Soil Survey Reference (FIFE)

Summary:

The objectives of this study were to collect soil survey information from the FIFE study area, determine the soil types at the FIFE sites, and characterize the physical and chemical properties of the soils. The Soil Properties Reference Information Data Set provide a description of the soils and their properties at the FIFE study sites as described by the U.S. Soil Conservation Service.

Five stations representative of the Clime, Benfield, Dwight, Florence, and Tully soil types were selected, and a detailed description of the soil profile at each of these five sites was made. Soil samples from the surface down to bedrock were collected from the horizons and analyzed for bulk density, particle size distribution, moisture retention at 1/3 and 15 bar suctions, cation exchange capacity, and other chemical and physical properties, using standard procedures (Soil Survey Staff 1984).

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1. Data Set Overview:

Data Set Identification:

Soil Survey Reference (FIFE).
(Soil Properties Reference Information).

Data Set Introduction:

The Soil Properties Reference Information Data Set provide a description of the soils and their properties at the FIFE study sites as described by the U.S. Soil Conservation Service.

Objective/Purpose:

The objectives were to collect soil survey information from the FIFE study area, determine the soil types at the FIFE sites, and characterize the physical and chemical properties of the soils.

Summary of Parameters:

Soil series name, soil horizon, depth, particle size distribution, organic carbon, nitrogen, extractable metals, extractable bases, acidity, bulk density, electrical conductivity, mottles, roots, rock fragments, concretions, and water holding capacity.

Discussion:

These data provide a description of the soils and their properties at the FIFE study sites as described by the U.S. Soil Conservation Service. Five pedon types were identified from 38 sitegrids within the study area. At five of these sites, detailed soil profiles were also analyzed.

Related Data Sets:

- Soil Hydraulic Conductivity.
- Soil Thermal Conductivity.
- Soil Water Properties.
- Gravimetric Soil Moisture.
- Soil Properties Reference Information.

FIS Data Base Table Name:

SOIL_SURVEY_REF.

2. Investigator(s):

Investigator(s) Name and Title:

Staff Science.

Title of Investigation:

Staff Science Ancillary Data Acquisition Program.

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Requested Form of Acknowledgment.

The soil survey data was obtained by the FIFE Information System staff from the United States Department of Agriculture, Soil Conservation Service (USDA-SCS). Thanks are due to Dr. Elissa Levine who was instrumental in acquiring, interpreting, and preparing these data.

3. Theory of Measurements:

Soil materials and soils are distributed in sufficiently uniform and recognizable entities to justify a system of classification. The technique of identifying and delineating soil units, together with the recording of such information in the form of a map, is the process of soil surveying. Reasonable objectives in soil surveys are to: (i) minimize the variation in terms of significant soil properties within mapping units while maximizing the variation among mapping units, and (ii) effectively characterize the mapping units in terms of significant soil properties.

The degree of purity of a soil mapping unit (soil series in FIFE) is its degree of homogeneity. A pure unit would consist entirely of pedons having characteristics that are in the range permitted by definition for a taxonomic unit. In terms of taxonomic units, the percent "purity" of soil mapping units ranges from about 50% for soil series and soil types to 75% for soil orders (Beckett and Webster 1971).

4. Equipment:

Sensor/Instrument Description:

Soil auger, spade, clinometer, and tape measure.

Collection Environment:

Ground.

Source/Platform:

Ground.

Source/Platform Mission Objectives:

The aim was to identify similar soils and separate different ones, and characterize both based on physical and chemical properties, so that interpretation could be made for other soils of the area.

Key Variables:

Soil horizons, color, particle size distribution, organic matter, acidity, and base status.

Principles of Operation:

Soil cores from a spot on the ground are laid out end to end on a tray. Horizonation and other soil profile characteristics are used to assign the soil to the right soil series (mapping unit). A representative soil profile is dug and described in detail for each mapping unit.

Sensor/Instrument Measurement Geometry:

The soil auger cores a cylindrical section of the soil for soil identification, and a soil profile pit (approximately 1 cubic meter in volume) is dug for a detailed description.

Manufacturer of Sensor/Instrument:

Soil Auger:
Sauze Technical Products Corp.
116 West Service Road, Unit 128
Champlain, NY 12919

Calibration:

Specifications:

Not applicable.

Tolerance:

Not applicable.

Frequency of Calibration:

Not applicable.

Other Calibration Information:

Not applicable.

5. Data Acquisition Methods:

In 1987, all the FIFE sites were surveyed by the United States Department of Agriculture, Soil Conservation Service personnel. The soil series at each station were identified by onsite inspection. With the exception of station 13 (6735-SCS), all other stations were found to be located on one of five soil series. These soil series were, Clime, Benfield, Dwight, Florence, and Tully.

Five stations representative of these soil types were selected, and a detailed description of the soil profile at each of these five sites was made (see the *Field Notes Section*). Soil samples from the surface down to bedrock were collected from the horizons and analyzed for bulk density, particle size distribution, moisture retention at 1/3 and 15 bar suctions, cation exchange capacity, and other chemical and physical properties, using standard procedures (Soil Survey Staff 1984).

In 1987, detailed soil analyses were made for the following:

- Station 1 (2731-SCS), identified as Dwight silty loam. Other stations situated on this soil series are, 2 (1916-SCS), 16 (4439-SCS), 19 (6912-SCS), 26 (8739-SCS), 38 (1478-SCS), and 44 (2043-SCS).
- Station 10 (3414-SCS), identified as Tully silty clay loam. Other stations situated on this soil series are, 3 (2428-SCS), 8 (3129-SCS), 9 (3921-SCS),17 (4609-SCS), 20 (6340-SCS), 28 (6943-SCS), and 36 (2655-SCS).
- Station 5 (2123-SCS), identified as Florence silty clay loam. Another station situated on this soil series is 25 (4168-SCS).
- Station 14 (2516-SCS), identified as Clime silty clay loam. Other stations situated on this soil series are, 6 (2132-SCS), 7 (3221-SCS), 27 (1563-SCS), 29 (0847-SCS), and 42 (1445-SCS).
- Station 31 (2139-SCS), identified as Benfield silt loam. Other stations situated on this soil series are 12 (2915-SCS), 34 (3479-SCS), and 40 (1246-SCS).

6. Observations:

Data Notes:

Not available.

Field Notes:

The pedons described in this data set are not the typical pedon in the mapping unit represented in the USDA-SCS soil map of the area. The representative pedon in a soil survey is usually the central concept of the designated mapping unit. The relationship between the sites in the FIFE study area and the sampled pedons are given below. A chart describing the columns is given first. Then the data pedon information is given by sitegrid.

Parameter/Variable Name	Parameter/Variable Description	Range	Units	Source
SITEGRID_ID	This is a FIS grid location code. Site grid codes (SSEE-III) give the south (SS) and east (EE) cell number in a 100 x 100 array of 200 m square cells. The last 3 characters (III) are an instrument identifier.			FIS
STATION_ID	The three-digit FIFE site identification number for the site where the data were collected.	min = 1, max = 44		FIS
PEDON_ID	The identification number for the soil site as given by the Soil CONSERVATION Conservation Service. Sites have been sampled by the National Soil Survey Laboratory.	min = 8700448, max = 8700452		SOIL CONSERVATION SERVICE
SOIL_SERIES	The soil series name.	min = BENFIELD, max = TULLY TAX AJUNCT	CONSERVATION SERVICE	SOIL
SOIL_COMPLEX_NAME	The name of the soil complex for this site as it is referred to on the soils map.	min = BENFIELD-FLORENCE COMPLEX, max = TULLY SICL, 8-20%		SOIL CONSERVATION SERVICE
LATITUDE				

The north latitude. min = 39 04 16 N, max = 39 05 47 N	[Degrees, Minutes, Seconds]	SOIL CONSERVATION SERVICE	

LONGITUDE The west longitude. min = 96 32 23 W, max = 96 35 49 W	[Degrees, Minutes, Seconds]	SOIL CONSERVATION SERVICE	

SLOPE The approximate gradient of the soil slope. min = 3, max = 4	[degrees]	SOIL CONSERVATION SERVICE	

ESTIMATED_PERMEABILITY The Soil Conservation Service class code for the rate of water flow through the soil. min = 2, max = 2	%	SOIL CONSERVATION SERVICE	

DRAINAGE_CLASS The Soil Conservation Service class name for drainage. min = 4, max = 5	$	SOIL CONSERVATION SERVICE	

ELEV The site elevation above sea level. min = 385, max = 445	[meters]	SOIL CONSERVATION SERVICE	

PARENT_MATERIAL_TYPE The type of parent material for the soil. min = 2VB31XH0, max = 3XL71XH2	+	SOIL CONSERVATION SERVICE	

MOISTURE_REGIME Conditions at depth from 10 - 90 cm depending on the soil texture. min = US, max = US	#	SOIL CONSERVATION SERVICE	

RUNOFF The runoff code. min = 4, max = 6	&	SOIL CONSERVATION SERVICE	

FLOODING YES if flooding occurs at the site, otherwise NO. CONSERVATION SERVICE	min = NO, max = NO	SOIL

COMMENTS Information on the site location, how the site may be linked to other sites, and other comments.	FIS

Footnotes:

% Decode the ESTIMATED_PERMEABILITY field as follows:

	Possible Rates (inches/hr)
Slow	
1 = Very slow	> .05
2 = Slow	.05 - .2
Moderate	
3 = Moderately slow	.2 - .8
4 = Moderate	.8 - 2.5
5 = Moderately rapid	2.5 - 5.0
Rapid	
6 = Rapid	5.0 - 10.0
7 = Very rapid	< 10

& Decode the RUNOFF field as follows:

- 0 = Ponded
- 1 = Very slow
- 2 = Medium
- 3 = Rapid
- 4 = Very Rapid

Decode the MOISTURE_REGIME field as follows:

- AQ = Aquic - Water saturated for long enough for reducing conditions to exist.
- AR = Aridic or Torric - Both dry more than half the time when not frozen and never moist more than 90 consecutive days when soil temperatures are above 8 degrees C at 50 cm depth.
- PE = Perudic - Precipitation exceeds evapotranspiration every month of the year.
- UD = Udic - Not dry as long as 90 cumulative days.
- US = Ustic - Dry for more than 90 cumulative days but less than 180 days. In temperature (non-iso) climates, they are usually moist at least 45 consecutive days in the

4 months after the winter solstice and not dry 45 consecutive days in the 4 months after the summer solstice.

- XE = Xeric - Only in the temperate (non-iso) areas and have dry summers and moist winters, usually dry > 45 consecutive days in the summer and moist > 45 consecutive days in the winter.

Decode the PARENT_MATERIAL_TYPE field as follows:

The PARENT_MATERIAL_TYPE is an encoded 8 digit field which describes the weathering, the mode of deposition and the origin of the top 2 layers in a pedon and the fracture distance between these layers.

In these 8 digits the first digit encodes the values for the amount of weathering.

Where:
1 = Slight
2 = Moderate
3 = Strong

The second digit is the mode of deposition for the first layer in the pedon, and the sixth digit is the mode of deposition for the second layer in the pedon. The interpretation of the codes is as follows:

A = alluvium
D = glacial drift
E = eolian
F = mine spoil and earth fill
G = glacial outwash
H = volcanic ash
I = lacustrine sands
J = lacustrine silts
K = lacustrine clays
L = lacustrine
M = marine
N = marine sands
O = organic
P = marine silts
Q = marine clays
R = solid rock
S = eollan sand
T = glacial till
U = unconsolidated sediments
V = local colluvium
W = loess
X = residuum

Y = solifluctate
Z = estuarine

The third and fourth digits, and the seventh and eighth digits are 2 digit encoded values for the origin of the material in the top layer and the second layer in the pedon, respectively. The interpretation for these codes follows:

A0 = sandstone unspecified
A1 = sandstone noncalcareous
A2 = arkosic sandstone
A4 = sandstone calcareous
B0 = interbodded sedimentary unspecified
B1 = limestone sandstone shale
B2 = limestone sandstone
B3 = limestone shale
B4 = limestone siltstone
B5 = sandstone shale
B6 = sandstone siltstone
B7 = shale siltstone
C0 = conglomerate unspecified
C1 = conglomerate noncalcareous
C2 = conglomerte calcareous
E0 = ejecta ash unspecified
E1 = acidic ash
E2 = basic ash
E3 = basaltic ash
E4 = andesitic ash
E5 = cinders
E6 = pumice
E7 = scoria
E8 = volcanic bombs
H0 = shale unspecified
H1 = shale noncalcareous
H2 = shale calcareous
H3 = shale clay
I0 = igneous unspecified
I1 = igneous coarse (or intrusive)
I2 = igneous basic (e.g., gabbro)
I3 = igneous intermediate (e.g., diorite)
I4 = igneous granite
I5 = igneous fine (or extrusive)
I6 = igneous basalt
I7 = igneous andesite
I8 = igneous acid (e.g., rhyolite)
I9 = igneous ultrabasic
K0 = organic unspecified

K1 = mossy material
K2 = herbaceous material
K3 = woody material unspecified
K4 = wood fragments
K5 = logs and stumps
K6 = charcoal
K7 = coal
L0 = limestone unspecified
L1 = chalk
L2 = marble
L3 = dolomite
L4 = limestone phosphatic
L5 = limestone arenaceous
L6 = limestone argillaceous
L7 = limestone cherry
M0 = metamorphic unspecified
M1 = gneiss unspecified
M2 = gneiss acidic
M3 = gneiss basic
M4 = serpentine
M5 = schist unspecified
M6 = schist acidic
M7 = schist basic
M8 = slate
M9 = quartzite
P0 = pyroclastic unspecified
P1 = tuff unspecified
P2 = tuff acidic
P3 = tuff basic
P4 = volcanic breccia unspecified
P5 = breccia acidic
P6 = breccia basic
P7 = tuff breccia
P8 = aa
P9 = pahoehoe
S0 = sedimentary unspecified
S1 = marl
S2 = glauconite
T0 = siltstone unspecified
T1 = siltstone noncalcareous
T2 = siltstone calcareous
Y0 = mixed unspecified
Y1 = mixed noncalcareous
Y2 = mixed calcareous
Y4 = mixed igneous metamorphic and sedimentary
Y5 = mixed igneous and metamorphic

Y6 = mixed igneous and sedimentary
Y7 = mixed metamorphic and sedimentary

The fifth digit is the encoded value for the bedrock fracture distance between the top two layers. The interpretation of these codes are as follows.

where:
1 = less than 10 cm between fractures
2 = 10 to 45 cm between fractures
3 = 45 cm to 1.0 meter between fractures
4 = 1.0 to 2.0 meters between fractures
5 = greater than 2 meters between fractures

The soil site reference information for sites within the FIFE study area follows.

SITEGRID	STN_ID	PEDON_ID	SOIL_SERIES	SOIL_COMPLEX_NAME
0847-SCS	29	8700448	CLIME	CLIME-SOGN COMPLEX
1445-SCS	42	8700448	CLIME	CLIME-SOGN COMPLEX
1563-SCS	27	8700448	CLIME	STONY STEEP LAND
2132-SCS	6	8700448	CLIME	BENFIELD-FLORENCE COMPLEX
2516-SCS	14	8700448	CLIME TAXAJUNCT	CLIME-SOGN COMPLEX
3221-SCS	7	8700448	CLIME	BENFIELD-FLORENCE COMPLEX
2428-SCS	3	8700449	TULLY	DWIGHT-IRWIN COMPLEX
2655-SCS	36	8700449	TULLY	CLIME-SOGN COMPLEX
3129-SCS	8	8700449	TULLY	BENFIELD-FLORENCE COMPLEX
3414-SCS	10	8700449	TULLY	IRWIN SICL, 1-4%
3921-SCS	9	8700449	TULLY	TULLY SICL, 8-20%
4609-SCS	17	8700449	TULLY	DWIGHT SICL
4609-SCS	22	8700449	TULLY	DWIGHT SICL
5926-SCS	15	8700449	TULLY	MUIR SICL
6340-SCS	20	8700449	TULLY TAXAJUNCT	IRWIN SICL, 1-4%
6943-SCS	28	8700449	TULLY	TULLY SICL, 1-4%
1478-SCS	38	8700450	DWIGHT	CLIME-SOGN COMPLEX
1916-SCS	2	8700450	DWIGHT	IRWIN SICL, 4-8%
2043-SCS	44	8700450	DWIGHT	DWIGHT-IRWIN COMPLEX, 1-4%
2731-SCS	1	8700450	DWIGHT	DWIGHT-IRWIN COMPLEX, 1-4%
2731-SCS	4	8700450	DWIGHT	DWIGHT-IRWIN COMPLEX, 1-4%
4439-SCS	11	8700450	DWIGHT	DWIGHT SICL
4439-SCS	16	8700450	DWIGHT	DWIGHT SICL
4439-SCS	18	8700450	DWIGHT	DWIGHT SICL
6912-SCS	19	8700450	DWIGHT	IRWIN SICL, 1-4%
6912-SCS	24	8700450	DWIGHT	IRWIN SICL, 1-4%
8639-SCS	21	8700450	DWIGHT	DWIGHT SICL
8739-SCS	26	8700450	DWIGHT	DWIGHT SICL
2123-SCS	5	8700451	FLORENCE	BENFIELD-FLORENCE COMPLEX
4168-SCS	25	8700451	FLORENCE	BENFIELD-FLORENCE COMPLEX
4268-SCS	30	8700451	FLORENCE	BENFIELD-FLORENCE COMPLEX
4268-SCS	32	8700451	FLORENCE	BENFIELD-FLORENCE COMPLEX
1246-SCS	40	8700452	BENFIELD	CLIME-SOGN COMPLEX
2139-SCS	31	8700452	BENFIELD	BENFIELD-FLORENCE COMPLEX
2915-SCS	12	8700452	BENFIELD	BENFIELD-FLORENCE COMPLEX
3479-SCS	34	8700452	BENFIELD	CLIME-SOGN COMPLEX
6469-SCS	23	8700452	BENFIELD	LABETTE-FLORENCE COMPLEX
6735-SCS	13		HOBBS	HOBS SILT LOAM

SITEGRID	PEDON_ID	LATITUDE	LONGITUDE	SLOPE	ESTIMATED_PERMEABILITY
0847-SCS	8700448			2	

1445-SCS	8700448							2	
1563-SCS	8700448							2	
2132-SCS	8700448							2	
2516-SCS	8700448	39	05	12	N	96	35	39	W	4	2
3221-SCS	8700448							2	
2428-SCS	8700449							2	
2655-SCS	8700449							2	
3129-SCS	8700449							2	
3414-SCS	8700449	39	04	16	N	96	35	49	W	4	2
3921-SCS	8700449							2	
4609-SCS	8700449							2	
4609-SCS	8700449							2	
5926-SCS	8700449							2	
6340-SCS	8700449							2	
6943-SCS	8700449							2	
1478-SCS	8700450							2	
1916-SCS	8700450							2	
2043-SCS	8700450							2	
2731-SCS	8700450	39	04	54	N	96	33	34	W	3	2
2731-SCS	8700450							2	
4439-SCS	8700450							2	
4439-SCS	8700450							2	
4439-SCS	8700450							2	
6912-SCS	8700450							2	
6912-SCS	8700450							2	
8639-SCS	8700450							2	
8739-SCS	8700450							2	
2123-SCS	8700451	39	05	47	N	96	34	39	W	3	
4168-SCS	8700451										
4268-SCS	8700451										
4268-SCS	8700451										
1246-SCS	8700452										
2139-SCS	8700452	39	05	36	N	96	32	23	W	4	
2915-SCS	8700452										
3479-SCS	8700452										
6469-SCS	8700452										
6735-SCS											

SITEGRID	PEDON_ID	DRAINAGE_CLASS	ELEV	PARENT_MATERIAL_TYPE
0847-SCS	8700448	5		2VL72XB3
1445-SCS	8700448	5		2VL72XB3
1563-SCS	8700448	5		2VL72XB3
2132-SCS	8700448	5		2VL72XB3
2516-SCS	8700448	5	405	2VL72XB3
3221-SCS	8700448	5		2VL72XB3
2428-SCS	8700449	5		2VB31XH0
2655-SCS	8700449	5		2VB31XH0
3129-SCS	8700449	5		2VB31XH0
3414-SCS	8700449	5	410	2VB31XH0
3921-SCS	8700449	5		2VB31XH0
4609-SCS	8700449	5		2VB31XH0
4609-SCS	8700449	5		2VB31XH0
5926-SCS	8700449	5		2VB31XH0
6340-SCS	8700449	5		2VB31XH0
6943-SCS	8700449	5		2VB31XH0
1478-SCS	8700450	4		2WY31WY31XL71XH2
1916-SCS	8700450	4		2WY31WY31XL71XH2
2043-SCS	8700450	4		2WY31WY31XL71XH2
2731-SCS	8700450	4	445	2WY31WY31XL71XH2
2731-SCS	8700450	4		2WY31WY31XL71XH2
4439-SCS	8700450	4		2WY31WY31XL71XH2
4439-SCS	8700450	4		2WY31WY31XL71XH2
4439-SCS	8700450	4		2WY31WY31XL71XH2

6912-SCS	8700450	4			2WY31WY31XL71XH2
6912-SCS	8700450	4			2WY31WY31XL71XH2
8639-SCS	8700450	4			2WY31WY31XL71XH2
8739-SCS	8700450	4			2WY31WY31XL71XH2
2123-SCS	8700451			405	3XL71XH2
4168-SCS	8700451				3XL71XH2
4268-SCS	8700451				3XL71XH2
4268-SCS	8700451				3XL71XH2
1246-SCS	8700452				2VL71XH2
2139-SCS	8700452			385	2VL71XH2
2915-SCS	8700452				2VL71XH2
3479-SCS	8700452				2VL71XH2
6469-SCS	8700452				2VL71XH2
6735-SCS					

SITEGRID	PEDON_ID	MOISTURE_REGIME	RUNOFF	FLOODING
0847-SCS	8700448	US	6	NO
1445-SCS	8700448	US	6	NO
1563-SCS	8700448	US	6	NO
2132-SCS	8700448	US	6	NO
2516-SCS	8700448	US	6	NO
3221-SCS	8700448	US	6	NO
2428-SCS	8700449	US	5	
2655-SCS	8700449	US	5	
3129-SCS	8700449	US	5	
3414-SCS	8700449	US	5	
3921-SCS	8700449	US	5	
4609-SCS	8700449	US	5	
4609-SCS	8700449	US	5	
5926-SCS	8700449	US	5	
6340-SCS	8700449	US	5	
6943-SCS	8700449	US	5	
1478-SCS	8700450	US	4	
1916-SCS	8700450	US	4	
2043-SCS	8700450	US	4	
2731-SCS	8700450	US	4	
2731-SCS	8700450	US	4	
4439-SCS	8700450	US	4	
4439-SCS	8700450	US	4	
4439-SCS	8700450	US	4	
6912-SCS	8700450	US	4	
6912-SCS	8700450	US	4	
8639-SCS	8700450	US	4	
8739-SCS	8700450	US	4	
2123-SCS	8700451	US		
4168-SCS	8700451	US		
4268-SCS	8700451	US		
4268-SCS	8700451	US		
1246-SCS	8700452	US		
2139-SCS	8700452	US		
2915-SCS	8700452	US		
3479-SCS	8700452	US		
6469-SCS	8700452	US		
6735-SCS				

SITEGRID	PEDON_ID	COMMENTS
0847-SCS	8700448	BASED ON SITEGRID 2516-SCS SINCE SIMILAR SOIL SERIES.
1445-SCS	8700448	BASED ON SITEGRID 2516-SCS SINCE SIMILAR SOIL SERIES.
1563-SCS	8700448	BASED ON SITEGRID 2516-SCS SINCE SIMILAR SOIL SERIES.
2132-SCS	8700448	BASED ON SITEGRID 2516-SCS SINCE SIMILAR SOIL SERIES.
2516-SCS	8700448	THIS SITE SAMPLED BY NSSL. TAXAJUNCT TO CLIME SERIES BECAUSE OF DEPTH TO LIME. 400 FT E AND 600 FT S OF NW CORNER OF SECT 19 T.11 S. R.8 E. RILEY CO. KS

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3221-SCS    8700448    BASED ON SITEGRID 2516-SCS SINCE SIMILAR SOIL SERIES.
2428-SCS    8700449    LINK TO DATA FOR SITE 10. INCLUDED IN THE SITE ARE SOME
PEDONS THAT HAVE SHALE AT A DEPTH OF ABOUT 40 INCHES.
2655-SCS    8700449    BASED ON SITEGRID 3414-SCS SINCE SIMILAR SOIL SERIES.
3129-SCS    8700449    BASED ON SITEGRID 3414-SCS SINCE SIMILAR SOIL SERIES.
UPPER PART OF SITE IS IN BENFIELD SOILS, LOWER PART
OF SITE IS TULLY SOILS.
3414-SCS    8700449    SAMPLED BY NSSL. 500 FT W AND 750 FT S OF NE CORNER OF
SECTION 25 T. 11 S., R. 7 E. GEARY CO. KS. AREA
MAPPED AS IRWIN.
3921-SCS    8700449    BASED ON SITEGRID 3414-SCS SINCE SIMILAR SOIL SERIES.
4609-SCS    8700449    BASED ON SITEGRID 3414-SCS SINCE SIMILAR SOIL SERIES.
4609-SCS    8700449    BASED ON SITEGRID 3414-SCS SINCE SIMILAR SOIL SERIES.
5926-SCS    8700449    BASED ON SITEGRID 3414-SCS SINCE SIMILAR SOIL SERIES.
6340-SCS    8700449    BASED ON SITEGRID 3414-SCS SINCE SIMILAR SOIL SERIES.
TAXAJUNCT TO THE TULLY SERIES BECAUSE OF DEPTH TO
LIME.
6943-SCS    8700449    BASED ON SITEGRID 3414-SCS SINCE SIMILAR SOIL SERIES.
1478-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
1916-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
2043-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
2731-SCS    8700450    SAMPLED BY NSSL; 2200 FT S AND 700 FT W OF NE CORNER
OF SECTION 20 T. 11 S. , R. 8 E. RILEY CO. KS
2731-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
4439-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
4439-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
4439-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
6912-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
6912-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
8639-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
8739-SCS    8700450    BASED ON SITEGRID 2731-SCS SINCE SIMILAR SOIL SERIES.
2123-SCS    8700451    SAMPLED BY NSSL. SITE INCLUDES SOME LABETTE SOILS.
400 FT N AND 400 FT W OF CENTER OF SECTION 18 T.
11 S., R. 8 E. RILEY CO. KS
4168-SCS    8700451    BASED ON SITEGRID 2123-SCS SINCE SIMILAR SOIL SERIES.
4268-SCS    8700451    BASED ON SITEGRID 2123-SCS SINCE SIMILAR SOIL SERIES.
4268-SCS    8700451    BASED ON SITEGRID 2123-SCS SINCE SIMILAR SOIL SERIES.
1246-SCS    8700452    BASED ON SITEGRID 2139-SCS SINCE SIMILAR SOIL SERIES.
2139-SCS    8700452    SAMPLED BY NSSL. 2000 FT N AND 400 FT W OF THE SE
CORNER OF SECTION 17 T.11 S., R. 8 E. RILEY CO. KS.
2915-SCS    8700452    BASED ON SITEGRID 2123-SCS SINCE SIMILAR SOIL SERIES.
3479-SCS    8700452    BASED ON SITEGRID 2123-SCS SINCE SIMILAR SOIL SERIES.
6469-SCS    8700452    BASED ON SITEGRID 2123-SCS SINCE SIMILAR SOIL SERIES.
6735-SCS               ONLY TRUE ALLUVIAL SITE IN STUDY, NOT SAMPLED.
```

7. Data Description:

Spatial Characteristics:

The FIFE study area, with areal extent of 15 km by 15 km, is located south of the Tuttle Reservoir and Kansas River, and about 10 km from Manhattan, Kansas, USA. The northwest corner of the area has UTM coordinates of 4,334,000 Northing and 705,000 Easting in UTM Zone 14.

Spatial Coverage:

Below is a list of the FIFE sites for which soil survey data exists. The stations with the latitude and longitude information were the sites where detailed soil profile descriptions were made:

	SITEGRID	STN_ID	PEDON_ID	SOIL_SERIES	LATITUDE	LONGITUDE
0847-SCS	29	8700448	CLIME			
1445-SCS	42	8700448	CLIME			
1563-SCS	27	8700448	CLIME			
2132-SCS	6	8700448	CLIME			
2516-SCS	14	8700448	CLIME TAXAJUNCT	39 05 12 N	96 35 39 W	
3221-SCS	7	8700448	CLIME			
2428-SCS	3	8700449	TULLY			
2655-SCS	36	8700449	TULLY			
3129-SCS	8	8700449	TULLY			
3414-SCS	10	8700449	TULLY	39 04 16 N	96 35 49 W	
3921-SCS	9	8700449	TULLY			
4609-SCS	17	8700449	TULLY			
4609-SCS	22	8700449	TULLY			
5926-SCS	15	8700449	TULLY			
6340-SCS	20	8700449	TULLY TAXAJUNCT			
6943-SCS	28	8700449	TULLY			
1478-SCS	38	8700450	DWIGHT			
1916-SCS	2	8700450	DWIGHT			
2043-SCS	44	8700450	DWIGHT			
2731-SCS	1	8700450	DWIGHT	39 04 54 N	96 33 34 W	
2731-SCS	4	8700450	DWIGHT			
4439-SCS	11	8700450	DWIGHT			
4439-SCS	16	8700450	DWIGHT			
4439-SCS	18	8700450	DWIGHT			
6912-SCS	19	8700450	DWIGHT			
6912-SCS	24	8700450	DWIGHT			
8639-SCS	21	8700450	DWIGHT			
8739-SCS	26	8700450	DWIGHT			
2123-SCS	5	8700451	FLORENCE	39 05 47 N	96 34 39 W	
4168-SCS	25	8700451	FLORENCE			
4268-SCS	30	8700451	FLORENCE			
4268-SCS	32	8700451	FLORENCE			
1246-SCS	40	8700452	BENFIELD			
2139-SCS	31	8700452	BENFIELD	39 05 36 N	96 32 23 W	
2915-SCS	12	8700452	BENFIELD			
3479-SCS	34	8700452	BENFIELD			
6469-SCS	23	8700452	BENFIELD			
6735-SCS	13		HOBBS			

Spatial Coverage Map:

Not available.

Spatial Resolution:

These were point data. However, the soil profile information represents data from approximately 1 meter square area.

Projection:

Not available.

Grid Description:

Not available.

Temporal Characteristics:

Temporal Coverage:

These data were acquired during the summer of 1987.

Temporal Coverage Map:

Not available.

Temporal Resolution:

Soil profiles are generally stable for hundreds of years or more.

Data Characteristics:

The SQL definition for this table is found in the SOILSURV.TDF file located on FIFE CD-ROM Volume 1.

Parameter/Variable Name

Parameter/Variable Description	**Range**	**Units**	**Source**
PEDON_ID The identification number for the soil site as given by the Soil CONSERVATION Conservation Service.	min = 8700448, max = 8700453		SOIL SERVICE
SOIL_SERIES The name of the soil series at this site.	min = BENFIELD, max = TULLY		SOIL
CONSERVATION SERVICE			
SOIL_HORIZON_LAYER The soil horizon layer number, 1	min = 1,		SOIL

being the top layer. CONSERVATION SERVICE	max = 9		
SOIL_HORIZON_DESCR The soil horizon description. max = 4CR	min = A, CONSERVATION	*	SOIL
TOTAL_CLAY The percent of total clay (particles < 0.002 mm diameter) CONSERVATION in this horizon.	min = 16.9, max = 73.9	[percent]	SOIL SERVICE
TOTAL_SILT The percent of total silt (particles between 0.05 and 0.002 CONSERVATION mm diameter) in this horizon.	min = 16.9, max = 67.7	[percent	SOIL SERVICE
TOTAL_SAND The percent of total sand (particles between 2.0 and 0.05 CONSERVATION mm diameter) in this horizon.	min = 2.1, max = 38	[percent]	SOIL SERVICE
FINE_SILT The percent of fine silt in this horizon. CONSERVATION SERVICE	min = 10.5, max = 60.5	[percent]	SOIL
COARSE_SILT The percent of coarse silt in this horizon. CONSERVATION SERVICE	min = 3.3, max = 39.5	[percent]	SOIL
VERY_FINE_SAND The percent of very fine sand (particles between 0.1 and 0.05 CONSERVATION mm diameter) in this horizon.	min = 1.1, max = 8.7	[percent]	SOIL SERVICE
FINE_SAND The percent of fine sand (particles between 0.25 and 0.1 CONSERVATION	min = -2, max = 7.2,	[percent]	SOIL

mm diameter) in this horizon. -1 = trace amount	-2 = dash,		SERVICE

MEDIUM_SAND The percent of medium sand (particles between 0.5 and 0.25 CONSERVATION mm diameter) in this horizon. -1 = trace amount	min = -2, max = 7.2, -2 = dash,	[percent	SOIL SERVICE

COARSE_SAND The percent of coarse sand (particles between 1.0 and 0.5 CONSERVATION mm diameter) in this horizon. -1 = trace amount	min = -2, max = 8.2, -2 = dash,	[percent]	SOIL SERVICE

VERY_COARSE_SAND The percent of very coarse sand (particles between 2.0 and 1.0 CONSERVATION mm diameter) in this horizon. -1 = trace amount	min = -2, max = 8.7, -2 = dash,	[percent]	SOIL SERVICE

ORGANIC_CARBON The percent of organic carbon in this horizon. CONSERVATION SERVICE	min = .09, max = 5.8	[percent]	SOIL

ORGANIC_NITROGEN The percent of organic nitrogen in this horizon. CONSERVATION -3 = blank, -2 = dash, -1 = trace amount	min = -3, max = .38, SERVICE	[percent]	SOIL

EXTRACTABLE_FE The percent dithionite citrate extractable iron from this horizon. CONSERVATION SERVICE	min = .3, max = 2.4	[percent]	SOIL

EXTRACTABLE_AL The percent dithionite citrate extractable aluminum from this CONSERVATION horizon.	min = -1, max = .4, -1 = trace amount	[percent]	SOIL SERVICE

EXTRACTABLE_CA The NH4OAC (pH 7) extractable calcium from this horizon. CONSERVATION	min = 17.2, max = 63.3	[MEQ][100 grams^-1]	SOIL

EXTRACTABLE_MG The NH4OAC (pH 7) extractable magnesium from this horizon. CONSERVATION SERVICE	min = .5, max = 10.7	[MEQ][100 grams^-1]	SOIL

EXTRACTABLE_NA The NH4OAC (pH 7) extractable sodium from this horizon. CONSERVATION -1 = trace amount	min = -1, max = 6.5, SERVICE	[MEQ][100 grams^-1]	SOIL

EXTRACTABLE_K The NH4OAC (pH 7) extractable potassium from this horizon. CONSERVATION -1 = trace amount	min = -1, max = 1.7, SERVICE	[MEQ][100 grams^-1]	SOIL

SUM_EXTRACTABLE_BASES The sum of the NH4OAC (pH 7) extractable bases in this horizon. CONSERVATION SERVICE	min = 23.5, max = 64.6	[MEQ][100 grams^-1]	SOIL

EXTRACTABLE_ACIDITY The NH4OAC (pH 8.2) extractable acidity in this horizon. CONSERVATION -3 = blank, -2 = dash, -1 = trace amount	min = -3, max = 13.3, SERVICE	[MEQ][100 grams^-1]	SOIL

CATION_EXCHANGE_CAPACITY The NH4OAC (pH 7) cation exchange capacity in this horizon. CONSERVATION SERVICE	min = 9.3, max = 54	[MEQ][100 grams^-1]	SOIL

BASE_SATRTN The NH4OAC (pH 7) base saturation for this horizon. CONSERVATION SERVICE	min = 82.3, max = 440.9	[percent]	SOIL

CARBONATE_FRACTION
The carbonate > 2 mm fraction for this horizon.
CONSERVATION
-3 = blank,
-2 = dash,
-1 = trace amount
min = -3,
max = 69.4,
SERVICE
[MEQ] [liter^-1]
SOIL

SOIL_RESISTIVITY
The soil resistivity.
max = 570,
-3 = blank,
-2 = dash,
-1 = trace amount
min = -3,
CONSERVATION
SERVICE
[ohms]
SOIL

SOIL_WATER_SUSPENSION_PH
The pH for a 1:1 soil-water suspension.
CONSERVATION
SERVICE
min = 5.8,
max = 8.8
[Standard Units]
SOIL

SOIL_CACL2_SUSPENSION_PH
The pH for a 1:2 soil-CaCl2 suspension.
CONSERVATION
SERVICE
min = 5.4,
max = 7.9
[Standard Units]
SOIL

BICARB_SATRTN_EXTRCT
The bicarbonate saturation extract (H2O) for this horizon.
CONSERVATION
-3 = blank,
-2 = dash,
-1 = trace amount
min = -3,
max = 9,
SERVICE
[MEQ] [liter^-1]
SOIL

CHLORIDE_SATRTN_EXTRCT
The chloride saturation extract (H2O) for this horizon.
CONSERVATION
-3 = blank,
-2 = dash,
-1 = trace amount
min = -3,
max = 24.7,
SERVICE
[MEQ] [liter^-1]
SOIL

SULFATE_SATRTN_EXTRCT
The sulfate saturation extract (H2O) for this horizon.
CONSERVATION
-3 = blank,
-2 = dash,
-1 = trace amount
min = -3,
max = 17.1,
SERVICE
[MEQ] [liter^-1]
SOIL

CONDCTVTY_SATRTN_EXTRCT The electric conductivity saturation extract for this CONSERVATION horizon. -2 = dash, -1 = trace amount	min = -3, max = 4.35, -3 = blank,	[milliMhos] [cm^-1]	SOIL SERVICE
BULK_DENSITY The bulk density at 1/3 bar tension for this horizon. CONSERVATION -3 = blank, -2 = dash, -1 = trace amount	min = -3, max = 1.79, SERVICE	[grams] [cm^-3]	SOIL
COARSE_FRAGMENTS The percent of coarse fragments (particles > 2 mm diameter) for CONSERVATION this horizon. -2 = dash, -1 = trace amount	min = -3, max = 96, -3 = blank,	[percent]	SOIL SERVICE
DEPTH_TO_TOP The depth to the top of the soil horizon. CONSERVATION SERVICE	min = 0, max = 167	[cm]	SOIL
DEPTH_TO_BOTTOM The depth to the bottom of the soil horizon. CONSERVATION SERVICE	min = 10, max = 185	[cm]	SOIL
DRY_COLOR The dry soil color (hue, value and chroma) using the Munsell CONSERVATION notation.	$ min = 10YR 31, max = 7.5YR54		SOIL SERVICE
MOIST_COLOR The moist soil color (hue, value and chroma) using the Munsell CONSERVATION notation.	** min = 10YR 21, max = 7.5YR44		SOIL SERVICE

SOIL_TEXTURE_CLASS An abbreviation for the soil texture class. Soil texture is based on the relative proportions of clay, silt, and sand.	# min = CL, max = WB	SOIL CONSERVATION SERVICE
SOIL_STRUCTURE_CLASS An abbreviation for the soil structure class. Soil structure is a description of how soil particles aggregate.	& min = 0 MA, max = 3M GR	SOIL CONSERVATION SERVICE
DRY_SOIL_CONSISTENCE An abbreviation for the dry soil consistence. Consistence refers to the degree and kind of adhesion of soil particles.	$$ min = 000, max = VH	SOIL CONSERVATION SERVICE
MOIST_SOIL_CONSISTENCE An abbreviation for the soil consistence when moist. Consistence refers to the degree and kind of adhesion of soil particles.	## min = EFI, max = VFI	SOIL CONSERVATION SERVICE
SOIL_MOTTLE A description of variations (abundance and contrast) in the soil coloring. Mottling in soils is described by the colors and patterns of the soil.	! min = C 1 D10YR 56, max = C 2 D7.5Y R46	SOIL CONSERVATION SERVICE
SOIL_SURFACE_FEATURES The gross characteristics of the soil surface (stoniness, erosion, etc.). 34	&& min = ACCD27.5Y R32, max = TMDFR5YR	SOIL CONSERVATION SERVICE
LOWER_BNDRY_DISTINCTNESS A description of the distinctness of the lower horizon boundary.	+ min = AS, max = GW	SOIL CONSERVATION SERVICE

EFFERVESCENCE_CLASS
The strength of the effervescence reaction to an acid; 1 = slight, 2 = strong, 3 = violent.
CONSERVATION
SERVICE
min = 1, max = 3
SOIL

EFFERVESCENCE_AGENT
The agent used to test effervescence.
CONSERVATION
SERVICE
min = I, max = I
SOIL

DEGREE_OF_EFFERVESCENCE
The degree of effervescence displayed by the soil.
CONSERVATION
SERVICE
min = C, max = D
SOIL

ROOT_DISTRIBUTION ++
A description of the distribution of roots in the horizon.
CONSERVATION
SERVICE
min = C 1 C, max = M 1 T
SOIL

CONCRETIONS *+
A description of the amount and type of concretions.
CONSERVATION
SERVICE
min = A2C Z2, max = M3F Z1
SOIL

ROCK_FRAGMENTS #$
A description of the amount and type of rock fragments.
CONSERVATION
SERVICE
min = C011, max = Y071
SOIL

WATER_EXTRCTD_1_THIRD_BAR
The amount of water extracted from the soil at 1/3 bar.
CONSERVATION
-3 = blank,
-2 = dash,
-1 = trace amount
SERVICE
min = -3, max = 46.4,
[percent]
SOIL

WATER_EXTRCTD_15_BAR
The amount of water extracted from the soil at 15 bar.
CONSERVATION
SERVICE
min = 7.2, max = 30.7
[percent]
SOIL

Footnotes:

Decode the SOIL_HORIZON_LAYER field as follows:

Symbol	Description
A	Mineral, mixed with humus, dark colored.
A1	Mineral, accumulation of humidified organic matter.
A2	Maximum eluviation of clay, E horizon in new nomenclature.
AB	Transition to B, more like A than B.
AP	Plowed of disturbed A.
BA	Transition to A, more like B than A.
BC	Transition to C, more like B than C.
BT1	Maximum accumulation of clay, first part.
BT2	Maximum accumulation of clay, second part.
BT3	Maximum accumulation of clay, third part.
BW1	Color or structural B, first part.
BW2	Color or structural B, second part.
BW3	Color or structural B, third part.
BW4	Color or structural B, fourth part.
BW5	Color or structural B, fifth part.
C1	Least weathering or accumulation, first part.
CR	Transition to bedrock (R), more like C than R.
2BC	Second parent material, Transition to C, more like B than C.
2BT2	Second parent material, maximum accumulation of clay, second part.
2BT4	Second parent material, maximum accumulation of clay, fourth part.
2BT5	Second parent material, maximum accumulation of clay, fifth part.
2BT6	Second parent material, maximum accumulation of clay, sixth part.
2C	Second parent material, least weathering or accumulation.
2C1	Second parent material, least weathering or accumulation, first part
2C2	Second parent material, least weathering or accumulation, 2nd part.
2CR	Second parent material, transition to bedrock, more like C than R.
3BT7	Third parent material, maximum accumulation of clay, seventh part.
4CR	Fourth parent material, transition to bedrock, more like C than R.

$ Decode the DRY_COLOR field as follows:

Symbol	Description
10YR 31	Very dark gray
10YR 41	Dark gray
10YR 42	Dark grayish brown
10YR 43	Brown
10YR 53	Brown

10YR 54	Yellowish brown
10YR 64	Light yellowish brown
2.5Y 64	Light yellowish brown
2.5Y 74	Pale yellow
5YR 43	Reddish brown
7.5YR42	Brown
7.5YR44	Brown
7.5YR54	Brown

** Decode the MOIST_COLOR field as follows:

Symbol	Description
10YR 21	Black
10YR 31	Very dark gray
10YR 32	Very dark grayish brown
10YR 33	Dark brown
10YR 43	Brown
10YR 44	Dark yellowish brown
10YR 54	Yellowish
2.5Y 54	Light olive brown
2.5Y 64	Light yellowish brown
2.5Y 74	Pale yellow
5Y 51	Gray
5YR 33	Dark reddish brown
5YR 46	Yellowish red
7.5YR32	Dark brown
7.5YR34	Dark brown
7.5YR44	Dark brown to brown

Decode the SOIL_TEXTURE_CLASS field as follows:

Symbol	Description
CL	Clay loam
SIC	Silty clay
SICL	Silty clay loam
SIL	Silty loam
WB	Weathered bedrock

& Decode the SOIL_STRUCTURE_CLASS field as follows:

Symbol	Description
0 MA	Structureless, massive
1F SBK	Weak, fine, subangular blocky
1M PR	Weak, medium, prismatic
1M SBK	Weak, medium, subangular blocky
2F GR	Moderate, fine, granular
2F SBK	Moderate, fine, subangular blocky
2M COL	Moderate, medium, columnar
2M GR	Moderate, medium, granular
2M PR	Moderate, medium, prismatic
2M SBK	Moderate, medium, subangular blocky
3M GR	Strong, medium, granular

$$ Decode the DRY_SOIL_CONSISTENCE field as follows:

Symbol	Description
000	Not described (soil in moist or wet state)
H	Hard
SH	Slightly hard
VH	Very hard

Decode the MOIST_SOIL_CONSIST field as follows:

Symbol	Description
EFI	Extremely firm
FI	Firm
FR	Friable
VFI	Very firm

! Decode the SOIL_MOTTLE field using the method given below:

This field is a 10 to 12 digit field which encodes the abundance, size, contrast and color of the soil sample. The form of the code is as follows:

AbSbCKKKKKKK

where
A = Abundance and is either:
F = Few (5 to 25%)
C = Common (25 to 50%)
M = Many (greater than 50%)

b = a blank space in the field

S = Size and is either:
1 = Fine (major axis is less than 5 mm)
2 = Medium (major axis is between 5 and 15 mm)
3 = Coarse (major axis is greater than 15 mm)

C = Contrast and is either:
F = Faint (recognizable only on close examination)
D = Distinct (readily seen)
P = Prominent (obvious and an outstanding feature of horizon)

KKKKKKK = Color of the horizon - described by its Hue, Value and Chroma. Where the first five digits are the code for the Hue, the sixth digit is the code for the Value and the seventh digit is the code for the Chroma.

Hue = dominant spectral (rainbow) color
10 R
2.5 YR
5 YR
7.5 YR
10 YR
2.5 Y
5 Y
where
R = Red
YR = yellow-red/orange
Y = yellow
0 - 10 where each number is more yellow and less red than the next higher number.

Value = relative lightness of the color
0 - 10
where
0 = absolute black
10 = absolute white

Chroma (saturation) = relative purity or strength of the spectral color
0 - 20
where
0 = neutral grays and increasing equal intervals

&& Decode the SOIL_SURF_FEATURES field as follows:

Symbol	Description
ACCDZ7.5YR32	Skeltans over cutans, common, continuous, distinct, on vertical and horizontal faces, dark brown
AMCFZ10YR 31	Skeltans over cutans, many, continuous, faint, on vertical and horizontal faces, very dark gray
MCDDZ10YR 21	Mn or Fe-Mn stains, common, discontinuous, distinct, on vertical and horizontal faces, black
OFPFV10YR 21	Organic coats, few, patchy, faint, on vertical faces of peds, black
QM FT10YR 43	Non-intersecting slickensides, many, faint, throughout, brown
QM FT10YR 44	Non-intersecting slickensides, many, faint, throughout, dark yellowish brown
TCDDZ10YR 44	Clay films, common, discontinuous, distinct, on vertical and horizontal faces, dark yellowish brown
TCDFZ10YR 32	Clay films, common, discontinuous, faint, on vertical and horizontal faces, very dark grayish brown
TCDFZ7.5YR34	Clay films, common, discontinuous, faint, on vertical and horizontal faces, dark brown
TCPDZ7.5YR32	Clay films, common, patchy, distinct, on vertical and horizontal faces, dark brown
TFPFZ10YR 22	Clay films, few, patchy, faint, on vertical and horizontal faces, very dark brown

```
TMCDZ5YR  33     Clay films, many, continuous, distinct, on vertical
and horizontal faces, dark reddish brown
TMCDZ7.5YR32     Clay films, many, continuous, distinct, on vertical
and horizontal faces, dark brown
TMCDZ7.5YR44     Clay films, many, continuous, distinct, on vertical
and horizontal faces, brown
TMCFP5YR  33     Clay films, many, continuous, faint, on faces of peds,
dark reddish brown
TMCFR5YR  34     Clay films, many, continuous, faint, on rock fragments,
dark reddish brown
TMCFZ5YR  44     Clay films, many, continuous, faint, on vertical
and horizontal faces, reddish brown
TMDFR5YR  34     Clay films, many, discontinuous, faint, on rock fragments,
dark reddish brown
```

Decode the LOWER_BNDRY_DISTINCTNESS field as follows:

Symbol	Description
AS	Abrupt, smooth
AW	Abrupt, wavy
CS	Clear, smooth
CW	Clear, wavy
GS	Gradual, smooth
GW	Gradual, wavy

++ Decode the ROOTS_DISTRIBUTION field as follows:

Symbol	Description
C 1 C	Common, fine, cracks
C 1 P	Common, fine, between peds
C 1 T	Common, fine, throughout
F 1 C	Few, fine, cracks
F 1 P	Few, fine, between peds
F 1 T	Few, fine, throughout
F V1T	Few, very fine, throughout
M 1 P	Many, fine, between peds
M 1 T	Many, fine, throughout

*+ Decode the CONCRETIONS field as follows:

Symbol	Description
A2C Z2	Clay bodies, common, irregular, medium
C2M Z2	Soft masses, many, irregular, medium
F3C O1	Iron concretions, common, rounded, fine
K2C 2	Soft masses of carbonate, common, medium
K2C 3	Soft masses of carbonate, common, coarse
K2M 3	Soft masses of carbonate, many, coarse
K3F O1	Carbonate concretions, many, rounded, fine
K4C Z2	Carbonate nodules, common, irregular, medium
K4F Z2	Carbonate nodules, few, irregular, medium
M3C O1	Iron and Manganese concretions, common, rounded, fine

```
M3C Z1                  Iron and Manganese concretions, common, irregular,
fine
M3F O1                  Iron and Manganese concretions, few, rounded, fine
M3F Z1                  Iron and Manganese concretions, few, irregular,
fine
```

#$ Decode the ROCK_FRAGMENTS field as follows:

Symbol	Description
C011	Conglomerate, 1% of soil volume, gravel
H051	Shale, 5% of soil volume, gravel
H201	Shale, 20% of soil volume, gravel
H301	Shale, 30% of soil volume, gravel
H501	Shale, 50% of soil volume, gravel
H751	Shale, 75% of soil volume, gravel
S021	Sedimentary, 2% of soil volume, gravel
S041	Sedimentary, 4% of soil volume, gravel
S051	Sedimentary, 5% of soil volume, gravel
S101	Sedimentary, 10% of soil volume, gravel
S151	Sedimentary, 15% of soil volume, gravel
S351	Sedimentary, 35% of soil volume, gravel
S401	Sedimentary, 40% of soil volume, gravel
S501	Sedimentary, 50% of soil volume, gravel
S601	Sedimentary, 60% of soil volume, gravel
S902	Sedimentary, 90% of soil volume, cobbles
Y011	Mixed lithology, 1% of soil volume, gravel
Y021	Mixed lithology, 2% of soil volume, gravel
Y041	Mixed lithology, 4% of soil volume, gravel
Y071	Mixed lithology, 7% of soil volume, gravel

Sample Data Record:

PEDON_ID	SOIL_SERIES	SOIL_HORIZON_LAYER	SOIL_HORIZON_DESCR	TOTAL_CLAY
8700448	CLIME	1	A1	46.70
8700448	CLIME	2	A2	59.40
8700448	CLIME	3	BT1	65.90
8700448	CLIME	4	2BT2	33.40

TOTAL_SILT	TOTAL_SAND	FINE_SILT	COARSE_SILT	VERY_FINE_SAND	FINE_SAND
45.90	7.40	21.40	24.50	4.90	.70
32.70	7.90	19.30	13.40	2.70	.70
30.80	3.30	22.40	8.40	1.20	.60
59.30	7.30	50.30	9.00	2.50	2.20

MEDIUM_SAND	COARSE_SAND	VERY_COARSE_SAND	ORGANIC_CARBON	ORGANIC_NITROGEN
.50	.60	.70	4.820	.380
.70	1.00	2.80	2.500	.270
.30	.50	.70	1.520	.180
1.20	.70	.70	.730	.080

EXTRACTABLE_FE	EXTRACTABLE_AL	EXTRACTABLE_CA	EXTRACTABLE_MG	EXTRACTABLE_NA
1.30	.20	32.60	4.00	-1.00
1.60	.20	34.30	4.00	.10
1.90	.30	45.70	2.60	.10
.80	.10	63.30	1.00	-1.00

EXTRACTABLE_K	SUM_EXTRACTABLE_BASES	EXTRACTABLE_ACIDITY
1.30	37.90	10.60
.80	39.20	10.90
.70	49.10	8.40
.20	64.60	-3.00

CATION_EXCHANGE_CAPACITY	BASE_SATRTN	CARBONATE_FRACTION	SOIL_RESISTIVITY
41.80	90.70	-3.00	-3
45.00	87.10	-3.00	-3
48.40	101.40	-3.00	-3
28.60	225.90	22.50	-3

SOIL_WATER_SUSPENSION_PH	SOIL_CACL2_SUSPENSION_PH	BICARB_SATRTN_EXTRCT
6.20	5.80	5.90
6.10	5.50	-3.00
7.00	6.30	-3.00
8.30	7.70	-3.00

CHLORIDE_SATRTN_EXTRCT	SULFATE_SATRTN_EXTRCT	CONDCTVTY_SATRTN_EXTRCT
.20	.80	.710
-3.00	-3.00	-3.000
-3.00	-3.00	-3.000
-3.00	-3.00	-3.000

BULK_DENSITY	COARSE_FRAGMENTS	DEPTH_TO_TOP	DEPTH_TO_BOTTOM	DRY_COLOR
.980	18	15	10YR 31	
1.130	70	15	41	10YR 42
1.210	37	41	62	7.5YR 54
1.430	9	62	78	10YR 64

MOIST_COLOR	SOIL_TEXTURE_CLASS	SOIL_STRUCTURE_CLASS	DRY_SOIL_CONSISTENCE
10YR 21	SICL	3M GR	000
10YR 32	SICL	2M GR	000
7.5YR44	SIC	2F SBK	000
10YR 54	SICL	2F SBK	000

MOIST_SOIL_CONSISTENCE	SOIL_MOTTLE	SOIL_SURFACE_FEATURES
FI		
FI		
FI	TMCDZ7.5YR32	
FI	TCPDZ7.5YR32	

LOWER_BNDRY_DISTINCTNESS	EFFERVESCENCE_CLASS	EFFERVESCENCE_AGENT
CW		
CW		
GW		
GW	2	I

DEGREE_OF_EFFERVESCENCE	ROOT_DISTRIBUTION	CONCRETIONS	ROCK_FRAGMENTS
M 1 T	S151		
M 1 T	S601		
C 1 P	S501		
C	F 1 P	K2C 2	H051

WATER_EXTRCTD_1_THIRD_BAR	WATER_EXTRCTD_15_BAR
35.40	23.70
37.80	26.80
35.90	27.80
25.20	15.40

8. Data Organization:

Data Granularity:

These were point data. However, the soil profile information represents data from approximately 1 meter square area.

A general description of data granularity as it applies to the IMS appears in the EOSDIS Glossary.

Data Format:

The CD-ROM file format consists of numerical and character fields of varying length separated by commas. The character fields are enclosed with a single apostrophe. There are no spaces between the fields. Each file begins with five header records. Header records contain the following information: Record 1 Name of this file, its table name, number of records in this file, path and name of the document that describes the data in this file, and name of principal investigator for these data. Record 2 Path and filename of the previous data set, and path and filename of the next data set. (Path and filenames for files that contain another set of data taken at the same site on the same day.) Record 3 Path and filename of the previous site, and path and filename of the next site. (Path and filenames for files of the same data set taken on the same day for the previous and next sites (sequentially numbered by SITEGRID_ID)). Record 4 Path and filename of the previous date, and path and filename of the next date. (Path and filenames for files of the same data set taken at the same site for the previous and next date.) Record 5 Column names for the data within the file, delimited by commas. Record 6 Data records begin.

Each field represents one of the attributes listed in the chart in the *Data Characteristics Section* and described in detail in the TDF file. These fields are in the same order as in the chart.

9. Data Manipulations:

Formulae:

Derivation Techniques and Algorithms:

Not available at this revision.

Data Processing Sequence:

Processing Steps:

Not available at this revision.

Processing Changes:

Not available at this revision.

Calculations:

Special Corrections/Adjustments:

Not available at this revision.

Calculated Variables:

Not available at this revision.

Graphs and Plots:

None.

10. Errors:

Sources of Error:

There are several sources of error in a soil survey, these include the subjective descriptions used for several of the variables, and the errors inherent in the soil chemistry measurements.

Quality Assessment:

Data Validation by Source:

No information on data validation was provided by the USDA-SCS.

Confidence Level/Accuracy Judgment:

No information on this was provided by the USDA-SCS.

Measurement Error for Parameters:

No quantitative assessment was made, see the *Confidence Level/Accuracy Judgment Section*.

Other errors mentioned in the *Sources of Error Section* above were not quantified.

Additional Quality Assessments:

Not available at this revision.

Data Verification by Data Center:

The data verification performed by the ORNL DAAC deals with the quality of the data format, media, and readability. The ORNL DAAC does not make an assessment of the quality of the data itself except during the course of performing other QA procedures as described below.

The FIFE data were transferred to the ORNL DAAC via CD-ROM. These CD-ROMs are distributed by the ORNL DAAC unmodified as a set or in individual volumes, as requested. In addition, the DAAC has incorporated each of the 98 FIFE tabular datasets from the CD-ROMs into its online data holdings. Incorporation of these data involved the following steps:

- Copying the entire FIFE Volume 1, maintaining the directory structure on the CD-ROM;
- Using data files, documentation, and SQL code provided on the CD-ROM to create a database in Statistical Analysis System (SAS); and
- Creating transfer files to transfer the SAS metadata database to Sybase tables.

Each distinct type of data (i.e. "data set" on the CD-ROM), is accompanied by a documentation file (i.e., .doc file) and a data format/structure definition file (i.e., .tdf file). The data format files on the CD-ROM are Oracle SQL commands (e.g., "create table") that can be used to set up a relational database table structure. This file provides column/variable names, character/numeric type, length, and format, and labels/comments. These SQL commands were converted to SAS code and were used to create SAS data sets and subsequently to input data files directly from the CD-ROM into a SAS dataset. During this process, file names and directory paths were captured and metadata was extracted to the extent possible electronically. No files were found to be corrupted or unreadable during the conversion process.

Additional Quality Assurance procedures were performed as follows:

- Statistical operations were performed to calculate minimum and maximum values for all numeric fields and to create a listing of all values of the character fields. During this process, it was determined that various conventions were used to represent missing values. (Note: no modifications were made to any data by the DAAC). In most cases, missing value identification conventions were discussed in the accompanying .doc file. Based on a visual check of the minimum and maximum values, no glaring errors or holes were identified that might indicate errors introduced during CD-ROM mastering by the FIFE project or data ingest by the DAAC.
- Some minor inconsistencies and typographical errors were identified in some of the character fields and column labels, however, no modifications were made to the data by the DAAC.
- Some conversions of ASCII data were necessary to move the data from a DOS platform to a UNIX platform. Standard operating system conversion utilities were used (e.g., dos2unix).
- Much of the metadata required for archival is imbedded in the narrative documentation accompanying the data sets and extracted manually by DAAC staff who have read the .doc files provided on the CD-ROM and have hand entered this information into the metadata database maintained by the DAAC. QA procedures have been performed on these metadata to identify and eliminate typographical errors and inconsistencies in

naming conventions, to ensure that all required metadata is present, and to ensure the accuracy of file names and paths for retrieval.
- Data requested for distribution to users are checked to verify that files copied from disk to other media remain uncorrupted.

As errors are discovered in the online tabular data by investigators, users, or DAAC staff, corrections are made in cooperation with the principal investigators. These corrections are then distributed to users. CD-ROM data are corrected when re-mastering occurs for replenishment of CD-ROM stock.

11. Notes:

Limitations of the Data:

Not available.

Known Problems with the Data:

None.

Usage Guidance:

The pedons described in this data set are not the typical pedon in the mapping unit (soil series) represented in the USDA-SCS soil map of the area. Therefore, caution should be exercised in using specific information from one site to interpret data from another site with the same soil series, bearing in mind the heterogeneity that is possible in a soilscape.

Any Other Relevant Information about the Study:

At the request of a non-FIFE investigator the USDA - Soil Conservation Service made a detailed description of the following soils within the FIFE study area in 1990.

Note: Only 3 of the 5 soil series found within the FIFE area were sampled by this investigator. Second, these are the actual field measurements and observations. They may not agree with the conceptual soil unit relationships.

Pedon Narrative Description

Soils Series: Clime
Soil Survey #S90-KS-l6l-536
Survey Area ID: 600
Map Unit Symbol: BF
Photo Number: 36
Description Type: full pedon description
Pedon Type: Map unit inclusion

Correlated Name: Benfield - Florence Complex
Location: FIFE 9l0 (3317-SCS) l600 ft E and l00 ft
N of the SW corner Section l9 TllS, R8E
Latitude: 39-04-24-N
Longitude: 096-35-l5-W
Classification: fine, mixed, mesic Entic Haplustoll
Physiography: Hillside in Hills
Geomorphic Position: on upper third, back slope of a side slope
Slope Characteristics: 35% west facing plane horizontal, convex vertical
Elevation: 420 m MSL
Precipitation: ustic moisture regime
MLRA: 76
Hydraulic Conductivity: moderately low
Drainage Class: somewhat excessively drained
Particle Size Control Section: 25 to 9l cm
Runoff: rapid
Parent Material: local colluvium from limestone-shale material over residuum from limestone-shale material
Diagnostic Horizons: 0 to 60 cm mollic, 30 to 9l cm cambic, 9l to l0l cm paralithic contact
Described By: William Wehmueller
Date: 0l/90

Notes: FIFE Station 9l0 (3317-SCS) on Konza Prairie

- A--0 to 30 cm; very dark gray (l0YR 3/l) coarse gravely silty clay loam; black (l0YR 2/l) moist; moderate medium granular structure; hard, friable; many fine roots throughout; slightly effervescent (HCl, limestone-cherty; clear smooth boundary.
- Bwl--30 to 60 cm; dark grayish brown (l0YR 4/2) cobbly silty clay loam; very dark grayish brown (l0YR 3/2) moist; moderate medium subangular blocky structure; hard, friable; many fine roots throughout; strongly effervescent (HCl, unspecified) continuous; l5% cobbles limestone; l0% pebbles limestone-cherty; clear smooth boundary.
- 2Bw2--60 to 9l cm; grayish brown (2.5Y 5/2) silty clay loam; dark grayish brown (2.5Y 4.2) moist; weak fine and medium subangular blocky structure; hard, firm; strongly effervescent (HCl, unspecified) continuous; 5% pebbles limestone-cherty.
- 2C4--9l to l0l cm; calcareous, olive shale.

Soils Series: Tully
Soil Survey # S90-KS-l6l-537
Survey Area ID: 600
Map Unit Symbol: BF
Photo Number: 36
Description Type: full pedon description
Pedon Type: Map unit inclusion
Correlated Name: Benfield - Florence Complex
Location: Fife 908 700 ft W and 600 ft N of the SE corner Section l8 Tlls, R8E
Latitude: 39-05-l6-N

Longitude: 096-33-28-W
Classification: fine, mixed, mesic Pachic Argiustoll
Physiology: Hillside in Hills
Geomorphic Position: on upper third, foot slope of a side slope
Slope Characteristics: l7% east facing concave horizontal, plane vertical
Elevation: 4l4 m MSL
Precipitation: ustic moisture regime
MLRA: 76
Hydraulic Conductivity: low
Drainage Class: well drained
Land Use: rangeland not grazed
Particle Size Control Section: 27 to 76 cm
Parent Material: local colluvium from limestone-shale material
Diagnostic Horizons: 0 to 55 cm mollic, 27 to ll9 cm argillic
Described By: William Wehmueller
Date: 0l/90

Notes: FIFE 908 (2330-SCS) on Konza Prairie

- Al--0 to 20 cm; very dark gray (l0YR 3/l) silty clay loam; black (l0YR 2/l) moist; moderate medium granular structure; slightly hard, friable; many fine roots throughout; clear smooth boundary.
- A2--20 to 27 cm; very dark grayish brown (l0YR 3/2) silty clay loam; very dark brown (l0YR 2/2) moist; moderate medium subangular blocky structure; hard, friable; many fine roots throughout; 5% pebbles limestone-cherty; clear smooth boundary.
- Btl--27 to 40 cm; dark grayish brown (l0YR 4/2) gravely silty clay; very dark grayish brown (l0YR 3/2) moist; moderate fine and medium subangular blocky structure; very hard, very firm; common fine roots throughout; common distinct very dark grayish brown (l0YR 3/2) continuous clay films (cutans) on vertical and horizontal faces of peds; l5% pebbles limestone-cherty; clear smooth boundary.
- Blt2--40 to 55 cm; brown to dark brown (7.5YR 4/4) silty clay; 50% dark brown (l0YR 3/3), and 50% dark brown 7.5YR ¾) moist; common fine faint brown to dark brown (7.5YR 4/4) mottles; moderate fine and medium subangular blocky structure; very hard, very firm; common fine roots throughout; common distinct dark brown (7.5YR 3/2) continuous clay films (cutans) on vertical and horizontal faces of peds; 20% pebbles limestone-cherty; clear smooth boundary.
- Bt3--55 to ll9 cm; brown (7.5YR 5/4) silty clay loam; brown to dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, very firm; common fine roots throughout; few distinct patchy clay films (cutans) on faces of peds; l2% pebbles limestone-cherty.

Soils Series: Benfield
Soil Survey # S90-KS-l6l-535
Survey Area ID: 600
Map Unit Symbol: BF
Photo Number: 36

Description Type: full pedon description
Pedon Type: within range of map unit
Correlated Name: Benfield - Florence Complex
Location: FIFE 9l2 (3129-SCS) l300 ft W and 400 ft N of
the SE corner Section l9 TllS, R8E
Latitude: 39-04-28-N
Longitude: 096-33-32-W
Classification: fine, mixed, mesic Pachic Argiustoll
Physiography: Hillside in Hills
Geomorphic Position: on lower third, back slope of a side slope
Slope Characteristics: 25% northeast facing convex horizontal, convex vertical
Elevation: 4l4 m MSL
Precipitation: ustic moisture regime
MLRA: 76
Hydraulic Conductivity: low
Drainage Class: somewhat excessively drained
Land Use: rangeland not grazed
Particle Size Control Section: 30 to 76 cm
Runoff: rapid
Parent Material: local colluvium from limestone-shale material over residuum from shale-calcareous material
Diagnostic Horizons: 0 to 60 cm mollic, 30 to 9l cm argillic, lll to l2l cm paralithic contact
Described By: William Wehmueller
Date: 0l/90

Notes: FIFE 9l2 (3129-SCS) on Konza Prairie

- Al--0 to 20 cm; very dark gray (l0YR 3/l) silty clay loam; black (l0YR 2/l) moist; moderate medium granular structure; slightly hard, friable; many fine roots throughout; clear smooth boundary.
- Al--20 to 30 cm; very dark grayish brown (l0YR 3/2) gravely silty clay loam; very dark brown (l0YR 2/2) moist; moderate fine subangular blocky structure; firm; many fine roots throughout; l5% pebbles limestone-cherty; clear smooth boundary.
- Btl--30 to 48 cm; dark grayish brown (l0YR 4/2) coarse gravely silty clay; very dark grayish brown (l0YR 3/2) moist; moderate medium subangular blocky structure; very hard, very firm; many fine roots throughout; common distinct very dark grayish brown (l0YR 3/2) continuous clay films (cutans) on vertical and horizontal faces of peds; 25% pebbles limestone-cherty; clear smooth boundary.
- 2Bt2--48 to 60 cm; brown to dark brown (l0YR 4/3) silty clay; dark brown (l0YR 3/3), and very dark grayish brown (l0YR 3/2) moist; moderate medium subangular blocky structure; common fine roots throughout; common distinct very dark grayish brown (l0YR 3/2) continuous clay films (cutans) on vertical and horizontal faces of peds; 2% pebbles limestone-cherty; gradual smooth boundary.
- 2Bt2--60 to 76 cm; 80% grayish brown (2.5Y 5/2), and 20% brown to dark brown (l0YR 4/3) silty clay; 80% dark grayish brown (2.5Y 4/2), and 20% dark grayish brown (l0YR 4/2) moist; moderate medium subangular blocky structure; very hard, very firm;

common fine roots throughout; few faint discontinuous clay films (cutans) on vertical faces of peds; common fine and medium rounded soft masses of carbonate; strongly effervescent; l% pebbles limestone-cherty; gradual smooth boundary.

- 2Bt4--76 to 9l cm; silty clay loam; olive brown (2.5Y 4/4), and moist; weak fine and medium subangular blocky structure; hard, firm; few fine roots throughout; few faint patchy clay films (cutans) on vertical faces of peds; common fine and medium rounded soft masses of carbonate; violently effervescent; 3% pebbles shale; gradual smooth boundary.
- 2BC--9l to lll cm; olive (5Y 5/4) silty clay loam; olive (5Y 5/3) moist; weak fine and medium subangular blocky structure; hard, firm; violently effervescent; l0% pebbles shale; gradual smooth boundary.
- 2Cr-lll to l2l cm; calcareous olive shale.

12. Application of the Data Set:

Not available.

13. Future Modifications and Plans:

The FIFE field campaigns were held in 1987 and 1989 and there are no plans for new data collection. Field work continues near the FIFE site at the Long-Term Ecological Research (LTER) Network Konza research site (i.e., LTER continues to monitor the site). The FIFE investigators are continuing to analyze and model the data from the field campaigns to produce new data products.

14. Software:

Software to access the data set is available on the all volumes of the FIFE CD-ROM set. For a detailed description of the available software see the *Software Description Document*.

15. Data Access:

Contact Information:

ORNL DAAC User Services
Oak Ridge National Laboratory

Telephone: (865) 241-3952
FAX: (865) 574-4665

Email: ornldaac@ornl.gov

Data Center Identification:

ORNL Distributed Active Archive Center
Oak Ridge National Laboratory
USA

Telephone: (865) 241-3952
FAX: (865) 574-4665

Email: ornldaac@ornl.gov

Procedures for Obtaining Data:

Users may place requests by telephone, electronic mail, or FAX. Data is also available via the World Wide Web at http://daac.ornl.gov.

Data Center Status/Plans:

FIFE data are available from the ORNL DAAC. Please contact the ORNL DAAC User Services Office for the most current information about these data.

16. Output Products and Availability:

Soil Properties Reference Information data are available on FIFE CD-ROM Volume 1. The CD-ROM filename is as follows:

\DATA\SOILPROP\SOILSURV\1987MULT.SSV

17. References:

Satellite/Instrument/Data Processing Documentation.

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Obukhov, A.I., and D.S. Orlov. 1964. Spectral reflectivity of major soil groups and the possibility of using diffuse reflection in soil investigation. Sov. Soil Sci. 2:174-184.

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Stoner, E.R., and M.F. Baumgardner. 1981. Characteristic variations in reflectance from surface soils. Soil Sci. Soc. Am. J. 45:1161-1165.

Archive/DBMS Usage Documentation.

Contact the EOS Distributed Active Archive Center (DAAC) at Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee (see the *Data Center Identification Section*). Documentation about using the archive and/or online access to the data at the ORNL DAAC is not available at this revision.

18. Glossary of Terms:

A general glossary for the DAAC is located at Glossary.

19. List of Acronyms:

CD-ROM Compact Disk-Read Only Memory DAAC Distributed Active Archive Center EOSDIS Earth Observing System Data and Information System FIFE First ISLSCP Field Experiment FIS FIFE Information System ISLSCP International Satellite Land Surface Climatology Project MSL Mean Sea Level ORNL Oak Ridge National Laboratory SCS Soil Conservation Service URL Uniform Resource Locator USDA United States Department of Agriculture UTM Universal Transverse Mercator

A general list of acronyms for the DAAC is available at Acronyms.

20. Document Information:

April 26, 1994 (citation revised on October 15, 2002).

This document has been reviewed by the FIFE Information Scientist to eliminate technical and editorial inaccuracies. Previous versions of this document have been reviewed by the Principal

Investigator, the person who transmitted the data to FIS, a FIS staff member, or a FIFE scientist generally familiar with the data. It is believed that the document accurately describes the data as collected and as archived on the FIFE CD-ROM series.

Document Review Date:

June 28, 1996.

Document ID:

ORNL-FIFE_SOILSURV.

Citation:

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Document Curator:

DAAC Staff

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