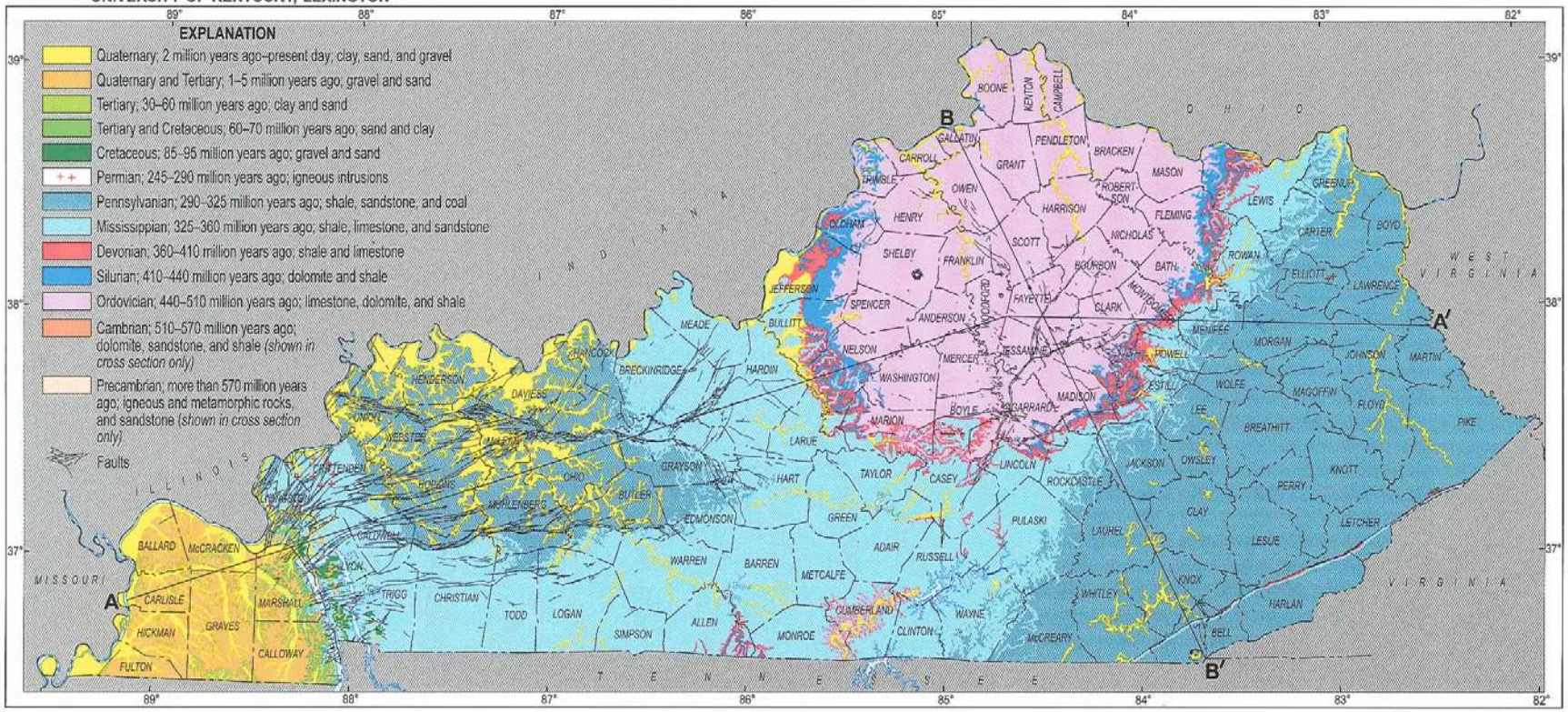
Welcome to Kentucky!

Included in this booklet is the background information that you will be seeing today on the field tour. We hope that you find it helpful and informative. We will be traversing two physiographic regions of the state today and have included some maps of the general area in which we will be traveling. Please ask your local "experts" if you have any questions on what you are seeing as we travel through the area. We are aware that Kentucky is known for several things; University of Kentucky Wildcat basketball, thoroughbred race horses, bourbon whiskey, Mammoth Cave, and bluegrass. By the end of our tour today it is hoped that you will appreciate the state for so much more, mainly its soil resources and ingenuity!

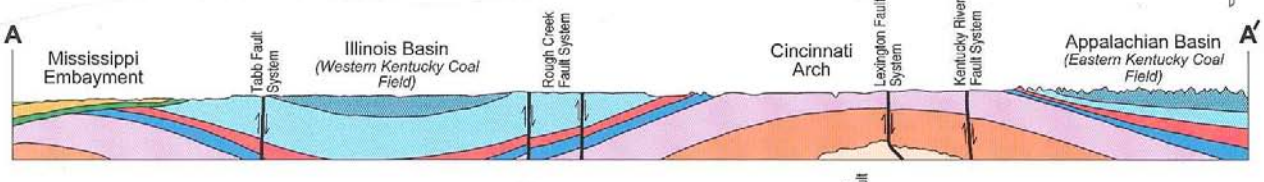


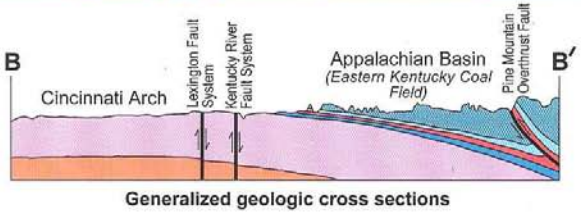
KENTUCKY GEOLOGICAL SURVEY
James C. Cobb, State Geologist and Director
UNIVERSITY OF KENTUCKY, LEXINGTON

MAP AND CHART 23
Series XII, 2001



GEOLOGIC MAP OF KENTUCKY





Generalized geologic cross sections

Cross sections are diagrammatic; not to scale

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Kentucky Geological Survey

Compiled from Noger, M.C., 1988, Geologic map of Kentucky: U.S. Geological Survey, scale 1:500,000.

Cartography by Terry Hounshell

View the KGS World Wide Web site at www.uky.edu/kgs

For information on obtaining copies of this map and other Kentucky Geological Survey maps and publications call:
Publication Sales
(859) 257-3896

Shawnee Hills Loess Study

McLean County, Kentucky

Study Site

Mauzy Grassland

Site has been in grass for more than 20 years. Two distinct loess units, the Peoria (late Wisconsinan) and the Roxana (mid-Wisconsinan), overlie residuum at this site. Residual soils are formed in a mixture of thin Loveland (Illinioian) loess and residuum from Pennsylvanian Aged sandstone and shale. The study site has 5 sample points. The sample sites are as follows:

Summit: more than 203 cm of loess (Ultic Hapludalf) 3% slope

Shoulder: 158 cm of loess overlying residuum (Oxyaquic Fragiudalf) (85 cm to fragipan) 9% slope

Backslope: 124 cm of loess overlying residuum from shale (Oxyaquic Fragiudalf) (43 cm to fragipan) 12% slope

Footslope: 56 cm of colluvium overlying an intact argillic horizon formed in loess and clayey residuum from shale (Aquic Hapludalf) 6% slope

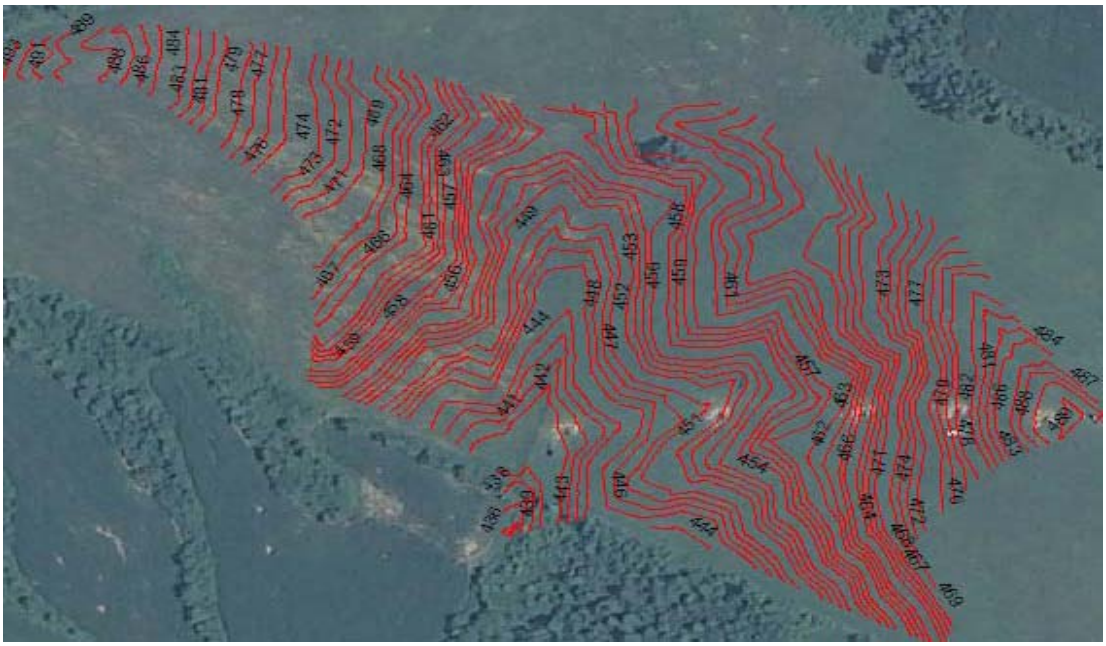
Toeslope: 73 cm of silty colluvium overlying an argillic horizon formed in pedisediments from loess and residuum (Typic Epiaqualf) 3% slope

All classifications are Fine-silty, mixed, active, mesic unless otherwise noted.

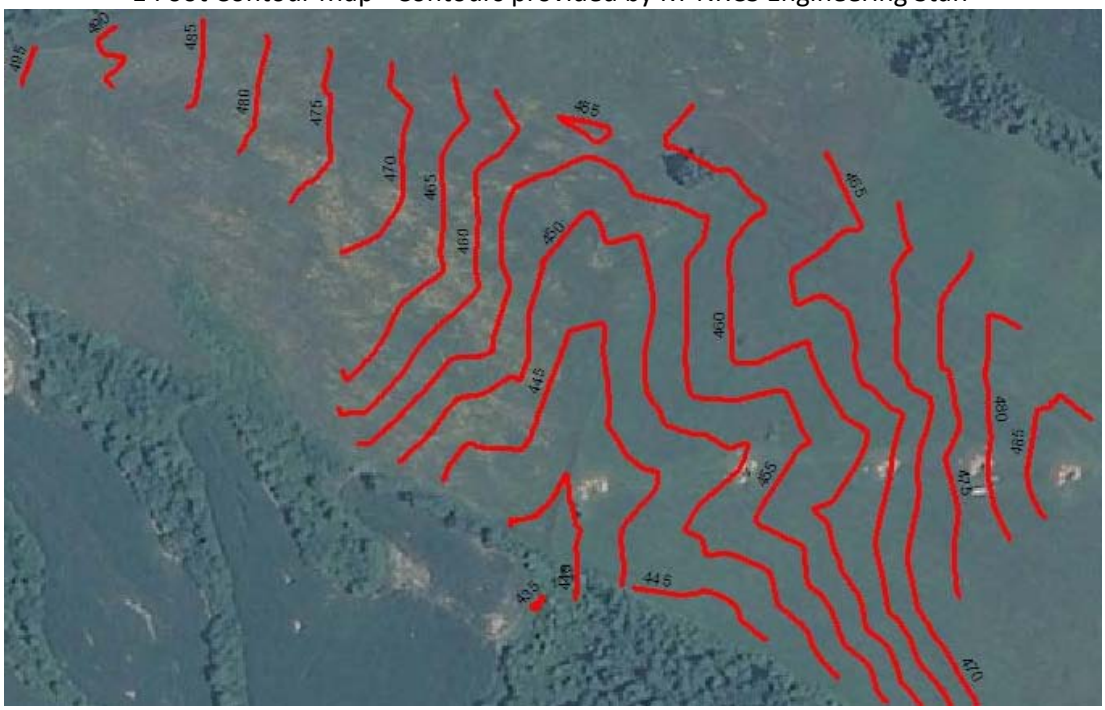
NAIP 2010 taken while we were in field on June 23, 2010

Elevation

Site ranges from a low of 435 feet on the toeslope to 490 feet on the summit. The upper portion of the site is B slope (2 to 6%), most of the site is a C slope (6 to 12%), and the toeslope is on an A slope (0 to 2%). A flume will be installed on the toeslope site to monitor the surface water runoff of the site.



1 Foot Contour Map - Contours provided by KY NRCS Engineering Staff



5 foot contours

Series: Alford
Classification: Fine-silty, mixed, active, mesic Ultic Hapludalf
Landform Position: summit
Site 1 on map
Parent Materials:
Peoria Loess from 0 to 140 cm
mixed Peoria Loess and Roxana Loess from 140 to 155 cm
Roxana Loess extends to below 203 cm

Alford Description

Ap--0 to 19 centimeters (0.0 to 7.5 inches); brown (10YR 4/3) silt loam, pale brown (10YR 6/3), dry; 4 percent sand; 80 percent silt; 16 percent clay; moderate fine granular structure; friable; many fine roots throughout; strongly acid, pH 5.5, pH meter 1:1 water; abrupt smooth boundary.

Bt1--19 to 38 centimeters (7.5 to 15.0 inches); strong brown (7.5YR 5/6) silty clay loam; 4 percent sand; 66 percent silt; 32 percent clay; strong fine prismatic parts to strong fine subangular blocky structure; firm; many fine roots throughout; 25 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese coatings with diffuse boundaries on faces of peds; strongly acid, pH 5.1, pH meter 1:1 water; abrupt smooth boundary.

Bt2--38 to 76 centimeters (15.0 to 29.9 inches); strong brown (7.5YR 5/6) silty clay loam; 5 percent sand; 67 percent silt; 28 percent clay; moderate medium prismatic parts to moderate medium subangular blocky structure; firm; common fine roots throughout; 30 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 3 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese coatings with diffuse boundaries on

faces of peds; very strongly acid, pH 4.6, pH meter 1:1 water; clear smooth boundary.

Bt3--76 to 116 centimeters (29.9 to 45.7 inches); strong brown (7.5YR 5/6) silty clay loam; 5 percent sand; 71 percent silt; 24 percent clay; moderate medium prismatic parts to moderate medium subangular blocky structure; firm; common fine roots throughout; 15 percent continuous prominent very pale brown (10YR 7/3), moist, silt coats on vertical faces of peds and 30 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese coatings with diffuse boundaries on faces of peds; very strongly acid, pH 4.6, pH meter 1:1 water; clear smooth boundary.

Bt4--116 to 140 centimeters (45.7 to 55.1 inches); strong brown (7.5YR 5/6) silt loam; 10 percent sand; 69 percent silt; 21 percent clay; moderate medium prismatic parts to moderate medium subangular blocky structure; firm; few very fine roots throughout; 15 percent continuous prominent very pale brown (10YR 7/3), moist, silt coats on vertical faces of peds and 25 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds and 35 percent continuous distinct yellowish brown (10YR 5/4), moist, clay films on all faces of peds; 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese masses with diffuse boundaries on faces of peds; very strongly acid, pH 4.9, pH meter 1:1 water; clear smooth boundary.

2Bt5--140 to 155 centimeters (55.1 to 61.0 inches); brown (7.5YR 5/4) silt loam; 12 percent sand; 67 percent silt; 21 percent clay; moderate coarse prismatic parts to moderate coarse angular blocky structure; friable; few very fine roots throughout; 25 percent continuous prominent very pale brown (10YR 7/3), moist, silt coats on vertical faces of peds and 30 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese masses with diffuse boundaries in matrix; strongly acid, pH 5.1, pH meter 1:1 water; clear smooth boundary.

3Bt6--155 to 203 centimeters (61.0 to 79.9 inches); brown (7.5YR 5/4) loam; 30 percent sand; 48 percent silt; 22 percent clay; moderate coarse prismatic parts to moderate coarse angular blocky structure; friable; 30 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds and 60 percent continuous prominent very pale brown (10YR 7/3), moist, silt coats on vertical faces of peds; 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese masses with diffuse boundaries in matrix; strongly acid, pH 5.3, pH meter 1:1 water.

*** Primary Characterization Data ***

Pedon ID: S10KY149001 (McLean, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled as on Jul 09, 2010: Alford ; Fine-silty, mixed, superactive, mesic Ultic Hapludalf
Revised to :

SSL - Project C2010USKY106 McLean Co.
- Site ID S10KY631001 Lat: 37° 35' 49.50" north Long: 87° 20' 17.10" west NAD83 MLRA: 120A
- Pedon No. 10N1055
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
10N05158	Ap		0.0-19.0	S10KY149001-1				SIL
10N05159	Bt1		19.0-38.0	S10KY149001-2				SICL
10N05160	Bt2		38.0-57.0	S10KY149001-3				SICL
10N05161	Bt2		57.0-76.0	S10KY149001-4				SIL
10N05162	Bt3		76.0-96.0	S10KY149001-5				SIL
10N05163	Bt3		96.0-116.0	S10KY149001-6				SIL
10N05164	Bt4		116.0-140.0	S10KY149001-7				SIL
10N05165	2Bt5		140.0-155.0	S10KY149001-8				SIL
10N05166	3Bt6		155.0-179.0	S10KY149001-9				SIL
10N05167	3Bt6		179.0-203.0	S10KY149001-10				SIL

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	0.29	% wt
Volume, >2mm, Weighted Average	first horizon has bad depths or the control section is not contained in the first horizon	% vol
Clay, total, Weighted Average	27.135	% wt
Clay, carbonate free, Weighted Average	27.135	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.451	(NA)
LE, Whole Soil, Summed to 1m	2.1	cm/m

Weighted averages based on control section: 19-69 cm

*** Primary Characterization Data ***

Pedon ID: S10KY149001 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Alford Fine-silty, mixed, superactive, mesic Ultic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 10N1055

PSDA & Rock Fragments				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
				Clay	Silt	Sand	Fine	CO_3	Fine	Coarse	VF	F	M	C	VC	(- - - - - - - - Weight - - - - - - - -)				>2 mm
	Depth			<	.002	.05	<	<	.002	.02	.05	.10	.25	.5	1	2	5	20	.1-	wt %
Layer	(cm)	Horz	Prep	.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2	-5	-20	-75	75	whole
				(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)			soil
				3A1a1a			3A1a1a		3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a					
10N05158	0-19	Ap	S	17.9	79.9	2.2	8.9		43.9	36.0	0.9	1.0	0.2	0.1	--				1	
10N05159	19-38	Bt1	S	30.5	68.5	1.0	17.6		40.2	28.3	0.6	0.2	0.2	tr	--				tr	
10N05160	38-57	Bt2	S	28.6	70.3	1.1	17.3		39.1	31.2	0.8	0.2	0.1	tr	--				tr	
10N05161	57-76	Bt2	S	19.5	79.5	1.0	11.6		43.2	36.3	0.9	0.1	tr	--	--				tr	
10N05162	76-96	Bt3	S	18.7	80.4	0.9	10.3		44.1	36.3	0.7	0.1	0.1	--	--	--	--	--	tr	--
10N05163	96-116	Bt3	S	15.2	83.8	1.0	7.3		45.4	38.4	0.7	0.2	0.1	tr	--	--	--	--	tr	--
10N05164	116-140	Bt4	S	15.5	80.7	3.8	7.2		45.7	35.0	0.9	1.6	1.2	0.1	--	--	--	--	3	--
10N05165	140-155	2Bt5	S	16.4	70.1	13.5	7.6		41.7	28.4	1.9	7.9	3.5	0.2	--				12	
10N05166	155-179	3Bt6	S	15.6	52.4	32.0	6.9		31.2	21.2	3.3	16.4	11.8	0.4	0.1	--	--	--	29	--
10N05167	179-203	3Bt6	S	17.0	62.4	20.6	7.6		36.4	26.0	2.5	10.0	7.7	0.3	0.1	--	--	--	18	--

Bulk Density & Moisture				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-
				(Bulk Density)		Cole	(- - - - - - - - - - - Water Content - - - - - - - - - - -)						WRD	Aggst		
				33	Oven	Whole	6	10	33	1500	1500 kPa	Ratio	Whole	Stabl	(- - Ratio/Clay - -)	
	Depth			kPa	Dry	Soil	kPa	kPa	kPa	kPa	Moist	AD/OD	Soil	2-0.5mm	CEC7	1500 kPa
Layer	(cm)	Horz	Prep	(- - - g cm^{-3} - - -)			(- - - - - - - - - - - - pct of < 2mm - - - - - - - - - - - -)						cm^3 cm^{-3}	%		
				DbWR1	DbWR1				DbWR1	3C2a1a		3D1				
10N05158	0-19	Ap	S	1.42	1.50	0.018			25.9	8.5		1.011			0.54	0.47
10N05159	19-38	Bt1	S	1.45	1.57	0.027			24.5	13.0		1.016			0.41	0.43
10N05160	38-57	Bt2	S	1.46	1.58	0.027			26.8	12.3		1.017			0.44	0.43
10N05161	57-76	Bt2	S	1.44	1.53	0.020			27.2	9.8		1.019			0.52	0.50
10N05162	76-96	Bt3	S	1.40	1.47	0.016			26.5	9.1		1.012	0.24		0.50	0.49
10N05163	96-116	Bt3	S	1.42	1.48	0.014			26.1	7.8		1.011	0.26		0.59	0.51
10N05164	116-140	Bt4	S	1.45	1.53	0.018			24.3	7.5		1.010	0.24		0.55	0.48
10N05165	140-155	2Bt5	S	1.51	1.58	0.015			22.9	7.0		1.010			0.54	0.43
10N05166	155-179	3Bt6	S	1.55	1.63	0.017			21.0	6.8		1.010	0.22		0.56	0.44
10N05167	179-203	3Bt6	S	1.63	1.69	0.012			18.1	5.9		1.007	0.20		0.39	0.35

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Sampled As : Alford Fine-silty, mixed, superactive, mesic Ultic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 10N1055

Carbon & Extractions

Layer	Depth (cm)	Horz	Prep	-1- (- - - - - Total - - - - -) C (- - - - - - - - - - % of <2 mm - - - - - - - - - -) 4H2a	-2- N 4H2a	-3- S 4H2a	-4- Est OC 4H2a	-5- OC (WB)	-6- C/N Ratio	-7- (- - - Dith-Cit Ext - - -) Fe (- % of < 2mm - - - - - - - - - - - - - - - - - -) 4G1	-8- Al 4G1	-9- Mn 4G1	-10- (- - - - - - Ammonium Oxalate Extraction - - - - - -) Al+½Fe	-11- ODOE 4G2a	-12- Fe 4G2a	-13- Al 4G2a	-14- Si 4G2a	-15- Mn mg kg^{-1} 4G2a	-16- (- - - Na Pyro-Phosphate - - -) C (- - - - - - % of < 2mm - - - - -)	-17- Fe	-18- Al	-19- Mn
10N05158	0-19	Ap	S	1.63	0.19	0.02	1.6		9	1.3	0.1	tr	0.26	0.05	0.31	0.10	0.01	507.7				
10N05159	19-38	Bt1	S	0.41	0.07	--	0.4		6	2.6	0.2	tr	0.47	0.03	0.58	0.18	0.03	149.7				
10N05160	38-57	Bt2	S	0.18	0.03	0.01	0.2		6	2.6	0.2	tr	0.56	0.04	0.71	0.20	0.04	256.7				
10N05161	57-76	Bt2	S	0.11	0.02	0.01	0.1		5	2.4	0.2	tr	0.54	0.04	0.73	0.17	0.04	405.5				
10N05162	76-96	Bt3	S	0.10	0.05	0.01	0.1		2	2.2	0.2	tr	0.55	0.04	0.77	0.16	0.04	333.9				
10N05163	96-116	Bt3	S	0.08	0.01	tr	0.1		8	1.9	0.1	tr	0.54	0.05	0.79	0.14	0.05	620.5				
10N05164	116-140	Bt4	S	0.07	0.06	--	0.1		1	1.2	0.1	tr	0.50	0.05	0.75	0.13	0.04	444.4				
10N05165	140-155	2Bt5	S	0.07	0.02	--	0.1		3	1.1	0.1	0.1	0.41	0.04	0.58	0.12	0.04	467.0				
10N05166	155-179	3Bt6	S	0.07	0.02	tr	0.1		3	1.2	0.1	tr	0.32	0.04	0.44	0.10	0.03	377.6				
10N05167	179-203	3Bt6	S	0.07	0.03	tr	0.1		2	1.1	0.1	0.1	0.25	0.03	0.35	0.08	0.03	285.9				

CEC & Bases

Layer	Depth (cm)	Horz	Prep	-1- (- - - - - - NH_4OAC Extractable Bases - - - - -) Ca (- - - - - - - - - - - - - - - - - - cmol(+) kg^{-1} - - - - - - - - - - - - - - - - - - -) 4B1a1a	-2- Mg 4B1a1a	-3- Na 4B1a1a	-4- K 4B1a1a	-5- Sum Bases	-6- Acid-ity 4B2b1a1	-7- Extr Al 4B3a1a	-8- KCl Mn mg kg^{-1} 4B3a1a	-9- CEC8 Sum Cats (- - - - cmol(+) kg^{-1} - - -)	-10- CEC7 NH_4 OAC 4B1a1a	-11- ECEC Bases +Al	-12- Al Sat (- - - - - - - - % - - - - - - - -)	-13- (- - - - Base - - - -) (- Saturation -) Sum	-14- NH_4OAC
10N05158	0-19	Ap	S	5.3	1.3	0.1	0.2	6.9	9.5	0.3	2.2	16.4	9.6	7.2	4	42	72
10N05159	19-38	Bt1	S	5.3	2.1	0.1	0.2	7.7	11.8	1.3	0.5	19.5	12.5	9.0	14	39	62
10N05160	38-57	Bt2	S	2.7	2.6	tr	0.3	5.6	14.3	2.9	1.2	19.9	12.7	8.5	34	28	44
10N05161	57-76	Bt2	S	1.5	2.3	tr	0.2	4.0	12.8	2.6	1.1	16.8	10.2	6.6	39	24	39
10N05162	76-96	Bt3	S	1.1	2.1	0.1	0.2	3.5	9.6	2.5	0.8	13.1	9.4	6.0	42	27	37
10N05163	96-116	Bt3	S	1.1	2.0	0.1	0.2	3.4	10.4	2.0	0.7	13.8	9.0	5.4	37	25	38
10N05164	116-140	Bt4	S	1.4	2.2	0.1	0.2	3.9	8.1	1.4	0.6	12.0	8.6	5.3	26	33	45
10N05165	140-155	2Bt5	S	2.1	2.6	0.1	0.2	5.0	7.5	0.9	0.7	12.5	8.9	5.9	15	40	56
10N05166	155-179	3Bt6	S	2.3	2.6	0.1	0.2	5.2	6.6	0.7	0.8	11.8	8.7	5.9	12	44	60
10N05167	179-203	3Bt6	S	2.1	2.4	0.1	0.2	4.8	4.0	0.4	0.7	8.8	6.7	5.2	8	55	72

*** Primary Characterization Data ***

Pedon ID: S10KY149001 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Alford Fine-silty, mixed, superactive, mesic Ultic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 10N1055

Salt

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
				(- Water Extracted From Saturated Paste -)																			
Layer	Depth (cm)	Horz	Prep	Ca	Mg	Na	K	CO_3	HCO_3	F	Cl	PO_4	Br	OAC	SO_4	NO_2	NO_3	H_2O	Total Salts	Elec Cond	Pred Elec Cond	Exch Na	SAR
				(- - - - - mmol(+) L^{-1} - - - - -)				(- mmol(-) L^{-1} -)										(- - - - % - - - -)		(- - dS m^{-1} - -)		%	
10N05158	0-19	Ap	S																			1	
10N05159	19-38	Bt1	S																			1	
10N05160	38-57	Bt2	S																			tr	
10N05161	57-76	Bt2	S																			tr	
10N05162	76-96	Bt3	S																			1	
10N05163	96-116	Bt3	S																			1	
10N05164	116-140	Bt4	S																			1	
10N05165	140-155	2Bt5	S																			1	
10N05166	155-179	3Bt6	S																			1	
10N05167	179-203	3Bt6	S																			2	

pH & Carbonates

				-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-10-	-11-
				(- - - - - - - - - - - - - - - - - - pH - - - - - - - - - - - - - - - - -)						(- - Carbonate - -)		(- - Gypsum - - -)		
					$CaCl_2$ 0.01M 1:2 4C1a2a	H_2O 1:1 4C1a2a	Sat Paste	Oxid	NaF	As $CaCO_3$ <2mm	As $CaCO_3$ <20mm	As $CaSO_4$*$2H_2O$ <2mm	As $CaSO_4$*$2H_2O$ <20mm	Resist ohms cm^{-1}
Layer	Depth (cm)	Horz	Prep	KCl						(- - - - - - - - - - - - % - - - - - - - - - - -)				
10N05158	0-19	Ap	S		4.6	4.9								
10N05159	19-38	Bt1	S		4.5	5.6								
10N05160	38-57	Bt2	S		4.2	5.2								
10N05161	57-76	Bt2	S		4.2	5.0								
10N05162	76-96	Bt3	S		4.2	4.9								
10N05163	96-116	Bt3	S		4.2	5.0								
10N05164	116-140	Bt4	S		4.3	5.1								
10N05165	140-155	2Bt5	S		4.4	5.3								
10N05166	155-179	3Bt6	S		4.5	5.4								
10N05167	179-203	3Bt6	S		4.6	5.6								

*** Supplementary Characterization Data ***

Pedon ID: S10KY149001 (McLean County, Kentucky) Print Date: Apr 13 2012 9:59AM

Sampled As : Alford Fine-silty, mixed, superactive, mesic Ultic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 10N1055

Tier 3

Layer	Depth (cm)	Horz	Prep	-51- >2	-52- 250 -UP	-53- 250 -75	-54- 75 -2	-55- 75 -20	-56- 20 -5	-57- 5 -2	-58- <2	-59- 2- .05	-60- .05- .002	-61- LT .002	-62- Pores D	-63- Pores F	-64- C /N Rat -io	-65- Ratios To Clay: Fine Clay	-66- <2 mm Fraction: CEC Sum Cats	-67- CEC NH_4-OAC	-68- 1500 kPa H_2O	-69- LEP 33 kPa	-70- Linear Extensiblity: Whole Soil 33 kPa 1500 kPa	-71- Whole Soil 33 kPa Oven -dry	-72- <2 mm to % 1500 kPa	-73- <2 mm to % Oven -dry	-74- WRD: Whole Soil	-75- WRD: <2 mm
				(- - - - - - - - - - - - - - - - - - Volume Fractions - - - - - - - - - - - - - - - - -) Whole Soil (mm) At 33 kPa														(- - - - - - - Ratios To Clay - - - - - -) <2 mm Fraction					(- - Linear Extensiblity - -) Whole Soil 33 kPa		<2 mm to %		(- - WRD - -) Whole Soil	<2 mm
				(---------- % of Whole Soil ----------)																						(---in^3/in^3---)	
10N05158	0-19	Ap	S														9	0.50	0.92	0.54	0.47	0.101		1.8	1.4	1.8		0.25
10N05159	19-38	Bt1	S														6	0.58	0.64	0.41	0.43	0.089		2.7	1.4	2.7		0.17
10N05160	38-57	Bt2	S														6	0.60	0.70	0.44	0.43	0.094		2.7	1.6	2.7		0.21
10N05161	57-76	Bt2	S														5	0.59	0.86	0.52	0.50	0.103		2.0	1.4	2.0		0.25
10N05162	76-96	Bt3	S	--	--	--	--	--	--	--	100	tr	43	10	9	38	2	0.55	0.70	0.50	0.49	0.086	1.2	1.6	1.2	1.6	0.24	0.24
10N05163	96-116	Bt3	S	--	--	--	--	--	--	--	100	1	45	8	9	37	8	0.48	0.91	0.59	0.51	0.092	0.9	1.4	0.9	1.4	0.26	0.26
10N05164	116-140	Bt4	S	--	--	--	--	--	--	--	100	2	44	8	10	35	1	0.46	0.77	0.55	0.48	0.116	1.4	1.8	1.4	1.8	0.24	0.24
10N05165	140-155	2Bt5	S														3	0.46	0.76	0.54	0.43	0.091		1.5	1.1	1.5		0.24
10N05166	155-179	3Bt6	S	--	--	--	--	--	--	--	100	19	30	9	9	33	3	0.44	0.76	0.56	0.44	0.109	1.3	1.7	1.3	1.7	0.22	0.22
10N05167	179-203	3Bt6	S	--	--	--	--	--	--	--	100	13	39	11	9	29	2	0.45	0.52	0.39	0.35	0.071	0.8	1.2	0.8	1.2	0.20	0.20

Tier 4

Layer	Depth (cm)	Horz	Prep	-76- >2	-77- 75 -20	-78- 20 -2	-79- 2- .05	-80- .05- .002	-81- < .002	-82- VC	-83- C	-84- M	-85- F	-86- VF	-87- C	-88- F	-89- Clay	-90-	-91- Text -ure by PSDA <2 mm	-92- PSDA (mm) Sand 2- .05	-93- Silt .05- .002	-94- Clay < .002	-95- pH Ca Cl_2 .01M	-96- Elect. Res- ist. ohms	-97- Con- duct dS m^{-1}	-98- Part- -icle Den- sity g cm^{-3}
				(- Weight Fractions - Clay Free - - - - - - - - - - - - - - - - - - -)																						
				(---------- Whole Soil ----------)						(---------- <2 mm Fraction ----------)																
										(---------- Sands ----------)					(--- Silts ---)												
				(- % of >2 mm Sand and Silt -)						(----------% of Sand and Silt ----------)																
																				(---- % of 2 mm ----)			(-------- <2 mm --------)			
																				3A1a1a4C1a2a						
10N05158	0-19	Ap	S							--	tr	tr	1	1	44	53	22		sil	2.2	79.9	17.9	4.6			
10N05159	19-38	Bt1	S							--	--	tr	tr	1	41	58	44		sicl	1.0	68.5	30.5	4.5			
10N05160	38-57	Bt2	S							--	--	tr	tr	1	44	55	40		sicl	1.1	70.3	28.6	4.2			
10N05161	57-76	Bt2	S							--	--	--	tr	1	45	54	24		sil	1.0	79.5	19.5	4.2			
10N05162	76-96	Bt3	S	--	--	--	1	99	23	--	--	tr	tr	1	45	54	23		sil	0.9	80.4	18.7	4.2			
10N05163	96-116	Bt3	S	--	--	--	1	99	18	--	--	tr	tr	1	45	54	18		sil	1.0	83.8	15.2	4.2			
10N05164	116-140	Bt4	S	--	--	--	4	96	18	--	tr	1	2	1	41	54	18		sil	3.8	80.7	15.5	4.3			
10N05165	140-155	2Bt5	S							--	tr	4	9	2	34	50	20		sil	13.5	70.1	16.4	4.4			
10N05166	155-179	3Bt6	S	--	--	--	38	62	18	tr	tr	14	19	4	25	37	18		sil	32.0	52.4	15.6	4.5			
10N05167	179-203	3Bt6	S	--	--	--	25	75	20	tr	tr	9	12	3	31	44	20		sil	20.6	62.4	17.0	4.6			

Series: Hosmer
Classification: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalf
Landform Position: shoulder
Site 2 on map
Fragipan occurs at 99 cm
Parent Materials:
Peoria Loess is from 0 to 99 cm
Roxana Loess occurs from 99 to 158 cm
Loess/Residuum mixture below 158 cm

Hosmer Soil Description

Ap--0 to 19 centimeters (0.0 to 7.5 inches); brown (10YR 5/3) silt loam, pale brown (10YR 6/3), dry; 4 percent sand; 79 percent silt; 17 percent clay; moderate medium platy parts to moderate fine granular structure; friable; many fine roots throughout and few medium roots throughout; strongly acid, pH 5.5, pH meter 1:1 water; abrupt smooth boundary.

Bt1--19 to 42 centimeters (7.5 to 16.5 inches); yellowish brown (10YR 5/6) silt loam; 4 percent sand; 70 percent silt; 26 percent clay; moderate medium prismatic parts to moderate medium subangular blocky structure; friable; many fine roots throughout; continuous distinct brown (7.5YR 5/4), moist, clay films on all faces of peds; 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1),

moist, manganese coatings with diffuse boundaries on faces of peds; 2 percent nonflat subangular moderately cemented 2-to 10-millimeter sandstone fragments; 2 percent krotovinas (volume percent); strongly acid, pH 5.4, pH meter 1:1 water; clear smooth boundary.
Bt2--42 to 66 centimeters (16.5 to 26.0 inches); strong brown (7.5YR 5/6) silty clay loam; 5 percent sand; 66 percent silt; 29 percent clay; moderate medium prismatic parts to moderate medium subangular blocky structure; firm; common very fine roots throughout; 5 percent patchy prominent light gray (10YR 7/2), moist, silt coats on vertical faces of peds and 53 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese coatings with diffuse boundaries on faces of peds; very strongly acid, pH 4.9, pH meter 1:1 water; clear wavy boundary.

Bt3--66 to 85 centimeters (26.0 to 33.5 inches); yellowish brown (10YR 5/4) silt loam; 6 percent sand; 69 percent silt; 25 percent clay; moderate medium prismatic parts to moderate medium subangular blocky structure; firm; few fine roots throughout; 15 percent discontinuous prominent light gray (10YR 7/2), moist, silt coats on vertical faces of peds and 60 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese masses with diffuse boundaries on faces of peds; very strongly acid, pH 4.9, pH meter 1:1 water; clear wavy boundary.

Btx1--85 to 99 centimeters (33.5 to 39.0 inches); yellowish brown (10YR 5/4) silt loam; 6 percent sand; 70 percent silt; 24 percent clay; moderate medium prismatic parts to moderate medium subangular blocky structure; firm; brittle; few very fine roots between peds; 60 percent continuous prominent dark yellowish brown (10YR 4/4), moist, silt coats on vertical faces of peds and 65 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; fine prominent spherical moderately cemented black (10YR 2/1), moist, iron-manganese masses with sharp boundaries in matrix; very strongly acid, pH 4.9, pH meter 1:1 water; clear wavy boundary.

2Btx2--99 to 158 centimeters (39.0 to 62.2 inches); yellowish brown (10YR 5/4) silt loam; 8 percent sand; 69 percent silt; 23 percent clay; strong very coarse prismatic parts to moderate coarse angular blocky structure; very firm; brittle; few very fine roots between peds; 60 percent continuous prominent light gray (10YR 7/2), moist, silt coats on vertical faces of peds and 65 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 1 percent fine prominent irregular moderately cemented black (10YR 2/1), moist, iron-manganese masses with sharp boundaries in matrix and 5 percent fine prominent irregular very weakly cemented black (10YR 2/1), moist, manganese coatings with diffuse boundaries on faces of peds; moderately acid, pH 6.0, pH meter 1:1 water; clear wavy boundary.

3Btx3--158 to 203 centimeters (62.2 to 79.9 inches); yellowish brown (10YR 5/4) silty clay loam; 8

percent sand; 64 percent silt; 28 percent clay; moderate very coarse prismatic parts to moderate medium angular blocky structure; firm; brittle; 15 percent discontinuous distinct strong brown (7.5YR 5/6), moist, clay films on all faces of peds and 35 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds and 65 percent continuous prominent light brownish gray (10YR 6/2), moist, silt coats on vertical faces of peds; 1 percent fine prominent spherical moderately cemented black (10YR 2/1), moist, iron-manganese masses with sharp boundaries in matrix and 1 percent fine prominent irregular extremely weakly cemented black (10YR 2/1), moist, manganese coatings with diffuse boundaries on faces of peds; neutral, pH 6.9, pH meter 1:1 water; gradual irregular boundary.

4Bt1--203 to 222 centimeters (79.9 to 87.4 inches); 40 percent gray (5Y 6/1) and 40 percent red (2.5YR 4/6) and 20 percent yellowish brown (10YR 5/8) gravelly clay; 2 percent sand; 20 percent silt; 78 percent clay; strong coarse angular blocky structure; very firm; 15 percent discontinuous distinct reddish brown (2.5YR 4/4), moist, clay films on all faces of peds; 16 percent nonflat subangular moderately cemented 2-to 10-millimeter sandstone fragments; 15 percent stone line (volume percent); neutral, pH 7.2, pH meter 1:1 water; gradual wavy boundary.

*** Primary Characterization Data ***

Pedon ID: S10KY149002 (McLean, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled as : Hosmer ; Fine-silty, mixed, active, mesic Oxyaquic Fragiudalf
Revised to :

SSL - Project C2010USKY106 McLean Co.
- Site ID S10KY631002 Lat: 37° 35' 40.50" north Long: 87° 20' 18.70" west NAD83 MLRA: 120A
- Pedon No. 10N1056
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
10N05168	Ap		0.0-19.0	S10KY149002-1				SIL
10N05169	Bt1		19.0-42.0	S10KY149002-2				SIL
10N05170	Bt2		42.0-66.0	S10KY149002-3				SIL
10N05171	Bt3		66.0-85.0	S10KY149002-4				SIL
10N05172	Btx1		85.0-99.0	S10KY149002-5				SIL
10N05173	2Btx2		99.0-129.0	S10KY149002-6				SIL
10N05174	2Btx2		129.0-158.0	S10KY149002-7				SIL
10N05175	3Btx3		158.0-183.0	S10KY149002-8				SIL
10N05176	3Btx3		183.0-203.0	S10KY149002-9				SIL
10N05177	4Bt1		203.0-222.0	S10KY149002-10				SICL
10N05178	4Bt2		222.0-240.0	S10KY149002-11				C

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	0.424	% wt
Volume, >2mm, Weighted Average	0	% vol
Clay, total, Weighted Average	20.766	% wt
Clay, carbonate free, Weighted Average	20.766	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 1	0.498	(NA)
LE, Whole Soil, Summed to 1m	1.9	cm/m

Weighted averages based on control section: 19-69 cm

*** Primary Characterization Data ***

Pedon ID: S10KY149002 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Hosmer Fine-silty, mixed, active, mesic Oxyaquic Fragiudalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 10N1056

PSDA & Rock Fragments

Layer	Depth (cm)	Horz	Prep	-1- Clay < .002 (Total)	-2- Silt .002-.05 (Total)	-3- Sand .05-2 (Total)	-4- Fine < .0002 (Clay)	-5- CO_3 < .002 (Clay)	-6- Fine .002-.02 (Silt)	-7- Coarse .02-.05 (Silt)	-8- VF .05-.10 (Sand)	-9- F .10-.25 (Sand)	-10- M .25-.50 (Sand)	-11- C .5-1 (Sand)	-12- VC 1-2 (Sand)	-13- 2-5 (Rock Fragments (mm) Weight)	-14- 5-20 (Rock Fragments (mm) Weight)	-15- 20-75 (Rock Fragments (mm) Weight)	-16- .1-75 (Rock Fragments (mm) Weight)	-17- >2 mm wt % whole soil
				% of <2mm Mineral Soil												% of <75mm				
				3A1a1a			3A1a1a		3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a					
10N05168	0-19	Ap	S	22.4	76.3	1.3	11.5		44.0	32.3	0.9	0.2	0.2	tr	--	--	--	--	tr	--
10N05169	19-42	Bt1	S	23.1	76.1	0.8	12.6		44.2	31.9	0.7	0.1	tr	--	--	--	--	--	tr	--
10N05170	42-66	Bt2	S	18.9	79.5	1.6	10.5		43.0	36.5	1.0	0.4	0.2	tr	--	--	--	--	1	--
10N05171	66-85	Bt3	S	17.9	79.2	2.9	8.9		44.2	35.0	1.4	0.8	0.6	0.1	tr	--	--	--	2	--
10N05172	85-99	Btx1	S	16.2	81.5	2.3	8.6		44.0	37.5	1.1	0.6	0.5	0.1	--	--	--	--	1	--
10N05173	99-129	2Btx2	S	17.5	80.5	2.0	10.7		46.3	34.2	1.0	0.5	0.4	0.1	--	--	--	--	1	--
10N05174	129-158	2Btx2	S	20.0	77.1	2.9	10.1		45.3	31.8	1.5	0.8	0.4	0.2	tr	--	--	--	1	--
10N05175	158-183	3Btx3	S	21.3	70.7	8.0	9.2		42.5	28.2	3.3	1.8	1.7	0.8	0.4	--	--	--	5	--
10N05176	183-203	3Btx3	S	23.8	64.7	11.5	10.9		41.9	22.8	4.3	2.6	1.9	1.3	1.4	1	tr	--	8	1
10N05177	203-222	4Bt1	S	31.4	48.7	19.9	13.9		31.7	17.0	6.1	3.0	2.4	3.3	5.1	17	16	--	42	33
10N05178	222-240	4Bt2	S	61.8	31.8	6.4	29.7		27.6	4.2	1.6	1.5	0.9	1.2	1.2	2	--	--	7	2

Bulk Density & Moisture

Layer	Depth (cm)	Horz	Prep	-1- 33 kPa (Bulk Density) DbWR1	-2- Oven Dry (Bulk Density) DbWR1	-3- Cole Whole Soil	-4- 6 kPa (Water Content)	-5- 10 kPa (Water Content)	-6- 33 kPa (Water Content) DbWR1	-7- 1500 kPa (Water Content) 3C2a1a	-8- 1500 kPa Moist (Water Content)	-9- Ratio AD/OD 3D1	-10- WRD Whole Soil	-11- Aggst Stabl 2-0.5mm	-12- CEC7 (Ratio/Clay)	-13- 1500 kPa (Ratio/Clay)
				g cm^{-3}			pct of < 2mm						cm^3 cm^{-3}	%		
10N05168	0-19	Ap	S	1.44	1.56	0.027			22.9	10.2		1.015	0.18		0.50	0.46
10N05169	19-42	Bt1	S	1.42	1.52	0.023			26.8	10.8		1.013	0.23		0.46	0.47
10N05170	42-66	Bt2	S	1.43	1.51	0.018			27.4	9.6		1.014	0.25		0.53	0.51
10N05171	66-85	Bt3	S	1.45	1.50	0.011			25.6	8.8		1.012	0.24		0.52	0.49
10N05172	85-99	Btx1	S	1.54	1.59	0.011			23.6	8.6		1.011	0.23		0.67	0.53
10N05173	99-129	2Btx2	S	1.50	1.58	0.017			24.0	9.9		1.015	0.21		0.62	0.57
10N05174	129-158	2Btx2	S	1.53	1.63	0.021			24.2	10.2		1.013	0.21		0.53	0.51
10N05175	158-183	3Btx3	S	1.56	1.65	0.019			22.7	9.7		1.013	0.20		0.51	0.46
10N05176	183-203	3Btx3	S	1.65	1.75	0.020			20.5	10.9		1.014	0.16		0.48	0.46
10N05177	203-222	4Bt1	S							13.6		1.019				0.43
10N05178	222-240	4Bt2	S	1.39	1.78	0.085			31.5	22.9		1.033	0.12		0.42	0.37

*** Primary Characterization Data ***

Pedon ID: S10KY149002 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Hosmer Fine-silty, mixed, active, mesic Oxyaquic Fragiudalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 10N1056

Carbon & Extractions

Layer	Depth (cm)	Horz	Prep	-1- C (- - - - - Total - - - - -)	-2- N	-3- S	-4- Est OC	-5- OC (WB)	-6- C/N Ratio	-7- Fe (- - - Dith-Cit Ext - - -)	-8- Al	-9- Mn	-10- Al+½Fe (- - - - - - Ammonium Oxalate Extraction - - - - - -)	-11- ODOE	-12- Fe	-13- Al	-14- Si	-15- Mn	-16- C (- - - Na Pyro-Phosphate - - -)	-17- Fe	-18- Al	-19- Mn
				(- - - - - - - - - - % of <2 mm - - - - - - - - - -)						(- % of < 2mm - - - - - - - - - - - - - - - - -)							mg kg^{-1}	(- - - - - - % of < 2mm - - - - -)		
				4H2a	4H2a	4H2a				4G1	4G1	4G1		4G2a	4G2a	4G2a	4G2a	4G2a				
10N05168	0-19	Ap	S	1.18	0.18	0.01	1.2		6	1.8	0.1	tr	0.30	0.05	0.37	0.11	0.02	261.4				
10N05169	19-42	Bt1	S	0.31	0.08	--	0.3		4	2.3	0.2	tr	0.39	0.03	0.50	0.14	0.03	193.8				
10N05170	42-66	Bt2	S	0.16	0.06	tr	0.2		3	2.0	0.1	tr	0.52	0.04	0.74	0.15	0.04	308.0				
10N05171	66-85	Bt3	S	0.12	0.05	tr	0.1		3	2.3	0.2	tr	0.57	0.04	0.85	0.15	0.05	426.6				
10N05172	85-99	Btx1	S	0.08	0.04	--	0.1		2	2.1	0.1	tr	0.51	0.04	0.79	0.12	0.06	319.0				
10N05173	99-129	2Btx2	S	0.07	0.05	--	0.1		1	2.2	0.2	tr	0.42	0.04	0.68	0.08	0.06	305.1				
10N05174	129-158	2Btx2	S	0.07	0.01	--	0.1		13	1.7	0.1	0.1	0.25	0.02	0.38	0.05	0.04	403.5				
10N05175	158-183	3Btx3	S	0.09	0.03	--	0.1		4	1.6	0.1	0.1	0.19	0.02	0.26	0.06	0.04	470.4				
10N05176	183-203	3Btx3	S	0.12	0.04	--	0.1		3	1.7	0.1	0.1	0.21	0.01	0.27	0.07	0.04	1150.8				
10N05177	203-222	4Bt1	S	0.16	0.07	--	0.2		2	3.0	0.2	0.1	0.23	0.01	0.27	0.10	0.05	635.9				
10N05178	222-240	4Bt2	S	0.18	0.04	--	0.2		4	3.6	0.2	--	0.22	0.01	0.23	0.10	0.05	34.5				

CEC & Bases

Layer	Depth (cm)	Horz	Prep	-1- Ca (- - - - - - NH$_4$OAC Extractable Bases - - - - -)	-2- Mg	-3- Na	-4- K	-5- Sum Bases	-6- Acid-ity	-7- Extr Al	-8- KCl Mn	-9- CEC8 Sum Cats	-10- CEC7 NH$_4$ OAC	-11- ECEC Bases +Al	-12- Al Sat	-13- (- - - - Base - - - -) (- Saturation -) Sum	-14- NH$_4$OAC
				(- - - - - - - - - - - - - - - - - - cmol(+) kg^{-1} - - - - - - - - - - - - - - - - - - -)							mg kg^{-1}	(- - - - cmol(+) kg^{-1} - - -)			(- - - - - - - - % - - - - - - - -)		
				4B1a1a	4B1a1a	4B1a1a	4B1a1a		4B2b1a1	4B3a1a	4B3a1a		4B1a1a				
10N05168	0-19	Ap	S	6.9	2.1	0.1	0.2	9.3	8.2	0.1	1.3	17.5	11.1	9.4	1	53	84
10N05169	19-42	Bt1	S	3.9	3.5	0.1	0.2	7.7	8.4	0.5	0.7	16.1	10.6	8.2	6	48	73
10N05170	42-66	Bt2	S	1.4	2.8	0.2	0.2	4.6	10.7	2.1	1.3	15.3	10.1	6.7	31	30	46
10N05171	66-85	Bt3	S	1.2	2.5	0.2	0.2	4.1	11.5	2.2	1.4	15.6	9.3	6.3	35	26	44
10N05172	85-99	Btx1	S	1.6	2.7	0.3	0.2	4.8	8.3	1.7	1.1	13.1	10.9	6.5	26	37	44
10N05173	99-129	2Btx2	S	3.8	5.1	0.4	0.2	9.5	8.1	0.6	1.0	17.6	10.9	10.1	6	54	87
10N05174	129-158	2Btx2	S	5.8*	6.3	0.5	0.2	12.8	5.7	0.2	1.0	18.5	10.5	13.0	2	69	100
10N05175	158-183	3Btx3	S	5.6*	5.8	0.6	0.2	12.2	3.4	0.1	0.9	15.6	10.8	12.3	1	78	100
10N05176	183-203	3Btx3	S	6.1*	6.1	0.7	0.2	13.1	2.9	0.1	0.8	16.0	11.5	13.2	1	82	100
10N05178	222-240	4Bt2	S	15.7*	13.0	1.9	0.3	30.9	6.4	--	0.1	37.3	25.8			83	100

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

*** Primary Characterization Data ***

Pedon ID: S10KY149002 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Hosmer Fine-silty, mixed, active, mesic Oxyaquic Fragiudalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 10N1056

Salt

Layer	Depth (cm)	Horz	Prep	-1- Ca	-2- Mg	-3- Na	-4- K	-5- CO_3	-6- HCO_3	-7- F	-8- Cl	-9- PO_4	-10- Br	-11- OAC	-12- SO_4	-13- NO_2	-14- NO_3	-15- H_2O	-16- Total Salts	-17- Elec Cond	-18- Pred Elec Cond	-19- Exch Na	-20- SAR
				(- Water Extracted From Saturated Paste -)																			
				(- - - - - mmol(+) L^{-1} - - - - -)				(- mmol(-) L^{-1} -)								(- - - - % - - - -)		(- - dS m^{-1} - -)		%	
10N05168	0-19	Ap	S																			1	
10N05169	19-42	Bt1	S																			1	
10N05170	42-66	Bt2	S																			2	
10N05171	66-85	Bt3	S																			2	
10N05172	85-99	Btx1	S																			2	
10N05173	99-129	2Btx2	S																			4	
10N05174	129-158	2Btx2	S																			4	
10N05175	158-183	3Btx3	S																			6	
10N05176	183-203	3Btx3	S																			7	
10N05178	222-240	4Bt2	S																			7	

pH & Carbonates

Layer	Depth (cm)	Horz	Prep	-1- KCl	-2- $CaCl_2$ 0.01M 1:2 4C1a2a	-3- H_2O 1:1 4C1a2a	-4- Sat Paste	-5- Oxid	-6- NaF	-7- Carbonate As $CaCO_3$ <2mm	-8- Carbonate As $CaCO_3$ <20mm	-9- Gypsum As $CaSO_4*2H_2O$ <2mm	-10- Gypsum As $CaSO_4*2H_2O$ <20mm	-11- Resist ohms cm^{-1}
				(- - - - - - - - - - - - - - - - - - pH - - - - - - - - - - - - - - - - -)						(- - Carbonate - -)		(- - Gypsum - - -)		
										(- - - - - - - - - - - - % - - - - - - - - - - -)				
10N05168	0-19	Ap	S		5.0	5.4								
10N05169	19-42	Bt1	S		5.0	5.8								
10N05170	42-66	Bt2	S		4.3	5.1								
10N05171	66-85	Bt3	S		4.2	5.1								
10N05172	85-99	Btx1	S		4.2	5.2								
10N05173	99-129	2Btx2	S		4.5	5.6								
10N05174	129-158	2Btx2	S		4.9	6.0								
10N05175	158-183	3Btx3	S		5.5	6.6								
10N05176	183-203	3Btx3	S		5.7	7.0								
10N05178	222-240	4Bt2	S		6.3	7.2								

*** Supplementary Characterization Data ***

Pedon ID: S10KY149002 (McLean County, Kentucky) Print Date: Apr 13 2012 9:59AM

Sampled As : Hosmer Fine-silty, mixed, active, mesic Oxyaquic Fragiudalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 10N1056

Tier 4

Layer	Depth (cm)	Horz	Prep	-76- >2	-77- 75-20	-78- 20-2	-79- 2-.05	-80- .05-.002	-81- <.002	-82- VC	-83- C	-84- M	-85- F	-86- VF	-87- C	-88- F	-89- Clay	-90-	-91- Texture by PSDA <2 mm	-92- Sand 2-.05	-93- Silt .05-.002	-94- Clay <.002	-95- pH Ca Cl_2 .01M	-96- Elect. Resist. ohms	-97- Conduct dS m^{-1}	-98- Particle Density g cm^{-3}
				(- - - - - - - - - - - - - - - - - - - Weight Fractions - Clay Free - - - - - - - - - - - - - - - - - - -)																PSDA (mm)						
				(---------- Whole Soil ----------)						(---------- <2 mm Fraction ----------)																
										(---------- Sands ----------)					(--- Silts ---)											
				(- % of >2 mm Sand and Silt -)						(----------% of Sand and Silt ----------)									(---- % of 2 mm ----)			(-------- <2 mm --------)			
																					3A1a1a	4C1a2a				
10N05168	0-19	Ap	S	--	--	--	2	98	29	--	--	tr	tr	1	42	57	29		sil	1.3	76.3	22.4	5.0			
10N05169	19-42	Bt1	S	--	--	--	1	99	30	--	--	--	tr	1	41	57	30		sil	0.8	76.1	23.1	5.0			
10N05170	42-66	Bt2	S	--	--	--	2	98	23	--	--	tr	tr	1	45	53	23		sil	1.6	79.5	18.9	4.3			
10N05171	66-85	Bt3	S	--	--	--	4	96	22	--	tr	1	1	2	43	54	22		sil	2.9	79.2	17.9	4.2			
10N05172	85-99	Btx1	S	--	--	--	3	97	19	--	tr	1	1	1	45	53	19		sil	2.3	81.5	16.2	4.2			
10N05173	99-129	2Btx2	S	--	--	--	2	98	21	--	tr	tr	1	1	41	56	21		sil	2.0	80.5	17.5	4.5			
10N05174	129-158	2Btx2	S	--	--	--	4	96	25	--	tr	tr	1	2	40	57	25		sil	2.9	77.1	20.0	4.9			
10N05175	158-183	3Btx3	S	--	--	--	10	90	27	1	1	2	2	4	36	54	27		sil	8.0	70.7	21.3	5.5			
10N05176	183-203	3Btx3	S	1	1	1	15	84	31	2	2	2	3	6	30	55	31		sil	11.5	64.7	23.8	5.7			
10N05177	203-222	4Bt1	S	42	42	42	17	41	27	7	5	3	4	9	25	46	46		sicl	19.9	48.7	31.4				
10N05178	222-240	4Bt2	S	5	5	5	16	79	154	3	3	2	4	4	11	72	162		c	6.4	31.8	61.8	6.3			

Summary Grassland Site

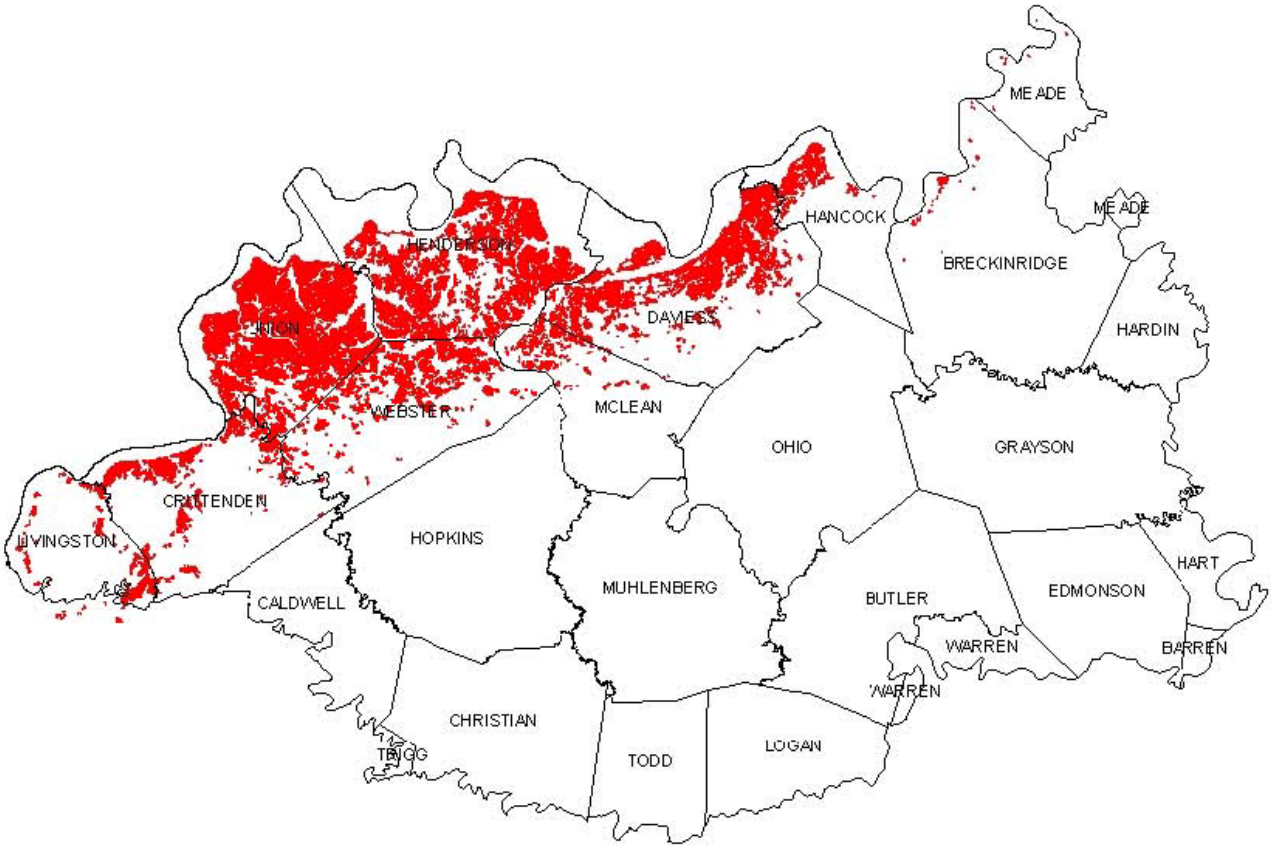
• This is the southern extent of Hapludalfs formed in loess occurring on summits. Further from the source of loess, Fragiudalfs occur on the summit and shoulders, with steeper backslopes typically lacking pans. Loess thickness appears to be a key factor in the formation of the pan. Soils formed in loess more than 2 meters thick, typically are Hapludalfs. At approximately 1.5 to 2 meters, depending on landscape position, fragipans form, and dominate the landscape until loess thins below about 50 centimeters, or slope exceeds 15 to 20%. Near the source of loess, Hapludalfs cover almost the entire upland landscape. Fragipans begin to occur on shoulders and backslopes of uplands as you proceed away from the source, and fragipans dominate the entire upland landscape in between 0.5 and 1.5 meters of loess on less than 20% slopes.

• The younger loess (Peoria) is typically yellowish brown (10YR 5/4-8) to yellow (10YR 7/6-8) in unweathered profiles. Further from the source, it ranges from strong brown (7.5YR 4/6, 5/6-8) and brown (7.5YR 4/4, 5/4) to yellowish brown (10YR 5/4-8) in well drained profiles and brown (7.5YR 4/4, 5/4) to yellowish brown (10YR 5/4-8) in moderately well drained (fragipan) profiles. The fragipan is streaked with light gray (10YR 7/2) albic materials between the prisms. Silt dominates this loess member. Clay ranges up to 34% in the upper argillic of Hapludalfs to as low as 7% in calcareous C horizons that occur near the source. The thickness ranges from more than 7 meters near the source to about 50 centimeters on stable uplands far from the source.

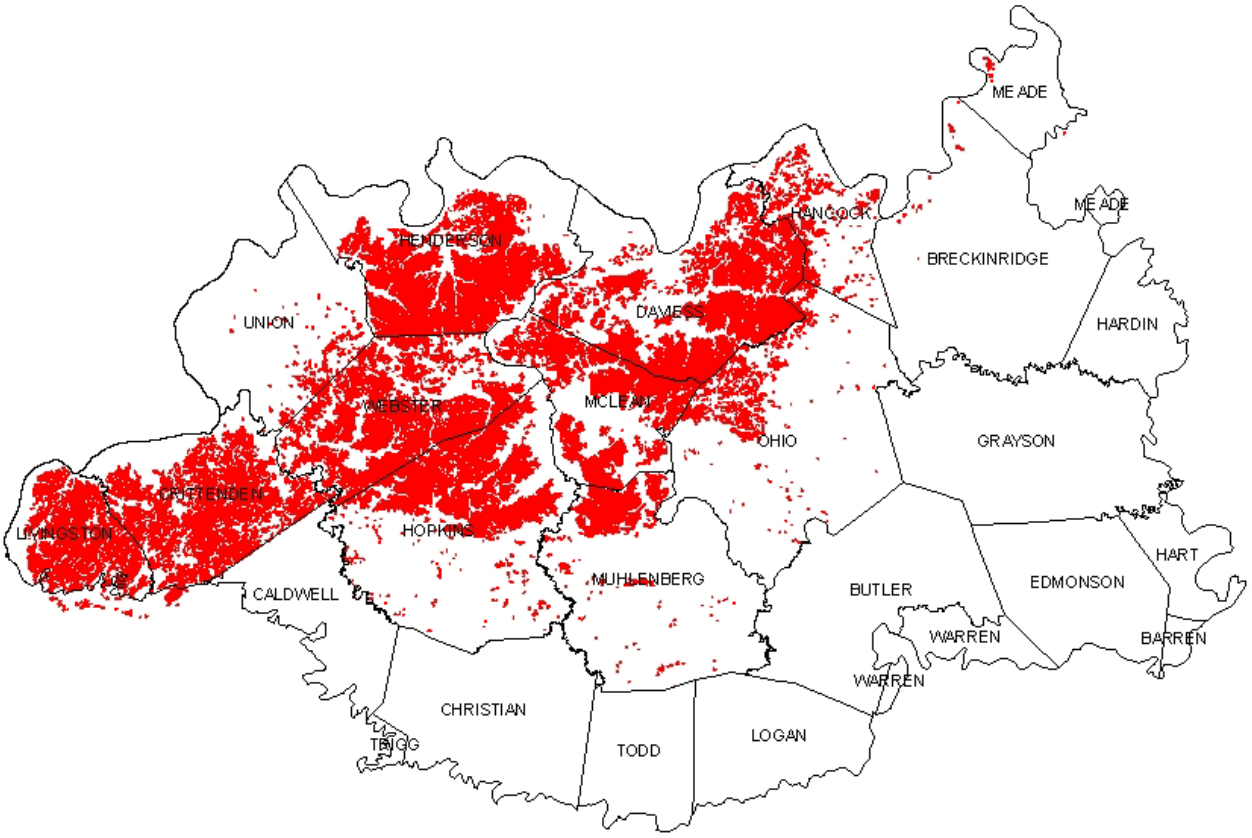
• The older loess (Roxana) color typically ranges from strong brown (7.5YR 4/6, 5/6-8) to brown (7.5YR 4/4, 5/4). This loess is discernible nearer the source but becomes “welded” between the overlying loess and the underlying residuum away from the source. Where discernible, it typically is higher in sand and “pinker” in color than the overlying loess. The sand content is higher due to mixing with underlying loamy residual soils. As the material becomes thicker, the upper portion is very similar to the overlying loess, in that it has a low sand content, and is dominated by silt. Clay ranges from about 15 to 25% in this older loess, and sand ranges from about 10 to 35%. The thickness ranges from about 1.5 meters near the source to a few centimeters away from the source.

• Pre-Wisconsinan loess (Loveland) and residuum occur between the overlying loess members and bedrock. Paleosols are typically formed in the red and gray shale or brown sandstone residuum. The shale residuum ranges from silty to clayey. Most of the sandstone residuum is loamy to sandy. The Loveland loess is significant near the source but is almost indiscernible further from the source.

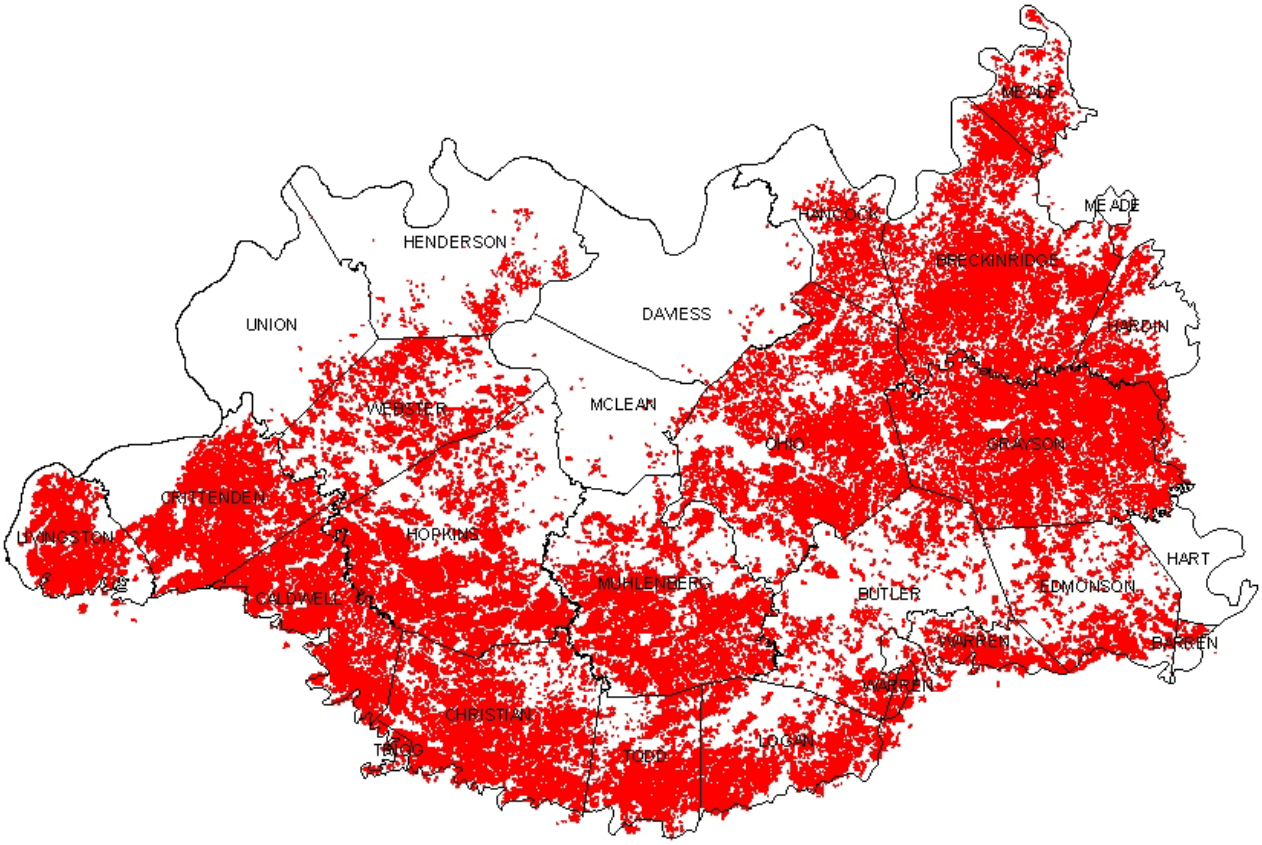
Alford soils in Kentucky. Typically 2 meters of loess or more. Loess thickness is greatest on uplands adjacent to where river valley is widest and loess thins away from source (river valley). These soils are typically within 20 miles from the river and occur on all slopes on the uplands near the river and usually just occur on summits as distance from the river increases. Loess thins more rapidly where the valley is narrower (typically Mississippian bedrock) and where elevations are higher (typically Mississippian Bedrock).



Deep loess fragipans include Hosmer and Robbs. These soils occur from 10 to 30 miles from the river valley over Pennsylvanian bedrock. These soils occur on shoulders in thicker loess uplands and on all slopes from 0 to 20% further from the river. These soils occur on uplands much closer to the river on higher elevations and over Mississippian bedrock.



Moderately deep to shallow loess fragipan soils include Zanesville and Sadler soils. These soils typically are more than 20 miles from the river over the Pennsylvanian bedrock, or are nearer the river over Mississippian bedrock. They occur on steeper slopes on uplands nearer the river and occur on all slopes from 0 to 20% further from the river.



Loess Thickness Borings Centimeters

Cambron Wooded Site

This site is steeper than the grassland site. The summit is comprised of Hapludalfs (though data indicated an Ultisol and some fragipans occur on the shoulder where loess is thicker). The shoulder is loess over sandstone residuum, and the backslope is loess over shale residuum. The lower backslope is colluvial materials from the loess and residuum above over shale.

Summit: 190 cm of loess overlying 64 cm of residuum from sandstone overlying sandstone (Typic Hapludult) (Alford-similar -Typic Hapludalf) 1% slope

Shoulder: 78 cm of loess overlying 21 cm of residuum from sandstone/loess mixed overlying sandstone Typic Hapludalf (Wellston - Ultic Hapludalf) 13% slope

Backslope (upper): 16 cm of loess overlying clayey shale residuum (Fine, mixed, mesic Aquic Hapludalf) (Lenberg MWD) 18% slope

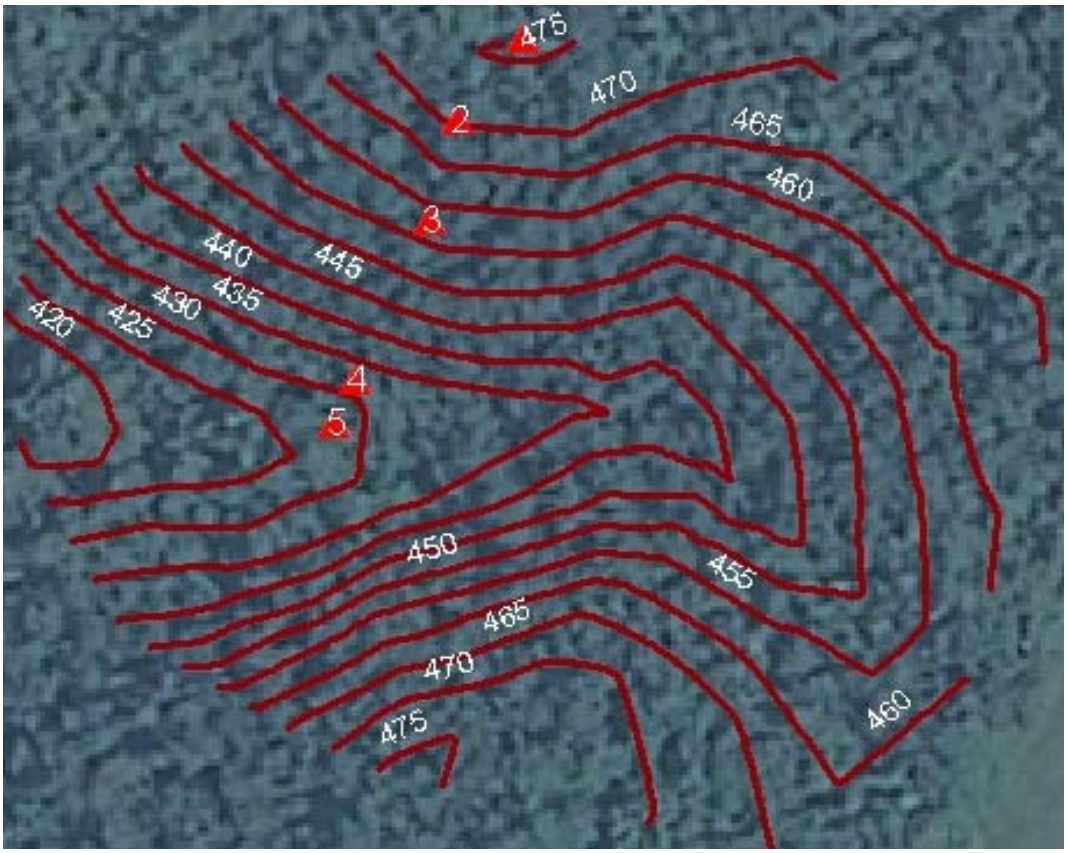
Backslope (lower): 74 cm of colluvium over more and 150 cm of loamy sandstone residuum (Oxyaquic Hapludalf) 21% slope

Toeslope: 81 cm of colluvium overlying 107 cm of an intact argillic developed in colluviums overlying 17 cm of clayey shale residuum over shale (Coarse-silty, mixed, non-acid, mesic Fluvaquentic Epiaquept) 5% slope

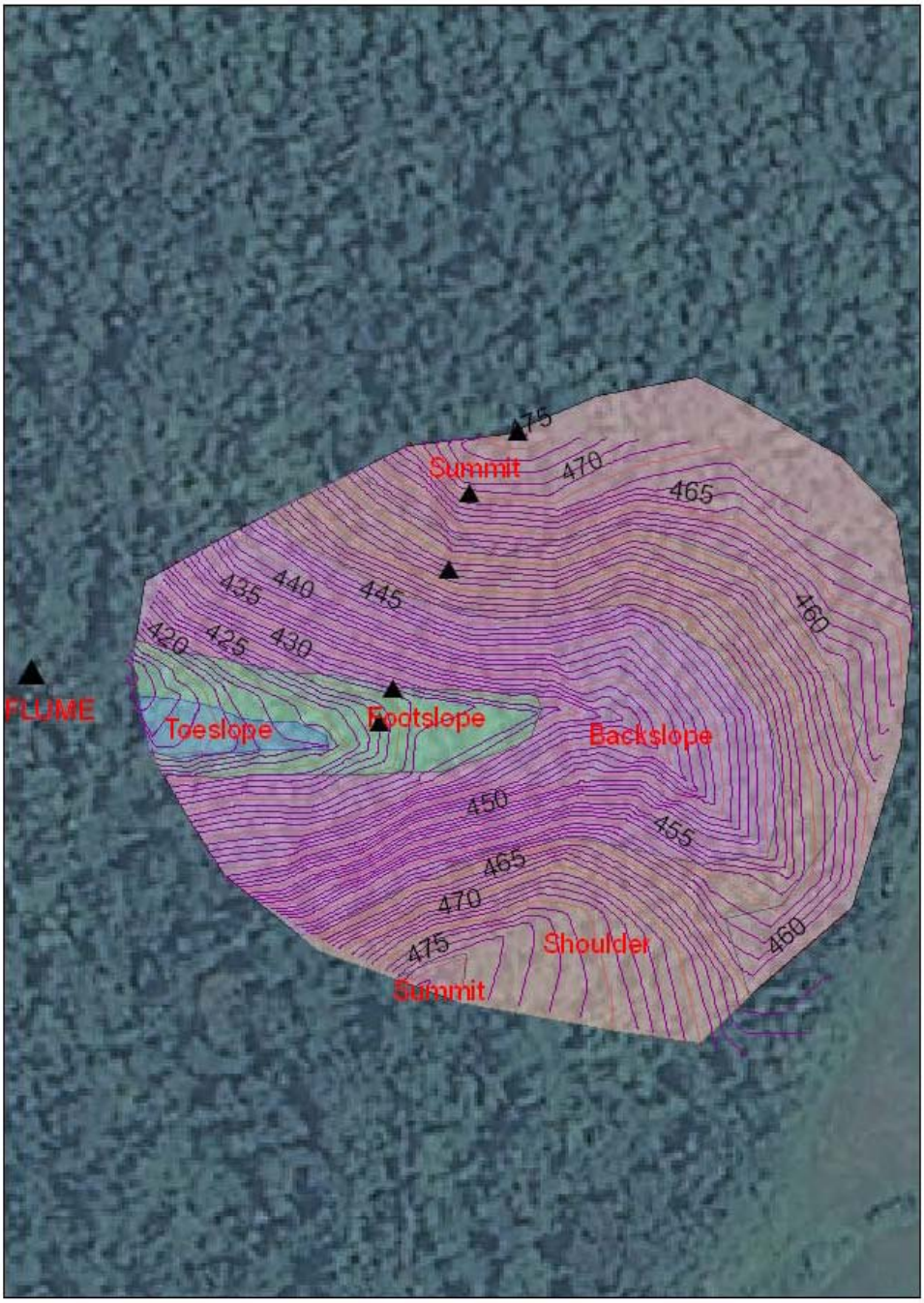
All soils are Fine-silty, mixed, active mesic unless otherwise noted.

Pre-settlement vegetation was likely an Oak-Hickory Forest with White Oak, Post Oak, Southern Red Oak, Black Oak, and Shagbark Hickory being most common.

Cambron Wooded Site Watershed



Cambron Elevation - 5 foot contours



Acreage of various landform positions within the watershed

Summit	Shoulder	Backslope	Footslope	Toeslope
3.96	2.19	2.47	.56	.13

Series: Wellston
Classification: Fine-silty, mixed, active, mesic Typic Hapludalf
Landform Position: Shoulder
Site 2 on map (wooded)
Parent Materials:
Peoria Loess is from 3 to 81 cm
Roxana Loess/Residuum mixture from 81 cm to 102 cm
Sandstone at 102 cm

Wellston Description

Oi--0 to 1 centimeters (0.0 to 0.4 inches); very dark grayish brown (10YR 3/2) slightly decomposed plant material; very friable; many fine roots throughout; abrupt smooth boundary.

Oe--1 to 3 centimeters (0.4 to 1.2 inches); very dark grayish brown (10YR 3/2) moderately decomposed plant material; moderate fine granular structure; very friable; many fine roots throughout; abrupt smooth boundary.

A--3 to 6 centimeters (1.2 to 2.4 inches); brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2), dry; 5 percent sand; 80 percent silt; 15 percent clay; weak fine granular structure; very friable; many fine roots throughout; abrupt smooth boundary.

E--6 to 19 centimeters (2.4 to 7.5 inches); dark yellowish brown (10YR 4/6) silt loam; 5 percent sand; 80 percent silt; 15 percent clay; moderate fine granular structure; friable; many fine roots throughout and few coarse roots throughout; abrupt smooth boundary.

Bt1--19 to 51 centimeters (7.5 to 20.1 inches); brown (7.5YR 4/4) silt loam; 5 percent sand; 73

percent silt; 22 percent clay; moderate medium subangular blocky structure; friable; common fine roots throughout and common medium roots throughout; 15 percent discontinuous faint strong brown (7.5YR 4/6), moist, clay films on all faces of peds; 1 percent fine prominent irregular black (10YR 2/1), moist, manganese coatings with diffuse boundaries between peds; clear wavy boundary.

Bt2--51 to 62 centimeters (20.1 to 24.4 inches); brown (7.5YR 4/4) silt loam; 5 percent sand; 69 percent silt; 26 percent clay; moderate medium subangular blocky structure; friable; few fine roots throughout; 15 percent patchy distinct brown (10YR 5/3), moist, silt coats on all faces of peds and 75 percent continuous distinct strong brown (7.5YR 4/6), moist, clay films on all faces of peds; 5 percent fine prominent irregular black (10YR 2/1), moist, manganese coatings with diffuse boundaries between peds; clear wavy boundary.

Bt3--62 to 81 centimeters (24.4 to 31.9 inches); strong brown (7.5YR 4/6) silty clay loam; 20 percent sand; 50 percent silt; 30 percent clay; moderate medium subangular blocky structure; firm; few fine roots throughout; 15 percent patchy distinct brown (10YR 5/3), moist, silt coats on all faces of peds and 75 percent continuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 10 percent fine prominent irregular black (10YR 2/1), moist, manganese coatings with diffuse boundaries between peds; clear wavy boundary.

2Bt4--81 to 102 centimeters (31.9 to 40.2 inches); yellowish red (5YR 4/6) silt loam; 22 percent sand; 53 percent silt; 25 percent clay; moderate medium subangular blocky structure; firm; few fine roots; 15 percent patchy faint brown (7.5YR 4/4), moist, clay films on all faces of peds; 3 percent fine prominent irregular black (10YR 2/1), moist, manganese coatings with diffuse boundaries between peds; 5 percent flat subangular indurated 2-to 33-millimeter sandstone fragments; abrupt smooth boundary.

2R--102 to 127 centimeters (40.2 to 50.0 inches); indurated sandstone bedrock.

*** Primary Characterization Data ***

Pedon ID: S11KY149002 (McLean, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled as on Mar 08, 2011: Wellston ; Fine-silty, mixed, active, mesic Ultic Hapludalf
Revised to :

SSL - Project C2011USKY101 KY Shawnee Hills Loess
- Site ID S11KY149002 Lat: 37° 35' 57.62" north Long: 87° 20' 36.83" west NAD83
- Pedon No. 11N7128
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
11N05259	Oi		0.0-1.0	S11KY149002-1			SPM	SI
11N05260	A		1.0-3.0	S11KY149002-2			SIL	SIL
11N05261	E		3.0-19.0	S11KY149002-3			SIL	SIL
11N05262	Bt1		19.0-34.0	S11KY149002-4			SIL	SIL
11N05263	Bt2		34.0-51.0	S11KY149002-5			SIL	SIL
11N05264	Bt3		51.0-62.0	S11KY149002-6			SIL	SIL
11N05265	Bt4		62.0-81.0	S11KY149002-7			SICL	SIL
11N05266	2Bt5		81.0-102.0	S11KY149002-8			SIL	SIL
11N05267	2R		102.0-127.0	S11KY149002-9			BR	LCOS

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	8.493	% wt
Volume, >2mm, Weighted Average	0.583	% vol
Clay, total, Weighted Average	22.554	% wt
Clay, carbonate free, Weighted Average	22.554	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 4	0.514	(NA)

Weighted averages based on control section: 16-66 cm

*** Primary Characterization Data ***

Pedon ID: S11KY149002 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Wellston Fine-silty, mixed, active, mesic Ultic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 11N7128

PSDA & Rock Fragments

Layer	Depth (cm)	Horz	Prep	-1- Clay < .002	-2- Silt .002-.05	-3- Sand .05-2	-4- Clay Fine < .0002	-5- Clay CO_3 < .002	-6- Silt Fine .002-.02	-7- Silt Coarse .02-.05	-8- Sand VF .05-.10	-9- Sand F .10-.25	-10- Sand M .25-.50	-11- Sand C .5-1	-12- Sand VC 1-2	-13- Rock Fragments (mm) 2-5	-14- Rock Fragments (mm) 5-20	-15- Rock Fragments (mm) 20-75	-16- Rock Fragments (mm) .1-75	-17- >2 mm wt % whole soil
				(- - - - - Total - - - - - -)			(- - Clay - - -)		(- - - - Silt - - - - -)		(- - - - - - - - - - - - Sand - - - - - - - - - - - -)					(Rock Fragments (mm))				
				(- % of <2mm Mineral Soil -)												(- - - - - - - Weight - - - - - - - -)				
				3A1a1a					3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a	(- - - - - - - % of <75mm - - - - - -)				
11N05259	0-1	Oi	S	10.7	80.8	8.5			47.2	33.6	2.9	2.3	2.3	0.9	0.1	--	--	--	6	--
11N05260	1-3	A	S	16.5	79.8	3.7			40.6	39.2	1.0	1.2	1.0	0.4	0.1	--	--	--	3	--
11N05261	3-19	E	S	20.4	76.9	2.7			41.8	35.1	0.8	0.6	1.2	0.1	--	--	--	--	2	--
11N05262	19-34	Bt1	S	24.8	72.0	3.2			41.8	30.2	0.8	0.7	1.3	0.4	tr	--	--	--	2	--
11N05263	34-51	Bt2	S	22.1	67.4	10.5			39.2	28.2	1.8	2.1	5.3	1.0	0.3	--	--	--	9	--
11N05264	51-62	Bt3	S	21.1	65.3	13.6			36.7	28.6	2.1	3.0	5.4	2.8	0.3	--	tr	4	15	4
11N05265	62-81	Bt4	S	21.6	58.4	20.0			33.7	24.7	2.6	4.1	7.8	4.5	1.0	--	--	--	17	--
11N05266	81-102	2Bt5	S	20.5	57.8	21.7			33.8	24.0	3.1	7.7	5.3	4.9	0.7	tr	1	1	20	2
11N05267	102-127	2R	S	4.0	9.2	86.8			5.0	4.2	5.3	9.6	19.0	36.7	16.2	--	--	--	82	--

Bulk Density & Moisture

Layer	Depth (cm)	Horz	Prep	-1- (Bulk Density) 33 kPa	-2- (Bulk Density) Oven Dry	-3- Cole Whole Soil	-4- (Water Content) 6 kPa	-5- (Water Content) 10 kPa	-6- (Water Content) 33 kPa	-7- (Water Content) 1500 kPa	-8- (Water Content) 1500 kPa Moist	-9- Ratio AD/OD	-10- WRD Whole Soil	-11- Aggst Stabl 2-0.5mm	-12- (Ratio/Clay) CEC7	-13- (Ratio/Clay) 1500 kPa
				(- - - g cm^{-3} - - -)			(- - - - - - - - - - - - pct of < 2mm - - - - - - - - - - - -)						cm^3 cm^{-3}	%		
				DbWR1	DbWR1				DbWR1	3C2a1a		3D1				
11N05259	0-1	Oi	S									1.099				
11N05260	1-3	A	S							22.4		1.025			1.48	1.36
11N05261	3-19	E	S	1.52	1.57	0.011			17.3	14.2		1.013	0.05		0.50	0.70
11N05262	19-34	Bt1	S	1.57	1.69	0.025			18.5	17.1		1.016	0.02		0.56	0.69
11N05263	34-51	Bt2	S	1.68	1.75	0.014			17.6	14.0		1.014	0.06		0.48	0.63
11N05264	51-62	Bt3	S	1.73	1.80	0.013			16.0	13.4		1.014	0.04		0.52	0.64
11N05265	62-81	Bt4	S	1.76	1.85	0.017			15.7	14.4		1.014	0.02		0.48	0.67
11N05266	81-102	2Bt5	S	1.82	1.90	0.014			13.6	13.0		1.013	0.01		0.47	0.63
11N05267	102-127	2R	S									1.012				

*** Primary Characterization Data ***

Pedon ID: S11KY149002 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Wellston Fine-silty, mixed, active, mesic Ultic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 11N7128

Carbon & Extractions

Layer	Depth (cm)	Horz	Prep	-1- (-----Total-----) C (----------% of <2 mm----------) 4H2a	-2- N 4H2a	-3- S 4H2a	-4- Est OC	-5- OC (WB)	-6- C/N Ratio	-7- (---Dith-Cit Ext---) Fe (----------% of < 2mm----------) 4G1	-8- Al 4G1	-9- Mn 4G1	-10- (------Ammonium Oxalate Extraction------) Al+½Fe	-11- ODOE 4G2a	-12- Fe 4G2a	-13- Al 4G2a	-14- Si 4G2a	-15- Mn mg kg^{-1} 4G2a	-16- (---Na Pyro-Phosphate---) C (------% of < 2mm-----)	-17- Fe	-18- Al	-19- Mn
11N05259	0-1	Oi	S	45.85	2.25	0.22	45.9		20													
11N05260	1-3	A	S	7.15	0.55	0.04	7.2		13	1.4	0.2	0.1	0.30	0.15	0.27	0.16	0.02	861.7				
11N05261	3-19	E	S	0.84	0.05	0.01	0.8		16	2.1	0.2	tr	0.37	0.05	0.46	0.14	0.02	106.9				
11N05262	19-34	Bt1	S	0.38	0.10	0.02	0.4		4	2.6	0.2	tr	0.50	0.06	0.67	0.16	0.04	159.0				
11N05263	34-51	Bt2	S	0.11	0.05	0.01	0.1		2	2.2	0.2	tr	0.39	0.06	0.54	0.11	0.05	194.3				
11N05264	51-62	Bt3	S	0.10	0.04	0.01	0.1		3	2.1	0.1	tr	0.28	0.05	0.40	0.08	0.05	146.6				
11N05265	62-81	Bt4	S	0.10	--	0.01	0.1			2.5	0.1	tr	0.18	0.03	0.23	0.07	0.03	118.9				
11N05266	81-102	2Bt5	S	0.24	0.10	0.01	0.2		3	1.9	0.1	tr	0.11	0.01	0.12	0.05	0.02	163.7				

CEC & Bases

Layer	Depth (cm)	Horz	Prep	-1- (------NH_4OAC Extractable Bases-----) Ca (----------cmol(+) kg^{-1}----------) 4B1a1a	-2- Mg 4B1a1a	-3- Na 4B1a1a	-4- K 4B1a1a	-5- Sum Bases	-6- Acid-ity 4B2b1a1	-7- Extr Al 4B3a1a	-8- KCl Mn mg kg^{-1} 4B3a1a	-9- CEC8 Sum Cats (----cmol(+) kg^{-1}---)	-10- CEC7 NH_4 OAC 4B1a1a	-11- ECEC Bases +Al	-12- Al Sat (--------%--------)	-13- (----Base----) (-Saturation-) Sum	-14- NH_4OAC
11N05260	1-3	A	S	19.5*	5.1	--	0.7	25.3	16.1			41.4	24.5			61	100
11N05261	3-19	E	S	0.8	1.1	--	0.2	2.1	14.5	4.5	2.4	16.6	10.1			13	21
11N05262	19-34	Bt1	S	1.2	3.1	--	0.2	4.5	13.1	3.5	1.1	17.6	13.8			26	33
11N05263	34-51	Bt2	S	1.7	4.0	--	0.1	5.8	10.3	2.0	0.8	16.1	10.7			36	54
11N05264	51-62	Bt3	S	2.2	5.0	--	0.1	7.3	8.7	1.2	0.5	16.0	10.9			46	67
11N05265	62-81	Bt4	S	2.7	5.6	--	0.1	8.4	6.5	0.6	0.7	14.9	10.4			56	81
11N05266	81-102	2Bt5	S	3.2	5.5	--	tr	8.7	5.7	0.4	1.0	14.4	9.6			60	91

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

*** Primary Characterization Data ***

Pedon ID: S11KY149002 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Wellston Fine-silty, mixed, active, mesic Ultic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 11N7128

Salt

Layer	Depth (cm)	Horz	Prep	-1- Ca	-2- Mg	-3- Na	-4- K	-5- CO_3	-6- HCO_3	-7- F	-8- Cl	-9- PO_4	-10- Br	-11- OAC	-12- SO_4	-13- NO_2	-14- NO_3	-15- H_2O	-16- Total Salts	-17- Elec Cond	-18- Pred Elec Cond	-19- Exch Na	-20- SAR
				(- Water Extracted From Saturated Paste -)																			
				(- - - - - mmol(+) L^{-1} - - - - -)				(- mmol(-) L^{-1} -)								(- - - - % - - - -)		(- - dS m^{-1} - -)		%	
11N05260	1-3	A	S																			--	
11N05261	3-19	E	S																			--	
11N05262	19-34	Bt1	S																			--	
11N05263	34-51	Bt2	S																			--	
11N05264	51-62	Bt3	S																			--	
11N05265	62-81	Bt4	S																			--	
11N05266	81-102	2Bt5	S																			--	

pH & Carbonates

Layer	Depth (cm)	Horz	Prep	-1- KCl	-2- $CaCl_2$ 0.01M 1:2 4C1a2a	-3- H_2O 1:1 4C1a2a	-4- Sat Paste	-5- Oxid	-6- NaF	-7- Carbonate As $CaCO_3$ <2mm	-8- Carbonate As $CaCO_3$ <20mm	-9- Gypsum As $CaSO_4*2H_2O$ <2mm	-10- Gypsum As $CaSO_4*2H_2O$ <20mm	-11- Resist ohms cm^{-1}
				(- - - - - - - - - - - - - - - - - - pH - - - - - - - - - - - - - - - - -)						(- - Carbonate - -)		(- - Gypsum - - -)		
										(- - - - - - - - - - - - % - - - - - - - - - - - -)				
11N05260	1-3	A	S		5.6	5.8								
11N05261	3-19	E	S		4.0	4.5								
11N05262	19-34	Bt1	S		4.3	5.1								
11N05263	34-51	Bt2	S		4.4	5.2								
11N05264	51-62	Bt3	S		4.4	5.3								
11N05265	62-81	Bt4	S		4.6	5.5								
11N05266	81-102	2Bt5	S		4.5	5.4								

*** Supplementary Characterization Data ***

Pedon ID: S11KY149002 (McLean County, Kentucky) Print Date: Apr 13 2012 9:59AM

Sampled As : Wellston Fine-silty, mixed, active, mesic Ultic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 11N7128

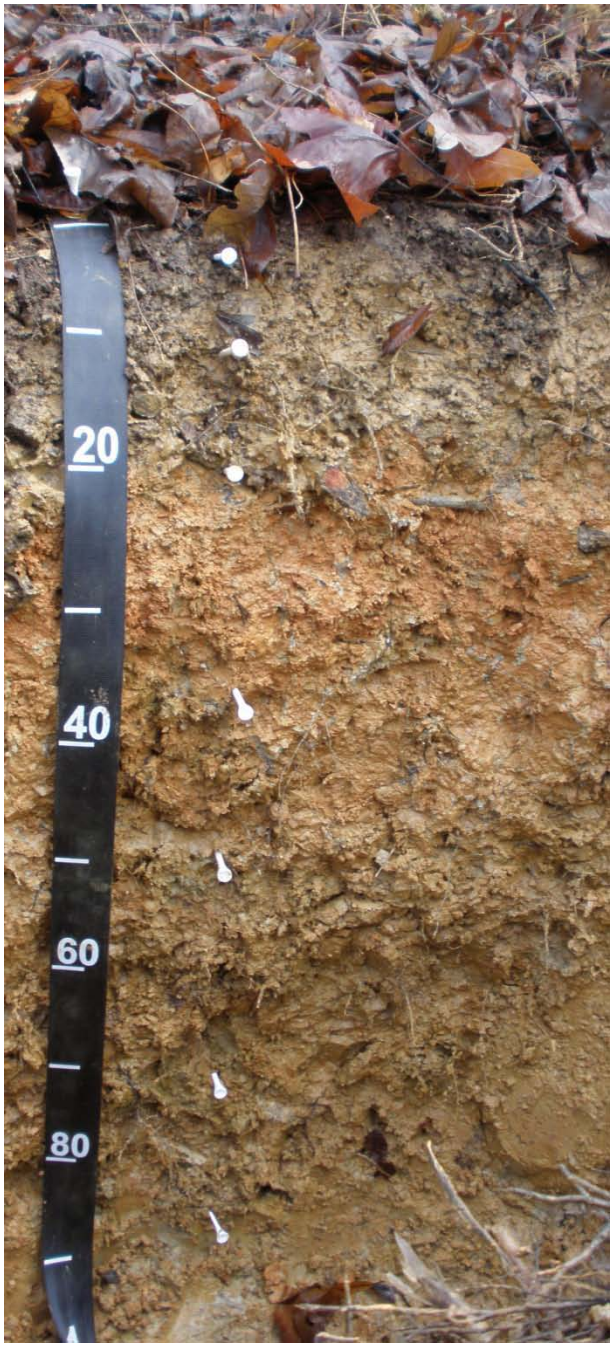
Tier 3

Layer	Depth (cm)	Horz	Prep	-51- (Volume Fractions, Whole Soil (mm) At 33 kPa) >2	-52- 250 -UP	-53- 250 -75	-54- 75 -2	-55- 75 -20	-56- 20 -5	-57- 5 -2	-58- <2	-59- 2- .05	-60- .05- .002	-61- LT .002	-62- Pores D	-63- Pores F	-64- C /N Rat -io	-65- Fine Clay	-66- (Ratios To Clay, <2 mm Fraction) CEC Sum Cats	-67- CEC NH4-OAC	-68- CEC 1500 kPa H2O	-69- CEC LEP 33 kPa	-70- (Linear Extensiblity, Whole Soil) 33 kPa 1500 kPa	-71- 33 kPa Oven -dry	-72- (Linear Extensiblity, <2 mm to %) 1500 kPa	-73- <2 mm to % Oven -dry	-74- (WRD, Whole Soil) (---in3/in3---)	-75- (WRD, <2 mm) (---in3/in3---)
				(% of Whole Soil)																								
11N05259	0-1	Oi	S	--	--	--	--	--	--	--	100	5	44	6			20											
11N05260	1-3	A	S	--	--	--	--	--	--	--	100	2	44	9			13		2.51	1.48	1.36							
11N05261	3-19	E	S	--	--	--	--	--	--	--	100	2	44	12	17	26	16		0.81	0.50	0.70	0.054	0.2	1.1	0.2	1.1	0.05	0.05
11N05262	19-34	Bt1	S	--	--	--	--	--	--	--	100	2	42	15	11	30	4		0.71	0.56	0.69	0.101	0.2	2.5	0.2	2.5	0.02	0.02
11N05263	34-51	Bt2	S	--	--	--	--	--	--	--	100	7	42	14	7	30	2		0.73	0.48	0.63	0.063	0.4	1.4	0.4	1.4	0.06	0.06
11N05264	51-62	Bt3	S	3	--	--	3	3	tr	--	97	9	42	13	8	26	3		0.76	0.52	0.64	0.062	0.2	1.3	0.2	1.3	0.04	0.04
11N05265	62-81	Bt4	S	--	--	--	--	--	--	--	100	13	39	14	6	28			0.69	0.48	0.67	0.079	0.2	1.7	0.2	1.7	0.02	0.02
11N05266	81-102	2Bt5	S	1	--	--	1	1	1	tr	99	15	39	14	7	24	3		0.70	0.47	0.63	0.068	--	1.4	--	1.4	0.01	0.01
11N05267	102-127	2R	S	--	--	--	--	--	--	--	100	47	5	2														

Tier 4

Layer	Depth (cm)	Horz	Prep	-76- (Weight Fractions - Clay Free, Whole Soil) >2	-77- 75 -20	-78- 20 -2	-79- 2- .05	-80- .05- .002	-81- < .002	-82- (<2 mm Fraction, Sands) VC	-83- C	-84- M	-85- F	-86- VF	-87- (Silts) C	-88- F	-89- Clay	-90-	-91- Texture by PSDA <2 mm	-92- PSDA (mm) Sand 2- .05	-93- Silt .05- .002	-94- Clay < .002	-95- pH Ca Cl2 .01M	-96- Elect. Resist. ohms	-97- Elect. Conduct dS m-1	-98- Particle Density g cm-3
				(% of >2 mm Sand and Silt)						(% of Sand and Silt)										(% of 2 mm)			(<2 mm)			
																							3A1a1a4C1a2a			
11N05259	0-1	Oi	S	--	--	--	10	90	12	tr	1	3	3	3	38	53	12		si	8.5	80.8	10.7				
11N05260	1-3	A	S	--	--	--	4	96	20	tr	tr	1	1	1	47	49	20		sil	3.7	79.8	16.5	5.6			
11N05261	3-19	E	S	--	--	--	3	97	26	--	tr	2	1	1	44	53	26		sil	2.7	76.9	20.4	4.0			
11N05262	19-34	Bt1	S	--	--	--	4	96	33	--	1	2	1	1	40	56	33		sil	3.2	72.0	24.8	4.3			
11N05263	34-51	Bt2	S	--	--	--	13	87	28	tr	1	7	3	2	36	50	28		sil	10.5	67.4	22.1	4.4			
11N05264	51-62	Bt3	S	5	5	--	16	79	25	tr	4	7	4	3	36	47	27		sil	13.6	65.3	21.1	4.4			
11N05265	62-81	Bt4	S	--	--	--	26	74	28	1	6	10	5	3	32	43	28		sil	20.0	58.4	21.6	4.6			
11N05266	81-102	2Bt5	S	3	3	1	27	71	25	1	6	7	10	4	30	43	26		sil	21.7	57.8	20.5	4.5			
11N05267	102-127	2R	S	--	--	--	90	10	4	17	38	20	10	6	4	5	4		lcos	86.8	9.2	4.0				

Series: Lenberg, moderately well drained
Classification: Fine, mixed, active, mesic Aquic Hapludalf
Landform Position: backslope
Site 3 on map (wooded)
Parent Material: Thin loess (1 – 18 cm) overlies residuum from shale
Oxidized Rhizospheres in gray layer at 75 to 89 cm



Lenberg (mwd) Description

Oi--0 to 1 centimeters (0.0 to 0.4 inches); very dark grayish brown (10YR 3/2) slightly decomposed plant material; very friable; many fine roots throughout; abrupt smooth boundary.

Oe--1 to 2 centimeters (0.4 to 0.8 inches); very dark grayish brown (10YR 3/2) moderately decomposed plant material; moderate fine granular structure; very friable; many fine roots throughout; abrupt smooth boundary.

A--2 to 9 centimeters (0.8 to 3.5 inches); brown (10YR 4/3) silt loam; 5 percent sand; 78 percent silt; 17 percent clay; moderate fine granular structure; friable; many fine roots throughout and many medium roots throughout; 1 percent fine distinct spherical yellowish red (5YR 4/6), moist, iron-manganese masses with sharp boundaries throughout; abrupt smooth boundary.

Bt1--9 to 18 centimeters (3.5 to 7.1 inches); dark yellowish brown (10YR 4/4) silt loam; 7 percent sand; 67 percent silt; 26 percent clay; strong medium prismatic parts to strong medium angular blocky structure; friable; many fine roots throughout and common medium roots throughout; 26 percent continuous distinct yellowish brown (10YR 5/4), moist, clay films on all faces of peds; 1

percent fine distinct spherical yellowish red (5YR 4/6), moist, iron-manganese masses with sharp boundaries throughout; abrupt smooth boundary.

2Bt2--18 to 36 centimeters (7.1 to 14.2 inches); yellowish red (5YR 4/6) clay; 15 percent sand; 37 percent silt; 48 percent clay; strong medium prismatic parts to strong medium angular blocky structure; very firm; common fine roots between peds and common medium roots between peds and common coarse roots between peds; 45 percent continuous distinct reddish brown (5YR 4/4), moist, clay films on all faces of peds; 1 percent fine distinct cylindrical moderately cemented yellowish red (5YR 4/6), moist, iron-manganese nodules with sharp boundaries throughout and 10 percent fine prominent cylindrical very weakly cemented grayish brown (2.5Y 5/2), moist, iron depletions with diffuse boundaries on surfaces along root channels; 5 percent nonflat subangular strongly cemented 2-to 75-millimeter sandstone fragments; clear smooth boundary.

2Bt3--36 to 55 centimeters (14.2 to 21.7 inches); yellowish red (5YR 4/6) clay; 17 percent sand; percent silt; 52 percent clay; moderate medium prismatic structure; very firm; common fine roots between peds and common medium roots between peds and common coarse roots between peds; 50 percent continuous distinct reddish brown (5YR 4/4), moist, clay films on all faces of peds; 15 percent fine prominent cylindrical very weakly cemented grayish brown (2.5Y 5/2), moist, iron depletions with diffuse boundaries on surfaces along root channels; 5 percent nonflat subangular strongly cemented 2-to 75-millimeter sandstone fragments; abrupt smooth boundary.

2Bt4--55 to 75 centimeters (21.7 to 29.5 inches); strong brown (7.5YR 4/6) clay; 15 percent sand; 39 percent silt; 46 percent clay; moderate medium prismatic structure; very firm; few fine roots between peds; 15 percent discontinuous distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 15 percent fine prominent irregular very weakly cemented grayish brown (2.5Y 5/2), moist, iron depletions with diffuse boundaries throughout; 10 percent nonflat subangular strongly cemented 2-to 75-millimeter sandstone fragments; clear smooth boundary.

2BC--75 to 89 centimeters (29.5 to 35.0 inches); grayish brown (2.5Y 5/2) silty clay; 15 percent sand; 45 percent silt; 40 percent clay; moderate thin platy structure; very firm; few fine roots between peds; 10 percent medium prominent irregular very weakly cemented red (2.5YR 4/6), moist, masses of oxidized iron with diffuse boundaries throughout and 40 percent medium prominent irregular very weakly cemented strong brown (7.5YR 4/6), moist, masses of oxidized iron with diffuse boundaries throughout; 10 percent nonflat subangular strongly cemented 2-to 75millimeter sandstone fragments; clear smooth boundary.

2Cr--89 to 114 centimeters (35.0 to 44.9 inches); pale olive (5Y 6/4) moderately cemented clayey shale bedrock; 15 percent sand; 53 percent silt; 32 percent clay; moderate thin platy structure; extremely firm.

*** Primary Characterization Data ***

Pedon ID: S11KY149003 (McLean, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled as on Mar 22, 2011: Lenberg ; Fine, mixed, active, mesic Aquic Hapludalf
Revised to :

SSL - Project C2011USKY101 KY Shawnee Hills Loess
- Site ID S11KY149003 Lat: 37° 35' 56.95" north Long: 87° 20' 37.05" west NAD83
- Pedon No. 11N7129
- General Methods 1B1A, 2A1, 2B

United States Department of Agriculture
Natural Resources Conservation Service
National Soil Survey Center
Soil Survey Laboratory
Lincoln, Nebraska 68508-3866

Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3	Field Texture	Lab Texture
11N05268	Oi		0.0-1.0	S11KY149003-1			SPM	L
11N05269	A1		1.0-2.0	S11KY149003-2			SIL	SIL
11N05270	A2		2.0-9.0	S11KY149003-3			SIL	SIL
11N05271	Bt1		9.0-18.0	S11KY149003-4			SIL	SIL
11N05272	2Bt2		18.0-36.0	S11KY149003-5			C	C
11N05273	2Bt3		36.0-51.0	S11KY149003-6			C	SIC
11N05274	2Bt4		51.0-75.0	S11KY149003-7			C	SIC
11N05275	2BC		75.0-89.0	S11KY149003-8			SIC	SICL
11N05276	2Cr		89.0-114.0	S11KY149003-9			BR	SICL

Pedon Calculations

Calculation Name	Result	Units of Measure
Weighted Particles, 0.1-75mm, 75 mm Base	6.977	% wt
Volume, >2mm, Weighted Average	0.534	% vol
Clay, total, Weighted Average	47.057	% wt
Clay, carbonate free, Weighted Average	47.057	% wt
CEC Activity, CEC7/Clay, Weighted Average, CECd, Set 4	0.467	(NA)

Weighted averages based on control section: 9-59 cm

*** Primary Characterization Data ***

Pedon ID: S11KY149003 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Lenberg Fine, mixed, active, mesic Aquic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 11N7129

PSDA & Rock Fragments

Layer	Depth (cm)	Horz	Prep	-1- (- - - - - Total - - - - - -) Clay < .002	-2- Silt .002 -.05	-3- Sand .05 -2	-4- (- - Clay - - -) Fine < .0002	-5- CO_3 < .002	-6- (- - - - Silt - - - - -) Fine .002 -.02	-7- Coarse .02 -.05	-8- (- - - - - - - - - - - - Sand - - - - - - - - - - - -) VF .05 -.10	-9- F .10 -.25	-10- M .25 -.50	-11- C .5 -1	-12- VC 1 -2	-13- (Rock Fragments (mm)) (- - - - - - - - Weight - - - - - - - -) 2 -5	-14- 5 -20	-15- 20 -75	-16- .1- 75	-17- >2 mm wt % whole soil
				(- % of <2mm Mineral Soil -)												(- - - - - - - % of <75mm - - - - - -)				
				3A1a1a					3A1a1a		3A1a1a	3A1a1a	3A1a1a	3A1a1a	3A1a1a					
11N05268	0-1	Oi	S	19.3	47.3	33.4			29.8	17.5	10.3	11.4	5.5	4.6	1.6	--	--	--	23	--
11N05269	1-2	A1	S	14.8	62.9	22.3			30.8	32.1	5.2	11.2	3.7	1.9	0.3	--	1	--	18	1
11N05270	2-9	A2	S	16.8	57.9	25.3			30.1	27.8	4.9	12.8	3.9	2.5	1.2	1	--	--	21	1
11N05271	9-18	Bt1	S	19.8	54.6	25.6			29.1	25.5	4.5	11.9	4.1	2.7	2.4	2	--	--	23	2
11N05272	18-36	2Bt2	S	55.3	39.9	4.8			33.9	6.0	0.9	2.2	0.5	0.6	0.6	1	--	--	5	1
11N05273	36-51	2Bt3	S	53.1	44.6	2.3			39.5	5.1	0.6	0.7	0.5	0.2	0.3	--	--	--	2	--
11N05274	51-75	2Bt4	S	47.9	47.3	4.8			39.0	8.3	1.8	1.1	0.7	0.9	0.3	1	--	--	4	1
11N05275	75-89	2BC	S	35.3	55.5	9.2			39.0	16.5	5.4	2.0	0.6	0.8	0.4	1	--	--	5	1
11N05276	89-114	2Cr	S	28.3	61.2	10.5			39.5	21.7	9.3	1.0	0.2	tr	tr	--	--	--	1	--

Bulk Density & Moisture

Layer	Depth (cm)	Horz	Prep	-1- (Bulk Density) 33 kPa (- - - g cm^{-3} - - -) DbWR1	-2- Oven Dry DbWR1	-3- Cole Whole Soil	-4- (- - - - - - - - - - - Water Content - - - - - - - - - - -) 6 kPa (- - - - - - - - - - - - pct of < 2mm - - - - - - - - - - - -)	-5- 10 kPa	-6- 33 kPa DbWR1	-7- 1500 kPa 3C2a1a	-8- 1500 kPa Moist	-9- Ratio AD/OD 3D1	-10- WRD Whole Soil cm^3 cm^{-3}	-11- Aggst Stabl 2-0.5mm %	-12- (- - Ratio/Clay - -) CEC7	-13- 1500 kPa
11N05268	0-1	Oi	S									1.094				
11N05269	1-2	A1	S							27.8		1.035			2.29	1.88
11N05270	2-9	A2	S	1.66	1.72	0.012			16.2	12.4		1.011	0.06		0.54	0.74
11N05271	9-18	Bt1	S	1.66	1.70	0.008			16.1	13.5		1.012	0.04		0.54	0.68
11N05272	18-36	2Bt2	S	1.53	1.82	0.059			24.9	22.0		1.033	0.04		0.49	0.40
11N05273	36-51	2Bt3	S	1.64	1.87	0.045			20.9	19.7		1.031	0.02		0.44	0.37
11N05274	51-75	2Bt4	S	1.62	1.97	0.067			21.5	19.4		1.029	0.03		0.39	0.41
11N05275	75-89	2BC	S	1.73	1.97	0.044			18.9	15.9		1.021	0.05		0.39	0.45
11N05276	89-114	2Cr	S	1.90	2.15	0.042			13.8	9.7		1.015	0.08			0.34

*** Primary Characterization Data ***

Pedon ID: S11KY149003 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Lenberg Fine, mixed, active, mesic Aquic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 11N7129

Carbon & Extractions

Layer	Depth (cm)	Horz	Prep	-1- C (Total)	-2- N (Total)	-3- S (Total)	-4- Est OC	-5- OC (WB)	-6- C/N Ratio	-7- Fe (Dith-Cit Ext)	-8- Al (Dith-Cit Ext)	-9- Mn (Dith-Cit Ext)	-10- Al+½Fe (Ammonium Oxalate Extraction)	-11- ODOE (Ammonium Oxalate Extraction)	-12- Fe (Ammonium Oxalate Extraction)	-13- Al (Ammonium Oxalate Extraction)	-14- Si (Ammonium Oxalate Extraction)	-15- Mn (Ammonium Oxalate Extraction)	-16- C (Na Pyro-Phosphate)	-17- Fe (Na Pyro-Phosphate)	-18- Al (Na Pyro-Phosphate)	-19- Mn (Na Pyro-Phosphate)
				% of <2 mm						% of < 2mm								mg kg^{-1}	% of < 2mm			
				4H2a	4H2a	4H2a				4G1	4G1	4G1		4G2a	4G2a	4G2a	4G2a	4G2a				
11N05268	0-1	Oi	S	44.26	1.65	0.15	44.3		27													
11N05269	1-2	A1	S	11.31	0.75	0.04	11.3		15	1.0	0.3	0.1	0.34	0.24	0.20	0.23	0.02	1049.9				
11N05270	2-9	A2	S	1.30	0.11	tr	1.3		12	1.7	0.1	tr	0.35	0.09	0.51	0.10	0.02	132.9				
11N05271	9-18	Bt1	S	0.85	0.13	0.01	0.9		7	2.3	0.2	--	0.34	0.07	0.46	0.11	0.02	71.6				
11N05272	18-36	2Bt2	S	0.40	0.10	0.02	0.4		4	3.2	0.3	--	0.41	0.03	0.36	0.23	0.04	12.5				
11N05273	36-51	2Bt3	S	0.27	0.03	0.02	0.3		9	2.5	0.2	--	0.23	0.02	0.18	0.14	0.03	13.7				
11N05274	51-75	2Bt4	S	0.22	0.06	0.02	0.2		3	3.8	0.1	tr	0.15	0.02	0.14	0.08	0.03	53.9				
11N05275	75-89	2BC	S	0.13	0.09	0.02	0.1		2	3.7	0.1	tr	0.12	0.01	0.13	0.05	0.03	77.4				
11N05276	89-114	2Cr	S							0.7	0.1	--	0.08	0.01	0.08	0.04	0.02	82.0				

CEC & Bases

Layer	Depth (cm)	Horz	Prep	-1- Ca (NH_4OAC Extractable Bases)	-2- Mg	-3- Na	-4- K	-5- Sum Bases	-6- Acid-ity	-7- Extr Al	-8- KCl Mn	-9- CEC8 Sum Cats	-10- CEC7 NH_4 OAC	-11- ECEC Bases +Al	-12- Al Sat	-13- Base Saturation Sum	-14- Base Saturation NH_4OAC
				cmol(+) kg^{-1}							mg kg^{-1}	cmol(+) kg^{-1}			%		
				4B1a1a	4B1a1a	4B1a1a	4B1a1a		4B2b1a1	4B3a1a	4B3a1a		4B1a1a				
11N05269	1-2	A1	S	28.5*	6.3	--	0.5	35.3	23.3			58.6	33.9			60	100
11N05270	2-9	A2	S	1.7	1.0	--	0.1	2.8	14.0	2.5	8.4	16.8	9.1			17	31
11N05271	9-18	Bt1	S	0.5	0.9	--	0.2	1.6	14.6	4.3	4.0	16.2	10.6			10	15
11N05272	18-36	2Bt2	S	6.4	8.5	--	0.3	15.2	26.8	11.2	0.3	42.0	26.9			36	57
11N05273	36-51	2Bt3	S	10.7*	13.4	--	0.3	24.4	15.0	3.0	0.2	39.4	23.6			62	100
11N05274	51-75	2Bt4	S	12.5*	13.8	--	0.3	26.6	9.3			35.9	18.8			74	100
11N05275	75-89	2BC	S	10.2*	10.2	--	0.4	20.8	6.9			27.7	13.7			75	100

*Extractable Ca may contain Ca from calcium carbonate or gypsum. CEC7 base saturation set to 100.

*** Primary Characterization Data ***

Pedon ID: S11KY149003 (McLean County, Kentucky) Print Date: Apr 13 2012 9:58AM

Sampled As : Lenberg Fine, mixed, active, mesic Aquic Hapludalf

USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 11N7129

Salt

Layer	Depth (cm)	Horz	Prep	-1- Ca	-2- Mg	-3- Na	-4- K	-5- CO_3	-6- HCO_3	-7- F	-8- Cl	-9- PO_4	-10- Br	-11- OAC	-12- SO_4	-13- NO_2	-14- NO_3	-15- H_2O	-16- Total Salts	-17- Elec Cond	-18- Pred Elec Cond	-19- Exch Na	-20- SAR
				(Water Extracted From Saturated Paste)																			
				(- - - - - mmol(+) L^{-1} - - - - -)				(- - - - mmol(-) L^{-1} - - - -)										(- - - - % - - - -)		(- - dS m^{-1} - -)		%	
11N05269	1-2	A1	S																			--	
11N05270	2-9	A2	S																			--	
11N05271	9-18	Bt1	S																			--	
11N05272	18-36	2Bt2	S																			--	
11N05273	36-51	2Bt3	S																			--	
11N05274	51-75	2Bt4	S																			--	
11N05275	75-89	2BC	S																			--	

pH & Carbonates

Layer	Depth (cm)	Horz	Prep	-1- KCl	-2- $CaCl_2$ 0.01M 1:2 4C1a2a	-3- H_2O 1:1 4C1a2a	-4- Sat Paste	-5- Oxid	-6- NaF	-7- Carbonate As $CaCO_3$ <2mm	-8- Carbonate As $CaCO_3$ <20mm	-9- Gypsum As $CaSO_4*2H_2O$ <2mm	-10- Gypsum As $CaSO_4*2H_2O$ <20mm	-11- Resist ohms cm^{-1}
				(pH)						(- - - - % - - - -)				
11N05269	1-2	A1	S		5.7	5.8								
11N05270	2-9	A2	S		4.3	5.2								
11N05271	9-18	Bt1	S		4.0	5.0								
11N05272	18-36	2Bt2	S		4.2	5.2								
11N05273	36-51	2Bt3	S		4.6	5.3								
11N05274	51-75	2Bt4	S		5.5	6.2								
11N05275	75-89	2BC	S		6.6	7.1								

*** Supplementary Characterization Data ***

(McLean County, Kentucky)

Pedon ID: S11KY149003 | Print Date: Apr 13 2012 9:59AM

Sampled As : Lenberg | Fine, mixed, active, mesic Aquic Hapludalf

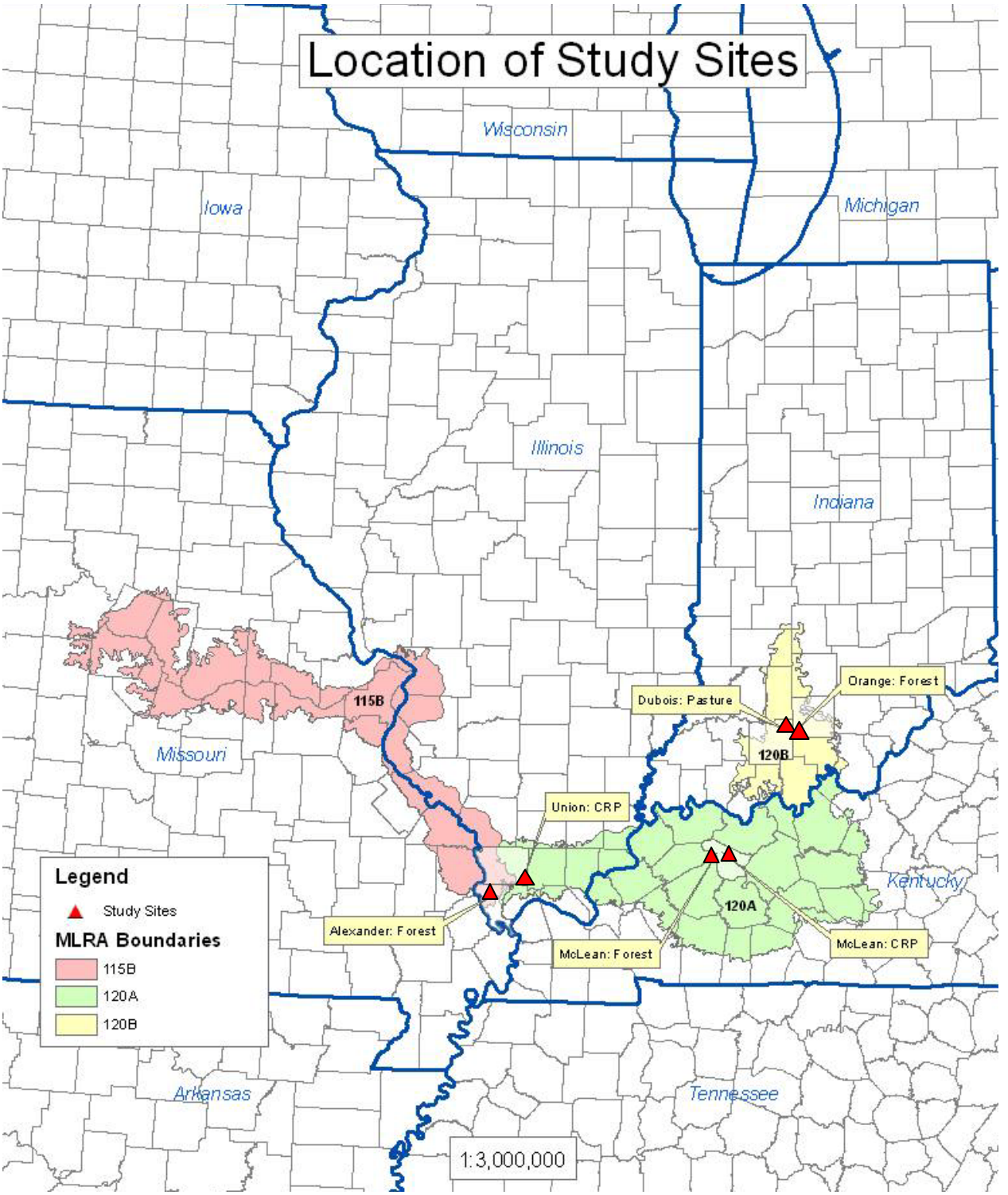
USDA-NRCS-NSSC-National Soil Survey Laboratory ; Pedon No. 11N7129

Tier 3

Layer	Depth (cm)	Horz	Prep	-51- >2	-52- 250 -UP	-53- 250 -75	-54- 75 -2	-55- 75 -20	-56- 20 -5	-57- 5 -2	-58- <2	-59- 2- .05	-60- .05- .002	-61- LT .002	-62- Pores D	-63- Pores F	-64- C /N Rat -io	-65- Fine Clay	-66- CEC Sum Cats	-67- CEC NH_4- OAC	-68- 1500 kPa H_2O	-69- LEP 33 kPa	-70- Whole Soil 33 kPa 1500 kPa	-71- Whole Soil Oven -dry	-72- <2 mm to % 1500 kPa	-73- <2 mm to % Oven -dry	-74- WRD Whole Soil	-75- WRD <2 mm
				(- Volume Fractions Whole Soil (mm) At 33 kPa														(- Ratios To Clay <2 mm Fraction -)					(- Linear Extensiblity -)				(- WRD -) (in^3/in^3)	
				(% of Whole Soil)																								
11N05268	0-1	Oi	S	--	--	--	--	--	--	--	100	18	26	11			27											
11N05269	1-2	A1	S	1	--	--	1	--	1	--	99	12	35	8			15		3.96	2.29	1.88							
11N05270	2-9	A2	S	1	--	--	1	--	--	1	99	16	36	10	10	27	12		1.00	0.54	0.74	0.071	0.2	1.2	0.4	1.2	0.06	0.06
11N05271	9-18	Bt1	S	1	--	--	1	--	--	1	99	16	34	12	10	27	7		0.82	0.54	0.68	0.040	0.2	0.8	0.2	0.8	0.04	0.04
11N05272	18-36	2Bt2	S	1	--	--	1	--	--	1	99	3	23	32	4	38	4		0.76	0.49	0.40	0.108	0.9	5.9	0.9	6.0	0.04	0.04
11N05273	36-51	2Bt3	S	--	--	--	--	--	--	--	100	1	28	33	4	34	9		0.74	0.44	0.37	0.085	0.4	4.5	0.4	4.5	0.02	0.02
11N05274	51-75	2Bt4	S	1	--	--	1	--	--	1	99	3	29	29	4	34	3		0.75	0.39	0.41	0.140	0.8	6.7	0.8	6.7	0.03	0.03
11N05275	75-89	2BC	S	1	--	--	1	--	--	1	99	6	36	23	1	33	2		0.78	0.39	0.45	0.125	0.8	4.4	0.8	4.4	0.05	0.05
11N05276	89-114	2Cr	S	--	--	--	--	--	--	--	100	7	44	20	1	27					0.34	0.148	1.4	4.2	1.4	4.2	0.08	0.08

Tier 4

Layer	Depth (cm)	Horz	Prep	-76- >2	-77- 75 -20	-78- 20 -2	-79- 2- .05	-80- .05- .002	-81- < .002	-82- VC	-83- C	-84- M	-85- F	-86- VF	-87- Silts C	-88- Silts F	-89- Clay	-90-	-91- Texture by PSDA <2 mm	-92- Sand 2- .05	-93- Silt .05- .002	-94- Clay < .002	-95- pH $CaCl_2$ .01M	-96- Elect. Res-ist. ohms	-97- Elect. Con-duct $dS\ m^{-1}$	-98- Part-icle Den-sity $g\ cm^{-3}$
				(- Weight Fractions - Clay Free -) Whole Soil (- % of >2 mm Sand and Silt -)						(<2 mm Fraction: Sands, Silts, Clay) (% of Sand and Silt)										PSDA (mm) (% of 2 mm) 3A1a1a4C1a2a			(<2 mm)			
11N05268	0-1	Oi	S	--	--	--	41	59	24	2	6	7	14	13	22	37	24		l	33.4	47.3	19.3				
11N05269	1-2	A1	S	1	1	1	26	73	17	tr	2	4	13	6	38	36	17		sil	22.3	62.9	14.8	5.7			
11N05270	2-9	A2	S	1	1	1	30	69	20	1	3	5	15	6	33	36	20		sil	25.3	57.9	16.8	4.3			
11N05271	9-18	Bt1	S	2	2	2	31	66	24	3	3	5	15	6	32	36	25		sil	25.6	54.6	19.8	4.0			
11N05272	18-36	2Bt2	S	2	2	2	10	87	121	1	1	1	5	2	13	76	124		c	4.8	39.9	55.3	4.2			
11N05273	36-51	2Bt3	S	--	--	--	5	95	113	1	tr	1	1	1	11	84	113		sic	2.3	44.6	53.1	4.6			
11N05274	51-75	2Bt4	S	2	2	2	9	89	90	1	2	1	2	3	16	75	92		sic	4.8	47.3	47.9	5.5			
11N05275	75-89	2BC	S	2	2	2	14	84	54	1	1	1	3	8	26	60	55		sicl	9.2	55.5	35.3	6.6			
11N05276	89-114	2Cr	S	--	--	--	15	85	39	--	--	tr	1	13	30	55	39		sicl	10.5	61.2	28.3				


Location of Study Sites
Wisconsin
Iowa
Michigan
Illinois
Indiana
Missouri
Kentucky
Arkansas
Tennessee
115B
120A
120B
Dubois: Pasture
Orange: Forest
Union: CRP
Alexander: Forest
McLean: Forest
McLean: CRP
Legend
Study Sites
MLRA Boundaries
115B
120A
120B
1:3,000,000

Tri-State Soil Systems Study – Comparison of Soils/Sites

Position	Summit	Summit	Summit
Site	Grassland	Grassland	Grassland
State	Illinois	Kentucky	Indiana
Soil Mapped	Menfro	Alford	Apalona
Loess Thickness Meters	3	2	0.92
Classification	Ultic Hapludalf *	Ultic Hapludalf	Fragiaquic Hapludult *
Family	Fine-Silty	Fine-Silty	Fine-silty
Base Sat. @ Critical Depth	56	40	34
Sand Control Section	1	1	3
Clay Control Section	31	27	25
Silt Control Section	68	72	72
Redox Depletion Depth Meters	> 3	> 2	0.65
Bedrock Depth Meters	7.3	2.5	0.92
Limiting Layer Meters	N/A	N/A	0.65
Position	Shoulder		
Site	Grassland		
State	Illinois	Kentucky	Indiana
Soil Mapped	Menfro	Hosmer	Deuchars
Loess Thickness Meters	>2.03	1.58	0.63
Classification	Oxyaquic Fragiudalf *	Oxyaquic Fragiudalf	Oxyaquic Hapludalf
Family	Fine-Silty	Fine-Silty	Fine-silty
Base Sat. @ Critical Depth	70	78	71
Sand Control Section	1	1	3
Clay Control Section	27	21	29
Silt Control Section	72	78	68
Redox Depletion Depth Meters	0.55	0.99	0.65
Bedrock Depth Meters	> 5	2.4	1.7
Limiting Layer Meters	0.93	0.99	1.7

Position	Shoulder	Shoulder	Shoulder
Site	Woodland	Woodland	Woodland
State	Illinois	Kentucky	Indiana
Soil Mapped	Alford	Wellston	Ebal
Loess Thickness Meters	> 2	1.02	0.42
Classification	Fragic Hapludalf *	Typic Hapludalf *	Oxyaquic Hapludalf
Family	Fine-Silty	Fine-Silty	Fine-Loamy *
Base Sat. @ Critical Depth	46	60	44
Sand Control Section	1	9	47
Clay Control Section	26	23	30
Silt Control Section	73	68	23
Redox Depletion Depth Meters	> 2	> 2	0.61
Bedrock Depth Meters	> 4	1.02	1.23
Limiting Layer Meters	1.21	1.02	1.23
Position	Backslope (upper)		
Site	Woodland		
State	Illinois	Kentucky	Indiana
Soil Mapped	Alford	Wellston	Ebal
Loess Thickness Meters	> 2	0.17	0.26
Classification	Oxyaquic Fragiudalf *	Aquic Hapludalf *	Oxyaquic Hapludult *
Family	Fine-silty	Fine *	Fine
Base Sat. @ Critical Depth	64	75	25
Sand Control Section	1	6	7
Clay Control Section	25	47	37
Silt Control Section	74	47	56
Redox Depletion Depth Meters	> 2	0.18	0.63
Bedrock Depth Meters	> 4	0.89	1.35
Limiting Layer Meters	0.39	0.89	1.35

*Denotes difference in classification from named series

Ecological Site Descriptions – An Introduction

Ecological sites describe the ecological dynamics and potential for a specific land type. An ecological site is defined in the USDA-NRCS National Range and Pasture Handbook as "a distinctive kind of land with specific soil and physical characteristics that differ from other kinds of land in its ability to produce a distinctive kind and amount of vegetation and its ability to respond similarly to management actions and natural disturbances." Sites are classified using both biotic and abiotic factors such as soils, climate, hydrology, geology, plant species, biomass production, etc. Detailed site descriptions, management actions and natural disturbance regimes are included in a reference document called an ecological site description (ESD). ESDs will serve as a repository of ecological site information and are maintained on the NRCS Ecological Site Information System (ESIS).

Completed and approved ESDs are available to the public through ESIS, and approved ESDs can be accessed at: http://esis.sc.egov.usda.gov/Welcome/pgESDWelcome.aspx. The documents are organized into four main sections:

- Site Characteristics -- Identifies the site and describes the physiographic, climate, soil, and water features associated with the site.
- Plant Communities -- Describes the ecological dynamics and the common plant communities comprising the various vegetation states of the site. The disturbances that cause a shift from one state to another are also described.
- Site Interpretations -- Interpretive information pertinent to the use and management of the site and its related resources.
- Supporting Information – Provides information on sources of information and data utilized in developing the site description and the relationship of the site to other ecological sites.

The NRCS Ecological Sites Inventory (ESI) Handbook describes the process of differentiating ecological sites across the landscape. The following criteria to delineate different sites include:

- Significant differences in the species or species groups that are in the characteristic plant community.
- Significant differences in the relative proportion of species or species groups in the characteristic plant community.
- Soil factors that determine plant production and composition, the hydrology of the site, and the functioning of the ecological processes of the water cycle, mineral cycles, and energy flow.

- Differences in the kind, proportion, and production of the overstory and understory plants due to differences in soil, topography, climate, and environment factors, or the response of vegetation to management.
- Where changes in soils, aspect, topography, or moisture conditions are abrupt, ecological site boundaries are distinct. Boundaries are broader and less distinct where plant communities change gradually along broad environmental gradients of relatively uniform soils and topography. Although some plant communities may appear to be along a continuum, distinctive plant communities can be identified and described. These communities occur with predictable regularity and are associated with concurrent differences in soil, topography, hydrology, or climate that can also be recognized.

NRCS separates Ecological Site Types (ESTs) into forestland ecological sites and rangeland ecological sites based on their historic climax plant community. A site type of forestland is assigned and described where a 25% overstory canopy of trees, as determined by crown perimeter-vertical projection, dominated this historic vegetation. A tree is defined as a woody-stemmed plant that can grow to 4 meters in height at maturity on the site being described. A site type of rangeland is assigned where overstory tree production was not significant in the climax vegetation.

Based on the best available historic information, ESDs will also describe the "historic climax plant community" (HCPC) for each ecological sites. As defined in the NRCS ESI Handbook, the HCPC is the plant community that "existed at the time of European immigration and settlement. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site."

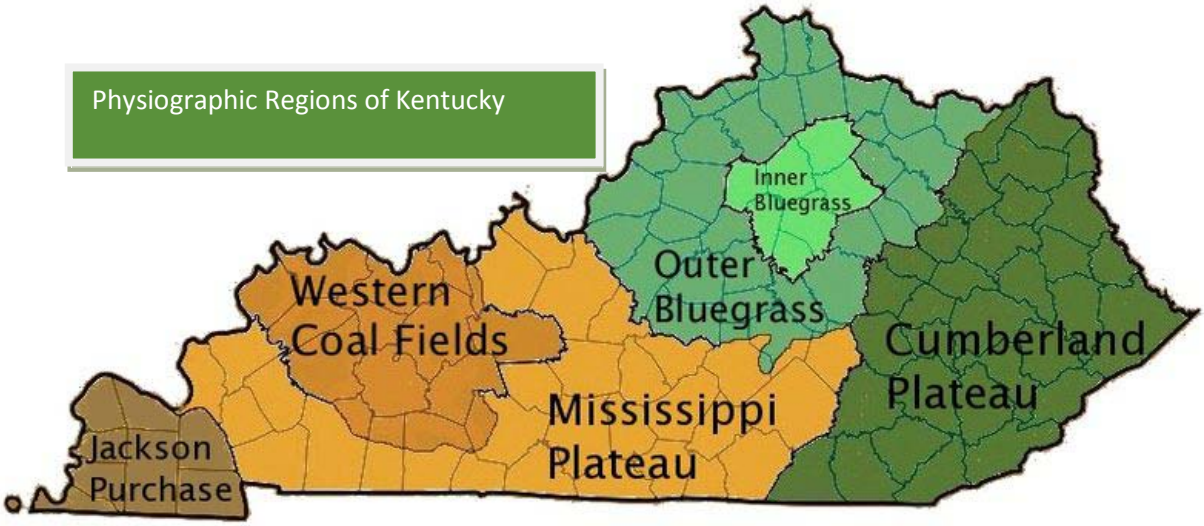
NRCS guidance includes steps for developing and describing ecological sites. The process is adapted from the Existing Vegetation Classification and Mapping Technical Guide (Brohman and Bryant 2005), Terrestrial Ecological Unit Inventory Technical Guide (Winthers et al. 2005), the National Range and Pasture Handbook, Chapter 3 (USDA-Natural Resources Conservation Service 1997, amended 2003).

1. Establish Local Work Groups
2. Define Geographic/Ecological Extent
3. Gather Background Information
4. Evaluate Existing Data
5. Conduct Reconnaissance – Low Intensity Traverses
6. Develop State-and-Transition Concepts
7. Formation of STM Development Team
8. Conduct STM Workshops for Partner Input
9. Develop Sampling Strategy

10. Gather Data/Analyze Data
11. Define Differentiating Characteristics of Ecological Sites
12. Field Test the Ecological Site Concept
13. Data Collection – High Intensity Sampling
14. Develop Management Interpretations
15. Correlation, Quality Control, and Quality Assurance
16. Certification of the ESD
17. Publish the Ecological Site Description

Ecological Site Description Development in Kentucky, 2012

This year, Kentucky NRCS has started developing ESDs for MLRA 120 – which closely coincides with the Western Coalfields Physiographic Region.



Map source: www.demovellen.com

Status of ESD Development in KY

The goal for Kentucky NRCS is to utilize existing ecological information and work closely with interested parties and our conservation partners to develop ESDs that are relevant, practical and accurate. ESD development is a process that draws information from many sources into a document that can be easily used by USDA staff and landowners to support conservation efforts. Over the last 2 months, Kentucky NRCS staff have meet with multiple state and federal agencies, conservation groups, non-profit organizations, and universities to gather and share information that can be used to develop high-quality ESDs. Key partners such as Kentucky Department of Fish and Wildlife Resources (KDFWR) and the Kentucky State Nature Preserves Commission (KSNPC) have already provided valuable support to Kentucky's ESD program.

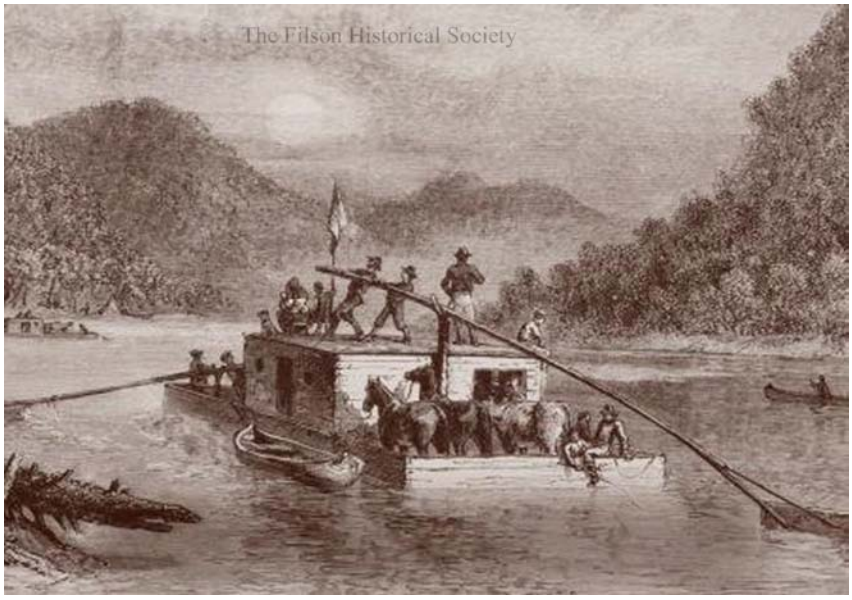
Many sources of existing ecological information have been utilized by NRCS staff to date. These include:

- scientific journals and reports
- University research publications
- existing field data from soils survey offices, district conservationists, and state/federal partners
- botanical surveys and monitoring data conducted statewide by state, federal, and private organizations
- ecological studies in National Park Service units, Kentucky Wildlife Management Areas (WMAs), KSNPC Nature Preserves, University Research Forests, and US Forest Service Lands

Reference Community Identification

Documentation of the pre-settlement and early settlement vegetation, anthropogenic influences, and ecology is an important component of ESD development. The Kentucky Historical Society in Frankfort, KY and multiple county-level historical societies have provided Kentucky NRCS with documentation (journals, publications, photos, and field notes) ranging from the mid-1700's to the late 1800's. For example, the following is an excerpt from H.E. Everman's The History of Bourbon County Kentucky, 1785-1865:

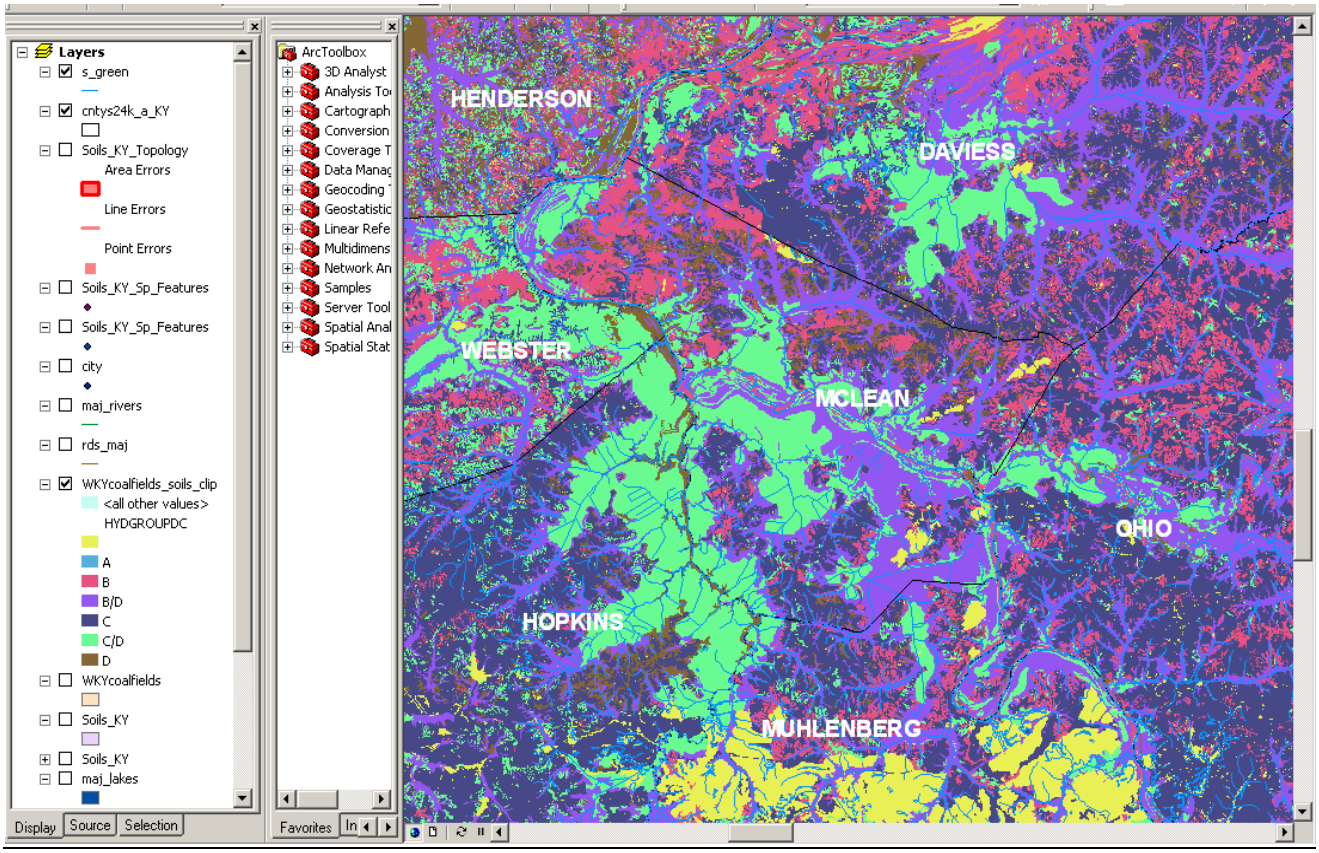
"*Honey locusts bore pea-like pods that tasted sweet and made excellent beer. Hickory ashes served as a salt substitute and sassafras from the laurel tree made tea the common beverage. Finally, the maple supplied molasses and sugar. Cane, with its leaves resembling the willot, was three to twelve feet high. Thickets were deep and hot with growth overhead and little air down under.[10] Blue and black ash, honey locusts, walnuts, wild cherry, buckeye, burr oaks, maple, laurel, hickory and bettywood trees choked the landscape.*"



The Kentucky River near Boonesborough

Madison County Kentucky 1775

Drawing: The Filson Historical Society



Kentucky GIS coverage showing hydrologic groupings of soils. This information will assist staff in grouping soils and conducting field reconnaissance to verify hypotheses.

Current ESD Efforts in MLRA 120

NRCS KY has been grouping soils based on key attributes that will influence ecological communities and have developed geographic information system (GIS) coverages to assist with first-level field reconnaissance. In April of 2012, Kentucky hosted an Ecological Site Description Workshop facilitated by Michael Kucera, NRCS Agronomist (Lincoln, NE), and David Clausnitzer, NRCS Ecological Site Inventory Specialist (Amherst, MA). The Tri-State Soil Research Site was used during the workshop as an outdoor classroom for new ESI Specialist from four states: Kentucky, Mississippi, Tennessee and Indiana. A draft State and Transition Model was developed during the workshop and is shown below. Over the next few months, additional work will be done on the Tri-State site to facilitate the development of Kentucky's first ESD.

MO-18 Leader and KY State Soil Scientist Steve Blanford takes a sample while MLRA 120 SSO Leader Matt McCauley (with soil probe) discusses the soils and ecology of a reclaimed mining site during the Kentucky ESD Workshop in April 2012.

Quaternary History of McLean County, Kentucky

Ron Counts - Kentucky Geologic Survey

There are several levels of old remnant terraces along the Green River in McLean County. Most of the deposits in the terraces are heavily weathered chert gravels with minor lenses of weathered sand and silt. Chert gravel deposits also exist high on some drainage divides. The gravels are up to 8 meters thick and are primarily reddish brown, fossiliferous chert with some white quartzite, silicified limestone, and reddish sandstone. These deposits contain no igneous rocks, carbonate rocks, or heavy minerals that are characteristic of glacial outwash, and these gravels genetically correlate to the Mounds Gravel in Illinois, the Lafayette gravels of western Kentucky, and the continental deposits on many USGS Geologic Quadrangle maps of western Kentucky.

The sediment in meltwater from late Pleistocene continental glaciers filled the Ohio River valley and impounded the mouth of the Green River, forming a series of large lakes that filled the valley (>25 meters) with lacustrine deposits. The bottom of this paleolake is preserved as the broad, flat terrace that lies between upland areas, and it has been incised by the modern Green River and its tributaries. Much of the lakebed has had Holocene alluvium of varying depths deposited upon the clayey lacustrine sediments. Several gravel deposits are preserved on the lacustrine terrace and are inferred to be beach deposits of the paleolake formed by wave action.

The upland hills in McLean County are mantled with more than 2 meters of windblown silt, which was derived from the Ohio River and possibly the lake plain on the valley bottoms when conditions were cold and dry. Profiles suggest that this windblown silt is composed of three loess units. The deepest loess unit, the Loveland loess, was deposited during the Illinoian glaciation and has been completely incorporated into the regolith. It is only faintly discernible and is recognized by its characteristic pinkish color. The Roxana silt is an early to middle Wisconsinan deposit that is characteristically <1 meter thick in most parts of the Ohio River Valley. In Mclean County the Roxana silt ranges from 10 to 30 cm thick and is finer grained, pinkish and denser than the overlying Peoria loess (brownish yellow). Most of the loess on the hillslopes in McLean County is the Peoria loess deposited during the late Wisconsinan glaciation.

The underlying bedrock is predominantly shale and sandstone of the McLeansboro Group, upper Pennsylvanian. Coal and gas and oil are important in the region.

Lunch Site

The mission of Mount Saint Joseph Conference and Retreat Center is to offer and host programs in a rural environment of tranquility for people of all ages and faiths to nurture spiritual and personal growth, advance the arts, and promote lifelong learning. Established in 1983 as a corporate ministry of the Ursuline Sisters of Mount Saint Joseph, the Center is situated on a beautiful 750- acre rural campus in Maple Mount, Ky., on the grounds of the Ursuline Motherhouse.

The original Mount Saint Joseph Academy building was built in 1874 and was the first building on the Ursuline Sisters' Motherhouse campus. Today it is part of Mount Saint Joseph Conference and Retreat Center.

Poultry Litter Subsurface Application

Darwin Newton - WKU and Dr. Karamat Sistani – ARS

A 2-year field experiment was initiated on Knott Bros. Farm in the spring of 2010 investigating the agronomic impact of sub-surface poultry litter application on no-till corn. Three treatments were applied and consisted of 28% UAN (urea and ammonium nitrate solution) surface broadcast (P & K based on soil tests), poultry litter surface broadcast, and poultry litter sub-surface applied. All treatments were applied pre-plant and had a target N rate of 150# PAN/Acre. Poultry litter rates were adjusted to assume 50% of the TN would be available to the corn during the growing season. Large scale plots (25 ft x 300 ft) were used and treatments were replicated three times. Sub-surface poultry litter was applied using a prototype no-till banding machine developed by scientists at an ARS research unit In Booneville, AR. Preliminary results show that sub-surface poultry litter plot corn yields were similar to the 28% UAN commercial fertilizer treatment. Treatment differences between plant nutrient uptake and soil nutrient concentrations are currently being analyzed.

Animal Waste Management Research Unit Experiments Conducted on Jerry O'Brien Farm

An experiment is ongoing determining the optimal frequency of turning for compost comprised of swine manure and wood chips. To date, the experiments have consisted of three treatments where the piles were turned once or thrice weekly, or when the pile temperature reached 150 $^{\circ}$F. These piles were compared to the same material that was piled and not disturbed during the same period. Nutrient values changed over time, with the biggest change occurring with N. Both NH_4-N and NO_3-N decreased over time with all managed treatments. However, the static pile had greater NH_4-N than any other treatment. Potassium was lower in the static pile compared to the managed piles regardless of turning frequency; however P values did not differ. Additional experiments are studying the survival of pathogens and indicators (i.e. *E. coli*, Enterococci, and *Samonella)* in the compost piles.

Air quality of the composting high-rise animal housing is also being studied with particular emphasis placed on NH_3, CH_4, and sulfides (e.g. hydrogen sulfide, methyl mercaptan, dimethyl sulfide). Air quality analyses of high-rise housing will be compared to that of traditional shallow pit housing located on the same site.

Water quality of the lagoon with the manure separator installed is being compared to the similarly-sized lagoon without manure separation. Biological oxygen demand, nutrients and dissolved greenhouse gases of the two lagoons are being compared. Micrometeorological measurements are being recorded from the two lagoons using the instrumentation installed on floats on the surface of the lagoons.