

ACT PRESENTATION 8

*SOIL PROFILE
DOCUMENTATION*

OCTOBER 2011



**REQUIREMENTS
FOR COMPLETING
SOIL PROFILES**

**Anyone performing soil profiles
must follow the same procedures**

**CHD's have additional duties when
the work is performed by non-
departmental personnel**

CHD Review Duties

- Must check all applications for correctness/completeness.
- Where incorrect or incomplete, correction is required.
- Must notify applicant/agent in writing regarding all deficiencies.
- Application is incomplete until all corrections made.

Non-CHD Evaluators

- Non-departmental evaluators must, at a minimum, comply with all 64E-6 standards (including use of minimum standards).
- However they can choose to mandate more than the minimum rule requirements (e.g. more drainfield, a specific drainfield type, larger tanks, etc.).

Each soil profile:

- Must be performed correctly
- Must use USDA NRCS methodology
- Must be documented correctly
- Stands on its own (see next slide)
- Establishes *facts* (something determined by evidence) i.e. soil colors, textures, SHWT indicators, etc.

Stands on it's own????

- **This means that each profile must be able to allow the system to be installed according to regulations when using the profile by itself.**
- **Why? The system is being installed where the profiles are performed.**
- **Most restrictive conditions must be used.**

Point of Refusal

- Point of refusal (or termination, etc.) indicates that the soil profile could not be advanced to the required 72" depth.
- Once 72" is reached, point of refusal is not normally used (due to the 72" minimum depth).
- Point of refusal must be clearly documented as to reason for the "refusal."

Examples of Refusal

- Hole collapses due to excessive water, ironstone, excessive roots, excessive debris, etc. "Didn't want to dig" is not a reason.
- **In all cases, the evaluator must not be able to proceed further.**
- **The reason must be given and recorded on the profile information or remarks section.**

Soil is spatially variable

- Once a soil profile is terminated (normally above 72"), what lies below the depth of termination cannot be assumed!! (Spodic layer, limestone, clay?)
- The termination point of the profile will influence the bottom of the drainfield due to the effective soil depth requirements.
- This could raise the system more than the separation to SHWT requirement.

Example with two profiles for system:

- One soil profile has FS down to 72", the other shows FS and the hole caving at 46" due to limestone (or bedrock, boulders, buried tree stump, whatever). The point is that the profile stops at 46".
- The profile that goes down to 72" cannot be used to justify the effective soil depth in the other profile. This makes the 46" depth the more restrictive profile and therefore must be used to install the system.

Effects on System Requirements

- In this example, presume the more restrictive SHWT between the profiles was determined to be at 42"
- The effective soil depth would have to be based on 46", not 72".
- This would mean that the elevation of the bottom of the drainfield would be higher based on the effective soil depth requirement rather than the SHWT requirement (a 14" difference).

Continuing with ramifications...

- Adds height to the system, will add a fill requirement, in this case goes from standard subsurface system to 14" filled system.
- Affects placement of system, system geometry, even ability of system to be permitted.
- If it were to go from fill to mound system the drainfield size could increase (depending on fill material), which would increase the unobstructed area, exacerbating above issues.

CHECKING NON-DEPARTMENTAL EVALUATOR SOIL PROFILES OR FILL MATERIAL

THIS IS REQUIRED

When CHD'S perform confirmatory soil profiles to check non-CHD personnel work (or when checking any type of fill material) the same procedures must be followed.

When the results are different or unsatisfactory, CHD soil profiles must be documented for enforcement measures.

How many confirmatory profiles must be done?

- Absolute minimum of one for SHWT and soil textures, should do more.
- However, if the findings of the confirmatory profile do not match the soil information used to issue the construction permit, perform more around the system to confirm departmental findings.

CHECKING FILL MATERIAL

- Must check fill material in enough locations to justify approval of material. Minimum of 4 locations, including under drainfield. Also must check shoulders and slopes.
- If excavation was performed, must confirm this was performed to correct dimensions (length, width, depth).
- Don't forget that the O horizon must be removed from entire fill area, so must check for that.

The Site Evaluation Form

- The column with the heading "Texture," must be completed using the correct USDA NRCS texture for each horizon. The use of non-standard abbreviations cannot be accepted. The use of the term "fill" in this column should be used when necessary, along with the corresponding texture(s) of the fill material.

Proper texture abbreviation

VCOS - very coarse sand ^a	COS - coarse sand ^a	S - sand ^a
FS - fine sand ^a	VFS - very fine sand ^a	LCOS - loamy coarse sand ^a
LS - loamy sand ^a	LFS - loamy fine sand ^a	LVFS - loamy very fine sand ^a
COSL - coarse sandy loam ^a	SL - sandy loam ^a	FSL - fine sandy loam ^a
VFSL - very fine sandy loam ^a	L - loam ^a	SIL - silt loam ^a
SI - silt ^a	SCL - sandy clay loam ^a	CL - clay loam ^a
SICL - silty clay loam ^a	SC - sandy clay ^a	SIC - silty clay ^a
C - clay ^a	MARL is written out ^a	MK - mucky ^a
PT - peaty ^a	GR - gravelly or gravels ^a	MUCK is written out ^a
PEAT - is written out ^a	Hard Rock is written out ^a	Soft Rock is written out ^a

- Note that ***ONLY*** the USDA NRCS particle sizes are used. Textures given in any other particle size or texture classification system are not acceptable. Some examples: Mucky Peat would be abbreviated as MK Peat. Note that the term "organic" is not listed. Organic soils are listed as muck, mucky peat or peat.

- Spodic (Bh) horizons should be noted as such. While a spodic layer contains organic matter that coats mineral soil particles, it is not an organic soil layer nor mucky mineral due to the small amount (<5%) of organic matter (carbon).

Spodic example

- 10YR 2/1 FS Spodic 16-23 inches
- This entry indicates a horizon of black fine sand that exists as a spodic layer from 16 to 23 inches.
- This is NOT an organic layer. Mucky mineral must have at least 5% organics and muck must have at least 12% organics, depending on texture.
- A spodic contains <5% organic matter (carbon), generally 1-3%.

A word about spodic layers

- By definition, spodic layers are a sandy material. They can be any texture sand. As long as it has the word "sand" and is a REAL texture, it can be used.
- Proper Examples: LFS, S, FS, VFS
- UNACCEPTABLE Examples: Muck, SiL, Silty fine sand, organics

**Particle Sizes Larger Than The
Fine Earth Fraction**

**A.K.A.
"Bigger Than Soil" Particles**

**NON-SOIL PARTICLES
(Coarse Fragments)**

Particles larger than 2 mm are not soil particles (i.e. the fine-earth fraction), they are Coarse Fragments and have several names. They do figure in to the overall texture of a soil by modifying the soil texture.

- When the particle size exceeds 2mm, it moves out of the very coarse sand texture and is no longer a soil particle. These items can include shells, rocks, or other non-soil (non-fine earth) items that are >2mm. The modifier *gravelly* or "GR" is used when the fragment content by volume is $\geq 15\%$ to $< 35\%$. Gravels range in size up to 75mm (3 inches).

For example,

- If there are 20% shell fragments that are 3-75mm in size and the soil texture is sand, the proper texture for that soil would be gravelly sand, or GR S. This example is an unsuitable soil type, as it is severely limited and could not be used for system installation. Use the "Charts for Estimating Proportions of Mottles and Coarse Fragments" found in the Munsell book to determine the percentage of fragments.

Soil Texture Determination

- Must remove the gravels from consideration of the soil-size particles in order to get actual soil texture (if $\geq 15\%$ by volume of the soil horizon).
- This is done by running the soil sample through a nest of sieves.
- After the large particles are removed, the remaining sample is the entire soil sample and will be used to determine the texture of the soil fraction.

Soil Texture Determination

- Once soil texture is determined, will add the proper adjective (e.g. gravelly, very gravelly, etc.) to soil texture to properly name the soil.
- Example:
Gravelly Loamy Fine Sand indicates that $\geq 15\%$ and $< 35\%$ gravels occupied the volume of the soil horizon whose soil texture was a Loamy Fine Sand.

Notes on Proper Use of Texture

- There is no acceptable texture such as “shelly sand” as the word “shell” has no actual meaning for size. Shell is a type of particle, not the size of a particle.
- Use the proper adjective to describe the large coarse fragments of the soil horizons.

REDOXIMORPHIC (Redox) FEATURES

Redox Feature Identification

- The site evaluation form asks for indications of “mottles.” What is required here are redoximorphic features only, that is, a mottle whose color change was caused by the presence of water.
- Use for all redox features.

Contrast of Colors

Contrast refers to the degree of visual distinction between associated colors.

Faint – contrasts that are evident only on close examination

Distinct -- contrasts that are readily seen but are only moderately expressed

Prominent -- contrasts that are strongly expressed

What we use to define the soil color contrast is a USDA NRCS document (DOH use since 2004)

***USDA NRCS Soil Survey
Technical Note No. 2
May 2002***

***Soil Color Contrast
Definitions***

- The RF that is used to determine the SHWT is what goes in the blank.
- Additional redox features, while documented as colors and depths in the profile, are not entered into the “mottle” area.
- Can enter additional information in Remarks area.

In the above example, the mottling would be marked as "yes" and the depth in inches would be 16, which is where the common prominent redox feature started. This must correspond with the information in the profile and remarks section.

- In the column heading "Depth", the beginning and ending depth of the soil horizon (layer) is recorded. This is a soil profile description, not a soil log. Soil logs are NOT acceptable. Depths are given for the boundaries of soil horizons, not in evenly spaced increments (such as 0-6", 6-12", etc.). While soil profiles may on occasion match, one should expect differences in the colors and depths of each horizon in individual profiles.

- Note that the redoximorphic feature line in the previous example shows the feature existed from 16-20”.
- This could also be listed as 16-16” if that is the depth where the feature occurs. (Note there is no thickness requirement for the redox features in this particular example.)
- The Environmental Health Database requires horizons to have a beginning and ending point, but it can be the same point (depth)
- So.....

- If an evaluator only lists one depth (e.g. 16”) where the redox feature is located, this is not necessarily an error, however this is not routine due to the methodology and requirements employed by the USDA NRCS.
- The redox feature would have to make up the correct percentage of the matrix (or be the matrix in certain circumstances) and be only one inch thick.
- This should not be a routine finding.

- Use the depth given as the beginning and ending depth for the area containing the redox feature. If the redox feature is listed in the remarks section, the CHD will normally enter the data as a remark.
- **CORRECTLY DOCUMENT THE FEATURES IN THEIR ENTIRETY.**

The soil profile must contain all information to document and validate the corresponding conclusions drawn from the profiles, including the estimated seasonal high water table determination, soil textures and effective soil depth. Lack of or inconsistency between any required information is scientific basis to question the evaluation.

- For example, in a profile that indicates no redoximorphic features either listed in the soil profile or remarks section, the mottling question has "no" and the evaluator indicates an estimated seasonal high water table at 10 inches.
- This is unacceptable by department standards as there is no scientific basis for the estimation of the seasonal high water table.

Lack of Redox Features

What to do

- Redoximorphic features need certain conditions in which to form.
- In certain cases, these conditions will not be present and redox features will not be found.
- This can happen in naturally occurring soils where there is very little organic matter or iron content, such as in beach areas, or in the situation where fill material has been moved on top of an otherwise natural soil.

- The fill material can be anywhere from a few inches to several feet thick, and have been in place for a few days to decades, and can vary greatly in texture. These soils can be very problematic.
- The SHWT can still be higher in the profile, even within the fill material.

Contemporary/Relict Features

- Contemporary features are soil morphological features that reflect current hydrologic conditions of saturation and anaerobiosis. These are used to determine SHWT.
- Relict features are soil morphological features that reflect past hydrologic conditions of saturation and anaerobiosis. These would normally occur in natural conditions and are NOT used to determine SHWT.

RELICT FEATURES

- In our case, relict features would also include mottles that have been transported in fill material and cannot be used to determine SHWT.

Absence of Redox features

- In the case where absolutely no redox features are found in the soil, for example in some beach-area soils, the experience of the site evaluator will come into play. For example, at a beach location, if a soil profile showed a 10YR 8/1 sand from 0-72 inches, no observed redoximorphic features, but an observed water table existed at 54 inches, and it had not rained in several weeks, there would be cause to consider the actual water table in light of the lack of redoximorphic features.

Absence of Redox features

- The amount of consideration would be based on the individual evaluator's experience and judgment. By way of this example, it could mean that a county health department (CHD) employee that has ample experience in the area in question has knowledge that water tables exist for several days or weeks at a time (as in the above example) at 48", even though no redox features are present.

Absence of Redox features

- Another evaluator (private or not) may not have the same experience and would not necessarily reach the same conclusion. In this example, the CHD employee (or non-department employee) would use their experience and judgment to determine the estimated seasonal high water table from all different sources required by rule, and this information would have to be documented during the site evaluation, in the soil profiles and in the remarks section. As in all site evaluations, the SHWT determination must be validated using all available information.

Absence(?) of Redox features

- From a historical perspective, it has been our experience that it is not uncommon for certain indicators to be missed, or misused, especially when the methodology in use is other than that employed by the USDA NRCS, which is required by regulation. This has resulted in improper seasonal high water table estimations.

VALIDATION OF SHWT

- We know that there are cases where there will not be indicators. When this occurs, all sources required by rule would be used as well as the professional judgment of the evaluator to state why the SHWT was determined to be at a specific level.

VALIDATION OF SHWT

- There is not a specific statement that has been used to cover all scenarios, but we are also trying to guard against the evaluator that is not using contemporary indicators (when present) and just stating a depth and "the call was based on my professional experience".

Consider the following information

- 10YR 3/1; 5/4; 6/3 FS Fill 0-21"
- 10YR 4/1 FS 21-27"
- 10YR 4/1; 5/2 FS 27-35"
- 10YR 2/1 Spodic Material 35-50"
- REFUSAL REFUSAL 50"
- REMARKS: Observed water table at 34", refusal due to hole caving in. No rain in 5 weeks. SHWT 21".

Example of WRONG reasoning for previous slide:

- No clear indicators of seasonal high water could be observed. Due to filled nature of lot, 21" represents "natural grade". Set SHWT at natural grade; this is conservative call for SHWT.

Now, a Proper Statement

- Determination of the SHWT was based on a combination of the following: While no specific redox features were observed, the several inches of generally grayer (low chroma) soils that exist in the upper part of the natural soils is normally indicative of SHWT being closer to the ground surface when viewed in relation to the spodic horizon, and considering the observed water table of 34" during this time of year, also no rainfall has occurred in the last 5 weeks.

Proper Statement continued

- Landscape position was indicative of [make statement – was area fairly flat, no water outlets?]. The soils that are mapped in this area indicates that seasonal high water tables would normally be within a few inches of the natural soil surface. Using all available information, my professional judgment is that the SHWT is most likely to be at the top of what was determined to be the natural soil.

THE PRECEDING WAS AN EXAMPLE ONLY AND IS NOT THE ONLY FORMAT THAT COULD BE APPROVED.

Actually, from looking only at the colors from 27-35", stripped matrix could have been present, just not identified.

USDA NRCS Determinations

What happens when a USDA NRCS Soil Scientist reviews the site

DOH USES MOST RESTRICTIVE SHWT DETERMINATION

- Get a report if at all possible.
- Where the USDA NRCS Soil Scientist gives a range for the SHWT (they normally call it “Seasonal High Saturation”), the more restrictive measurement must be used.
- Example: “SHS at 7-10 inches below soil surface” would mean that a 7 inch SHWT would be used by DOH.
- NO AVERAGING THE DEPTHS!!!!

DEPTH TO INDICATORS

- Where SHWT indicators exist in a profile, depth to indicators must be shown for all profiles.
- Can be identified in the soil profile
- Can be listed in the remarks section (e.g. stripped matrix)
- Use proper methodology
- Document correctly and completely
- Verify soil color contrast is correct for indicator use. If not, must be corrected.

***The Correct Soil Profile
(Field Copy)***

**EXAMPLE 1. HIGH CHROMA
REDOXIMORPHIC FEATURE IN SAND**

- 10YR 3/1 S 0-3"
- 10YR 4/4 S 3-9"
- 10YR 6/6 S 9-31"
- 7.5YR 6/8 CMN/DST RF 27-30"
- 10YR 7/2 S 31-54"
- 10YR 8/1 S 54-72"

THE ABOVE EXAMPLE SHOWS THE ENTRY FOR THE REDOX FEATURE WITHIN THE SOIL PROFILE. IT IS PLACED AS THE ENTRY FOLLOWING THE HORIZON IN WHICH IT IS LOCATED. SO, THE 10YR 6/6 SANDY SOIL MATRIX HAS COMMON ($\geq 2\%$, BUT $<20\%$) 7.5YR 6/8 REDOX FEATURES, WHICH MEETS THE CRITERIA IN THIS SANDY SOIL.

SOIL COLOR CONTRAST IS CALCULATED FROM THE CHANGE IN HUE, VALUE AND CHROMA

- CHANGE IN HUE IS 1 UNIT (10YR TO 7.5YR)
- CHANGE IN VALUE IS 0 UNITS (10YR 6/6 TO 7.5YR 6/8)
- CHANGE IN CHROMA IS 2 UNITS (10YR 6/6 TO 7.5YR 6/8)
- This color change is DISTINCT by definition.

EXAMPLE 2A. STRIPPED MATRIX

- 2.5Y 2.5/1 FS 0-2"
- 2.5Y 4/1 FS 2-5"
- 2.5Y 5/1 FS 5-12"
- 2.5Y 7/2 FS 5-12"
- 2.5Y 8/1 FS 12-25"
- N 8/ FS 25-72"
- REMARKS: SPLOTCHY COLORS WITH DIFFUSE BOUNDARIES FROM 5-12" EXIST AS FAINT SOIL COLOR CONTRAST AND THE LIGHTER AREAS (2.5Y 7/2) ARE AT LEAST 10% OF THE VOLUME, WHICH MEETS THE DEFINITION OF A STRIPPED MATRIX BEGINNING AT 5".

THE ABOVE EXAMPLE SHOWS THE ENTRY FOR THE REDOX FEATURE IN THE SOIL PROFILE OCCURRING ON TWO LINES. THE REDOX FEATURE IS STRIPPED MATRIX. COMPARE WITH FOLLOWING EXAMPLE.

EXAMPLE 2B. STRIPPED MATRIX

- 2.5Y 2.5/1 FS 0-2"
- 2.5Y 4/1 FS 2-5"
- 2.5Y 5/1; 7/2 FS 5-12"
- 2.5Y 8/1 FS 12-25"
- N 8/ FS 25-72"
- REMARKS: SPLOTCHY COLORS WITH DIFFUSE BOUNDARIES FROM 5-12" EXIST AS FAINT SOIL COLOR CONTRAST AND THE LIGHTER AREAS (2.5Y 7/2) ARE AT LEAST 10% OF THE VOLUME, WHICH MEETS THE DEFINITION OF A STRIPPED MATRIX BEGINNING AT 5".

THE ONLY DIFFERENCE IS HOW THE SOIL COLORS WERE WRITTEN FOR THE 5-12" HORIZON. THIS EXAMPLE HAS ONE HUE SHOWN WITH 2 DIFFERENT COLORS ON THE SAME LINE, MEANING BOTH COLORS HAVE A HUE OF 2.5Y. THE REMARKS ARE THE SAME.

EXAMPLE 3. LOW CHROMA REDOX DEPLETIONS

- 7.5YR 3/1 FS 0-4"
- 7.5YR 4/2 LFS 4-9"
- 5YR 5/6 FSL 9-43"
- 5YR 5/8 FSL 43-72"
- 5YR 6/3 MANY/PRM RF 65-72"
- REMARKS: SHWT AT 65" DUE TO LOW CHROMA DEPLETIONS AS NOTED.

THIS EXAMPLE SHOWS THE ENTRY FOR LOW CHROMA REDOX DEPLETIONS IN THE SOIL PROFILE. THE 5YR 5/8 FINE SANDY LOAM SOIL MATRIX HAS MANY ($\geq 20\%$) 5YR 6/3 REDOX DEPLETIONS, WHICH IS ACCEPTABLE IN THIS SOIL AT A DEPTH OF BELOW ONE METER (39.37")

EXAMPLE 4. LOW CHROMA REDOX AS A MATRIX

- 7.5YR 2.5/1 FS 0-3"
- 7.5YR 4/1 FS 3-7"
- 7.5YR 6/6 FSL 7-34'
- 7.5YR 7/1 FSL 34-72"
- REMARKS: THE HORIZON BEGINNING AT 34" IS THE REDOX FEATURE IN THAT THE COLORS MEET VALUE ≥ 5 AND CHROMA ≤ 2 ABOVE ONE METER.

EXAMPLE 5. MUCK SOIL SURFACE (SAMPLE IN LRR U)

- N 2.5/ MUCK 0-0.5"
- 5Y 4/1 FS 0.5-6"
- 5Y 7/1;8/1 FS 6-15"
- 10BG 6/1 FS 15-22"
- Refusal Refusal 22-22"
- REFUSAL DUE TO HOLE CAVING IN AND FILLING WITH WATER.

REMARKS: MUCK IS THE SHWT, AS IT QUALIFIES AS HYDRIC SOIL INDICATOR A8 (MUCK PRESENCE). SITE IS LEVEL, NOT IN A DEPRESSION. ALSO OF NOTE IS STRIPPED MATRIX INDICATOR IS MET BEGINNING AT 6", AND GLEYED MATRIX IS MET AT 15".

EXAMPLE 6: HYDROGEN SULFIDE SMELL

- N 2.5/ FS 0-1"
- 5Y 4/1 FS 1-6"
- 5Y 7/1 FS 6-15"
- 10BG 6/1 SCL 15-22"
- REFUSAL DUE TO HOLE CAVING IN AND FILLING WITH WATER

REMARKS: HYDROGEN SULFIDE SMELL OBSERVED AT 2", WHICH IS HYDRIC SOIL INDICATOR A4, HYDROGEN SULFIDE. ALSO OF NOTE IS GLEYED MATRIX IS MET AT 15". SHWT 2".

Anything wrong with the following profile?

SOIL PROFILE INFORMATION SITE 1			SOIL PROFILE INFORMATION SITE 2		
MUNSELL #/COLOR	TEXTURE	DEPTH	MUNSELL #/COLOR	TEXTURE	DEPTH
10YR 5/2	FS (GUNNELL FAU)	0 TO 8"	10YR 5/2	FS (GUNNELL FAU)	0 TO 10"
10YR 5/1	FS	8 TO 15"	10YR 5/1	FS	10 TO 17"
10YR 7/3	FS	15 TO 24"	10YR 7/3	FS	17 TO 25"
10YR 5/4	FS	24 TO 30"	10YR 5/4	FS	25 TO 28"
10YR 6/2	*RF MISC/ FS	30 TO 35"	10YR 6/2	*RF 10YR 5/6 FS	28 TO 36"
10YR 4/4	FS	35 TO 41"	10YR 4/4	FS	36 TO 42"
10YR 5/8	SC	41 TO 53"	10YR 5/8	SC	42 TO 54"
10YR 8/3	SAND F-SHALL	53 TO 82"	10YR 8/3	SAND F-SHALL	54 TO 72"

USDA SOIL SERIES: Gunville / MYANA FS
(mapped as F-similar fa)

USDA SOIL SERIES: Gunville / MYANA FS
(mapped as F-similar fa)

OBSERVED WATER TABLE: 40 INCHES (ABOVE / BELOW) EXISTING GRADE. TYPE: [PERCHED / APPARENT]

ESTIMATED WET SEASON WATER TABLE ELEVATION: 32 INCHES ABOVE (BELOW) EXISTING GRADE

HIGH WATER TABLE VEGETATION: [] YES [X] NO MOTTLING: [X] YES [] NO DEPTH: 38 INCHES

SOIL TEXTURE/LOADING RATE FOR SYSTEM SIZING: _____ DEPTH OF EXCAVATION: 53 INCHES

DRAINFIELD CONFIGURATION: [] TRENCH [] BED [X] OTHER (SPECIFY)

REMARKS/ADDITIONAL CRITERIA: *RF - Redoximorphic features observed on 10YR 5/6 inclusions, common & distinct @ 32-53 inches

SITE EVALUATED BY: _____ DATE: _____

SH 4015, 08/09 (Obsoletes previous editions which may not be used) Incorporated: 64E-6.001.FAC Page 3 of 4

Documentation of Lamellae

SOIL PROFILE INFORMATION SITE 1			SOIL PROFILE INFORMATION SITE 2		
MUNSELL #/COLOR	TEXTURE	DEPTH	MUNSELL #/COLOR	TEXTURE	DEPTH
10YR 4/2	S	0 TO 8"	10YR 4/2	S	0 TO 8"
10YR 6/4	S	3 TO 3 1/2"	10YR 6/4	S	3 TO 4 1/2"
10YR 7/4	S	3 1/2 TO 4 1/2"	10YR 7/4	S	3 TO 4 1/2"
10YR 8/3	S	4 1/2 TO 6 1/2"	10YR 8/3	S	4 1/2 TO 6 1/2"
10YR 8/2	S	6 1/2 TO 12"	10YR 8/2	S	6 1/2 TO 12"
	TO			TO	
	TO			TO	
	TO			TO	
	TO			TO	
USDA SOIL SERIES: <u>Somerset/Alpin</u>			USDA SOIL SERIES: <u>Somerset/Alpin</u>		

OBSERVED WATER TABLE: 37.2 INCHES (~~ABOVE~~ BELOW) EXISTING GRADE. TYPE: (~~PERMANENT~~ APPARENT)
ESTIMATED WET SEASON WATER TABLE ELEVATION: 37.2 INCHES (~~ABOVE~~ BELOW) EXISTING GRADE
HIGH WATER TABLE VEGETATION: () YES NO MOTTLING: () YES NO DEPTH: _____ INCHES

SOIL TEXTURE/LOADING RATE FOR SYSTEM SIZING: 0.8 DEPTH OF EXCAVATION: -0- INCHES
RAINFIELD CONFIGURATION: (X) TRENCH () BED () OTHER (SPECIFY)
REMARKS/ADDITIONAL CRITERIA: 42-66" from four 10YR 5/8 LFS lamellae about 1/2" thick, also with 47-61" on S/P2; 65-72 on S/P1 & 67-72" on S/P2 four common 10YR 5/8 LFS lamellae, also about 1/2" thick.

SITE EVALUATED BY: J. Young DATE: 05/11/11
James Young, CEHP 11-0213

DR 4015, 08/09 (obsoletes previous editions which may not be used) Incorporated 64E-6.001, FAC Page 3 of 4

Redox features documented after completed soil profile

SOIL PROFILE INFORMATION SITE 1			SOIL PROFILE INFORMATION SITE 2		
MUNSELL #/COLOR	TEXTURE	DEPTH	MUNSELL #/COLOR	TEXTURE	DEPTH
2.5Y 4/2	S	0 TO 8"	10YR 4/2	S	0 TO 8"
2.5Y 6/2	S	8 TO 8 1/4"	10YR 5/3	S	9 TO 12"
2.5Y 8/2	S	8 1/4 TO 10"	10YR 4/3	S	12 TO 16"
10YR 6/4	S	10 TO 12"	10YR 8/4	S	16 TO 22"
	TO			TO	
	TO			TO	
	TO			TO	
	TO			TO	
USDA SOIL SERIES: <u>Unknown</u>			USDA SOIL SERIES: <u>Unknown</u>		

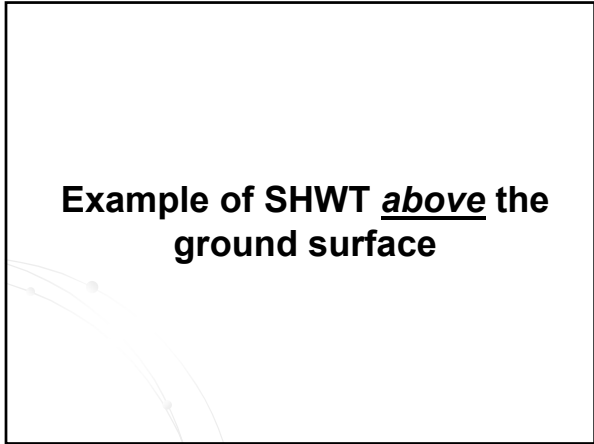
OBSERVED WATER TABLE: 68 INCHES (~~ABOVE~~ BELOW) EXISTING GRADE. TYPE: (~~PERMANENT~~ APPARENT)
ESTIMATED WET SEASON WATER TABLE ELEVATION: 44 INCHES (~~ABOVE~~ BELOW) EXISTING GRADE
HIGH WATER TABLE VEGETATION: () YES NO MOTTLING: () YES () NO DEPTH: 44 INCHES

SOIL TEXTURE/LOADING RATE FOR SYSTEM SIZING: 0.8 DEPTH OF EXCAVATION: -0- INCHES
RAINFIELD CONFIGURATION: (X) TRENCH () BED () OTHER (SPECIFY)
REMARKS/ADDITIONAL CRITERIA: bottom of pit not lower than 42.5 below pit level. 3 pits at 5 ft marked on site plan. site will be from 10 to 12 if location marked. No basement drains; 1.5 to slope from West to east.

SITE EVALUATED BY: J. Young DATE: 9/1/11
James Young, CEHP 11-0213

DR 4015, 08/09 (obsoletes previous editions which may not be used) Incorporated 64E-6.001, FAC Page 3 of 4

Example of SHWT above the ground surface



SOIL PROFILE INFORMATION SITE 1			SOIL PROFILE INFORMATION SITE 2		
MUNSELL #/COLOR	TEXTURE	DEPTH	MUNSELL #/COLOR	TEXTURE	DEPTH
A 2.5	MUCK	0 TO 17"	A 2.5	MUCK	0 TO 28"
5YR 2/1 w/10W3/1	MK FSL	27 TO	5YR 2/1 w/		28 TO
STRAINS		TO 35"	10YR 3/1 STRAIN	MK FSL	TO 36"
10YR 4/1 w/ 10YR 3/1	LFS	35 TO	10YR 4/1 w/		36 TO
STRAINS		35 TO 41"	10YR 3/1 STRAIN	FS	TO 42"
10YR 4/1 w/ 3/1	FS	41 TO 47"	10YR 4/1 w/ 3/1	FS	42 TO 44"
10YR 4/1 w/ 3/1	FS	47 TO 52"	10YR 4/1 w/ 3/1	FS	44 TO 47"
		TO			TO
		TO			TO
USDA SOIL SERIES: <u>DURGO-LIKE</u>			USDA SOIL SERIES: <u>DURGO-LIKE</u>		

OBSERVED WATER TABLE: 68 INCHES (~~ABOVE~~ / BELOW) EXISTING GRADE. TYPE: (~~SEDIMENT~~ / APPARENT)

ESTIMATED WET SEASON WATER TABLE ELEVATION: 3 INCHES (ABOVE / ~~BELOW~~) EXISTING GRADE

HIGH WATER TABLE VEGETATION: YES NO MOTTLING: YES NO DEPTH: _____ INCHES

TTT: BA, CYPRESS, WY, MYRTLE

SOIL TEXTURE/LOADING RATE FOR SYSTEM SIZING: _____ DEPTH OF EXCAVATION: 36 INCHES

DRAINFIELD CONFIGURATION: TRENCH BED OTHER (SPECIFY)

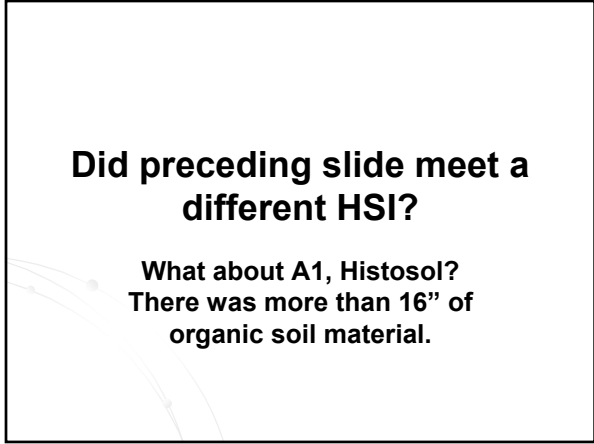
REMARKS/ADDITIONAL CRITERIA: SHWT found on water stains & kitchen counter in immediate area center room. Defunctional C.A.C. if surface water. MUCK SOIL - AT 1cm muck. Muck is indicator, see in depression, accounts for 4" SHWT.

SITE EVALUATED BY: _____ DATE: _____

EW 4015, 08/09 (Obsoletes previous editions which may not be used) Incorporated 64E.6.001 FAC Page 3 of 4

Did preceding slide meet a different HSI?

**What about A1, Histosol?
There was more than 16" of organic soil material.**



What about soil texture determined by a lab analysis?

SHOULD YOU CALL THE LAB?

CAUTIONS ON LAB ANALYSIS

- MAKE SURE THAT THE RESULTS ARE UNDERSTOOD!
- WHAT METHODS WERE USED?
- SIEVE ANALYSIS USING CORRECT USDA SIEVE STACK INCLUDED?
- HYDROMETER OR PIPETTE METHOD?
- **THE RESULTS MUST ACCOUNT FOR SAND GRADATION AS WELL AS SILT/CLAY CONTENT**

Example

- CHD sends a sample to an agricultural lab and asks for a texture determination
- Sample comes back as percent Sand/Silt/Clay so that the result could be read on the Textural Triangle. Result was given as Sandy Loam.
- The size of the sand had not been determined, so it is unknown if sample is COSL, SL, FSL, VFSL.
- The actual sand fragments would determine proper sizing of system. This could be done in the field.
- Accepting this lab report at face value would be a mistake.

Results if CHD accepted the soil as sandy loam?

- NO EFFECT ON REDOX FEATURES, SHWT WOULD BE UNAFFECTED.
- IF THE SOIL TYPE WAS ACTUALLY FINE SANDY LOAM THE DRAINFIELD WOULD BE UNDERSIZED BY OVER 23 PERCENT!!

When supplying soils samples to (or receiving results from) a lab always ensure a complete texture determination is made. This must include a proper USDA NRCS sieve analysis to determine the sand fraction size.

Lab Analysis continued

- If particles >2mm are present in sufficient quantities to require a “gravelly” or other modifier, ensure that the lab analysis provides this data.
- CHD personnel should make every effort to get a sample for their use and determine if the sample has particles larger than soil particles, as well as the correct sand size.

Lab Analysis continued

- If at any time the CHD is not sure if the lab analysis is consistent with what is on the site, you should call the lab, or take your own sample and send it to the lab.

Example of Real Profile

- 10YR 7/4 FILL-LS 0-37"
- 10YR 2/1 LS 37-43"
- 10YR 4/1 LS 43-48"
- 10YR 6/8 CMN/PRM RF 46-48"
- 5YR 3/4 LS 48-52"
- 10YR 4/4 LS 52-58"
- 10YR 4/6 LS 58-62"
- REFUSAL REFUSAL 62-62"
- USDA SOIL SERIES: RUTLEGE LS

Additional information

- Observed water at 60"
- Mottling "yes" at 46"
- No remarks listed
- No excavation is required.
- What if we remove the fill and look at what appears to be a natural soil?

IF THE FILL IS REMOVED...

- 10YR 2/1 LS 0-6"
- 10YR 4/1 LS 6-11"
- 10YR 6/8 CMN/PRM RF 9-11"
- 5YR 3/4 LS 11-15"
- 10YR 4/4 LS 15-21"
- 10YR 4/6 LS 21-25"
- REFUSAL REFUSAL 25-25"
- SHWT NOW IS AT 9"

Is this REALLY a Rutlege Soil?

FACTS FROM THE PROFILE...

- The horizon from 11-15" is a SPODIC horizon.
- Why? The E horizon above and the color of this horizon is 5YR 3/4 is DARK REDDISH BROWN and it is at least 1" thick.
- It may not have been cemented, but that doesn't mean it isn't a spodic.

FACTS FROM THE PROFILE...

- The layer below the first spodic at 15-21" is a second spodic or possibly a Bw horizon, the colors are 10YR 4/4, which is dark yellowish brown.
- More than likely it is spodic material.

FACTS FROM THE PROFILE...

- The layer at 21-25" may be a third spodic or is a Bw horizon, the colors are 10YR 4/6, which is dark yellowish brown.
- More than likely it is non-spodic material.

Look at the Web Soil Survey

- The lot falls close to the line of the following soils:
- Rutlege LS
- Ortega Sand, 0-5% slopes
- Pactolus LS, 0-5% slopes
- **NOTICE THE RUTLEGE SOIL DOES NOT HAVE A SLOPE ASSOCIATED WITH IT, SO IT SHOULD BE NEARLY LEVEL.**

Typical Rutlege Description...

- 10YR 2/1 LS 0-15"
- 10YR 4/1 S 15-35"
- 10YR 5/2 S 35-72"
- **NOTES TO THIS SERIES:**
- *Leon soil is a geographically associated soil (meaning it is found in similar areas).*

**Typical Leon Description
(from Official Series
Description website)**

- 10YR 2/1 S 0-5" (70%)
- 10YR 7/2 S 0-5' (30%)
- 10YR 6/1 S 5-15"
- 10YR 7/1 S 10-15" (20%)
- 7.5YR 3/3 S 15-18" (50%)
- 7.5YR 2.5/1 S 15-18" (50%)
- 7.5YR 3/4 S 18-29"
- 10YR 4/4 S 29-35" (80%)
- 10YR 3/3 S 29-35" (20%)
- CONTINUED NEXT SLIDE

Typical Leon Description cont.

- 2.5YR 5/2 S 35-41" (80%)
- 7.5YR 3/3 S 35-41" (20%)
- 7.5YR 7/2 S 41-48"
- 10YR 2/2 S 48-72" (50%)
- 10YR 3/4 S 48-72" (50%)

Ranges of Characteristics

- Bh horizon starts within 30" of natural soil surface
- The "A" horizon has salt & pepper appearance when dry and may have muck on top of it, or be a mucky sand (low flats/sloughs).
- The Bh horizon has hue of 5YR to 10YR, value of 2 or 4, and chroma of 1 to 4; or is neutral with value of 2 to 4.

THIS WAS NOT A RUTLEGE SOIL, IT WAS A LEON

Things to think about.....

- The soil profile could meet the hydric soil indicator S7, which is “Dark Surface”.
- A note to the amount of masking in the top horizon of soil (10YR 2/1 S 0-6”) would clarify if the soil meets S7 (Dark Surface). The only thing necessary here is that the soil be 70% or more masked with organics (*when using a hand lens*).
- The way the horizon is described in the profile indicates S7 criteria is met if we know a hand lens was used.

S7 DARK SURFACE

- A layer 10 cm (4”) thick starting within the upper 15 cm (6”) of the soil surface with a matrix value 3 or less and chroma 1 or less. Using a hand lens, at least 70% (near 100% if no hand lens) of the visible soil particles must be masked with organic material. The matrix color of the layer immediately below the dark layer must have the same colors as those described above or any color that has chroma 2 or less.

**This could also meet
S9, Thin Dark Surface**

**Note all indicators in
the soil profile and
make remarks!!!**

**Make a REMARK when using a
hand lens, or verify that a hand
lens is not used and state
percentage masked.**

REMEMBER

**If there are no observable redox
features, then other factual
information must be used to
validate the SHWT where
determined to be at or above 72
inches (or the termination of the
profile).**

SHWT must be validated from all information required by rule, and from the data collected on site.

If you document redox features, you have “mottles”

SHWT CONCLUSIONS

- **Conclusions must be validated by proper use of USDA NRCS methodology and wettest season water table indicators. Where no indicators can be detected or where there are conflicting factors, the evaluator must use all documented soil profiles, USDA NRCS soil maps and interpretation records, historical information, landscape position and onsite vegetation. (cont. next slide)**

- **They must also take into account the observed water table as well as the time of year and recent rainfall events and use their best professional judgment accounting for all factors to determine the wettest season water table. The wettest season water table shall always be validated.**

For example, the following statements DO NOT validate SHWT determinations:

- “Redox feature found at __ inches” when NO RF ARE DOCUMENTED IN THE EVALUATION.
- SHWT based on rule 64E-6.004(2)(a)

Examples of BAD soil profiles

What are the deficiencies?

SOIL PROFILE INFORMATION SITE 1				SOIL PROFILE INFORMATION SITE 2			
MUNSELL #/COLOR	TEXTURE	DEPTH		MUNSELL #/COLOR	TEXTURE	DEPTH	
10YR 5/1	SAND	0 TO 6		10YR 5/1	SAND	0 TO 4	
		TO				TO	
7/1	↓	6 TO 72		7/1	↓	4 TO 72	
		TO				TO	
		TO				TO	
		TO				TO	
		TO				TO	
		TO				TO	
		TO				TO	
USDA SOIL SERIES: # 7 ST. LOUISE				USDA SOIL SERIES: # 7 ST. LOUISE			

OBSERVED WATER TABLE: 4/6 INCHES [ABOVE / BELOW] EXISTING GRADE. TYPE: [PERCHED / APPARENT]

ESTIMATED WET SEASON WATER TABLE ELEVATION: 69 INCHES [ABOVE / BELOW] EXISTING GRADE

HIGH WATER TABLE VEGETATION: [] YES [X] NO MOTTLING: [] YES [X] NO DEPTH: _____ INCHES

SOIL TEXTURE/LOADING RATE FOR SYSTEM SIZING: .7 DEPTH OF EXCAVATION: _____ INCHES

DRAINFIELD CONFIGURATION: [] TRENCH [X] BED [] OTHER (SPECIFY) _____

REMARKS/ADDITIONAL CRITERIA: _____

SITE EVALUATED BY: _____ DATE: 8/4/05

Deficiencies

- SHWT called at 60" with no validation which is unacceptable.
- Soil loading rate is given as 0.7, but actually could be a 0.8 based on the soil.
- The soil profile information fits the soil profile description of a St. Lucie, but the SHWT is normally >72".
- Result: Return to evaluator. If continues to turn in sloppy work, make complaint against their certification or license.

What are the deficiencies?

SOIL PROFILE INFORMATION SITE 1			SOIL PROFILE INFORMATION SITE 2		
MUSSELS #/COLOR	TEXTURE	DEPTH	MUSSELS #/COLOR	TEXTURE	DEPTH
10YR 5/1 GRAY	SAND	0 TO 10	10YR 5/1 GRAY	SAND	0 TO 10
6/2 TAN	FILL	10 TO 16	6/2 TAN	FILL	10 TO 16
5/1 GRAY	SAND	16 TO 20	5/1 GRAY	SAND	16 TO 20
6/2 TAN	"	20 TO 32	6/2 TAN	"	20 TO 32
REFUSED	TOO WET	TO	REFUSED	TOO WET	TO
		TO			TO
		TO			TO
		TO			TO
		TO			TO
		TO			TO
USDA SOIL SERIES: #16 OLD SMAR FINE SAND			USDA SOIL SERIES: #16 OLD SMAR FINE SAND		

OBSERVED WATER TABLE: 20 INCHES (ABOVE / BELOW) EXISTING GRADE. TYPE: (RECHD / APPARENT)

ESTIMATED NET SEASON WATER TABLE ELEVATION: 10 INCHES (ABOVE / BELOW) EXISTING GRADE

HIGH WATER TABLE VEGETATION: () YES NO MOTTLING: () YES NO DEPTH: _____ INCHES

SOIL TEXTURE/LOADING RATE FOR SYSTEM SIZING: 0.8 DEPTH OF EXCAVATION: _____ INCHES

DRAINFIELD CONFIGURATION: () TRENCH BED () OTHER (SPECIFY) _____

REMARKS/ADDITIONAL CRITERIA: _____

SITE EVALUATED BY: _____ DATE: 10/5/07

DE 4015, 10/06 (Replaces MSF-2 Form 4015 (page 3) which may be used) Page 3 of 4

Deficiencies

- 10YR 6/2 is light brownish gray, not "tan". Actually, "tan" does not exist in our color books.
- Fill exists from 10-16", but not above it? How did this happen? Also, the fill must have at least one texture, none is listed.
- SHWT called at 10", but no validation. Maybe due to fill? How is this possible?
- Result: Return to evaluator. If continues to turn in sloppy work, make complaint against their certification or license.

Deficiencies

- Soil profiles have “fill” at top, but no color or textures. This is incorrect.
- 10YR 7/2 is actually LIGHT GRAY, the soil profile says LT B.G., which I guess they mean LIGHT BROWNISH GRAY (10YR 6/2), which is WRONG.
- Why do the third and fourth horizon (profile 1) have the same colors and textures? Should be one horizon.
- Cannot use “Same” for any other profiles.

Deficiencies

- SHWT shown at 52”, but no validation.
- Soil profile 2 has “Same” ***-NO!!!***
- Loading rate is “N/A”? How does that work?
- Form not completed properly.
- Result: Seems a meeting with evaluator is in order. If they continue to turn in sloppy work, make complaint against their certification or license.

Documenting Perched/Apparent Water Tables

- **Must document Perched or Apparent**
- **This deals only with the OBSERVED water table during the evaluation (see instructions on back of form).**

Documenting Perched/Apparent Water Tables

- **When no water is observed during the evaluation mark "APPARENT" as the type of water table.**
- **THIS IS DUE TO THE FACT THAT WATER WAS NOT PERCHED ABOVE A LAYER THAT COULD BE FOUND IN THE PROFILE.**

END OF PRESENTATION
