Part II

PREMINING INFORMATION

Premining information is to be displayed on premining land use map unless otherwise indicated.

1) Describe how the permit area perimeter will be marked and discuss the method or system employed to locate permit area perimeter and set markers along it. Designate a reference point outside the permit area. Provide a description of the reference point and a sketch relating the reference point to the permit area perimeter.

   The permit area will be marked with either steel fence posts or PVC Pipe to identify the permit perimeter. The reference point is an iron pin 150 feet north of road 800 North at the coordinates shown on the maps. The elevation is the top of the iron pin. The reference point is shown on Map A Hydrology Map, *Map D Surface Drainage Map, and Map S Shadow Area Map.*

2) Provide slope measurements to represent existing land surface configuration of proposed permit area as required under Section 1783.25(a)(11)(A-D). A soils map of medium intensity prepared to SCS specifications or a contoured aerial photo may be submitted in lieu of Section 1782.25(a)(11)(A-D).

   A soils map of medium intensity prepared to NRCS specifications will be submitted in lieu of Section 1783.25(a)(11)(A-D). The attached *Soils Map, Map C* is a 1 inch equals 400 feet scale map of the permit area.

3) A) Has previous mining activity occurred within the permit area and/or adjacent areas?
   Yes _____ No __X__

   If yes, provide the following information, if available:

3) A) 1) Type of mining, surface, underground, or both?

3) A) 2) What coal seam or other mineral(s) were extracted?

3) A) 3) What was the extent of coal or other mineral(s) removed? Delineate on the pre-mining land use map, or other designated map, the areas disturbed by previous mining activities, including active, inactive or abandoned underground mine work along with any mine opening to the surface.

   Identify for each area the type of mining and the approximate date of extraction.

3) A) 4) Identify on all maps submitted with the application areas where surface coal mining operations were conducted prior to August 3, 1977; after August 3, 1977 and prior to May 3, 1978; after May 3, 1978 and prior to February 1, 1983; and any permanent regulatory program permit issued after February 1, 1983.

3) A) 5) Identify the land uses preceding mining.

4) Give the acreage of each land use within the proposed permit area, employing land use categories of Section 1701.5 listed below, and delineate on premining land use map existing land uses in the proposed permit area and within 1,000 feet adjacent to it. Include on the premining land use map the location of all buildings and identify the current use of these buildings.

Please refer to the *Pre-Mining Map, Map B* and the table below.

Bulldog Mine
Permit No. 429
Pre-Mining Land Use/Capability Table

Land Use/Capability	Permit Area
Cropland Prime Farmland	389.0
Industrial/Commercial Negative Determination	1.3
Total	**390.3**

5) Have any of the land uses changed within the last five years?
Yes _____ No __X__

If yes, indicate the acreage and changes of land uses.

6) A) Provide a narrative of land capability and productivity of the proposed permit area prior to mining which shall provide an analysis of:

6) A) 1) The capability of the land to support a variety of uses, giving consideration to soil and foundation characteristics, topography, vegetative cover and hydrology;

Please refer to *Attachment II-6A1* for a soil resource analysis plan.

6) A) 2) The productivity of the total area expressed as average yield of food, fiber, forage, or wood products under high level management.

This information may be found in *Attachment II-6A2*, "Estimated Yields for Vermilion County"

Crop productivity data contained in the table was obtained from the following source: Olson, K.R., Lang, J.M., University of Illinois, College of Agricultural, Consumer and Environmental Sciences, Office of Research, Optimum Crop Productivity Ratings for Illinois Soil, Bulletin 811, August, 2000, 1/2/2012 Amended Table S2rev.

Deciduous tree growth data was obtained from the USDA – NRCS - Electronic Field Office Technical Guide.

6) B) Where the narrative of land capability and productivity employs the U.S.D.A Natural Resources Conservation Service (NRCS) Land-Capability Classification (Agriculture Handbook No. 210) in conjunction with the soil information provided under Part II 12) of this part, soil interpretation sheets or published soil survey or complete soil information chart for

productivity from Circular 1156 are to be submitted for each soil type occurring in the permit area.

This information may be found in *Attachment II-6A2*, "Estimated Yields for Vermilion County"

Crop productivity data contained in the table was obtained from the following source: Olson, K.R., Lang, J.M., University of Illinois, College of Agricultural, Consumer and Environmental Sciences, Office of Research, Optimum Crop Productivity Ratings for Illinois Soil, Bulletin 811, August, 2000, 1/2/2012 Amended Table S2rev.

Deciduous tree growth data was obtained from the USDA – NRCS - Electronic Field Office Technical Guide.

7) Provide a description of the existing land uses and land classifications under local law, if any, for the proposed permit and adjacent areas.

The applicant is not aware of any local land use zoning laws.

8) Provide fish and wildlife resource information for the proposed permit area and any adjacent areas. Prior to initiation of studies to obtain fish and wildlife resource information, the applicant must contact the Department for a determination of what fish and wildlife resources information will be required. Pursuant to 62 Ill. Adm. Code 1784.21(a)(1) and (2), the Department will determine the level of detail and the areas of study. Site-specific resource information will be required by the Department if either the permit area or adjacent area is likely to include threatened or endangered species or their critical habitats or habitats of unusually high value for fish and wildlife.

The applicant should complete the description of plant communities within the permit area and adjacent area, requested in Part II 9), below, prior to contacting the Department for a determination of the fish and wildlife resource information.

Please refer to the report titled *Site Specific, Pre-Mining Assessment, Endangered and Threatened Species* in *Attachment V-3B1* and the report tiled *Site Specific Wetland and Stream Resources Pre-Mining Assessment* in *Attachment V-3B3*.

9) Give a description of the plant communities within the proposed permit area and delineate on a vegetation map the vegetative types occurring within the proposed permit area and within any proposed reference area. Where a map or aerial photograph is required provide coverage of sufficient adjacent areas to allow evaluation of vegetation as important habitat for fish and wildlife for those species of fish and wildlife identified under Section 1784.21. The description shall include information adequate to predict the potential for reestablishing vegetation.

Vegetative types of the proposed permit area and adjacent areas are noted on the *Pre-Mining Map, Map B*.

The pre-mining vegetation types fall into one (1) basic category: cropland.

Plant communities in the cropland areas are represented by monocultures of corn, soybeans and wheat.

Please refer to the report titled *Site Specific, Pre-Mining Assessment, Endangered and Threatened Species* in *Attachment V-3B1* and the report tiled *Site Specific Wetland and Stream Resources Pre-Mining Assessment* in *Attachment V-3B3.*

10) A) Pursuant to 62 Ill. Adm. Code 1783.12(a), provide a description of the cultural, archeological and historic resources listed or eligible for listing on the National Register of Historic Places and any known archeological features within the proposed permit, adjacent areas, and shadow area (for planned subsidence). The description of the cultural, historic and archeological resources occurring within the permit area and adjacent areas shall be based upon available data, including data of State and local archeological, historical and cultural preservation agencies.

A Phase I Cultural Resource Survey prepared by Pioneer Consulting Services has been completed. The survey addresses cultural, archaeological and historic resources listed or eligible for listing on the National Register of Historic Places, and any known archaeological features within the proposed permit and adjacent areas. Pioneer Consulting Services determined that no cultural resources eligible for the National Register of Historic Places are present in the survey area.

A copy of the report has been forwarded to the Department. The Illinois Historic Preservation Agency (IHPA) has reviewed the report and concurs that there are no cultural resources eligible for the National Register of Historic Places present within the survey area.

10) B) 1) Pursuant to 62 Ill. Adm. Code 1783.12(b):

10) B) 1) a) State whether there is a substantial likelihood of currently unknown resources which would be eligible for the National Register of Historic places within the proposed permit, or adjacent areas or shadow area (for planned subsidence).

A Phase I Cultural Resource Survey was prepared by Pioneer Consulting Services for the Bulldog permit area. Pioneer Consulting Services determined that no cultural resources eligible for the National Register of Historic Places are present in the survey area.

10) B) 1) b) Provide a plan detailing the manner in which additional information will be gathered by the applicant to enable the Department to identify and evaluate such resources.

Please see the response to Part II, Question 10)A).

10) B) 2) Please Note: If the Department determines that the Part II 10)A) resource information is not adequate to make the required finding under 62 Ill. Adm. Code 1773.15(c)(12) because information available to the Department indicates a substantial likelihood of currently unknown resources within the permit area or adjacent areas which would be eligible for the National Register of Historic Places, the Department will require the applicant to submit additional information to enable the Department to identify and evaluate the potential resources. Such information might include the results of field investigations of the permit area and adjacent area if it is determined by the Department, in consultation with the Illinois State Historic Preservation Agency, that the field investigation will provide the information required under Part II 10)A).

Please see the response to Part II, Question 10)A).

The applicant believes the information provided in the response to Part II(10)(A) is adequate to make the required finding under 62 Ill. Adm. Code 1773.15(c)(12). However, the applicant is aware the Department may require the applicant to submit additional information to enable the Department to identify and evaluate the potential resources within the permit area or adjacent areas that may be eligible for the National Register of Historic Places.

10) C) For the permit area and/or shadow area (for planned subsidence) locate on the vegetation map or the land use map the following:

The boundaries of any publicly owned parks, locations of any cultural resources, historical resources listed or eligible for listing on the National Register of Historic Places.

Please see the response to Part II, Question 10)A).

No publicly owned parks are known to exist within or adjacent to the permit area.

A Phase I Cultural Resource Survey was prepared by Pioneer Consulting Services for the Bulldog permit area. Pioneer Consulting Services determined that no cultural resources eligible for the National Register of Historic Places are present in the survey area.

The shadow area is proposed for unplanned subsidence.

10) D) Provide a map showing the location of known Archeological site(s) listed on or eligible for listing on the National Register of Historic Places. Provide identifying field markings to be employed to insure that the site(s) will not be disturbed by surface coal mining and reclamation operations. The map is to be submitted in separate cover from the rest of the application. The Department will hold the map as a confidential document.

Please see the response to Part II, Question 10)A).

10) E) Provide a plan for publicly owned park(s), or place(s) identified above in paragraph(c) that may be adversely affected by the proposed operation describing the measures to be employed:

10) E) 1) To prevent adverse impacts caused by underground mining related activities including, but not limited to, loss or destruction of historic artifacts and damage to historic structures or property; or

Please see the response to Part II, Question 10)A).

10) E) 2) If valid existing rights exist or joint agency approval is to be obtained under 62 Ill. Adm. Code 1761.12(e), to minimize adverse impacts.

None are known to exist within the permit area.

11) For the permit area and/or shadow area (for planned subsidence) locate on the vegetation map or land use map the boundaries of any public or private cemeteries or Indian burial grounds.

No public or private cemeteries or Indian burial grounds are known to exist within the permit area.

The shadow area is proposed for unplanned subsidence.

12) A) Provide the location of surface and subsurface man-made features within, passing through, or passing over the proposed permit and shadow areas on the pre-mining land use map or other designated map.

Such features should include but are not limited to major electric transmission lines, pipelines, agricultural drainage tile fields, gas and oil wells, and water wells. For gas, oil and water wells provide the depth, if available, of the well.

All surface and subsurface features known by the applicant to exist are shown on the *Hydrology Map, Map A*, and/or *Shadow Area Map, Map S.*

The locations of all known agricultural drainage tiles are illustrated on the *Hydrology Map, Map A*, *Surface Drainage Map, Map D*, *Reclamation Plan Map, Map E*, and the *Shadow Area Map, Map S.* The drainage tile locations were obtained from a map labeled, Union Drainage District No. 1 of Vance and Sidell Townships Vermilion County Illinois, dated August 1923, John F. Fisher, Civil Engineer, or from personal contact and conversations between an employee of Sunrise Coal and a current commissioner of Vermilion County Drainage District No. 1.

Several oil and gas wells located within and in the vicinity of the permit and shadow areas are listed on the Illinois State Geological Survey website. The listed wells were drilled between 1937 and 1976. One well does not have a drilling date available. The listed wells are shown on the *Hydrology Map, Map A. Attachment II-12A* contains well information obtained from the website, and a table that reflects the current well status.

Water well depths are listed in this application in Part III 2)B)1), *Table III-A, Private Water Wells.*

12) B) Provide the elevation and location of all monitoring stations used to gather data for water quality and quantity, fish and wildlife, and air in preparation of the application.

Please refer to *Hydrology Map, Map A* for the location of water monitoring stations.

13) Soils Information Map

13) A) Does the submitted soils map represent a map developed by the Natural Resources Conservation Service?
Yes __X__ No _____

If no, explain. If SCS map has been modified, explain (Example - photographically enlarged; soil map units recorrelated; area affected after initial mapping). Soil map scale must be 1" = 400' unless otherwise approved by the Department.

The submitted soils map represents a map developed by the Natural Resources Conservation Service. The attached *Soils Map, Map C* is a 1 inch equals 400 feet scale map of the permit area.

13) B) Are any of the identified map units correlated as prime farmland by SCS criteria?

Yes __X__ No _____

If yes, provide acreage by completing soil information chart.

Please refer to the "Soils Information Chart" at the end of Part II.

A total of 1.3 acres of prime farmland soils in the permit area meet the negative determination exemption criteria requirements of Section 1785.17. *Attachment II-13B* is a request for negative determination for 1.3 acres.

13) C) Submit, by completing soils information chart, acreage totals of each map unit (soil type and slope classification) and land use capability classes in the permit area and the percent slope range of each lettered slope classification used on the soil map.

Please refer to the "Soils Information Chart" at the end of Part II.

13) D) Indicate the average topsoil thickness of each of the soil map units to be affected. Locate on soils map the test holes for soil horizon thickness sampling. The topsoil replacement thickness (inches) will be __12.0"__ .

The following table reflects the pre-mining topsoil thickness for each of the soil map units within the proposed permit area. Individual test hole locations are shown on the *Soils Map, Map C.*

Weighted average calculations based on the topsoil thicknesses shown below and the total acreage for each soil type reveals an average of 12 inches of topsoil is present on the permit area. The average topsoil thickness will be 12 inches.

Soil Mapping Unit	Average Depth (Inches)
56B2	10.0
67A	13.2
152A	12.4
154A	12.9
171B	13.2

13) E) List the soil types and acreages of areas that will require the B and/or portions of the C horizon to be removed and replaced in order to establish the root medium necessary to achieve soil productivity consistent with the proposed post-mining land use.

Alternatively, a narrative description explaining why specific soil type acres information for reclamation plan achievement is not necessary may be provided instead.

It is not anticipated that it will be necessary to remove and replace any of the B and/or C horizon soil types in order to establish the root medium necessary to achieve soil productivity on reclaimed areas.

13) F) Are selected overburden materials proposed to be used in lieu of or as a supplement to the A-horizon?

Yes _____ No __X__

If yes, provide t he appropriate information required under Section 1785.21(b). Also, identify source of the substitute materials and the topsoils to be substituted away from on a separate soils map unless the Department grants permission to describe the area in narrative form or to use the soils map provided in Part II 13(A). Explain why the proposed plan will provide the best available material of equal or better quality than present topsoil or surface existing material. This section must be addressed when reaffecting previously disturbed areas.

Sunrise Coal, LLC
Bulldog Mine
Permit No. 429

SOILS INFORMATION CHART

Soil Mapping Unit	Soil Name	Slope Class	Land Use Cap.	Prime Farmland Soils		High Capability Soils	Other	Totals
				Prime Farmland	Negative Determined			
56B2	Dana	B	IIe	11.1	-	-	-	11.1
67A	Harpster	A	IIw	5.2	-	-	-	5.2
152A	Drummer	A	IIw	214.9	-	-	-	214.9
154A	Flanagan	A	I	156.0	1.3	-	-	157.3
171B	Catlin	B	Ie	1.8	-	-	-	1.8
Totals				**389.0**	**1.3**	**-**	**-**	**390.3**

Sunrise Coal, LLC
Bulldog Mine
Permit No. 429

ATTACHMENT II-6A1

SOIL RESOURCE ANALYSIS PLAN

Soil Tech, Inc.

Soil & Environmental Services

5144 W. Timberwood
Newburgh, IN 47630
Office: (812) 858-7003
Fax: (812) 858-0888

January 31, 2012

Scott Gambill
Sunrise Coal, LLC
1466 East S.R. 58
Carlisle, Indiana 47838

RE: Allerton Mine – New Permit
Soil Resources Analysis Plan
Vermilion County, Illinois

Dear Mr. Gambill:

You requested that Soil Tech field sample soils and prepare this "Soil Resources Analysis Plan" for the proposed underground mining facility at Allerton Mine. The surface facilities for the underground mine will be located five miles northeast of Allerton, in Vermilion County. The purpose of the plan is to provide a foundation document on which soil-handling decisions can be made for the proposed surface facilities and the refuse-disposal area that will support the underground coal mining operation.

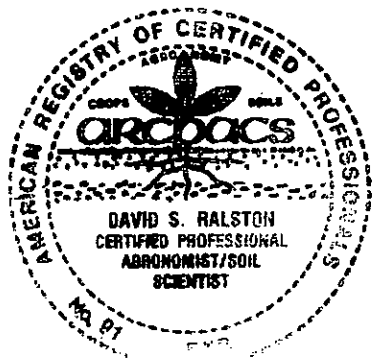
Sunrise Coal, LLC, requested specific information on the soils where the coal refuse will be placed south of Co. Rd. 200N and west of Co. Rd. 200E, and on the source of borrow materials for cover of the refuse pile and for final reclamation of the site. In addition, the company requested field data on the thickness of the existing A-horizon topsoil for the dominant soil series within the permit.

Soil Tech used a Giddings hydraulic sampling unit to obtain representative profiles of the dominant soil map units under the refuse disposal area. This report presents the analysis of the laboratory results by map unit and makes recommendations on how best to combine the soil horizons during reclamation. This report is intended to provide a reference source for both the permit submittal and the reclamation personnel operating equipment.

Call if you have questions or need additional information on the plan.

Sincerely,
Soil Tech, Inc.

David S. Ralston, Ph.D., CPAg/SSc
President



SUNRISE COAL, LLC

ALLERTON MINE

NEW PERMIT

SOIL RESOURCES ANALYSIS PLAN

January 31, 2012

Prepared by

Soil Tech, Inc.
Newburgh, Indiana 47630
812-858-7003

SOIL RESOURCES ANALYSIS PLAN
ALLERTON MINE – NEW PERMIT

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Attachments

Soil Resources Analysis Plan

1.0 Introduction

Allerton Mine, operated by Sunrise Coal, LLC, will be located about five miles northeast of Allerton, Illinois. The surface facilities will be located on both sides of Co. Rd. 200N between Co. Rd. 100E and Co. Rd. 200E, as shown on the Google Earth map (Attachment 1).

Soil Tech, Inc., was requested to sample the soil resources for the new permit area at the Allerton Mine. In addition, Soil Tech was requested to make recommendations on how the soils can best be utilized and reclaimed to achieve the requirements of the mining permit. A truck-mounted Giddings hydraulic soil sampler was used to obtain samples to a depth of 12 feet. The soil samples were sent to Key Agricultural Services, Macomb, Illinois, for laboratory analysis.

This report is intended to provide a reference document to be used both for the permit submittal and by the reclamation personnel in the field. It will contain both the lab data and the analysis of combined soil horizons that can be used in defining the reclamation process.

The certification letter for David S. Ralston, Ph.D., for this report is presented in Attachment 2. Dr. Ralston sampled the soils in the field and prepared this report. He is an ARCPACS Certified Professional Soil Scientist and Agronomist with over 35 years of experience in the evaluating soils for coal mining operations.

2.0 Sampling Plan

Representative sampling sites were identified for the dominant soil-mapping units and are shown on the soils map (Attachment 3). Drummer and Flanagan make up 95.5% of the soils in the permit area, with the remaining 4.5% comprised of Dana (2.7%), Harpster (1.4%), and Catlin (0.4%). Sampling sites were concentrated on the dominate soil series – Drummer, Flanagan, and Dana. The NRCS web soil survey report was generated to provide the preliminary breakout of soil map units in the Allerton permit (Attachment 4).

The Drummer and Flanagan soils are located on the broad-flat areas and in the depressions. The Drummer-Flanagan soils are poorly-drained and somewhat-poorly-drained soils that formed in loess over

glacial outwash or loamy till on till plains. The typical profile is black topsoil over gray, mottled subsoil on stratified gray silt loam and loam calcareous glacial outwash. The underlying material is stratified loam and silt loam calcareous glacial outwash.

Soil profile samples were obtained for ten sites on 12 December 2011, using a Giddings hydraulic soil sampler. An open core tube was used to sample the top four feet, and then an auger was used to obtain deeper soil samples to a maximum depth of 12 feet.

Soil samples were sent to Key Agricultural Services, Macomb, Illinois, for analysis. The pH, buffer pH, phosphorus (P1 and P2), potassium, organic matter, and texture were analyzed for each. Gravel was not an issue for the samples, so only the deepest sample was evaluated for material greater than 2mm. Samples having a pH higher than 7.5 were also analyzed for free calcium carbonate content. The laboratory data are included in Attachment 6 in the Appendix.

3.0 Results and Analyses

Table 3.0 presents a listing of the soil profiles for the sampling sites. The table identifies the soil series for each site and identifies the horizon for each sampling depth. Data are provided for the dominant soil series in the Allerton Mine permit. Table 3.0 also lists the field-measured thickness of topsoil for the sampling sites.

3.1 Soil Profile Summary by Soil Series

Table 3.1 provides a summary listing of the physical and chemical properties by soil series and depth for Dana, Drummer, and Flanagan. Dana series has silt loam topsoil with silty clay loam subsoil. The underling glacial till is stratified loam and silt loam.

Flanagan on the rises has a topsoil texture that is border line between silt loam and silty clay loam at 27% clay. The subsoil average is a heavy silty clay loam. The underlying glacial till ranges from loam to clay loam, and averages silt loam. The glacial till has free calcium carbonate that averages 14.4% in the 4- to 8-foot depth and averages 21% for the 8- to 12-foot depth.

Drummer series in the depressions has a silty clay loam topsoil and subsoil with clay contents averaging 32%. The underlying glacial till has a loam and silt loam texture. The free carbonates average 12% in the 4- to 8-foot depth and 20% for the 8- to 12-foot depth.

3.2 Topsoiling Materials

The existing topsoil will be stockpiled for use as the final cover in reclamation. Topsoil thickness generally ranges between 9 and 14 inches, and most areas have at least a foot of topsoil. The Bt1 upper subsoil has high organic matter and is often nearly as dark as the A horizon, but the heavier silty clay loam subsoil texture is less desirable for mixing with the topsoil.

Data for the existing A-horizon topsoil is presented in Table 3.1. The average pH of the topsoil is 6.3, which is desirable for plant growth. The phosphorus and potassium content of the existing topsoil are in the high range. The average texture of the topsoil is silt loam for the Dana series and silty clay loam for Drummer and Flanagan series. The existing topsoil will provide an excellent material for use in reclaiming both the mine facilities site and the refuse disposal site activities.

The organic matter content of the Drummer, Flanagan, Dana topsoil is between 1.7 and 3.7 % and averages 2.8%. The high organic matter reflects the influence of the prairie vegetation under which the soils developed. These soils are highly productive for agriculture and will make an excellent material for use in reclaiming the site.

The thickness of the A-horizon for the dominant soil series within the surface facilities permit is listed in Table 3.1. The measured thickness ranges from 9 inches for to 13 inches for the ridges and 12 to 15 inches for the depressions. Most of the relatively flat, till plain soils have an A-horizon thickness of between 10 and 15 inches.

3.3 Rooting Media Materials

The proposed source of rooting media is the existing subsoil and glacial outwash and till for the Drummer, Flanagan, and Dana soils. The rooting media will consist of the subsoil and glacial materials to a maximum depth of 12 feet.

The average pH of the subsoil is 6.7, and the phosphorus content is low. The potassium level is in the high range. The organic matter average for the subsoil is 1.1 %. The average subsoil texture is silty clay loam.

The data for the glacial outwash to a depth of 12 feet are also presented in Table 3.3. The data are summarized for 4- to 8-feet and 8- to 12-feet. The calcium carbonate content of 15% and 21% in the glacial outwash is causing the relatively high pH of 8.0 and low available phosphorus. The glacial outwash in the 4- to 8-foot depth has an average texture of loam, and the deeper glacial materials have an average texture of silt loam.

The percent calcium carbonate equivalent averages 15 to 21% percent. The free carbonates in the glacial materials will be an advantage for achieving the low permeability of the rooting media used as the liner and soil cover layer for the refuse pile.

The phosphorus and potassium levels of the glacial outwash are in the low to medium range, due to the high saturation of calcium on the soil cation exchange sites. The texture of the glacial outwash is loam and silt loam, with average clay content of 21.5% and average sand content of 29.6%.

Table 3.3 shows a weighted average blend of 3 feet of subsoil and 8 feet of glacial outwash material. The average texture is silt loam, and the pH is 7.2. The average calcium carbonate content is 15 percent.

4.0 Recommendations

The existing prairie-derived topsoil will make an excellent soil for reclaiming the areas affected by mining activities within the support facilities area for the Allerton Mine. The thickness of the topsoil for the relatively flat areas ranges from 9 to 14 inches, and the average thickness is closer to 12 inches.

No supplemental topsoiling materials are proposed for this plan, but data are provided for the upper part of the subsoil to show that the physical and chemical properties are suitable for revegetation. All the topsoil will be removed for storage for use in covering the refuse pile and for reclaiming the disturbed area in the permit.

Rooting media to be used for cover of the refuse pile and for reclamation will consist of the existing subsoil and glacial outwash and

till to a maximum depth of 12 feet. The texture of the glacial rooting media materials is silt loam and loam. The existing high levels of free carbonates in the soil between 4 and 12 feet deep will help reduce permeability of the soil under the refuse pile and will provide a good capping soil for the pile. The combination of an average of 20% clay and the free carbonates will help in achieving the reduced permeability of both the liner and the capping soil.

5.0 Summary & Conclusions

Soil resources at the Allerton Mine permit site range from nearly-level to gently-sloping loess over glacial outwashes that developed under prairie vegetation. Soil data contained in Table 3.1 show that the existing topsoil is the best soil material for use in reclaiming the areas affected for the proposed refuse disposal site for the underground mine.

Topsoil removal thickness will range from 9 to 14 inches for the prairie soils. Topsoil replacement for most areas will average 12 inches. Agronomic soil tests will be taken at the time of reclamation to determine the soil nutrients needed to supplement the vegetation being planted.

Rooting media will be used to cover the refuse pile prior to replacement of topsoil. The rooting media will consist of a mixture of subsoil, loess, and glacial outwash to a maximum borrow depth of 12 feet. Data in Table 3.2 show that the proposed mixture of existing subsoil and deeper glacial outwash materials will provide a suitable cover material for the refuse pile. The soil will have a loam or silt loam texture with an average of 20% clay and sufficient free carbonates to reduce the permeability of water through the profile.

In conclusion, the proposed method of replacing high-organic topsoil on rooting media consisting of subsoil and glacial outwash will provide suitable cover material for the refuse pile and for reclaiming areas affected by the surface facilities for the underground operation.

SUNRISE COAL, LLC
ALLERTON MINE PERMIT
TABLE 3.0
SOIL CHARACTERIZATION DATA

Site Location	Soil Series	Sample ID	Depth	Horizon	Soil pH(1:1)	Buffer pH	Organic Matter	Phosphorus P-1	Phosphorus P-2	Potassium K	%Ca	%CCE	Tons CCE	>2mm	Sand	Silt	Clay	Texture Class
			ft				%	lb/a	lb/a	lb/a	%	%	t/1000t	%	%	%	%	
Sunrise Coal Allerton Mine Sampled 12 December 2011																		
SC01-154A	154A - Flanagan	1 - 1	0 - 1.1	A	5.82	6.65	1.9	10	18	248	67.4				7.6	65.0	27.4	SILTY CLAY LOAM
DSR1	silt loam	1 - 2	1.1 - 2.1	Bt1	6.04	6.63	1.7	4	8	446	57.5				3.2	55.8	41.0	SILTY CLAY
12/12/2011	0 - 2%	1 - 3	2.1 - 4.0	Bt2	6.91	6.98	0.7	4	112	296	63.0				13.9	60.2	25.9	SILT LOAM
		1 - 4	4 - 8	C1	7.94	7.00	0.1	4	34	176	79.0	16.13	161.3		27.8	50.1	22.1	SILT LOAM
		1 - 5	8 - 12	C2	8.07	7.00	0.1	4	10	150	85.5	21.67	216.7	0.77	28.9	50.1	21.0	SILT LOAM
SD02-152A	152A - Drummer	2 - 1	0 - 1.0	A	6.33	6.71	3.8	26	104	400	67.7				5.6	59.4	35.0	SILTY CLAY LOAM
DSR1	silty clay loam	2 - 2	1.0 - 2.0	Bt1	6.98	7.00	1.6	6	98	310	68.7				4.9	60.3	34.8	SILTY CLAY LOAM
10/28/2011	0 - 2%	2 - 3	2.0 - 4.0	Bt2	8.11	7.00	1.1	4	28	332	75.4	11.09	110.9		3.1	66.3	30.6	SILTY CLAY LOAM
		2 - 4	4 - 8	C1	8.22	7.00	0.1	8	62	210	80.3	18.15	181.5		28.8	50.9	20.3	SILT LOAM
		2 - 5	8 - 12	C2	8.24	7.00	0.1	6	20	152	85.7	21.67	216.7	1.05	28.6	54.3	17.1	SILT LOAM
SC03-56B2	56B2 - Dana	3 - 1	0 - 0.9	A	5.64	6.73	1.8	20	26	202	67.0				9.1	64.2	26.7	SILT LOAM
DSR1	silt loam	3 - 2	0.9 - 2.0	Bt1	5.71	6.68	1.0	6	24	282	58.2				8.2	63.8	28.0	SILTY CLAY LOAM
12/12/2011	2 - 5%	3 - 3	2.0 - 4.0	Bt2	6.17	6.86	0.2	6	92	200	59.5				57.9	26.6	15.5	SANDY LOAM
		3 - 4	4 - 8	C1	8.05	7.00	0.1	4	50	132	69.0	13.10	131.0		43.8	40.7	15.5	LOAM
		3 - 5	8 - 12	C2	8.07	7.00	0.1	4	54	128	85.9	21.67	216.7	0.66	31.1	55.9	13.0	SILT LOAM
SC04-152A	152A - Drummer	4 - 1	0 - 1.0	A	6.23	6.72	3.3	20	52	368	67.3				10.8	53.8	35.4	SILTY CLAY LOAM
DSR1	silty clay loam	4 - 2	1.0 - 2.0	BA	6.59	6.87	1.1	4	42	318	66.1				15.3	53.9	30.8	SILTY CLAY LOAM
12/12/2011	0 - 2%	4 - 3	2.0 - 4.0	Bt2	7.16	7.00	0.9	4	116	376	61.8	2.02	20.2		7.7	57.3	35.0	SILTY CLAY LOAM
		4 - 4	4 - 8	C1	7.97	7.00	0.1	6	90	208	70.4	8.06	80.6		33.9	43.3	22.8	LOAM
		4 - 5	8 - 12	C2	8.18	7.00	0.1	6	58	154	84.1	18.15	181.5	1.01	32.5	48.2	19.3	LOAM
SC05-154A	154A - Flanagan	5 - 1	0 - 1.1	A	6.31	6.80	3.7	38	92	290	72.4				11.0	60.0	29.0	SILTY CLAY LOAM
DSR1	silt loam	5 - 2	1.1 - 2.0	Bt1	6.71	6.91	1.7	6	60	362	69.3				8.5	60.4	31.1	SILTY CLAY LOAM
12/12/2011	0 - 2%	5 - 3	2.0 - 4.0	Bt2	7.16	7.00	0.7	6	118	370	64.4	2.02	20.2		16.3	25.8	57.9	CLAY
		5 - 4	4 - 8	C1	7.58	7.00	0.6	14	150	336	63.8	2.52	25.2		17.3	52.8	29.9	SILTY CLAY LOAM
		5 - 5	8 - 12	C2	8.02	7.00	0.1	6	50	204	82.6	17.14	171.4	0.77	22.7	50.2	27.1	CLAY LOAM
SC06-152A	152A - Drummer	6 - 1	0 - 1.0	A	7.10	7.00	2.9	12	72	356	80.9	1.51	15.1		13.7	55.2	31.1	SILTY CLAY LOAM
DSR1	silty clay loam	6 - 2	1.0 - 2.0	Bt1	7.24	7.00	1.2	4	64	294	74.2	2.52	25.2		15.1	53.9	31.0	SILTY CLAY LOAM
12/12/2011	0 - 2%	6 - 3	2.0 - 4.0	Bt2	7.39	7.00	0.7	4	138	368	63.2	2.52	25.2		15.0	58.0	27.0	SILT LOAM
		6 - 4	4 - 8	C1	7.93	7.00	0.1	10	136	250	64.6	8.06	80.6		24.2	52.9	22.9	SILT LOAM
		6 - 5	8 - 12	C2	8.11	7.00	0.1	6	54	182	82.9	20.16	201.6	1.92	30.0	51.1	18.9	SILT LOAM

SUNRISE COAL, LLC
ALLERTON MINE PERMIT
TABLE 3.0
SOIL CHARACTERIZATION DATA

Site Location	Soil Series	Sample ID	Depth	Horizon	Soil pH(1:1)	Buffer pH	Organic Matter	Phosphorus P-1	Phosphorus P-2	Potassium K	%Ca	%CCE	Tons CCE	>2mm	Sand	Silt	Clay	Texture Class
			ft				%	lb/a	lb/a	lb/a	%	%	t/1000t	%	%	%	%	
SC07-154A	56B2 - Dana	7 - 1	0 - 0.8	A	5.90	6.79	1.7	14	28	228	74.2				8.5	66.8	24.7	SILT LOAM
DSR1	silt loam	7 - 2	0.8 - 1.9	Bt1	6.12	6.77	1.1	4	8	278	67.8				18.0	49.4	32.6	SILTY CLAY LOAM
12/12/2011	2 - 5%	7 - 3	1.9 - 4.0	Bt2	7.70	7.00	0.1	4	32	162	73.9	12.60	126.0		13.8	54.4	31.8	SILTY CLAY LOAM
		7 - 4	4 - 8	C1	8.13	7.00	0.1	4	10	126	87.3	29.23	292.3		26.0	51.1	22.9	SILT LOAM
		7 - 5	8 - 12	C2	7.92	7.00	0.1	4	22	106	88.4	24.19	241.9	0.60	27.6	49.9	22.5	LOAM
SC08-152A	152A - Drummer	8 - 1	0 - 1.1	A	6.48	6.83	2.4	12	38	324	76.3				14.0	58.9	27.1	SILTY CLAY LOAM
DSR1	silty clay loam	8 - 2	1.1 - 2.0	Bt1	6.74	6.92	1.3	6	44	356	58.3				10.3	58.4	31.3	SILTY CLAY LOAM
12/12/2011	0 - 2%	8 - 3	2.0 - 4.0	Bt2	7.37	7.00	0.9	4	140	384	65.8	1.51	15.1		10.0	60.9	29.1	SILTY CLAY LOAM
		8 - 4	4 - 8	C1	8.29	7.00	0.1	6	70	124	80.3	13.61	136.1		31.3	49.8	18.9	LOAM
		8 - 6	8 - 12	C3	8.27	7.00	0.1	4	32	148	87.1	21.67	216.7	1.76	30.4	49.9	19.7	LOAM
SC09-154A	154A - Flanagan	9 - 1	0 - 1.0	A	7.26	7.00	2.2	12	28	284	84.3	1.01	10.1		10.3	63.1	26.6	SILT LOAM
DSR1	silt loam	9 - 2	1.0 - 2.0	Bt1	6.46	6.84	1.3	6	10	358	65.3				4.7	69.8	35.5	SILTY CLAY LOAM
12/12/2011	0 - 2%	9 - 3	2.0 - 4.0	Bt2	6.91	6.98	0.6	6	24	246	65.4				25.3	52.2	22.5	SILT LOAM
		9 - 4	4 - 8	C1	8.08	7.00	0.1	4	36	76	80.2	19.66	196.6		43.5	46.6	9.9	LOAM
		9 - 5	8 - 12	C3	8.17	7.00	0.1	4	34	102	86.1	22.68	226.8	0.85	25.0	58.6	16.4	SILT LOAM
SC10-154A	154A - Flanagan	10 - 1	0 - 1.1	A	7.28	7.00	1.7	26	54	310	87.4	1.51	15.1		9.6	65.6	24.8	SILT LOAM
DSR1	silt loam	10 - 2	1.1 - 2.1	Bt1	6.58	6.86	1.8	6	12	384	74.8				2.0	63.9	34.1	SILTY CLAY LOAM
12/12/2011	0 - 2%	10 - 3	2.1 - 4.0	Bt2	7.92	7.00	0.1	4	68	130	75.4	20.16	201.6		17.9	65.9	16.2	SILT LOAM
		10 - 4	4 - 8	C1	8.25	7.00	0.1	4	30	134	84.3	19.66	196.6		19.4	51.3	29.3	SILTY CLAY LOAM
		10 - 5	8 - 12	C3	8.21	7.00	0.1	4	30	122	86.3	23.19	231.9	0.98	25.6	52.4	22.1	SILT LOAM

%CCE = Percent Calcium Carbonate Equivalent

Notes:
1. DSR1 = Sampled by David Ralston, Soil Tech, Inc., Newburgh, Indiana, using a Giddings hydraulic soil probe and auger unit
2. DSR2 = Sampled by David Ralston using a 3" diameter hand bucket auger
3. Soil samples analyzed by Key Agricultural Services, Macomb, Illinois using standard procedures

SUNRISE COAL, LLC
ALLERTON MINE PERMIT
TABLE 3.1
SOIL DATA ANALYSIS BY SOIL SERIES AND DEPTH

Site Location	Soil Series	Sample ID	Depth	Horizon	Soil pH(1:1)	Buffer pH	Organic Matter	Phosphorus P-1	Phosphorus P-2	Potassium K	%Ca	%CCE	Tons CCE	>2mm	Sand	Silt	Clay	Texture Class
			ft				%	lb/a	lb/a	lb/a	%	%	t/1000t	%	%	%	%	
Sunrise Coal Allerton Mine Sampled 12 December 2011																		
Data analysis for 56 - Dana topsoil																		
56	Dana	3 - 1	0 - 0.9	A	5.54	6.73	1.8	20	26	202	67.0				9.1	64.2	26.7	SILT LOAM
56	Dana	7 - 1	0 - 0.8	A	5.90	6.79	1.7	14	28	228	74.2				8.5	66.8	24.7	SILT LOAM
56	Dana		0 - 0.9	A	5.68	6.76	1.7	17	27	215	70.6				8.8	65.5	25.7	SILT LOAM
Data analysis for 56 - Dana subsoil																		
56	Dana	3 - 2	0.9 - 2.0	Bt1	5.71	6.68	1.0	6	24	282	58.2				8.2	63.8	28.0	SILTY CLAY LOAM
56	Dana	3 - 3	2.0 - 4.0	Bt2	6.17	6.86	0.2	6	92	200	59.5				57.9	26.6	15.5	SANDY LOAM
56	Dana	7 - 2	0.8 - 1.9	Bt1	6.12	6.77	1.1	4	8	278	67.8				18.0	49.4	32.6	SILTY CLAY LOAM
56	Dana	7 - 3	1.9 - 4.0	Bt2	7.70	7.00	0.1	4	32	162	73.9	12.60	126.0		13.8	54.4	31.8	SILTY CLAY LOAM
56	Dana		0.9 - 4.0	B	6.07	6.83	0.6	5	39	230.5	64.8	12.60	126.0		24.5	48.6	27.0	SILTY CLAY LOAM
Data analysis for 56 - Dana C-horizon 4 - 12'																		
56	Dana	3 - 4	4 - 8	C1	8.05	7.00	0.1	4	50	132	69.0	13.10	131.0		43.8	40.7	15.5	LOAM
56	Dana	7 - 4	4 - 8	C1	8.13	7.00	0.1	4	10	126	87.3	29.23	292.3		26.0	51.1	22.9	SILT LOAM
56	Dana	3 - 6	8 - 12	C2	8.07	7.00	0.1	4	64	128	85.9	21.67	216.7	0.66	31.1	55.9	13.0	SILT LOAM
56	Dana	7 - 5	8 - 12	C2	7.92	7.00	0.1	4	22	106	88.4	24.19	241.9	0.60	27.6	49.9	22.5	LOAM
56	Dana		4 - 12	C	8.04	7.00	0.1	4	34	123	82.6	22.05	220.5	0.63	32.1	49.4	18.5	LOAM
Data analysis for 154 - Flanagan topsoil																		
154	Flanagan	1 - 1	0 - 1.1	A	5.82	6.65	1.9	10	18	248	67.4				7.6	65.0	27.4	SILTY CLAY LOAM
154	Flanagan	5 - 1	0 - 1.1	A	6.31	6.80	3.7	38	92	290	72.4				11.0	60.0	29.0	SILTY CLAY LOAM
154	Flanagan	9 - 1	0 - 1.0	A	7.26	7.00	2.2	12	28	284	84.3	1.01	10.1		10.3	63.1	26.6	SILT LOAM
154	Flanagan	10 - 1	0 - 1.1	A	7.28	7.00	1.7	26	54	310	87.4	1.51	15.1		9.6	65.6	24.8	SILT LOAM
154	Flanagan		0 - 1.1	A	6.28	6.86	2.4	21.5	48	283	77.9	1.26	12.6		9.6	63.4	27.0	SILTY CLAY LOAM
Data analysis for 154 - Flanagan subsoil																		
154	Flanagan	1 - 2	1.1 - 2.1	Bt1	6.04	6.63	1.7	4	8	446	57.5				3.2	55.8	41.0	SILTY CLAY
154	Flanagan	1 - 3	2.1 - 4.0	Bt2	6.91	6.98	0.7	4	112	296	63.0				13.9	60.2	25.9	SILT LOAM
154	Flanagan	5 - 2	1.1 - 2.0	Bt1	6.71	6.91	1.7	6	60	362	69.3				8.5	60.4	31.1	SILTY CLAY LOAM
154	Flanagan	5 - 3	2.0 - 4.0	Bt2	7.16	7.00	0.7	6	118	370	64.4	2.02	20.2		16.3	25.8	57.9	CLAY
154	Flanagan	9 - 2	1.0 - 2.0	Bt1	6.46	6.84	1.3	6	10	358	65.3				4.7	59.8	35.5	SILTY CLAY LOAM
154	Flanagan	9 - 3	2.0 - 4.0	Bt2	6.91	6.98	0.6	6	24	246	65.4				25.3	52.2	22.5	SILT LOAM
154	Flanagan	10 - 2	1.1 - 2.1	Bt1	6.58	6.86	1.8	6	12	384	74.8				2.0	63.9	34.1	SILTY CLAY LOAM
154	Flanagan	10 - 3	2.1 - 4.0	Bt2	7.92	7.00	0.1	4	68	130	75.4	20.16	201.6		17.9	65.9	16.2	SILT LOAM
154	Flanagan		1.1 - 4.0	Bt	6.59	6.90	1.1	5.25	51.5	324	66.9	11.09	110.9		11.5	55.5	33.0	SILTY CLAY LOAM
Data analysis for 154 - Flanagan C1 - 4 to 8'																		
154	Flanagan	1 - 4	4 - 8	C1	7.94	7.00	0.1	4	34	176	79.0	16.13	161.3		27.8	50.1	22.1	SILT LOAM
154	Flanagan	5 - 4	4 - 8	C1	7.58	7.00	0.6	14	150	336	63.8	2.52	25.2		17.3	52.8	29.9	SILTY CLAY LOAM
154	Flanagan	9 - 4	4 - 8	C1	8.08	7.00	0.1	4	36	76	80.2	19.66	196.6		43.5	46.6	9.9	LOAM
154	Flanagan	10 - 4	4 - 8	C1	8.25	7.00	0.1	4	30	134	84.3	19.66	196.6		19.4	51.3	29.3	SILTY CLAY LOAM
154	Flanagan		4 - 8	C1	7.89	7.00	0.2	6.5	62.5	180.5	76.8	14.49	144.9		27.0	50.2	22.8	SILT LOAM

SUNRISE COAL, LLC
ALLERTON MINE PERMIT
TABLE 3.1
SOIL DATA ANALYSIS BY SOIL SERIES AND DEPTH

Site Location	Soil Series	Sample ID	Depth	Horizon	Soil pH(1:1)	Buffer pH	Organic Matter	Phosphorus P-1	Phosphorus P-2	Potassium K	%Ca	%CCE	Tons CCE	>2mm	Sand	Silt	Clay	Texture Class
			ft				%	lb/a	lb/a	lb/a	%	%	t/1000t	%	%	%	%	
Data analysis for 154 - Flanagan C2 - 8 -to 12'																		
154	Flanagan	1 - 5	8 - 12	C2	8.07	7.00	0.1	4	10	150	85.5	21.67	216.7	0.77	28.9	50.1	21.0	SILT LOAM
154	Flanagan	5 - 5	8 - 12	C2	8.02	7.00	0.1	6	50	204	82.6	17.14	171.4	0.77	22.7	50.2	27.1	CLAY LOAM
154	Flanagan	9 - 5	8 - 12	C3	8.17	7.00	0.1	4	34	102	86.1	22.68	226.8	0.85	25.0	58.6	16.4	SILT LOAM
154	Flanagan	10 - 5	8 - 12	C3	8.21	7.00	0.1	4	30	122	86.3	23.19	231.9	0.98	25.5	52.4	22.1	SILT LOAM
154	Flanagan		8 - 12	C2	8.11	7.00	0.1	4.5	31	144.5	85.1	21.17	211.7	0.84	25.5	52.8	21.7	SILT LOAM
Data analysis for 152 - Drummer topsoil																		
152	Drummer	2 - 1	0 - 1.0	A	6.33	6.71	3.8	26	104	400	67.7				5.6	59.4	35.0	SILTY CLAY LOAM
152	Drummer	4 - 1	0 - 1.0	A	6.23	6.72	3.3	20	52	368	67.3				10.8	53.8	35.4	SILTY CLAY LOAM
152	Drummer	6 - 1	0 - 1.0	A	7.10	7.00	2.9	12	72	356	80.9	1.51	15.1		13.7	55.2	31.1	SILTY CLAY LOAM
152	Drummer	8 - 1	0 - 1.1	A	6.48	6.83	2.4	12	38	324	76.3				14.0	58.9	27.1	SILTY CLAY LOAM
152	Drummer		0 - 1.0	A	6.44	6.82	3.1	17.5	66.5	362	73.1	1.51	15.1		11.0	56.8	32.2	SILTY CLAY LOAM
Data analysis for 152 - Drummer subsoil																		
152	Drummer	2 - 2	1.0 - 2.0	Bt1	6.98	7.00	1.6	6	98	310	68.7				4.9	60.3	34.8	SILTY CLAY LOAM
152	Drummer	2 - 3	2.0 - 4.0	Bt2	8.11	7.00	1.1	4	28	332	75.4	11.09	110.9		3.1	66.3	30.6	SILTY CLAY LOAM
152	Drummer	4 - 2	1.0 - 2.0	BA	6.59	6.87	1.1	4	42	318	66.1				15.3	53.9	30.8	SILTY CLAY LOAM
152	Drummer	4 - 3	2.0 - 4.0	Bt2	7.15	7.00	0.9	4	116	376	61.8	2.02	20.2		7.7	57.3	35.0	SILTY CLAY LOAM
152	Drummer	6 - 2	1.0 - 2.0	Bt1	7.24	7.00	1.2	4	64	294	74.2	2.52	25.2		15.1	53.9	31.0	SILTY CLAY LOAM
152	Drummer	6 - 3	2.0 - 4.0	Bt2	7.39	7.00	0.7	4	138	368	63.2	2.52	25.2		15.0	58.0	27.0	SILT LOAM
152	Drummer	8 - 2	1.1 - 2.0	Bt1	6.74	6.92	1.3	6	44	366	68.3				10.3	58.4	31.3	SILTY CLAY LOAM
152	Drummer	8 - 3	2.0 - 4.0	Bt2	7.37	7.00	0.9	4	140	384	65.8	1.51	15.1		10.0	60.9	29.1	SILTY CLAY LOAM
152	Drummer		1.0 - 4.0	Bt1	7.02	6.97	1.1	4.5	83.75	343.5	67.9	3.93	39.3		10.2	58.6	31.2	SILTY CLAY LOAM
Data analysis for 152 - Drummer C1 - 4 to 8'																		
152	Drummer	2 - 4	4 - 8	C1	8.22	7.00	0.1	8	62	210	80.3	18.15	181.5		28.8	50.9	20.3	SILT LOAM
152	Drummer	4 - 4	4 - 8	C1	7.97	7.00	0.1	6	90	208	70.4	8.06	80.6		33.9	43.3	22.8	LOAM
152	Drummer	6 - 4	4 - 8	C1	7.93	7.00	0.1	10	136	250	64.6	8.06	80.6		24.2	52.9	22.9	SILT LOAM
152	Drummer	8 - 4	4 - 8	C1	8.29	7.00	0.1	6	70	124	80.3	13.61	136.1		31.3	49.8	18.9	LOAM
152	Drummer		4 - 8	C1	8.08	7.00	0.1	7.5	89.5	198	73.9	11.97	119.7		29.6	49.2	21.2	LOAM
Data analysis for 152 - Drummer C2 - 8 to 12'																		
152	Drummer	2 - 5	8 - 12	C2	8.24	7.00	0.1	6	20	152	85.7	21.67	216.7	1.05	28.6	54.3	17.1	SILT LOAM
152	Drummer	4 - 5	8 - 12	C2	8.18	7.00	0.1	6	58	154	84.1	18.15	181.5	1.01	32.5	48.2	19.3	LOAM
152	Drummer	6 - 5	8 - 12	C2	8.11	7.00	0.1	6	54	182	82.9	20.16	201.6	1.92	30.0	51.1	18.9	SILT LOAM
152	Drummer	8 - 5	8 - 12	C3	8.27	7.00	0.1	4	32	148	87.1	21.67	216.7	1.76	30.4	49.9	19.7	LOAM
152	Drummer		8 - 12	C2	8.20	7.00	0.1	5.5	41	159	85.0	20.41	204.1	1.44	30.4	50.9	18.8	SILT LOAM

SUNRISE COAL, LLC
ALLERTON MINE PERMIT
TABLE 3.2
SOIL DATA ANALYSIS FOR A-HORIZON TOPSOIL

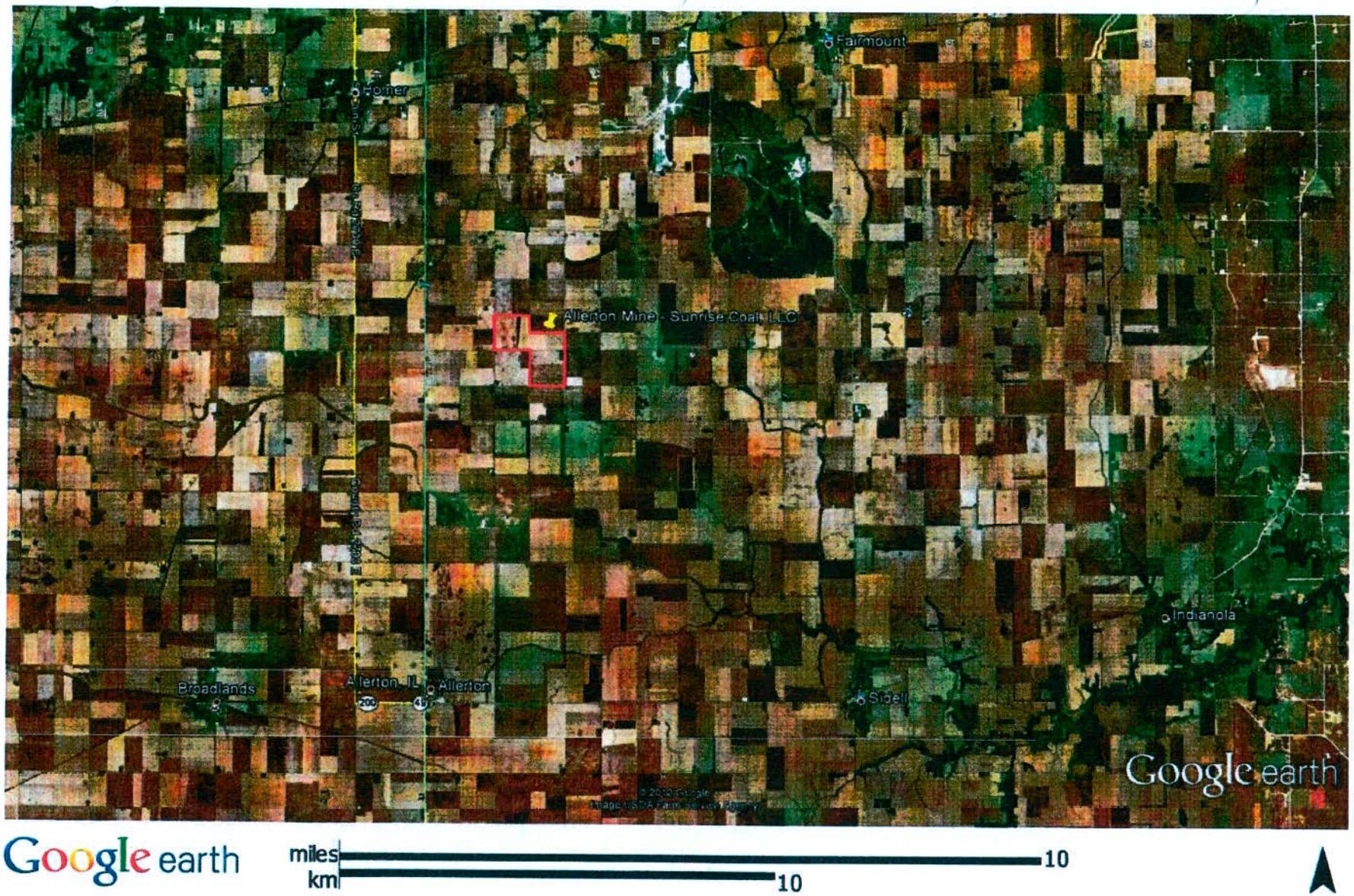
Site Location	Soil Series	Sample ID	Depth	Horizon	Soil pH(1:1)	Buffer pH	Organic Matter	Phosphorus P-1	Phosphorus P-2	Potassium K	%Ca	%CCE	Tons CCE	>2mm	Sand	Silt	Clay	Texture Class
			ft				%	lb/a	lb/a	lb/a	%	%	t/1000t	%	%	%	%	
Sunrise Coal Allerton Mine Sampled 12 December 2011																		
Data analysis for 56 - Dana topsoil			Acres =	11														
56	Dana	3 - 1	0 - 0.9	A	5.54	6.73	1.8	20	26	202	67.0				9.1	64.2	26.7	SILT LOAM
56	Dana	7 - 1	0 - 0.8	A	5.90	6.79	1.7	14	28	228	74.2				8.5	66.8	24.7	SILT LOAM
56	Dana		0 - 0.9	A	5.68	6.76	1.7	17	27	215	70.6				8.8	65.5	25.7	SILT LOAM
Data analysis for 154 - Flanagan topsoil			Acres =	167														
154	Flanagan	1 - 1	0 - 1.1	A	5.82	6.65	1.9	10	18	248	67.4				7.6	65.0	27.4	SILTY CLAY LOAM
154	Flanagan	5 - 1	0 - 1.1	A	6.31	6.80	3.7	38	92	290	72.4				11.0	60.0	29.0	SILTY CLAY LOAM
154	Flanagan	9 - 1	0 - 1.0	A	7.26	7.00	2.2	12	28	284	84.3	1.01	10.1		10.3	63.1	26.6	SILT LOAM
154	Flanagan	10 - 1	0 - 1.1	A	7.28	7.00	1.7	26	54	310	87.4	1.51	15.1		9.6	65.6	24.8	SILT LOAM
154	Flanagan		0 - 1.1	A	6.28	6.86	2.4	21.5	48	283	77.9	1.26	12.6		9.6	63.4	27.0	SILTY CLAY LOAM
Data analysis for 152 - Drummer topsoil			Acres =	229														
152	Drummer	2 - 1	0 - 1.0	A	6.33	6.71	3.8	26	104	400	67.7				5.6	59.4	35.0	SILTY CLAY LOAM
152	Drummer	4 - 1	0 - 1.0	A	6.23	6.72	3.3	20	52	368	67.3				10.8	53.8	35.4	SILTY CLAY LOAM
152	Drummer	6 - 1	0 - 1.0	A	7.10	7.00	2.9	12	72	356	80.9	1.51	15.1		13.7	55.2	31.1	SILTY CLAY LOAM
152	Drummer	8 - 1	0 - 1.1	A	6.48	6.83	2.4	12	38	324	76.3				14.0	58.9	27.1	SILTY CLAY LOAM
152	Drummer		0 - 1.0	A	6.44	6.82	3.1	17.5	66.5	362	73.1	1.51	15.1		11.0	56.8	32.2	
Potential blended topsoil for storage and replacement																		
Weighted average topsoil blend			Total acres =	407	6.32	6.83	2.8	19.1	57.8	325.6	75.0	1.4	13.7	0.00	10.4	59.8	29.8	SILTY CLAY LOAM

SUNRISE COAL, LLC
ALLERTON MINE PERMIT
TABLE 3.3
EXISTING SUBSOIL AND PROPOSED ROOTING MEDIA

Site Location	Soil Series	Sample ID	Depth	Horizon	Soil pH(1:1)	Buffer pH	Organic Matter	Phosphorus P-1	Phosphorus P-2	Potassium K	%Ca	Tons %CCE	Tons CCE	>2mm	Sand	Silt	Clay	Texture Class
			ft				%	lb/a	lb/a	lb/a	%	%	t/1000t	%	%	%	%	
Sunrise Coal Allerton Mine Sampled 12 December 2011																		
Data analysis for 56 - Dana subsoil			Acres =	11														
56	Dana	3 - 2	0.9 - 2.0	Bt1	5.71	6.68	1.0	6	24	282	58.2				8.2	63.8	28.0	SILTY CLAY LOAM
56	Dana	3 - 3	2.0 - 4.0	Bt2	6.17	6.86	0.2	6	92	200	59.5				57.9	26.6	15.5	SANDY LOAM
56	Dana	7 - 2	0.8 - 1.9	Bt1	6.12	6.77	1.1	4	8	278	67.8				18.0	48.4	32.6	SILTY CLAY LOAM
56	Dana	7 - 3	1.9 - 4.0	Bt2	7.70	7.00	0.1	4	32	162	73.9	12.60	126.0		13.8	54.4	31.8	SILTY CLAY LOAM
56	Dana		0.9 - 4.0	B	6.07	6.83	0.6	5	39	230.5	64.8	12.60	126.0		24.5	48.6	27.0	SILTY CLAY LOAM
Data analysis for 154 - Flanagan subsoil			Acres =	167														
154	Flanagan	1 - 2	1.1 - 2.1	Bt1	6.04	6.63	1.7	4	8	446	57.5				3.2	55.8	41.0	SILTY CLAY
154	Flanagan	1 - 3	2.1 - 4.0	Bt2	6.91	6.98	0.7	4	112	296	63.0				13.9	60.2	25.9	SILT LOAM
154	Flanagan	5 - 2	1.1 - 2.0	Bt1	6.71	6.91	1.7	6	60	362	69.3				8.5	60.4	31.1	SILTY CLAY LOAM
154	Flanagan	5 - 3	2.0 - 4.0	Bt2	7.16	7.00	0.7	6	118	370	64.4	2.02	20.2		16.3	25.8	57.9	CLAY
154	Flanagan	9 - 2	1.0 - 2.0	Bt1	6.46	6.84	1.3	6	10	358	65.3				4.7	59.8	35.5	SILTY CLAY LOAM
154	Flanagan	9 - 3	2.0 - 4.0	Bt2	6.91	6.98	0.6	6	24	246	65.4				25.3	52.2	22.5	SILT LOAM
154	Flanagan	10 - 2	1.1 - 2.1	Bt1	6.58	6.86	1.8	6	12	384	74.8				2.0	63.9	34.1	SILTY CLAY LOAM
154	Flanagan	10 - 3	2.1 - 4.0	Bt2	7.92	7.00	0.1	4	68	130	75.4	20.16	201.6		17.9	65.9	16.2	SILT LOAM
154	Flanagan		1.1 - 4.0	Bt	6.59	6.90	1.1	5.25	51.5	324	66.9	11.09	110.9		11.5	55.5	33.0	SILTY CLAY LOAM
Data analysis for 152 - Drummer subsoil			Acres =	229														
152	Drummer	2 - 2	1.0 - 2.0	Bt1	6.98	7.00	1.6	6	98	310	68.7				4.9	60.3	34.8	SILTY CLAY LOAM
152	Drummer	2 - 3	2.0 - 4.0	Bt2	8.11	7.00	1.1	4	28	332	75.4	11.09	110.9		3.1	66.3	30.6	SILTY CLAY LOAM
152	Drummer	4 - 2	1.0 - 2.0	BA	6.59	6.87	1.1	4	42	318	66.1				15.3	53.9	30.8	SILTY CLAY LOAM
152	Drummer	4 - 3	2.0 - 4.0	Bt2	7.15	7.00	0.9	4	116	376	61.8	2.02	20.2		7.7	57.3	35.0	SILTY CLAY LOAM
152	Drummer	6 - 2	1.0 - 2.0	Bt1	7.24	7.00	1.2	4	64	294	74.2	2.52	25.2		15.1	53.9	31.0	SILTY CLAY LOAM
152	Drummer	6 - 3	2.0 - 4.0	Bt2	7.39	7.00	0.7	4	138	368	63.2	2.52	25.2		15.0	58.0	27.0	SILT LOAM
152	Drummer	8 - 2	1.1 - 2.0	Bt1	6.74	6.92	1.3	6	44	366	68.3				10.3	58.4	31.3	SILTY CLAY LOAM
152	Drummer	8 - 3	2.0 - 4.0	Bt2	7.37	7.00	0.9	4	140	384	65.8	1.51	15.1		10.0	60.9	29.1	SILTY CLAY LOAM
152	Drummer		1.0 - 4.0	Bt1	7.02	6.97	1.1	4.5	83.75	343.5	67.9	3.93	39.3		10.2	58.6	31.2	SILTY CLAY LOAM
Potential blended subsoil for storage and replacement																		
Weighted average subsoil blend			Total acres =	407	6.74	6.94	1.1	4.8	69.3	332.4	67.4	7.1	71.0	0.00	11.1	57.1	31.8	SILTY CLAY LOAM
Data analysis for 56 - Dana C-horizon 4 - 12'																		
56	Dana	3 - 4	4 - 8	C1	8.05	7.00	0.1	4	50	132	69.0	13.10	131.0		43.8	40.7	15.5	LOAM
56	Dana	7 - 4	4 - 8	C1	8.13	7.00	0.1	4	10	126	87.3	29.23	292.3		26.0	51.1	22.9	SILT LOAM
154	Flanagan	1 - 4	4 - 8	C1	7.94	7.00	0.1	4	34	176	79.0	16.13	161.3		27.8	50.1	22.1	SILT LOAM
154	Flanagan	5 - 4	4 - 8	C1	7.58	7.00	0.6	14	150	336	63.8	2.52	25.2		17.3	52.8	29.9	SILTY CLAY LOAM
154	Flanagan	9 - 4	4 - 8	C1	8.08	7.00	0.1	4	36	76	80.2	19.66	196.6		43.5	46.6	9.9	LOAM
154	Flanagan	10 - 4	4 - 8	C1	8.25	7.00	0.1	4	30	134	84.3	19.66	196.6		19.4	51.3	29.3	SILTY CLAY LOAM
152	Drummer	2 - 4	4 - 8	C1	8.22	7.00	0.1	8	62	210	80.3	18.15	181.5		28.8	50.9	20.3	SILT LOAM

SUNRISE COAL, LLC
ALLERTON MINE PERMIT
TABLE 3.3
EXISTING SUBSOIL AND PROPOSED ROOTING MEDIA

Site Location	Soil Series	Sample ID	Depth	Horizon	Soil pH(1:1)	Buffer pH	Organic Matter	Phosphorus P-1	Phosphorus P-2	Potassium K	%Ca	%CCE	Tons CCE	>2mm	Sand	Silt	Clay	Texture Class
			ft				%	lb/a	lb/a	lb/a	%	%	t/1000t	%	%	%	%	
152	Drummer	4 - 4	4 - 8	C1	7.97	7.00	0.1	6	90	208	70.4	8.06	80.6		33.9	43.3	22.8	LOAM
152	Drummer	6 - 4	4 - 8	C1	7.93	7.00	0.1	10	136	250	64.6	8.06	80.6		24.2	52.9	22.9	SILT LOAM
152	Drummer	8 - 4	4 - 8	C1	8.29	7.00	0.1	6	70	124	80.3	13.61	136.1		31.3	49.8	18.9	LOAM
	Glacial till average		4 - 8	C1	7.99	7.00	0.2	6.4	66.8	177.2	75.9	14.82	148.2		29.6	49.0	21.5	LOAM
Potential rooting media mix of subsoil and upper 4 feet of glacial till - Assume 3' subsoil mixed with 4' glacial till																		
Rooting media mix to 8 feet					7.08	7.0	0.5	5.7	67.9	243.7	72.3	11.5	115.1	0.00	21.7	52.4	25.9	SILT LOAM
56	Dana	3 - 5	8 - 12	C2	8.07	7.00	0.1	4	54	128	85.9	21.67	216.7	0.66	31.1	55.9	13.0	SILT LOAM
56	Dana	7 - 5	8 - 12	C2	7.92	7.00	0.1	4	22	106	88.4	24.19	241.9	0.60	27.6	49.9	22.5	LOAM
154	Flanagan	1 - 5	8 - 12	C2	8.07	7.00	0.1	4	10	150	86.5	21.67	216.7	0.77	28.9	50.1	21.0	SILT LOAM
154	Flanagan	5 - 5	8 - 12	C2	8.02	7.00	0.1	6	50	204	82.6	17.14	171.4	0.77	22.7	50.2	27.1	CLAY LOAM
154	Flanagan	9 - 5	8 - 12	C3	8.17	7.00	0.1	4	34	102	86.1	22.68	226.8	0.85	25.0	58.6	16.4	SILT LOAM
154	Flanagan	10 - 5	8 - 12	C3	8.21	7.00	0.1	4	30	122	86.3	23.19	231.9	0.98	25.5	52.4	22.1	SILT LOAM
152	Drummer	2 - 5	8 - 12	C2	8.24	7.00	0.1	6	20	152	85.7	21.67	216.7	1.05	28.6	54.3	17.1	SILT LOAM
152	Drummer	4 - 5	8 - 12	C2	8.18	7.00	0.1	6	58	154	84.1	18.15	181.5	1.01	32.5	48.2	19.3	LOAM
152	Drummer	6 - 5	8 - 12	C2	8.11	7.00	0.1	6	54	182	82.9	20.16	201.6	1.92	30.0	51.1	18.9	SILT LOAM
152	Drummer	8 - 5	8 - 12	C3	8.27	7.00	0.1	4	32	148	87.1	21.67	216.7	1.76	30.4	49.9	19.7	LOAM
	Glacial till average		8 - 12	C2	8.11	7.00	0.1	4.8	36.4	144.8	86.4	21.22	212.2		28.2	52.1	19.7	SILT LOAM
Potential rooting media mix of subsoil and upper 4 feet of glacial till - Assume 3' subsoil mixed with 8' glacial till																		
Rooting media mix to 12 feet			1 - 12	BC mix	7.25	7.0	0.4	5.4	56.4	207.8	77.1	15.0	150.4	0.00	24.1	52.3	23.6	SILT LOAM


Fairmount
Homer
Allerton Mine - Sunrise Coal, LLC
Indianola
Broadlands
Allerton, IL
Allerton
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Soil Tech, Inc.

Soil & Environmental Services

5144 W. Timberwood
Newburgh, IN 47630
Office: (812) 858-7003
Fax: (812) 858-0888

Attachment 2

January 31, 2012

Scott Gambill
Sunrise Coal, LLC
1466 East S.R. 58
Carlisle, Indiana 47838

RE: Allerton Mine – New Permit
Soil Resources Analysis Plan
Certification of Soil Data

Dear Mr. Gambill:

This letter is to certify that the laboratory data are for sampling sites identified on the Soil Resources Map for the Allerton Mine. Soil sampling sites are identified on the map and are listed in Table 3.0.

Soils were sampled on 12 December 2011 by David Ralston using a truck-mounted Giddings hydraulic soil sampling equipment. Samples were sent to Key Agricultural Services in Macomb, Illinois, for analysis. The lab used standard agronomic procedures for analysis.

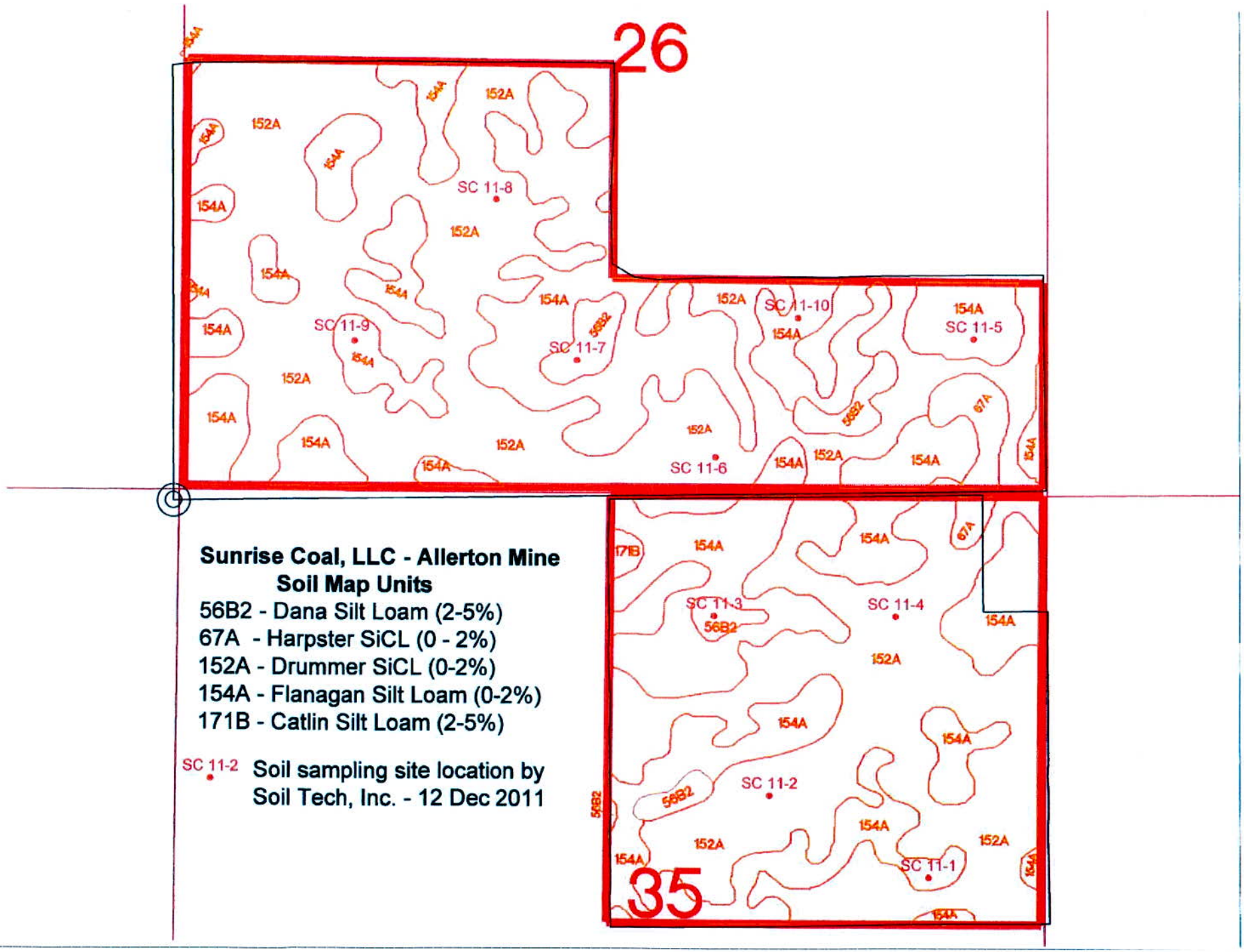
The laboratory data are presented in Attachment 4 in Appendix A. The data are summarized in Table 3.0.

Call if you have questions or need additional information on this plan.

Sincerely,
Soil Tech, Inc.

David S. Ralston, Ph.D., CPAg/SSc
President

AMERICAN REGISTRY OF CERTIFIED PROFESSIONALS
AGRONOMY CROPS SOILS
ARCPACS
DAVID S. RALSTON
CERTIFIED PROFESSIONAL
AGRONOMIST/SOIL
SCIENTIST
No. 91
EXP.


26
35
SC 11-8
SC 11-9
SC 11-7
SC 11-10
SC 11-5
SC 11-6
SC 11-3
SC 11-4
SC 11-2
SC 11-1
152A
154A
56B2
67A
171B
Sunrise Coal, LLC - Allerton Mine
Soil Map Units
56B2 - Dana Silt Loam (2-5%)
67A - Harpster SiCL (0 - 2%)
152A - Drummer SiCL (0-2%)
154A - Flanagan Silt Loam (0-2%)
171B - Catlin Silt Loam (2-5%)
SC 11-2 Soil sampling site location by
Soil Tech, Inc. - 12 Dec 2011

LOCATION DANA IL+IN OH

Established Series
Rev. TJE-SEW-AAC
10/2009

56

DANA SERIES

The Dana series consists of very deep, moderately well drained soils that formed in loess or other silty materials and in the underlying loamy calcareous till on till plains. Permeability is moderate. Slope ranges from 0 to 12 percent. Mean annual air temperature is 10 degrees C (50 degrees F), and mean annual precipitation is 838 mm (33 inches).

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Oxyaquic Argiudolls

TYPICAL PEDON: Dana silt loam - on a north-east facing slope of 3 percent in a cultivated field at an elevation of about 706 feet above MSL. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 28 cm (0 to 11 inches); very dark grayish brown (10YR 3/2) silt loam, brown (10YR 4/3) dry; moderate fine granular structure; friable; common very fine and fine roots throughout; moderately acid; clear smooth boundary. [25 to 46 cm (10 to 18 inches) thick]

Bt1--28 to 38 cm (11 to 15 inches); dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; common very fine and fine roots throughout; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; many distinct dark brown (10YR 3/3) organo-clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2--38 to 64 cm (15 to 25 inches); yellowish brown (10YR 5/4) silty clay loam; moderate fine prismatic structure parting to moderate fine angular blocky; firm; common very fine and fine roots between peds; many distinct brown (10YR 4/3) clay films on faces of peds; moderately acid; clear smooth boundary.

Bt3--64 to 81 cm (25 to 32 inches); brown (10YR 5/3) silty clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common very fine and fine roots between peds; common medium vesicular and tubular pores; few distinct dark brown (10YR 3/3) organo-clay films on faces of peds and in pores; many distinct brown (10YR 4/3) clay films on faces of peds; common fine faint light brownish gray (10YR 6/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; common fine and medium spherical black (7.5YR 2.5/1) weakly cemented iron-manganese nodules throughout; slightly acid; clear smooth boundary. [Combined thickness of the Bt horizon is 31 to 71 cm (12 to 28 inches).]

2Bt4--81 to 97 cm (32 to 38 inches); brown (10YR 5/3) clay loam; moderate medium prismatic structure; firm; few very fine and fine roots between peds; common medium vesicular and tubular pores; few distinct very dark grayish brown (10YR 3/2) organo-clay films along root channels and pores; many distinct brown (10YR 4/3) clay films on faces of peds; common medium faint light brownish gray (10YR 6/2) iron depletions in the matrix; many medium distinct yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; common fine and medium spherical black (7.5YR 2.5/1) weakly cemented iron-manganese nodules throughout; 3 percent fine and medium gravel; neutral; clear smooth boundary.

2Bt5--97 to 135 cm (38 to 53 inches); brown (10YR 5/3) clay loam; moderate coarse prismatic structure; firm; few very fine and fine roots between peds; common medium and coarse vesicular and tubular pores; few prominent very dark gray (10YR 3/1) organo-clay films along root channels and pores; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium distinct gray (10YR 6/1) iron depletions in the matrix; many medium distinct dark yellowish brown (10YR 4/6) masses of oxidized iron in the matrix; few medium spherical black (7.5YR 2.5/1) weakly cemented iron-manganese nodules throughout; 7 percent fine and medium gravel; neutral; clear smooth boundary.

2Bt6--135 to 147 cm (53 to 58 inches); brown (10YR 5/3) clay loam; weak coarse angular blocky structure; firm; few very fine and fine roots between peds; common medium and coarse vesicular and tubular pores; few prominent very dark gray (10YR 3/1) organo-clay films along root channels and pores; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium distinct gray (10YR 6/1) iron depletions in the matrix; many medium distinct yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; few medium spherical black (7.5YR 2.5/1) weakly cemented iron-manganese nodules throughout; 7 percent fine and medium gravel; neutral; clear smooth boundary. [Combined thickness of the 2Bt horizon is 25 to 76 cm (10 to 30 inches).]

2C--147 to 203 cm (58 to 80 inches); pale brown (10YR 6/3) loam; massive; firm; few fine and medium vesicular and tubular pores; common medium distinct gray (10YR 6/1) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium irregular brown (10YR 4/3) iron-manganese accumulations on horizontal fracture planes; few fine to coarse rounded yellowish red (5YR 5/8) weakly cemented iron-manganese nodules throughout; few medium spherical black (7.5YR 2.5/1) weakly cemented iron-manganese nodules throughout; common medium rounded and irregular white (10YR 8/1) weakly cemented calcium carbonate nodules throughout; 7 percent fine and medium gravel; violently effervescent; slightly alkaline.

TYPE LOCATION: Edgar County, Illinois; about 4 miles north and 2.5 miles east of Newman, Illinois; 1,810 feet north and 750 feet east of the southwest corner of sec. 10, T. 16 N., R. 14 W.; USGS Newman topographic quadrangle; lat. 39 degrees, 51 minutes, 21 seconds N., and long. 87 degrees, 56 minutes, 05 seconds W.; UTM Zone 16S 0420042E 4411965N; NAD 83.

RANGE IN CHARACTERISTICS: The depth to the base of the argillic horizon ranges from 81 to 152 cm (32 to 60 inches). The depth to carbonates ranges from 102 to 152 cm (40 to 60 inches). The depth to horizons with more than 20 percent fine sand or coarser ranges from 60 to 102 cm (22 to 40 inches). The average silt content in the horizons formed in till is less than 50 percent. The mollic epipedon is 25 to 46 cm (10 to 18 inches) thick. The particle-size control section ranges from 27 to 35 percent clay and less than 15 percent fine sand or coarser.

The Ap or A horizon has hue of 10YR, value of 2 or 3 (4 or 5 dry), and chroma of 1 or 2. It is typically silt loam. Severely eroded pedons are silty clay loam. Reaction ranges from moderately acid to neutral.

The BA horizon, where present, has hue of 10YR, value of 4, and chroma of 3. It is silt loam or silty clay loam

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam. Clay content ranges from 27 to 35 percent and sand content is less than 15 percent. Reaction ranges from strongly acid to neutral.

The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is clay loam. Clay

content ranges from 27 to 35 percent, silt content ranges from 33 to 45 percent, and sand content ranges from 20 to 40 percent. Content of rock fragments ranges from 1 to 7 percent. Reaction ranges from moderately acid to neutral.

The 2BC horizon, where present, has hue of 10YR or 2.5Y, value of 4 or 5 , and chroma of 3 or 4. Reaction ranges from neutral to moderately alkaline and carbonates are commonly present.
The 2C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. It is dominantly loam but is clay loam in the upper part of some pedons. Clay content ranges from 15 to 30 percent, silt content ranges from 40 to 50 percent, and sand content rages from 20 to 45 percent. Content of rock fragments ranges from 1 to 15 percent. Reaction is slightly alkaline or moderately alkaline and carbonates are present.

COMPETING SERIES: These are the Assumption, Aviston, Barrington, Blackberry, Buckhart, Catlin, Clare, Danabrook, Geryune, Graymont, Harrison, Keltner, Saybrook, and Totanang series. Assumption soils average more than 30 percent clay in the lower part of the series control section. Aviston soils have less then 20 percent sand in the lower part of the series control section. Barrington, Blackberry, and Clare soils are stratified in the lower half of the series control section with textures containing more than 40 percent sand. Buckhart soils have less than 7 percent sand throughout the series control section. Catlin and Harrison soils are deeper than 102 cm (40 inches) to horizons containing more than 20 percent sand. Danabrook and Geryune soils have hue of 7.5YR and average more than 40 percent sand in the lower half of the series control section. Graymont and Saybrook soils have carbonates within a depth of 102 cm (40 inches) and are typically less then 81 cm (32 inches) to the base of the argillic horizon. Keltner soils have a paralithic contact within the series control section and has more than 30 percent clay in the lower part. Tonanang soils have more than 15 percent rock fragments in the lower part of the series control section.

GEOGRAPHIC SETTING: Dana soils formed in loess or other silty materials and the underlying loamy, calcareous till and are on till plains of Wisconsinan Age. Slope ranges from 0 to 12 percent. Mean annual air temperature ranges from 8 to 12 degrees C (46 to 54 degrees F), mean annual precipitation ranges from 737 to 1016 mm (29 to 40 inches), frost-free period ranges from 160 to 180 days, and elevation ranges from 600 to 1,020 feet above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Catlin, Drummer, Flanagan, Raub, and Wyanet soils. Catlin soils are on similar landform positions where the loess mantle is thicker. The poorly drained Drummer soils are in depressions and drainageways. The somewhat poorly drained Flanagan and Raub soils are on lower landform positions. The well drained Wyanet soils are on backslopes below the Dana soils where the loess mantle is thinner.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. A perched seasonal high water table is at a depth of 2.0 to 3.5 feet at some time between February and April in most years. The potential for surface runoff is negligible to medium. Saturated hydraulic conductivity is moderately high to high (4.23 to 14.11 micrometer per second). Permeability is moderate.

USE AND VEGETATION: Mostly cropped to corn, soybeans, or small grains. A few small areas are used for pasture and hay. Native vegetation is tall prairie grasses, chiefly blue stem.

DISTRIBUTION AND EXTENT: Central and east-central Illinois and west-central Indiana. The series is of large extent in MLRA 108 and is of moderate extent in MLRA 111.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Indianapolis, Indiana

SERIES ESTABLISHED: Vermillion County, Indiana, 1930.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
mollic epipedon - the zone from 0 to 11 inches (Ap horizon); argillic horizon - the zone from 11 to 58 inches (Bt1, Bt2, Bt3, 2Bt4, 2Bt5, 2Bt6 horizons); redoximorphic features consist of iron depletions below a depth of 25 inches;
udic moisture regime; mesic temperature regime.

National Cooperative Soil Survey
U.S.A.

LOCATION HARPSTER IL+IA IN MN

(67)

Established Series
Rev. JBF-JWS-JCD
01/2009

HARPSTER SERIES

The Harpster series consists of very deep, poorly drained soils formed in calcareous loess or glacial drift. They are on nearly level or depressional parts of outwash plains, till plains, glacial lake plains, or stream terraces. Slope ranges from 0 to 2 percent. Mean annual precipitation is about 890 mm (35 inches), and mean annual air temperature is about 10 degrees C (50 degrees F).

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Typic Calciaquolls

TYPICAL PEDON: Harpster silty clay loam - in a cultivated field at an elevation of 220 meters (722 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

Apk--0 to 23 cm (0 to 9 inches); black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; common very fine roots; many snail shells; strongly effervescent (20 percent calcium carbonate); moderately alkaline; abrupt smooth boundary.

Ak--23 to 46 cm (9 to 18 inches); very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine and medium granular structure; firm; common very fine roots; many snail shells; strongly effervescent (18 percent calcium carbonate); moderately alkaline; clear smooth boundary. [(Combined thickness of the A horizon is 25 to 48 cm (10 to 19 inches).]

Bg1--46 to 64 cm (18 to 25 inches); dark grayish brown (2.5Y 4/2) silty clay loam; weak fine and medium angular blocky structure; firm; common very fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4) masses of oxidized iron in the matrix; few snail shells; slightly effervescent (7 percent calcium carbonate); moderately alkaline; gradual smooth boundary.

Bg2--64 to 79 cm (5 to 31 inches); dark gray (5Y 4/1) silty clay loam; moderate medium prismatic structure parting to moderate fine and medium angular blocky; firm; few very fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine prominent dark yellowish brown (10YR 4/4) and few fine distinct olive (5Y 4/4) masses of oxidized iron-manganese in the matrix; few snail shells; slightly effervescent (5 percent calcium carbonate); slightly alkaline; gradual smooth boundary.

Bg3--79 to 91 cm (31 to 36 inches); dark gray (5Y 4/1) silty clay loam; weak coarse prismatic structure parting to weak medium angular blocky; firm; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common medium distinct olive (5Y 4/4) masses of oxidized iron-manganese and few fine prominent yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; 2 percent gravel; slightly effervescent (2 percent calcium carbonate); slightly alkaline; gradual smooth boundary.

Bg4--91 to 104 cm (36 to 41 inches); 40 percent olive brown (2.5Y 4/4), 35 percent olive yellow (2.5Y 6/6), and 25 percent gray (5Y 5/1) silty clay loam; weak coarse angular blocky structure; firm; few very

fine roots; 2 percent gravel; slightly effervescent (2 percent calcium carbonate); slightly alkaline; gradual smooth boundary. [Combined thickness of the Bg horizon is 25 to 89 cm (10 to 35 inches).]

Cg1--104 to 142 cm (41 to 56 inches); 55 percent gray (5Y 5/1), 40 percent light olive brown (2.5Y 5/6), and 5 percent dark yellowish brown (10YR 4/4) silt loam; massive; firm; 1 percent gravel; strongly effervescent (16 percent calcium carbonate); moderately alkaline; clear smooth boundary.

2Cg2--142 to 152 cm (56 to 60 inches); gray (10YR 5/1) loam; massive; friable; 5 percent gravel; strongly effervescent; moderately alkaline.

TYPE LOCATION: Ford County, Illinois; about 4.8 kilometers (3 miles) southwest of Gibson City; 261 meters (855 feet) south and 21 meters (70 feet) west of the northeast corner of sec. 20, T. 23 N., R. 7 E.; USGS Gibson City West topographic quadrangle; lat. 40 degrees 26 minutes 24 seconds N. and long. 88 degrees 25 minutes 23 seconds W., NAD 27; UTM Zone 16, 379305 easting and 4477570 northing, NAD 83.

RANGE IN CHARACTERISTICS: The depth to the base of soil development ranges from 56 to 117 cm (22 to 46 inches). The mollic epipedon ranges from 25 to 61 cm (10 to 24 inches) in thickness and includes the upper part of the B horizon in some pedons. A calcic horizon is typically at the surface or within a depth of 41 cm (16 inches) and has a calcium carbonate equivalent of 15 to 40 percent. These soils commonly contain small snail shells in part or all of the series control section. The depth to horizons with greater than 15 percent sand ranges from 91 to 152 cm (36 to 60 inches). The particle-size control section averages between 27 and 35 percent clay. Reaction is slightly alkaline or moderately alkaline. Gravel content is less than 10 percent.

The Apk or Ak horizon has hue of 10YR, 2.5Y, 5Y, or is neutral; value of 2 to 3; and chroma of 0 or 1. It typically is silty clay loam but is silt loam in some pedons.

The Bg horizon has hue of 10YR, 2.5Y, 5Y, or is neutral; value of 3 to 6; and chroma of 0 to 2. Redoximorphic features generally have higher chroma. Texture is typically silty clay loam, but includes silt loam, clay loam, and loam in the lower part. Clay content ranges from 22 to 35 percent.

The Cg or 2Cg horizon has hue of 7.5YR, 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 1 to 8. It commonly has redoximorphic features. Texture is typically silt loam or loam, but strata of sandy loam, very fine sandy loam, or clay loam is present in some pedons. Clay content ranges from 15 and 30 percent and sand content ranges from 5 to 55 percent.

COMPETING SERIES: These are the Chipman, Leen, Logan, Prophetstown, and Spaulding series. Chipman, Leen, and Logan soils are dry for more than 20 consecutive days in all parts of the soil moisture control section in at least 6 out of 10 years. Prophetstown soils contain 18 to 27 percent clay in the particle-size control section. Spaulding soils contain less than 7 percent sand in the lower part of the series control section.

GEOGRAPHIC SETTING: Harpster soils are on nearly level or slightly depressional parts of till plains, outwash plains, lake plains, or stream terraces. Slopes typically are less than 1 percent but range to as much as 2 percent. The soils formed in calcareous silty material derived from loess or glacial drift. Mean annual air temperature ranges from 7 to 11 degrees C (45 to 52 degrees F), mean annual precipitation ranges from 740 to 1020 mm (29 to 40 inches), frost-free period ranges from 140 to 180 days, and elevation ranges from 165 to 311 meters (540 to 1,020 feet) above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Brenton, Drummer, Elburn, Hartsburg and Pella soils. None of these soils have calcic horizons. The somewhat poorly drained Brenton and Elburn soils are on higher parts of the landform. The poorly drained Drummer soils generally are on slightly higher lying parts of till plains or outwash plains. The poorly drained Hartsburg and Pella soils are on similar depressional areas on outwash plains or till plains.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. Where drained, an apparent seasonal high water table is 15 cm (0.5 foot) above the surface to 31 cm (1.0 foot) below the surface at some time between January and May in most years. In undrained conditions, an apparent seasonal high water table is 15 cm (0.5 foot) above the surface to 15 cm (0.5 foot) below the surface at some time between November and June in most years. The potential for surface runoff is negligible. Saturated hydraulic conductivity is moderately high or high (4.23 to 14.11 micrometers per second). Permeability is moderate.

USE AND VEGETATION: Most areas are cultivated. Corn and soybeans are the principal crops. Native vegetation is hydrophytic herbaceous vegetation.

DISTRIBUTION AND EXTENT: Central and northern Illinois, east and north-central Iowa, and south-central Minnesota and west-central Indiana. Harpster soils are of moderate extent in MLRAs 95B, 103, 104, 108A, 108B, 110, and 111D.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Indianapolis, Indiana.

SERIES ESTABLISHED: Ford County, Illinois, 1929.

REMARKS: Some pedons in the Harpster series do not have a calcic horizon that has 5 percent greater calcium carbonate content than the C horizon, but all pedons have at least 5 percent less calcium carbonate equivalent in some horizon below the calcic horizon. Flooded and nonponded phases are currently recognized. These soils will be evaluated during MLRA updating to determine if new series needed.

Diagnostic horizons and features recognized in this pedon are: mollic epipedon - the zone from the surface of the soil to a depth of 46 cm (18 inches) (Apk and Ak horizons); cambic horizon - the zone from approximately 46 to 104 cm (18 to 41 inches) (Bg1, Bg2, Bg3, and Bg4 horizons); calcic horizon - the zone from the surface of the soil to a depth of about 46 cm (18 inches) (Apk and Ak horizons); aquic conditions - redoximorphic features present in the zone from approximately 46 to 152 cm (18 to 60 inches) (Bg1, Bg2, Bg3, Bg4, Cg1, and Cg2 horizons).

National Cooperative Soil Survey
U.S.A.

LOCATION DRUMMER IL+IN OH WI

152

Established Series
Rev. JBF-JDA-TJE
12/2008

DRUMMER SERIES

The Drummer series consists of very deep, poorly drained soils formed in loess or other silty material and in the underlying loamy stratified outwash on nearly level or depressional parts of outwash plains, stream terraces, and till plains. Slope ranges from 0 to 2 percent. Mean annual precipitation is about 940 mm (37 inches), and mean annual air temperature is about 11 degrees C (52 degrees F).

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Typic Endoaquolls

TYPICAL PEDON: Drummer silty clay loam - on a south-facing concave slope with less than 1 percent gradient under grass at an elevation of about 218 meters (715 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 18 cm (0 to 7 inches); black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; firm; many fine roots; moderately acid; clear smooth boundary.

A--18 to 36 cm (7 to 14 inches); black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure parting to weak fine granular; firm; many fine and medium roots throughout; slightly acid; clear smooth boundary. [Combined thickness of the A horizons is 25 to 56 cm (10 to 22 inches)].

BA--36 to 48 cm (14 to 19 inches); very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine and medium subangular blocky structure; firm; many fine and medium roots; few fine faint very dark grayish brown (2.5Y 3/2) masses of oxidized iron-manganese in the matrix; slightly acid; gradual smooth boundary. [0 to 20 cm (0 to 8 inches) thick]

Bg--48 to 64 cm (19 to 25 inches); dark gray (10YR 4/1) silty clay loam; moderate fine prismatic structure parting to moderate fine angular blocky; firm; many fine roots; common fine distinct and prominent yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; many worm holes; neutral; gradual smooth boundary.

Btg1--64 to 81 cm (25 to 32 inches); grayish brown (2.5Y 5/2) silty clay loam; weak fine and medium prismatic structure parting to moderate fine angular blocky; firm; many fine roots; common distinct dark gray (N 4/0) clay films on faces of peds; many medium distinct yellowish brown (10YR 5/4) masses of oxidized iron-manganese in the matrix; neutral; gradual wavy boundary.

Btg2--81 to 104 cm (32 to 41 inches); gray (N 5/0) silty clay loam; weak medium prismatic structure parting to weak medium angular blocky; firm; few fine roots; few distinct dark gray (N 4/0) clay films on faces of peds; many medium prominent yellowish brown (10YR 5/4) masses of oxidized iron-manganese in the matrix; neutral; clear wavy boundary. [Combined thickness of the Bg horizon and Btg horizons is 51 to 119 cm (20 to 47 inches).]

2Btg3--104 to 119 cm (41 to 47 inches); gray (N 5/0) loam; weak coarse subangular blocky structure; friable; few fine roots; few distinct dark gray (10YR 4/1) clay films on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; 4 percent fine gravel; neutral; abrupt wavy boundary. [10 to 25 cm (4 to 10 inches) thick]

2Cg--119 to 152 cm (47 to 60 inches); dark gray (10YR 4/1) stratified loam and sandy loam; massive; friable; many medium prominent olive brown (2.5Y 4/4) masses of oxidized iron-manganese in the matrix; many medium distinct gray (N 5/0) iron depletions in the matrix; slightly alkaline.

TYPE LOCATION: Champaign County, Illinois; on the University of Illinois south farm 1 mile south of Urbana; 1,600 feet east and 300 feet north of the southwest corner of sec. 19, T. 19 N., R. 9 E.; USGS Urbana topographic quadrangle; lat. 40 degrees 05 minutes 04.1 seconds N.,long. 88 degrees 13 minutes 58.2 seconds W.; UTM Zone 16T 0394894 easting 4437861 northing; NAD 83.

RANGE IN CHARACTERISTICS: The depth to the base of soil development ranges from 102 to 165 cm (40 to 65 inches). The depth to horizons with greater than 15 percent sand ranges from 102 to 152 cm (40 to 60 inches). The dominant clay mineral in the upper part of the series control section is smectite and in the lower part is illite. The particle-size control section averages between 20 and 35 percent clay and less than 15 percent fine sand or coarser. The mollic epipedon ranges from 25 to 61 cn (10 to 24 inches) in thickness and extends into the upper part of the B horizon in many pedons. Rock fragments are less than 15 percent in the lower part of the series control section. Depth to carbonates is greater than 102 cm (40 inches).

The Ap, A, and/or AB horizon has hue of 10YR, 2.5Y, 5Y, or is neutral; value of 2 to 3; and chroma of 0 to 2. It is silty clay loam and less commonly is silt loam. Clay content ranges from 20 to 35 percent. Reaction ranges from moderately acid to slightly alkaline.

Some pedons have an AB horizon rather than a BA horizon.

The Bg, Btg, and/or BA horizon has hue of 10YR, 2.5Y, 5Y, or is neutral; value dominantly of 4 or 5, but ranges to 3 in the upper part and to 6 in the lower part; and chroma dominantly of 1 or 2, but ranging from 0 to 4. Texture is silty clay loam in the upper part and silty clay loam or silt loam in the lower part. Clay content ranges from 20 to 35 percent. Reaction ranges from moderately acid to slightly alkaline.

The 2Bg, 2Btg, and/or 2BCg horizon has hue of 7.5YR, 10YR, 2.5Y, 5Y, or is neutral; value of 4 to 6; and chroma of 0 to 2. Some pedons have nearly equal proportions of low chroma and high chroma colors in the matrix. Texture is commonly loam or silt loam, and most pedons contain strata of sandy loam, clay loam, silty clay loam, sandy clay loam, or fine sandy loam. Clay content ranges from 15 to 33 percent and sand content ranges from 15 to 55 percent. Content of rock fragments is less than 7 percent. Reaction ranges from slightly acid to moderately alkaline.

The 2Cg and/or 2C horizon has hue of 7.5YR, 10YR, 2.5Y, 5Y, or is neutral; value of 4 to 7; and chroma of 0 to 8. It typically is stratified. Textures include loam, sandy loam, sandy clay loam, clay loam, silt loam, and silty clay loam. Some pedons have thin strata of loamy sand. Clay content ranges from 10 to 32 percent and sand content ranges from 15 to 80 percent. Content of rock fragments is less than 15 percent. Reaction ranges from neutral to moderately alkaline.

COMPETING SERIES: These are the Chalmers, Chetomba, Dolbee, Dunham, Elpaso, Elvira, Garwin, Gillet_Grove, Hartsburg, Madelia, Marcus, Mascoutah, Maxcreek, Maxfield, Ossian, Patton, Pella, Rushmore, Sable, and Wacousta series. Chalmers, Maxcreek and Maxfield soils are less than 40 inches

to subhorizons that average more than 15 percent sand. Chetomba, Madelia, Pella, Rushmore, and Wacousta soils contain carbonates at depths less than 40 inches. Dolbee and Elvira soils formed in silty alluvial sediments on flood plains and river terraces and are subject to flooding. Dolbee soils do not have stratification and typically have less sand in the substratum than the Drummer soils. Elvira soils have high concentrations of iron and manganese oxides in the solum. Dunham soils average more than 15 percent gravel in the lower part of the series control section. Elpaso and Gillett_Grove soils have a well graded sand fraction in the lower part of the series control section. Garwin, Hartsburg, Marcus, Mascoutah, Ossian, and Sable soils average less than 15 percent sand in the lower part of the series control section. Patton soils average less than 25 percent sand in the lower part of the series control section, and the sand fraction is dominantly fine and very fine sand.

GEOGRAPHIC SETTING: Drummer soils are on nearly level or depressional parts of outwash plains, stream terraces, and till plains of Wisconsinan Age. Slope ranges from 0 to 2 percent. Drummer soils formed in 40 to 60 inches of loess or other silty material and in the underlying loamy stratified outwash. Mean annual air temperature ranges from 46 to 54 degrees F., mean annual precipitation is 29 to 40 inches, frost free days range from 140 to 180 days, and the elevation ranges from 500 to 1020 feet above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are Blackberry, Brenton, Catlin, Clare, Dana, Elburn, Flanagan, Lisbon, Plano, Proctor, Raub, Saybrook, and Sidell soils. The associated soils are on higher positions on the landform. The somewhat poorly drained Elburn, moderately well drained Blackberry, and well drained Plano soils form a drainage sequence with Drummer soils. The somewhat poorly drained Brenton, moderately well drained Clare and well drained Proctor soils have a thinner mantle of loess. The moderately well drained Catlin, Dana, and Saybrook soils, the somewhat poorly drained Flanagan, Lisbon, and Raub soils, and the well drained Sidell soils formed in loess and in the underlying loamy till.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. In drained conditions, an apparent seasonal high water table is 15 cm (0.5 foot) above the surface to 31 cm (1.0 foot) below the surface at some time between January and May in most years. In undrained conditions, an apparent seasonal high water table is 15 cm (0.5 foot) above the surface to 15 cm (0.5 foot) below the surface at some time between November and June in most years. The potential for surface runoff is negligible to low. Water ponds on these soils for brief periods during the spring. Saturated hydraulic conductivity is moderately high to high (4.23 to 14.11 micrometers per second). Permeability is moderate.

USE AND VEGETATION: Most areas are cropped. Corn and soybeans are the principal crops. Some areas are used for growing small grain or meadow. Native vegetation is hydrophytic grasses, reeds, and sedges.

DISTRIBUTION AND EXTENT: Northern and central Illinois, northwestern Indiana, southwestern Ohio and southeastern Wisconsin. The extent is large in MLRAs 95B, 108, 110, 111, and 114; more than 500,000 acres have been correlated in Illinois to date.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Indianapolis, Indiana.

SERIES ESTABLISHED: Ford County, Illinois, 1929.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
mollic epipedon - the zone from the surface to a depth of 48 cm (19 inches) (Ap, A, and BA horizons);
cambic horizon - the zone from approximately 48 to 119 cm (19 to 47 inches) (Bg, Btg1, Btg2, and

2Btg3 horizons);
aquic conditions - redoximorphic features present in the zone from approximately 36 to 152 cm (14 to 60 inches) (BA, Bg, Btg1, Btg2, 2Btg3, and 2Cg horizons).

ADDITIONAL DATA: SSIR No. 19, pp. 92-109. University of Illinois Agricultural Experiment Station Bulletin 665, Profile No. 29.

National Cooperative Soil Survey
U.S.A.

LOCATION FLANAGAN IL+IN

154

Established Series
Rev. JBF-SLE-SEW
09/2008

FLANAGAN SERIES

The Flanagan series consists of very deep, somewhat poorly drained soils that formed in loess or other silty material and the underlying loamy calcareous till on till plains. Slope ranges from 0 to 7 percent. Mean annual air temperature is 11 degrees C (51 degrees F), and mean annual precipitation is 889 mm (35 inches).

TAXONOMIC CLASS: Fine, smectitic, mesic Aquic Argiudolls

TYPICAL PEDON: Flanagan silt loam - on a 1 percent convex south-facing slope in a grass border of the University of Illinois experimental plots at an elevation of about 223 meters (730 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

A1--0 to 20 cm (0 to 8 inches); very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; slightly acid; gradual smooth boundary.

A2--20 to 38 cm (8 to 15 inches); very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; slightly acid; clear smooth boundary. [Combined thickness of the A horizon is 25 to 46 cm (10 to 18 inches).]

A3--38 to 46 cm (15 to 18 inches); very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; slightly acid; clear smooth boundary. [0 to 15 cm (0 to 6 inches) thick]

Bt1--46 to 58 cm (18 to 23 inches); dark grayish brown (10YR 4/2) silty clay loam; moderate fine subangular blocky structure; firm; many distinct very dark grayish brown (10YR 3/2) organo-clay films on faces of peds; few fine faint brown (10YR 4/3) iron-manganese accumulations in the matrix; moderately acid; clear smooth boundary.

Bt2--58 to 81 cm (23 to 32 inches); dark grayish brown (10YR 4/2) silty clay loam; moderate medium subangular blocky structure; firm; many distinct very dark grayish brown (10YR 3/2) organo-clay films on faces of peds; common fine faint brown(10YR 5/3 and 10YR 4/3) iron-manganese accumulations in the matrix; moderately acid; clear smooth boundary.

Bt3--81 to 97 cm (32 to 38 inches); yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; many distinct very dark grayish brown (10YR 3/2) organo-clay films on faces of peds; common fine faint light yellowish brown (10YR 6/4) and distinct yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; slightly acid; clear smooth boundary.

Bt4--97 to 114 cm (38 to 45 inches); 40 percent yellowish brown (10YR 5/6), 30 percent light brownish gray (10YR 6/2), and 30 percent brown (10YR 5/3) silt loam; weak medium subangular blocky structure; friable; common distinct very dark grayish brown (10YR 3/2) organo-clay films on faces of

peds; slightly acid; gradual smooth boundary.[Combined thickness of the Bt horizon is 66 to 102 cm (26 to 40 inches).]

2Bt5--114 to 125 cm (45 to 49 inches); 35 percent yellowish brown (10YR 5/4), 35 percent light olive brown (2.5Y 5/4), and 30 percent light brownish gray (10YR 6/2) silt loam; weak coarse subangular blocky structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; 5 percent fine gravel; neutral; abrupt smooth boundary. [8 to 38 cm (3 to 15 inches) thick]

2C--125 to 152 cm (49 to 60 inches); yellowish brown (10YR 5/4) loam; massive; firm; common medium rounded white (10YR 8/1) weakly cemented calcium carbonate nodules throughout; common fine and medium distinct light brownish gray (10YR 6/2) iron depletions in the matrix; 5 percent fine gravel; slightly effervescent; slightly alkaline.

TYPE LOCATION: Champaign County, Illinois; about 1 mile south of Champaign on University of Illinois south farm; 1,607 feet east and 1,405 feet north of the southwest corner, sec. 19, T. 19 N., R. 9 E.; USGS Urbana topographic quadrangle; lat. 40 degrees, 5 minutes, 14 seconds N., and long. 88 degrees, 13 minutes, 57 seconds W.; NAD 27; UTM Zone 16T, 0394923 easting and 4438169 northing, NAD 83.

RANGE IN CHARACTERISTICS: The depth to the base of the argillic horizon ranges from 114 to 165 cm (45 to 65 inches). The depth to horizons with more than 10 percent sand ranges from 102 to 152 cm (40 to 60 inches). Soil development extends into the glacial till. The depth to carbonates ranges from 114 to 165 cm (45 to 65 inches). The mollic epipedon is 25 to 61 cm (10 to 24 inches) thick and includes the upper part of the B horizon in some pedons. The particle-size control section averages between 35 and 42 percent clay and less than 10 percent fine sand or coarser.

The A and Ap horizons have hue of 10YR, value of 2 or 3 (4 or 5 dry), and chroma of 1 or 2. They commonly are silt loam but in some pedons it is silty clay loam. Clay content ranges from 20 to 30 percent. Reaction ranges from neutral to strongly acid.

Some pedons have an AB or BA horizon.

The Bt has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is dominantly silty clay loam, but some subhorizons are silty clay or silt loam. Clay content ranges from 35 to 42 percent. It is neutral to moderately acid.

The 2Bt has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 1 to 6. Redoximorphic features are present. It is loam, clay loam, silt loam, or silty clay loam. Clay content ranges from 20 to 30 percent and sand content ranges from 15 to 40 percent. Individual subhorizons have up to 40 percent clay. Gravel content ranges from 1 to 15 percent. Reaction is slightly acid to slightly alkaline and some pedons contain carbonates in the lower part.

The 2C horizon has hue of 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 6. It commonly is loam but includes clay loam, silt loam, or silty clay loam. It is slightly alkaline or moderately alkaline and contains carbonates.

COMPETING SERIES: These are the Biddle, Herrick, Ipava, Macksburg, Malvern, and Timewell, soils. Biddle, Herrick, Ipava, Malvern, and Timewell soils average less than 15 percent sand in the lower part of the series control section. Macksburg soils do not have carbonates within a depth of 165 cm (65 inches).

GEOGRAPHIC SETTING: Flanagan soils are on convex slopes of till plains of Wisconsinan Age. Slopes are typically between 0 and 4 percent but range to 7 percent. The soils formed in 102 to 152 cm (40 to 60 inches) of loess and the underlying calcareous till. Mean annual temperature ranges from 8 to 12 degrees C (46 to 54 degrees F); mean annual precipitation ranges from 737 to 889 mm (29 to 35 inches); frost-free period ranges from 160 to 180 days; and elevation ranges from 207 to 311 meters (680 to 1020 feet) above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Catlin, Dana, Drummer, Milford, Raub, and Saybrook soils. The moderately well drained Catlin soils and the poorly drained Drummer soils are on nearby landscapes and form a drainage sequence. The moderately well drained Dana and Saybrook soils and somewhat poorly drained Raub soils are on nearby parts of the till plain where loess is thinner than 102 cm (40 inches). The poorly drained and very poorly drained Milford soils are lower on the landscape in lacustrine areas.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat poorly drained. An apparent seasonal high water table is at a depth of 31 to 61 cm (1 to 2 feet) at some time between January and May in most years. The potential for surface runoff is low to high. Saturated hydraulic conductivity is moderately high (1.41 to 4.23 micrometers per second). Permeability is moderately slow.

USE AND VEGETATION: Most areas of Flanagan soils are used to grow corn and soybeans. Native vegetation is prairie grasses.

DISTRIBUTION AND EXTENT: Flanagan soils are in central and north-central Illinois and in west-central Indiana. The acreage is of large extent (more than 540,000 acres correlated to date) in MLRAs 95B, 108A, and 110.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Indianapolis, Indiana

SERIES ESTABLISHED: DeWitt County, Illinois, 1937.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
mollic epipedon - the zone from the surface to 18 inches. (A1, A2, and AB horizons);
argillic horizon - the zone from 18 to 49 inches (Bt1, Bt2, Bt3, Bt4, and 2Bt5 horizons):
aquic conditions - redoximorphic features in horizons below the mollic epipedon; udic moisture regime; mesic temperature regime.

ADDITIONAL DATA: For series typical pedon refer to University of Illinois laboratory samples 17882-17890. Data for 13 additional pedons is in the database of soils sampled by the University of Illinois.

National Cooperative Soil Survey
U.S.A.

LOCATION CATLIN IL

171

Established Series
Rev. JCD-SLE-AAC
03/2011

CATLIN SERIES

The Catlin series consists of very deep, moderately well drained soils on till plains. These soils formed in loess or other silty material and in the underlying loamy calcareous till. Slope ranges from 0 to 15 percent. The mean annual temperature is 8.3 degrees C (47 degrees F), and the mean annual precipitation is 890 mm (35 inches).

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Oxyaquic Argiudolls

TYPICAL PEDON: Catlin silt loam on a southwest-facing 2 percent slope in a cultivated field at an elevation of 253 meters (830 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 28 cm (0 to 11 inches); very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary. [25 to 51 cm (10 to 20 inches) thick]

BA--28 to 46 cm (11 to 18 inches); brown (10YR 4/3) silt loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few faint dark brown (10YR 3/3) organic coatings on faces of peds; common distinct light gray (10YR 7/1) (dry) silt coatings on faces of peds; moderately acid; clear smooth boundary. [0 to 20 cm (0 to 8 inches) thick]

Bt1--46 to 58 cm (18 to 23 inches); brown (10YR 5/3) silty clay loam; weak medium prismatic structure parting to strong fine and medium subangular blocky; friable; many faint brown (10YR 4/3) clay films on faces of peds; few distinct light gray (10YR 7/1) (dry) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2--58 to 79 cm (23 to 31 inches); yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to strong medium angular and subangular blocky; firm; few distinct very dark brown (10YR 2/2) organo-clay films on surfaces along root channels; many faint brown (10YR 4/3) clay films on faces of peds; few distinct light gray (10YR 7/1) (dry) silt coatings on faces of peds; few black (N 2.5/) weakly cemented iron-manganese concretions throughout; few fine faint brown (7.5YR 4/4) and common fine distinct yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; moderately acid; clear smooth boundary.

Bt3--79 to 91 cm (31 to 36 inches); yellowish brown (10YR 5/4) silty clay loam; strong medium prismatic structure parting to strong medium angular and subangular blocky; firm; common prominent grayish brown (2.5Y 5/2) clay films on faces of peds; few distinct light gray (10YR 7/1) (dry) silt coatings on faces of peds; few black (N 2.5/) weakly cemented iron-manganese concretions throughout; few fine faint brown (7.5YR 4/4) extemley weakly cemented iron-manganese accumulations and distinct yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; slightly acid; clear smooth boundary.

Bt4--91 to 112 cm (36 to 44 inches); yellowish brown (10YR 5/4), brown (7.5YR 4/4), and light brownish gray (2.5Y 6/2) silty clay loam; weak coarse prismatic structure parting to moderate coarse subangular blocky; firm; many faint grayish brown (2.5Y 5/2) clay films on faces of peds; common distinct light gray (10YR 7/1) (dry) silt coatings on faces of peds; few distinct very dark brown (10YR 2/2) organo-clay films on surfaces along root channels; slightly acid; abrupt smooth boundary. [Combined thickness of the Bt horizon is 64 to 107 cm (25 to 42 inches).]

2Bt5--112 to 124 cm (44 to 49 inches); dark yellowish brown (10YR 4/4) clay loam; weak coarse subangular blocky structure; firm; few faint brown (10YR 5/3) clay films on vertical faces of peds; few distinct very dark brown (10YR 2/2) organo-clay films on surfaces along root channels; slightly alkaline; clear smooth boundary. [13 to 51 cm (5 to 20 inches) thick]

2C--124 to 152 cm (49 to 60 inches); yellowish brown (10YR 5/4) loam; massive; firm; common fine distinct yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; 5 percent gravel; strongly effervescent; moderately alkaline.

TYPE LOCATION: Ogle County, Illinois; about 1 1/2 miles south and 2 1/2 miles east of Monroe Center; 650 feet south and 571 feet east of the northwest corner of sec. 36, T. 42 N., R. 2 E.; USGS Fairdale topographic quadrangle; lat. 42 degrees 04 minutes 38 seconds N., and long. 88 degrees 57 minutes 17 seconds W., UTM Zone 16338307 Easting and 4660199 Northing; NAD83.

RANGE IN CHARACTERISTICS:
Thickness of mollic epipedon: 25 to 51 cm (10 to 20 inches)
Depth to carbonates: 102 to 152 cm (40 to 60 inches)
Depth to horizons with more than 15 percent sand (loess or other silty material): 102 to 152 cm (40 to 60 inches)
Depth to the base of the argillic horizon: 114 to 165 cm (45 to 65 inches)
Particle-size control section: averages 27 and 35 percent clay

Ap, A, and/or AB horizons:
Hue: 10YR
Value: 2 or 3
Chroma: 1 to 3
Texture: silt loam or silty clay loam
Clay content: averages 18 to 30 percent
Sand content: averages 0 to 8 percent
Reaction: strongly acid to neutral

BA horizon (where present):
Hue: 10YR or 2.5Y
Value: 3 to 5
Chroma: 3 or 4
Texture: silt loam or silty clay loam

Bt horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5
Chroma: 3 or 4
Texture: commonly silty clay loam, but ranges to silt loam in upper and/or lower subhorizons of some pedons.
Clay content: averages 24 to 35 percent

Sand content: averages 0 to 8 percent
Reaction: strongly acid to neutral

2Bt, 2BC, and/or 2C horizons:
Hue: 10YR, 2.5Y or 7.5YR
Value: 4 or 5
Chroma: 2 to 8
Texture: clay loam, loam, silty clay loam or silt loam
Clay content: averages 20 to 35 percent
Sand content: averages 15 to 40 percent
Gravel content: less than 10 percent
Reaction: slightly acid to moderately alkaline

COMPETING SERIES: These are the Assumption, Aviston, Barrington, Blackberry, Buckhart, Clare, Dana, Danabrook, Geryune, Graymont, Harrison, Keltner, Saybrook, and Totanang soils. Assumption and Harrison soils do not have carbonates within a depth of 152 cm (60 inches). Aviston soils have less than 15 percent sand in the lower part of the series control section. Barrington, Blackberry, and Clare soils have horizons in the middle or lower part of the series control section with sand content greater than 40 percent. Buckhart soils have less than 7 percent sand throughout the series control section. Dana, Danabrook, Geryune, Graymont and Saybrook soils have horizons with more than 15 percent sand within a depth of 102 cm (40 inches). Keltner soils have a paralithic contact within a depth of 152 cm (60 inches). Totanang soils have more than 10 percent rock fragments in the lower part of the series control section.

GEOGRAPHIC SETTING: Catlin soils are on relatively undissected loess covered till plains. Slope typically is between 3 and 7 percent, but ranges from 0 to 15 percent and are convex. Catlin soils formed in 102 to 152 cm (40 to 60 inches) of loess or other silty material and in the underlying loamy calcareous till. The mean annual air temperature ranges from 7.8 to 12.8 degrees C (46 to 55 degrees F), mean annual precipitation ranges from 890 to 1016 mm (35 to 40 inches), frost free period ranges from 150 to 180 days, and elevation ranges from 207 to 305 meters (680 to 1000 feet) above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Saybrook soils and the Drummer, Elburn, Flanagan, and Plano soils. The poorly drained Drummer soils and the somewhat poorly drained Flanagan soils are on lower lying parts of the landscape and form a drainage sequence with Catlin soils. The Plano and somewhat poorly drained Elburn soils are on adjacent or nearby outwash plains. Saybrook soils are on similar nearby landscapes where the loess mantle is thinner.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. An apparent seasonal high water table is 61 to 107 cm (2.0 to 3.5 feet) below the surface at some time between February and April in most years. The potential for surface runoff is low or medium. Saturated hydraulic conductivity is moderately high to high (4.23 to 14.11 micrometers per second). Permeability is moderate.

USE AND VEGETATION: Almost all areas used to grow corn and soybeans. Native vegetation is prairie grass.

DISTRIBUTION AND EXTENT: Catlin soils are in central and northern Illinois. LRR M, MLRAs 95B, 105, 108A, 108B, 110, and 115C. They are of large extent (more than 305,000 acres are correlated).

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Indianapolis, Indiana

SERIES ESTABLISHED: Vermilion County, Illinois, 1932.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
mollic epipedon - from a depth of 0 to 28 cm (0 to 11 inches) (Ap horizon);
argillic horizon - from a depth of 46 to 124 cm (18 to 49 inches) (Bt1, Bt2, Bt3, Bt4, and 2Bt5 horizons).

National Cooperative Soil Survey
U.S.A.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Vermilion County, Illinois

Sunrise Coal Mine

December 7, 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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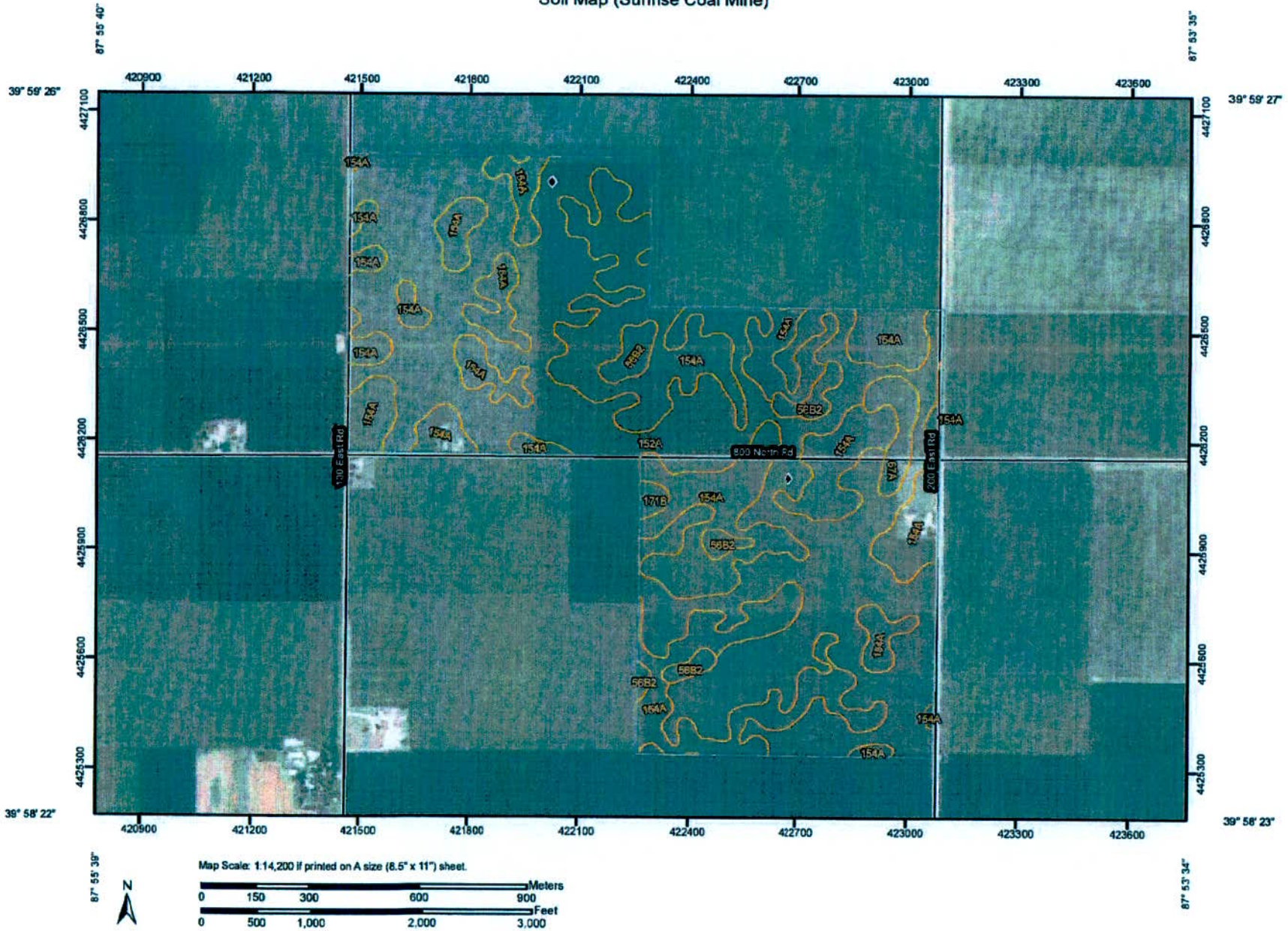
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (Sunrise Coal Mine)



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:14,200 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Vermilion County, Illinois
Survey Area Data: Version 7, Jan 28, 2011

Date(s) aerial images were photographed: 7/31/2007

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Sunrise Coal Mine)

Vermilion County, Illinois (IL183)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
56B2	Dana silt loam, 2 to 5 percent slopes, eroded	11.0	2.7%
67A	Harpster silty clay loam, 0 to 2 percent slopes	6.2	1.5%
152A	Drummer silty clay loam, 0 to 2 percent slopes	228.6	55.2%
154A	Flanagan silt loam, 0 to 2 percent slopes	166.6	40.3%
171B	Catlin silt loam, 2 to 5 percent slopes	1.6	0.4%
Totals for Area of Interest		**413.9**	**100.0%**

Map Unit Descriptions (Sunrise Coal Mine)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Vermilion County, Illinois

56B2—Dana silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

Elevation: 590 to 930 feet
Mean annual precipitation: 32 to 40 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 160 to 180 days

Map Unit Composition

Dana and similar soils: 94 percent

Description of Dana

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over till

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 6.0
Available water capacity: High (about 9.2 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 7 inches: Silt loam
7 to 34 inches: Silty clay loam
34 to 53 inches: Clay loam
53 to 80 inches: Loam

67A—Harpster silty clay loam, 0 to 2 percent slopes

Map Unit Setting

Elevation: 540 to 930 feet
Mean annual precipitation: 32 to 40 inches

Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 150 to 180 days

Map Unit Composition
Harpster and similar soils: 97 percent

Description of Harpster

Setting
Landform: Outwash plains, ground moraines, lake plains, stream terraces, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Calcareous fine-silty colluvium over glacial drift

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Available water capacity: High (about 12.0 inches)

Interpretive groups
Land capability (nonirrigated): 2w

Typical profile
0 to 18 inches: Silty clay loam
18 to 41 inches: Silty clay loam
41 to 56 inches: Silt loam
56 to 60 inches: Loam

152A—Drummer silty clay loam, 0 to 2 percent slopes

Map Unit Setting
Elevation: 590 to 930 feet
Mean annual precipitation: 32 to 40 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 160 to 180 days

Map Unit Composition
Drummer and similar soils: 90 percent

Description of Drummer

Setting
Landform: Outwash plains, stream terraces

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over stratified loamy outwash

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Available water capacity: High (about 9.0 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 14 inches: Silty clay loam
14 to 41 inches: Silty clay loam
41 to 47 inches: Loam
47 to 60 inches: Stratified loam to sandy loam

154A—Flanagan silt loam, 0 to 2 percent slopes

Map Unit Setting

Elevation: 590 to 930 feet
Mean annual precipitation: 32 to 40 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 160 to 180 days

Map Unit Composition

Flanagan and similar soils: 94 percent

Description of Flanagan

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Available water capacity: High (about 9.1 inches)

Interpretive groups
Land capability (nonirrigated): 1

Typical profile
0 to 18 inches: Silt loam
18 to 38 inches: Silty clay loam
38 to 45 inches: Silt loam
45 to 49 inches: Silt loam
49 to 60 inches: Loam

171B—Catlin silt loam, 2 to 5 percent slopes

Map Unit Setting
Elevation: 590 to 1,020 feet
Mean annual precipitation: 33 to 40 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 150 to 180 days

Map Unit Composition
Catlin and similar soils: 94 percent

Description of Catlin

Setting
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over till

Properties and qualities
Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: High (about 11.5 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile

0 to 11 inches: Silt loam
11 to 45 inches: Silty clay loam
45 to 57 inches: Clay loam
57 to 70 inches: Loam

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Sunrise Coal, LLC
Bulldog Mine
Permit No. 429

ATTACHMENT II-6A2

ESTIMATED YIELDS FOR VERMILION COUNTY

ESTIMATED YIELDS FOR VERMILION COUNTY

SOIL MAPPING UNIT		ADJUSTMENT PER BULLETIN 811, TABLE S3		PRODUCTIVITY OF SOILS UNDER OPTIMUM MANAGEMENT LEVELS PER BULLETIN 811, TABLE S2, REVISED 1/2/2012						[e] ANNUAL TREE GROWTH DECIDUOUS	
Soil Number	Soil Name	[a] Subsoil Rooting	[b] Optimum Management Adjustment %	Corn bu/ac	Soybeans bu/ac	Wheat bu/ac	[c] Alfalfa Hay ton/ac	[d] Grass-Legume Hay ton/ac	Crop Productivity Index	Site Index avg	Volume of Wood Fiber cu ft/ac
56B2	Dana silt loam, 2-5% slopes, eroded	FAV	95	171	53	66	5.96	0.00	124	--	--
67A	Harpster silty clay loam, 0-2% slopes	FAV	100	182	57	68	0.00	5.39	133	--	--
152A	Drummer silty clay loam, 0-2% slopes	FAV	100	195	63	73	0.00	5.64	144	--	--
154A	Flanagan silt loam, 0-2% slopes	FAV	100	194	63	77	0.00	5.90	144	--	--
171B	Catlin silt loam, 2-5% slopes	FAV	99	185	58	72	6.70	0.00	137	--	--

Crop yields are those that can be expected under an optimum level of management.
Cells not containing a numerical value indicate the soil type is not generally suited for this use.

[a] UNF = unfavorable; FAV = favorable

[b] Based on information supplied in Bulletin 811, Table S3, optimum crop productivities have been adjusted by the percentage shown to reflect subsoil quality, steepness of slopes and erosion.

[c] Soils in the poorly drained group were not rated for alfalfa and are shown with zeros, 0.00.

[d] Soils in the well drained group were not rated for grass-legume and are shown with zeros, 0.00.

[e] "Potential productivity" of common trees is expressed as a site index and as a volume number. The "site index" is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. The "volume of wood fiber" is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Sunrise Coal, LLC
Bulldog Mine
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ATTACHMENT II-12A

PRIVATE OIL AND GAS WELL DATA

Private Oil and Gas Well Status

Well ID	Current Well Status	Well Distance From Shadow Area
OGW-1	Dry, Abandoned	2306'
OGW-2	Dry, Abandoned	281'
OGW-3	Stratigraphic Test Hole	1852'
OGW-4	Structure Test Hole	2718'
OGW-5	Dry, Abandoned, Plugged	3132'

PRIVATE OIL/GAS WELL #OGW-1

ILLINOIS STATE GEOLOGICAL SURVEY

	Top	Bottom
Pennsylvanian	105	
Salem	609	
Osage	682	
Rockford	1272	
New Albany	1276	
Tully	1361	
Geneva	1426	
Total Depth		1464

Dry and abandoned.

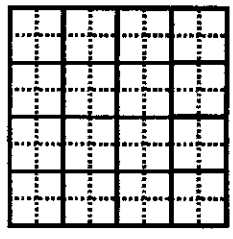
Drilling Time Log filed.
Company Sample Study filed.

Sample set # 60806 0'- 1450'

Get Scout Check Ticket for this well.

Permit Date: August 13, 1976 **Permit #:** 2831

COMPANY Corley, W. Andrew
FARM Smith, Frank **NO.** 1
DATE DRILLED September 10, 1976 **COUNTY NO.** 22082
AUTHORITY
ELEVATION 681' KB
LOCATION 330'S line, 330'E line of NE NW
COUNTY VERMILION



13-18N-14W

NAD 83 Geographic Coordinates (Obtained from ISGS Website)
Latitude: 40.023012
Longitude: -87.892973

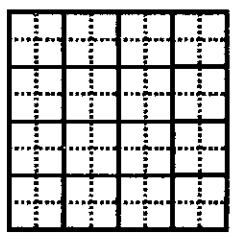
PRIVATE OIL/GAS WELL #OGW-2

ILLINOIS STATE GEOLOGICAL SURVEY

	Top	Bottom
Total Depth		1462
Dry and abandoned.		
Driller's Log filed.		
Survey Sample Study filed.		
Sample Study filed.		
Sample set # 2085 102'- 1452'		

Permit Date: January 1, 1937 **Permit #:**

COMPANY	Myers A M Etal		
FARM	Foreman, Newt	**NO.**	1
DATE DRILLED		**COUNTY NO.**	00180
AUTHORITY			
ELEVATION	677' GL		
LOCATION	200'S line, 200'E line of SW		
COUNTY	**VERMILION**		



13-18N-14W

NAD 83 Geographic Coordinates (Obtained from ISGS Website)
Latitude: 40.011768
Longitude: -87.892462

PRIVATE OIL/GAS WELL #OGW-3

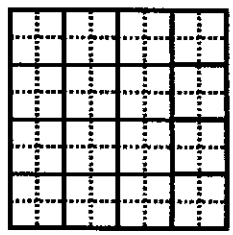
ILLINOIS STATE GEOLOGICAL SURVEY

Page 1

	Top	Bottom
STRATIGRAPHIC TEST		
Total Depth		43
Sample set # 22418 8'- 162'		

Permit Date: **Permit #:**

COMPANY	owner		
FARM	Trisler, J. L. & Blanche	**NO.** 2	
DATE DRILLED		**COUNTY NO.** 01152	
AUTHORITY			
ELEVATION	680' TM		
LOCATION	NW NE NW		
COUNTY	**VERMILION**		



31-18N-13W

NAD 83 Geographic Coordinates (Obtained from ISGS Website)
Latitude: 39.981201
Longitude: -87.875383

PRIVATE OIL/GAS WELL #OGW-4

ILLINOIS STATE GEOLOGICAL SURVEY

	Top	Bottom
STRUCTURE TEST		
Total Depth		873

Electric Log filed.
Company Sample Study filed.

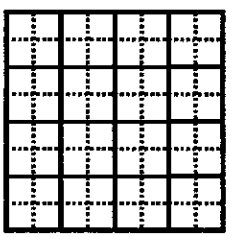
Image viewing help: New users please read this.

GET IMAGE Induction Electric Log

Sample set # 58034 130'- 870'

Permit Date: August 27, 1971 **Permit #:** 6764

COMPANY	Peoples Gas Light & Coke Co.		
FARM	Cress, D.	**NO.** 1	
DATE DRILLED	September 1, 1971	**COUNTY NO.** 01731	
AUTHORITY			
ELEVATION	712' GL		
LOCATION	53'N line, 96'W line of NW		
COUNTY	**VERMILION**		



35-17N-14W

NAD 83 Geographic Coordinates (Obtained from ISGS Website)
Latitude: 39.894238
Longitude: -87.918442

PRIVATE OIL/GAS WELL #OGW-5

ILLINOIS STATE GEOLOGICAL SURVEY

	Top	Bottom
Pennsylvanian	247	
Devonian	1207	
Total Depth		1251

Dry and abandoned. Plugged May 12, 1958.

Company Sample Study filed.
Driller's Log filed.

Sample set # 31375 0'- 1251'

Get Scout Check Ticket for this well.

Permit Date: April 16, 1958 **Permit #:** 572

COMPANY

FARM Pawcett, Floyd **NO.** 1

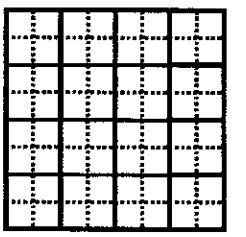
DATE DRILLED May 6, 1958 **COUNTY NO.** 01353

AUTHORITY

ELEVATION 725' TM

LOCATION 330'N line, 990'E line of SE SW

COUNTY VERMILION



25-17N-14W

NAD 83 Geographic Coordinates (Obtained from ISGS Website)
Latitude: 39.897304
Longitude: -87.894084

Sunrise Coal, LLC
Bulldog Mine
Permit No. 429

ATTACHMENT II-13B

PRIME FARMLAND NEGATIVE DETERMINATION REQUEST

SUNRISE COAL LLC

July 22, 2014

Mr. Scott Fowler
Illinois Department of Natural Resources
Office of Mines and Minerals
Land Reclamation Division
524 South Second Street
Springfield, IL 62701-1787

RE: Negative Determination Request

Dear Mr. Fowler:

Pursuant to 62 Ill. Adm. Code 1785.17, Sunrise, LLC seeks a negative determination for the prime farmlands noted on the "Soils Information Chart" in Part II, and soils maps included with this request. These areas, containing 1.3 acres, include industrial/commercial areas not historically cropped.

Pre-mining aerial photos indicate, and site visits verify, the industrial/commercial areas were not used for cropland for any five years or more out of the ten years immediately preceding the acquisition, including purchase, lease, or option, of the lands for the purpose of conducting or allowing through resale, lease or option, the conduct of surface coal mining and reclamation operations.

Based upon the above, Sunrise Coal, LLC, respectfully requests the described acres be determined not to have been historically used for cropland purposes, thus, not prime farmland.

Sincerely,

Brent Bilsland
President
Sunrise Coal, LLC

xc: Midwest Reclamation Resources, Inc.

1183 East Canvasback Drive | Terre Haute, IN 47802 | p: 812-299-2800 | f: 812-299-2810