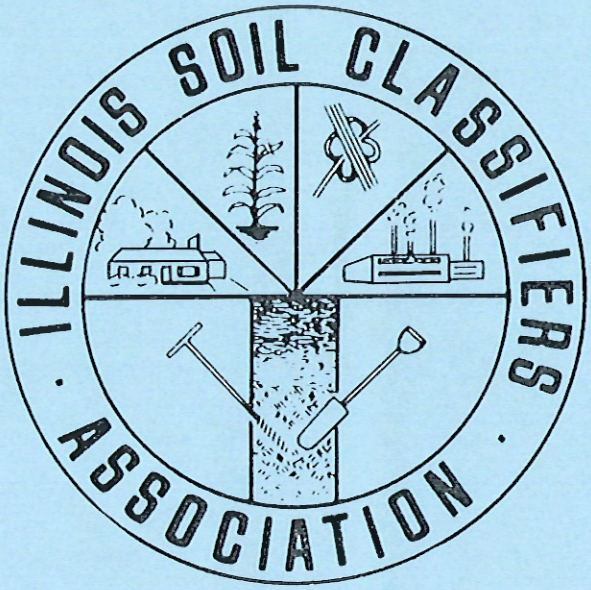
SOILS TOUR

MARION COUNTY, ILLINOIS

SEPTEMBER 27, 1986



Sponsored by

the MARION COUNTY SOIL SURVEY STAFF:

Clifford C. Miles

Tonie J. Endres

Wm. Burke Davies

Andrew V. Gallagher

AGENDA

ISCA SUMMER MEETING

Saturday, September 27, 1986

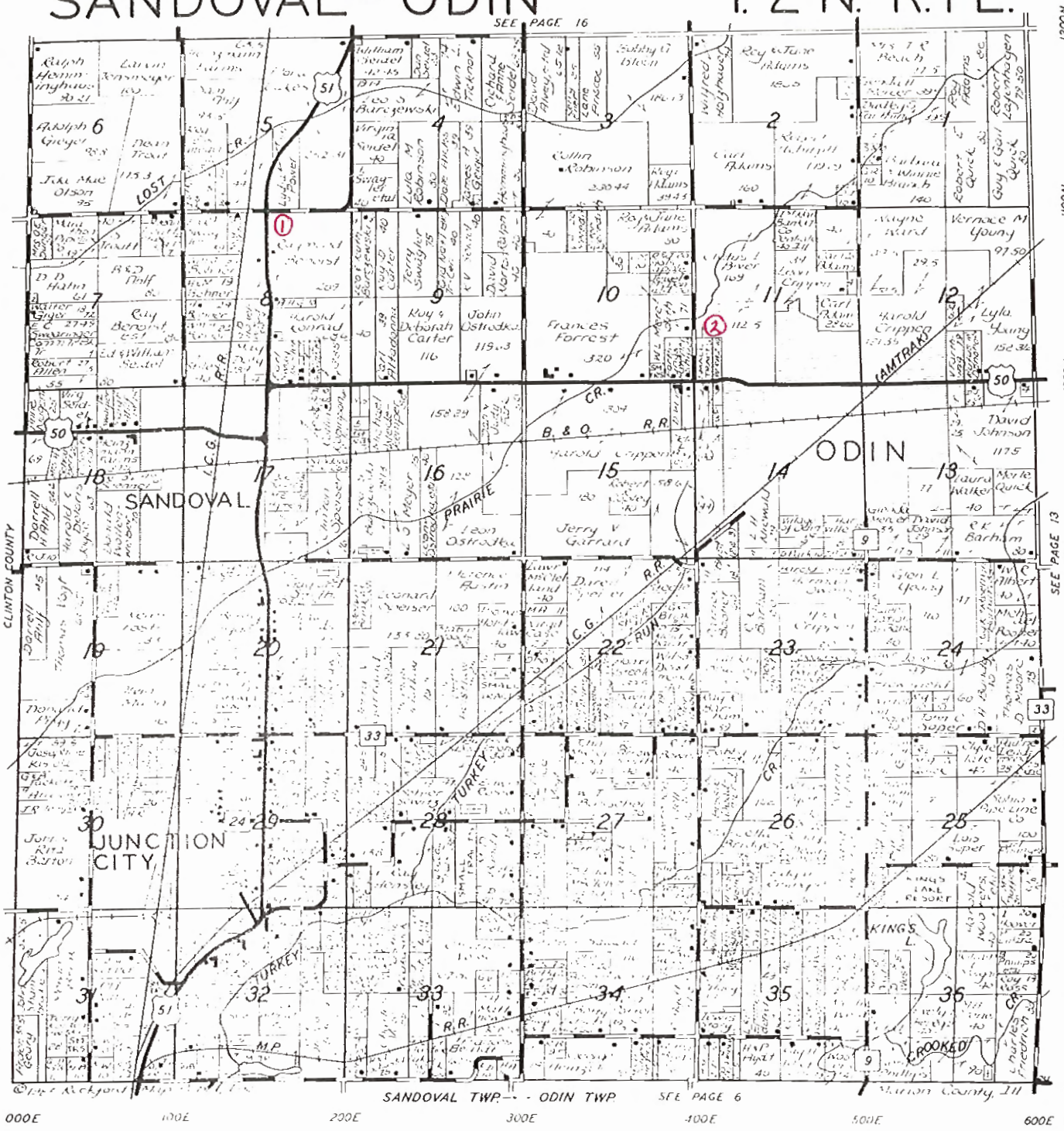
10:30 a.m.	Council meeting
11:30 a.m.	Potluck lunch
12:30 p.m.	General membership meeting
1:00 - 3:00 p.m.	Soils tour to two sites -

Stop 1 Introduction & Comments - Clifford C. Miles

Examine and discuss soils damaged by oil brine spills - led by Wm. Burke Davies and Andrew V. Gallagher

Stop 2 Examine and discuss the occurrence and properties of sodium soils ("slicks") - led by Tonie J. Endres

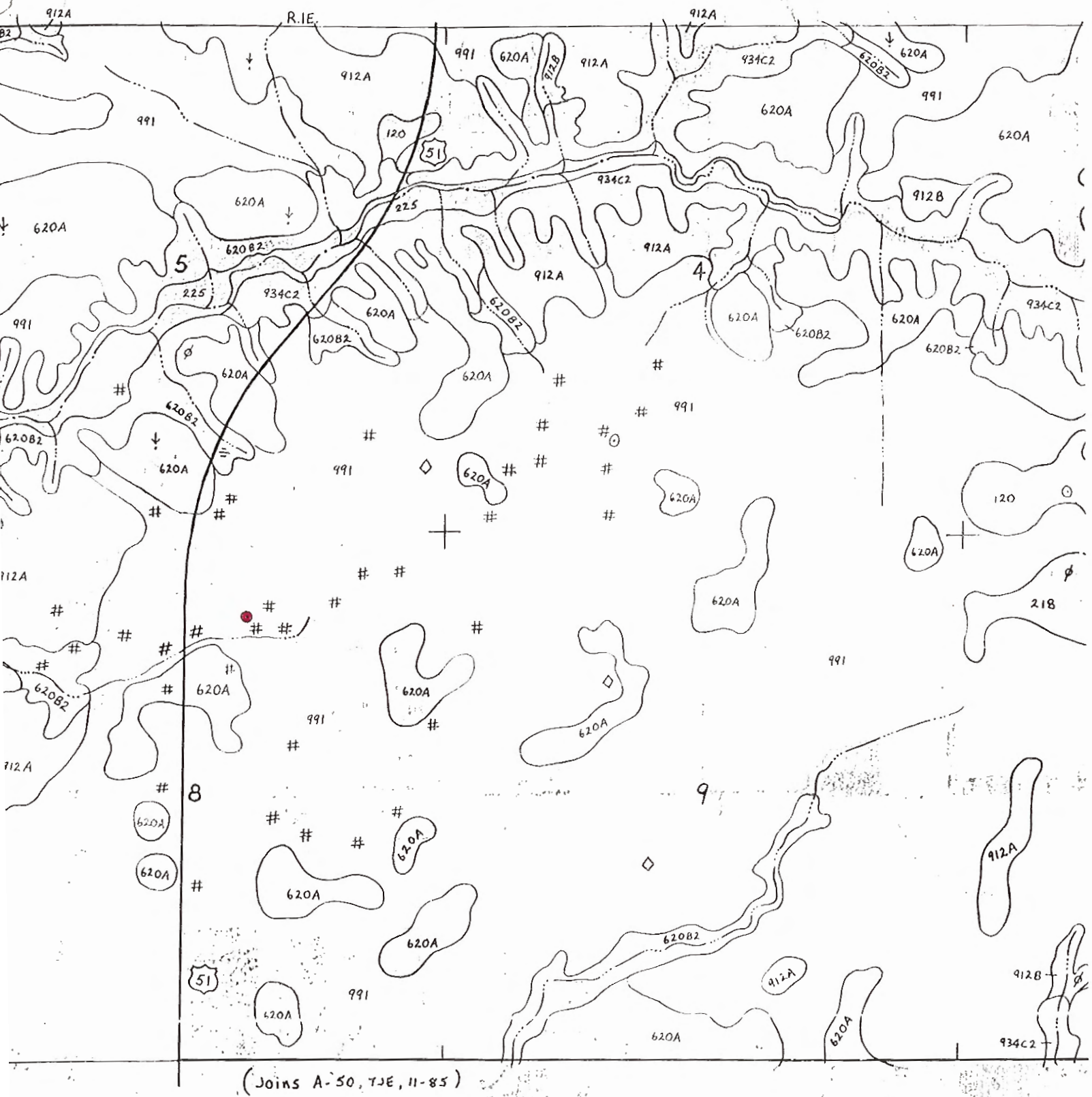
SANDOVAL – ODIN T. 2 N. – R. 1 E.



STOP 1

ADVANCE COPY SUBJECT TO CHANGE

Mapped by Tonie J. Endres
SCS Soil Scientist



OIL BRINE SPECIAL PROJECT

OIL BRINE SPECIAL PROJ

OIL BRINE - SPECIAL PROJECT, LITERATURE REVIEW

There are forty six counties in Illinois that have had oil production beginning in 1888. Previous estimates of total oil brine damage in Illinois range from 3500[4] acres to 380,000 acres[5]. An estimate of 3500 acres damaged is certainly too low since the three counties which ranked eleventh, thirteenth, and fifteenth in oil production in 1981, have a measured area of 2477 acres of barren land due to oil brine damage areas[1]. In 1981 Marion County ranked second in the state in oil production and out-produced the three counties mentioned above by one million barrels of oil. The size of the oil field brine damaged areas ranges from ten acres and larger to an acre or less.

The brine from oil fields contains high concentrations of sodium, potassium, calcium, magnesium, chloride, bicarbonate, and sulfate ions. Recorded concentrations of 30,500 mg/liter of chloride and 16,000 mg/liter of sodium have been found in brine pits on Southern Illinois soils. Concentrations of 1,600 mg/liter of sodium and 19,000 mg/liter of chloride ions are common in sea water[1]. Brine contains between 3,600 ppm and 5,300 ppm total dissolved salt which is equivalent to 1.5 to 2.3 pounds of salt in a 55 gallon drum of water[5]. The basic problem with salt-saturated spill areas is that the soil becomes relatively compact and impermeable, which prevents rain water from flushing the displaced sodium down and out of the root zone.

When the brine is taken up by plants, the capacity of plant cells to take up and hold water is reversed, and the plant withers and dies. Seeds will not germinate in such conditions. The sodium, after entering the soil, causes soil structure degradation and the soil loses some of its available water holding capacity and natural cohesiveness. This results in a soil that erodes more quickly. In a study conducted in Hamilton County, Illinois, the average rate of erosion of 36 randomly sampled oil brine damaged areas was estimated to be 6.7 times the average rate of erosion on agricultural lands in the county[2]. Deep gullies quickly form in areas with moderate slopes. Many of these affected areas remain barren of vegetation or partly barren and erode at a high rate for thirty years or more[6]. Natural leaching will lower salt concentration gradually which may result in the establishment of salt tolerant grasses. Further leaching could result in a natural progression of salt tolerant species over decades of time.

The oil brine affected areas are conspicuous and are resistant to healing through natural processes[3]. The past reclamation practices for these areas have consisted mainly of achieving an acceptible pH level by adding lime or gypsum. Organic matter is important for improving soil structure and permeability. Straw, manures, sewage sludge have been used to add organic matter to the soil. In some cases, areas have been tiled to aid in removing the sodium from the soil profile. A combination of improving soil pH, adding organic matter, and tiling has had the best results.

Literature Review

1. Greater Egypt Regional Planning and Development Commission, Brine Damaged Survey Procedures. Publication No. GERPDC 83-631, 1982.

2. Greater Egypt Regional Planning and Development Commission, An overview of Oil Field Brine Problems, in Three Illinois Counties. Publication NO. GERPDC 82-626, 1982.

3. Charles Pardee, Executive Vice President, Oil and Gas Association, Private Comm. 1982.

4. Bernard Podosky, "Reclamation of Oil Brine Damaged Soil," December 13, 1984.

5. R. P. Schmerbauch, "Restoring Salt Damaged Soils," Second Midwest Oil and Gas Symposium of the Society of Petroleum Engineers, March, 1974.

6. Wendy Blake Coleman and Douglas A. Crandall, Illinois Oil Field Brine Disposal Assessment, Phase II, Illinois Environmental Protection Agency, November, 1981.

William Burke Davies
Marion County Soil Scientist

1/ 2/

SITE AND PEDON DESCRIPTION

SOIL TYPE: Oil Brine Damaged Soil MAP UNIT: 991

CLASSIFICATION: Fine, Montmorillonitic, Mesic Typic Albaqualf FILE NO: STOP NO:

PEDON NO: 85IL121-52 1 - 6 QUADRANGLE: Fairman

COUNTY: Marion County, Illinois FIELD SHEET: Atlas 43

MLRA: 113

LOCATION: Approx. 1,716 ft. North and 594 ft. East of the center of Sec. 8 NE¼, SW¼, NW¼, NE¼, Sec. 8, T2N, R1E.

N. VEG. (OR CROP): Void of vegetation.

PARENT MATERIAL: Loess and silty erosional sediments.

PHYSIOGRAPHY: Broad Illinoian till plain

SLOPE: 1% ASPECT: --

DRAINAGE: Poor GROUND WATER: Greater than 60"

PERMEABILITY: Very slow MOISTURE: Moist

EROSION: Class 3 severe STONINESS: --

pH METHOD: LaMotte % CLAY: 39%

SAMPLED BY: WBD, TJE September 4, 1985 % COARSER THAN VFS: --

DESCRIBED BY: CCM, TJE, WBD September 24, 1985 % COARSE FRAG. --

Evaluation:

ADDITIONAL NOTES:

1. Site is located East of US 51 near intersection of RD 300 N.

OIL BRINE DAMAGED SOIL
85IL121-52-1 to 6

Ap- 0 to 7 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; common medium prominent strong brown (7.5YR 5/6) mottles; weak very fine and thin platy structure in the upper part changing to weak fine angular blocky in the lower part; friable; few distinct light gray (10YR 7/2) silt coatings on the faces of peds and common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; many fine and medium rounded dark nodules (iron and manganese oxide); extremely acid; clear smooth boundary.

Btg1- 7 to 12 inches; grayish brown (10YR 5/2) silty clay loam, common fine faint light brownish gray (10YR 6/2) and many medium and coarse prominent yellowish red (5YR 4/6) mottles; moderate fine prismatic structure parting to moderate medium angular blockly; firm; many faint dark gray (10YR 4/1) clay films on the faces of peds and many light gray (10YR 7/2) silt coatings on faces of peds; common fine medium rounded dark nodules (iron and manganese oxide); very strongly acid; abrupt smooth boundary.

Btg2- 12 to 20 inches; light brownish gray (10YR 6/2) silty clay; many medium prominent yellowish red (5YR 4/6) and strong brown (7.5YR 5/6) mottles; strong medium prismatic structure parting to moderate coarse angular blocky; very firm; few very fine roots; many prominent very dark gray (10YR 3/1) and dark gray (10YR 4/1) clay films on faces of peds; few fine and medium rounded dark nodules (iron and manganese oxide); very strongly acid; clear smooth boundary.

Btg3- 20 to 31 inches; light brownish gray (10YR 6/2) silty clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate coarse angular blocky; firm; few very fine roots; many distinct gray (10YR 5/1) and dark gray (10YR 4/1) clay films on faces of peds; common fine and medium rounded dark nodules (iron and manganese oxide); very strongly acid; clear smooth boundary.

Btg4- 31 to 37 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; firm; few fine and very fine roots; common faint gray (10YR 5/1) clay films on faces of peds; many fine and medium rounded dark nodules (iron and manganese oxide); strongly acid; gradual smooth boundary.

2BCg- 37 to 60 inches; mixed very dark gray (2.5Y 3/1) and dark gray (2.5Y 4/1) silty clay loam; common medium and coarse prominent strong brown (7.5YR 4/6) and common medium and coarse dark yellowish brown (10YR 3/4) mottles; weak medium prismatic structure parting to weak very coarse and thick platy; firm; few fine and very fine roots; common distinct very dark gray (2.5YR 3/1) clay films on vertical faces of peds; common fine and medium rounded dark nodules (iron and manganese oxide); about 1 percent by volume fine and medium gravel; about 20% sand; neutral.

NOT DESIGNATED MARION COUNTY, ILLINOIS

SAMPLED AS: FINE, MONTMORILLONITIC, MESIC TYPIC ALBAQUALF

DATE PRINTED 05/20/86 PAGE

S 85IL-121 -052

PROJECT: OIL BRINE

SAMPLE NO. 86P1429-1437
PEDON NO. 86P 246
PROJECT NO. 86P 46

U. S. DEPARTMENT OF
SOIL CONSERVATION
NATIONAL SOIL SURVE
LINCOLN, NEBRASKA

GENERAL METHODS 1B1A, 2A1, 2B

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
				(- - -TOTAL - - -)			(- -CLAY- -)		(- -SILT- -)			(- - - - - -SAND- - - - - -)				(-COARSE FRACTION		
				CLAY	SILT	SAND	FINE	CO3	FINE	COARSE	VF	F	M	C	VC	- - - - WEIGHT -		
HZN	DEPTH	HORIZON		LT	.002	.05	LT	LT	.002	.02	.05	.10	.25	.5	1	2	5	20
NO.	(CM)			.002	-.05	-2	.0002	.002	-.02	-.05	-.10	-.25	-.50	-1	-2	-5	-20	-75
				<- - - - - - - - - - - - - PCT OF <2MM (3A1) - - - - - - - - - - - - ->												<- PCT OF <75MM(		
1S	0- 18	AP		17.3	74.1	8.6			42.8	31.4	1.4	2.0	1.9	1.7	1.7	1	TR	--
2S	18- 30	BTG1		29.2	66.2	4.6			37.9	28.3	1.2	1.5	1.1	0.6	0.2	TR	--	--
3S	51- 79	BTG3		37.9	56.9	5.2			33.7	23.2	1.2	1.6	1.5	0.7	0.2	TR	TR	--
4S	94-152	2BC		24.4	55.2	20.4			26.5	28.7	4.5	8.0	5.8	1.7	0.4	TR	TR	--

	ORGN	TOTAL	EXTR	TOTAL	(- - DITH-CIT - -)			(RATIO/CLAY)		(ATTERBERG)		(- BULK DENSITY -)			COLE	(- - -WATER CONTE		
	C	N	P	S	EXTRACTABLE			CEC	15 BAR	- LIMITS -		FIELD MOIST	1/3 BAR	OVEN DRY	WHOLE SOIL	FIELD MOIST	1/10 BAR	1/ BAR
HZN					FE	AL	MN			LL	PI							
NO.	6A1C	6B3A		6R3A	6C2B	6G7A	6D2A	8D1	8D1	4F1	4F	4A3A	4A1D	4A1H	4D1	4B4	4B1C	4B1C
	<- - - - - - -PCT OF <2MM - - - - - - - ->									PCT <0.4MM		<- - G/CC - - ->			CM/CM	<- - -PCT OF <2M		
1	0.50							0.50	0.55									
2	0.39							0.58	0.53									
3	0.34							0.70	0.52									
4	0.16							0.71	0.50									

*** CONTINUATION ON NEXT PAGE ***

CT DESIGNATED S 85IL-121 -052 PEDON NO. 86P 246 NATIONAL SOIL SURVEY

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
	(- NH4OAC EXTRACTABLE BASES -)					ACID-	EXTR	(- -CEC- -)		EXCH	SAR	BASE SATURATION		CO3 AS CACO3	RES. OHMS	CASO4 AS GYPSUM		(- - -
	CA	MG	NA	K	SUM	ITY	AL	SUM CATS	NH4- OAC	NA		SUM	NH4OAC	<2MM	/CM	<2MM	<20MM	SAT PASTE
ZN	5B5A	5B5A	5B5A	5B5A	BASES													
C.	6N2E	6Q2D	6P2B	6Q2B		6H5A	6G9A	5A3A	5A8B	5D2	5E	5C3	5C1	6E1C	8F1	6F1A	6F4	8C1B
	<- - - - - - - - - -			-MEQ / 100		G - - - - - - - - - - - - - - ->				PCT		<- -PCT- >		PCT		<- -PCT ->		
1	12.2	7.6	29.5	TR	49.3	5.0	0.7	54.3	8.7	58	44	91	100					4.0
2	8.1	4.5	31.1	0.1	43.8	6.4	1.0	50.2	16.9	57	53	87	100					4.3
3	7.4	4.2	35.2	0.3	47.1	9.2	1.1	56.3	26.5	53	59	84	100					4.2
4	4.6	2.2	22.8	0.1	29.7	1.8		31.5	17.2	68	67	94	100		220			6.4

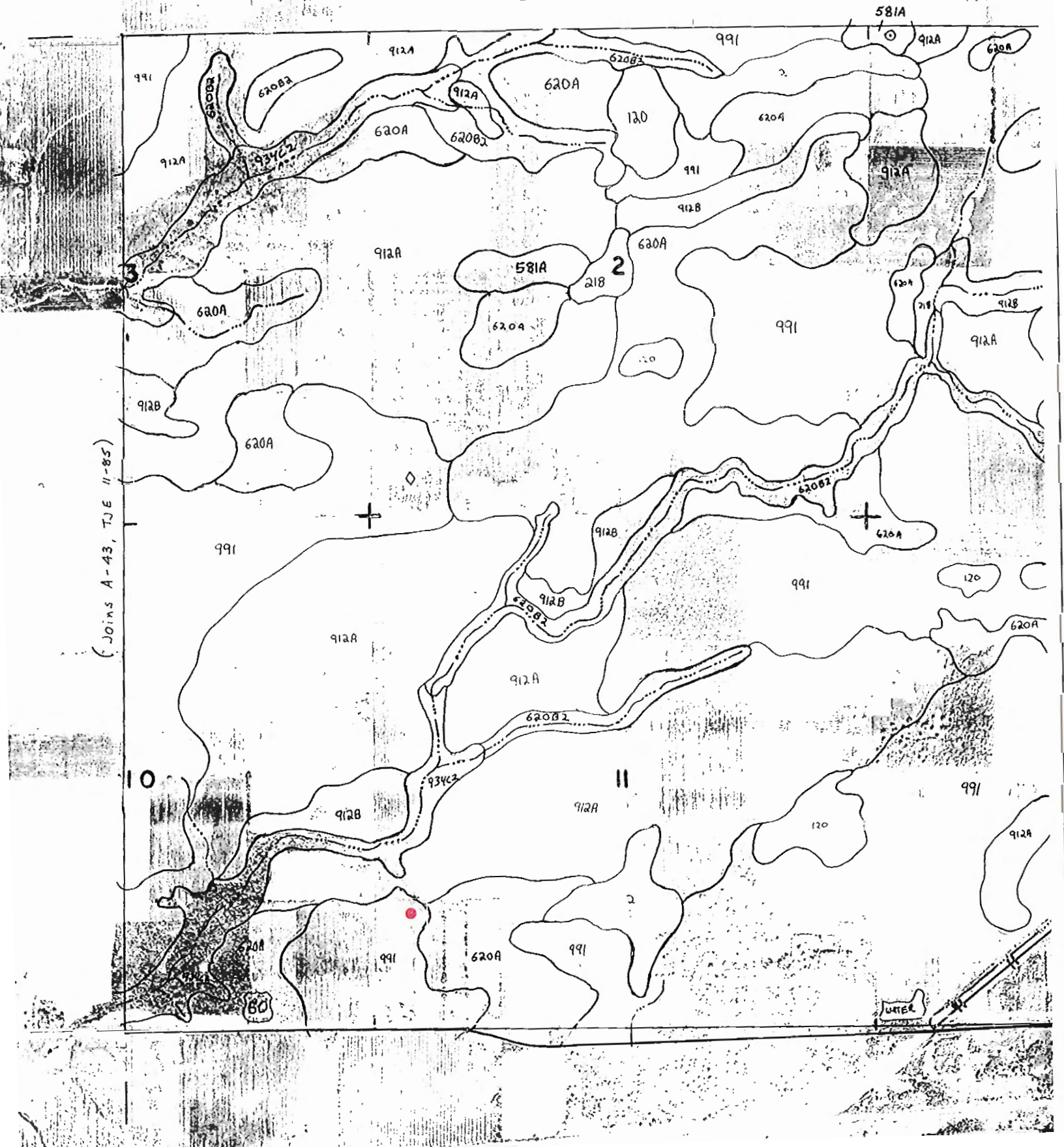
	(- - - - - - - -WATER EXTRACTED FROM SATURATED PASTE- - - - - - - - - -)											(- - - - - - - - -MINERALOGY - - - -						
											TOTAL	ELEC.	(- - - - - - - - CLAY - - - - - - - -)					
	CA	MG	NA	K	CO3	HCO3	CL	SO4	NO3	H2O	SALTS	COND.	(- - - - X-RAY - - - -)(- -DTA - -)					
ZN											EST.	8A3A						
G.	6N1J	6Q1B	6P1B	6Q1B	6I1B	6J1B	6K1C	6L1C	6M1C	8A	8D5	MMHOS	7A2I	7A2I	7A2I	7A2I	7A3	7A3
	<- - - - - - - - - -			-MEQ / LITER		- - - - - - - - - ->				<- -PCT ->		/CM	<- RELATIVE AMOUNTS ->				<- - - - -	-PC
1	218.3	146.2	594.3	0.3	--	TR	946.9	--	--	41.1	3.0	77.30						
2	59.4	38.6	369.6	0.3	--	0.1	459.3	34.5	--	59.2	2.3	43.30						
3	76.2	16.3	271.2	0.3	--	0.2	307.7	--	--	78.0	2.2	31.80						
4	8.2	4.3	170.9	0.1	--	0.4	175.1	10.3	--	64.5	1.1	19.60						

NALYSES: S= ALL CN SIEVED <2MM BASIS

STOP 2

ADVANCE COPY SUBJECT TO CHANGE

Mapped by Wm. Burke Davies
County Soil Scientist



SODIUM SOILS

Sodium soils, commonly called "slick spots" or "scalds", are extensive in south-central and western Illinois. These soils have a characteristic morphology and have a natric horizon. A natric horizon, as defined in Soil Taxonomy, is a special kind of argillic horizon that has prismatic or columnar structure, and more than 15 percent saturation with exchangeable sodium (Soil Survey Staff, 1975).

The high content of sodium and very slow permeability in the subsoil results in moisture stress during dry periods and excess moisture during wet periods. The sodium restricts the availability and uptake of some plant nutrients. In addition, the high content of sodium causes dispersion of the clay, resulting in an unfavorable medium for root development.

In Marion County, three sodium soils have been identified: Huey, Darmstadt, and Tamalco. The pH of the natric horizon in these soils ranges from neutral to moderately alkaline. In some areas, Huey and Darmstadt soils are closely intermingled on the landscape with soils that have an acid subsoil and are mapped as a complex. Cisne-Huey silt loams (991) is an extensive map unit on broad, nearly level parts of the till plain. Hoyleton-Darmstadt silt loams, 0 to 2 pecent slopes (912A) and 2 to 5 percent slopes (912B) are common on convex ridges on the till plain. In other areas, the sodium soils can be identified and delineated as consociations: Huey silt loams (120); Darmstadt silt loams, 0 to 3 percent slopes (620A) and 3 to 6 percent slopes, eroded (620B2); and Tamalco, 1 to 3 percent slopes (581A).

The genesis of sodium soils in Illinois is as complex as it is interesting. Fehrenbacher et al (1966) and Wilding et al (1963) have detailed the processes and factors involved in their formation. The sodium in these soils originated from the weathering of sodium feldspars in the loess. On sloping areas along drainageways, the occurrence of sodium soils is generally related to lateral seepage of groundwater. On nearly level landscapes, the occurrence of sodium soils is related to the permeability of the underlying glacial till. The till underlying the sodium soils is more permeable than the till underlying the associated non-sodic soils. As described by Fehrenbacher et al (1966), during early stages of sodium soil development, percolating water was channeled through the loess and toward the more permeable till. Sodium,

calcium, magnesium, and other products of weathering, were carried in solution by the percolating water. As a result of low CO_2 pressures and low moisture in the lower part of the loess, calcium and magnesium precipitated to form carbonate concretions. As the sodium concentration increased, the B horizon became less permeable as the clay was increasingly dispersed by the sodium. During advanced stages of sodium soil development, percolating water was diverted by the very slow permeability in the natric horizon and channeled instead through the associated non-sodic soils.

LITERATURE CITED

Fehrenbacher, J.B., R.T. Odell, P.E. Johnson, and B.A. Jones, Jr. 1966. Natric soils in Illinois. Illinois Research. University of Illinois Agricultural Experiment Station.

Soil Survey Staff. 1975. Soil taxonomy, a basic system of soil classification for making and interpreting soil surveys. USDA Handb. 436. U.S. Government Printing Office. Washington, D.C.

Wilding, L.P., R.T. Odell, J.B. Fehrenbacher, and A.H. Beavers. 1963. Source and distribution of sodium in solonetic soils in Illinois. Soil Sci. Soc. Am. Proc. 27:432-438.

Tonie J. Endres
Soil Scientist, SCS
President-Elect, ISCA

1/ 2/

SITE AND PEDON DESCRIPTION

SOIL TYPE: Huey silt loam MAP UNIT: 991

CLASSIFICATION: fine-silty, mixed, mesic Typic Natraqualf FILE NO: 301 STOP NO:

PEDON NO: - QUADRANGLE: Centralia East

COUNTY: Marion FIELD SHEET: Atlas 44

MLRA: 113

LOCATION: Approx. 1280 feet north and 410 feet east of the southwest corner of sec. 11, T.2N., R.1E. Sandoval-Odin Twp.
NE¼, NW¼, SW¼, SW¼ sec. 11

N. VEG. (OR CROP): corn

PARENT MATERIAL: loess and erosional sediments

PHYSIOGRAPHY: slightly depressional area on the Illinoian till plain

SLOPE: 0% ASPECT: -

DRAINAGE: Poor GROUND WATER: >60 inches

PERMEABILITY: Very slow MOISTURE: 0-10" moist; 10-45" dry; 45-60" moist

EROSION: Class 1 None to slight STONINESS: -

pH METHOD: LaMotte % CLAY: 35

SAMPLED BY: Staff % COARSER THAN VFS:

DESCRIBED BY: TJE 09-23-86 % COARSE FRAG.

Evaluations:
1. Typical pedon of Huey silt loam in the 991 map unit
2. Soil properties of pedon are within the Huey series range in characteristics

ADDITIONAL NOTES:
3. Described from a soil pit
4. Pedon is located approx. 65 feet north of a typical pedon of Cisne silt loam (file # 302)

RIZON	DEPTH	MATRIX COLOR	TEXTURE	MOTTLES	STRUCTURE	SISTENCE	ROOTS	PORES	COATINGS	CONCENTRATIONS	ROCK FRAG	REACTION	BOUNDARY
Ap1	0-3"	dry 10YR 6/3 10YR 4/2	sil	–	1msbk and 1mafgr	fr	3vfaf		–	c1a2r-irn	–	6.6	cs
Ap2	3-6"	dry 10YR 6/3 10YR 5/2	sil	–	2vfafpl	fr	2vfaf		–	c1a2r-irn	–	7.2	as
Bt	6-10"	10YR 5/3	sicl	c2f 10YR 6/2 c2d 10YR 5/6	2mpr 2mabk	fi	2vfaf		(dry) 2d 10YR 7/2 sic-pf 3d 10YR 4/2 cf-pf	c1a2r-irn	–	7.4	cw
Btg1	10-27"	10YR 5/2	hsicl	c2f 10YR 6/2 c1a2f 7.5YR 4/6	1mpr	(dry) h	2vfaf		2d 10YR 4/2 cf-pf	c3ir-cs acn c1a2r-irn	–	ev 8.0	cw
Btg2	27-45"	10YR 6/2	hsicl	c2p 7.5YR 4/6	1macpr 2cabk	(dry) h	1vf		2d 10YR 5/1 cf-pf	c3ir-cs acn c2ir-irs	–	ev 7.8	cw
2Btg3	45-60"	10YR 5/2	sicl	c2a3p 7.5YR 4/6 a 5/6	1macpr	fi	–		2d 10YR 5/1 a 4/1 cf-pf	c3ir-cs acn c2a3ir-irs	1% fama	ev 7.6	–

Huey silt loam
201

1/ 2/

SITE AND PEDON DESCRIPTION

SOIL TYPE: Cisne silt loam MAP UNIT: 991

CLASSIFICATION: fine, montmorillonitic, mesic Mollic Albaqualf FILE NO: 302 STOP NO:

PEDON NO: - QUADRANGLE: Centralia East

COUNTY: Marion FIELD SHEET: Atlas 44

MLRA: 113

LOCATION: approx. 1215 feet north and 410 feet east of the southwest corner of sec. 11, T.2N., R.1E. Sandoval-Odin Twp. NE¼, NW¼, SW¼, SW¼ sec. 11

N. VEG. (OR CROP): corn

PARENT MATERIAL: loess and erosional sediments

PHYSIOGRAPHY: broad, nearly level till plain

SLOPE: 0-1% ASPECT: -

DRAINAGE: poor GROUND WATER: >60 inches

PERMEABILITY: Very slow MOISTURE: moist except for E2 horizon 14-19"

EROSION: Class 1 None to slight STONINESS: -

pH METHOD: LaMotte % CLAY: 38

SAMPLED BY: Staff % COARSER THAN VFS: 5

DESCRIBED BY: CCM 09-23-86 % COARSE FRAG. -

Evaluation: 1. Typical pedon of Cisne silt loam in the 991 map unit

2. Soil properties of pedon are within Cisne series range in characteristics

ADDITIONAL NOTES: 3. Described from a soil pit

4. Pedon is located approx. 65 feet south of a typical pedon of Huey silt loam (file #301)

1 NSH 602-105 2 NSH 602-18

RIZON	DEPTH	MATRIX COLOR	TEX TURE	MOTTLES	STRUCTURE	SIST ENCE	ROOTS	PORES	COATINGS	CONC ENTRA TIONS	ROCK FRAG	REAC TION	BOUN DARY
A_p	0-9"	dry 10YR 5/2 10YR 3/2	sil	—	1mgr ^ 1msbk grading to 2mpl	fr	3f		—	—	—	6.6	as
Eg_1	9-14"	10YR 5/2	sil	cld 10YR 5/4	1mpl	fr	2f		—	c1-irs	—	5.8	as
Eg_2	14-19"	10YR 6/2	sil	cld 10YR 5/4	1cpl	(dry) h	1f		3d 10YR 7/1 sic-pf	c1-irs	—	4.8	as
B/E	19-21"	B 10YR 5/2 E 10YR 7/1	sicl si	c2p 5YR 4/6 ^ 7.5YR 5/6	2f^msbk	fi ^ fr	2f		4f 10YR 3/2 cf-vpf 4d 10YR 3/2 ^ 4/2 cf-hpf	—	—	5.0	as
Btg_1	21-29"	10YR 5/2	lsic	m2^3p 5YR 4/6 ^ 7.5YR 5/6	3m^cpr / 2m^cabk	vfi	2f^vf		3d 10YR 4/2 ^ 3/2 cf-pf	—	—	5.4	cs
Btg_2	29-39"	10YR 5/2	hsicl	m2^3p 7.5YR 5/6	2m^cpr / 2m^cabk	vfi	2vf		3d 10YR 5/2 cf-pf	—	—	5.6	cs
$2Btg_3$	39-50"	10YR 5/2	sicl	m2^3p 7.5YR 5/6 ^ 10YR 5/4	1m^csbk	fi	1vf		3f 10YR 5/2 cf-pf	c2-irs	1% fg	5.8	gs
2BCg	50-60"	10YR 5/2	cl	m3p 7.5YR 5/6	1csbk	fi	—		1f 2.5Y 6/2 cf-pf 3f 10YR 7/1 sic-pf	c2-irs	2% fg	6.2	—

Cisne silt loam