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ATLANTIC
ENVIRONMENTAL SERVICES, INC.

engineers
geologists
scientists

March 14, 1995

Ms. Kymberlee Keckler
U.S. Environmental Protection Agency - Region I
Waste Management Division - HAN-CAN1
J.F.K. Federal Building
Boston, MA 02203

RE: Wetland Delineation
Naval Submarine Base - New London
Groton, Connecticut
Atlantic Project No. 2072-01-07

Dear Ms. Keckler:

On behalf of the United States Navy, Northern Division Naval Facilities Engineering Command this letter will serve as a response to the October 25, 1994 EPA letter regarding the review of Atlantic Environmental Services, Inc. Wetland Delineation Area A report, dated July 26, 1994.

The delineation of wetlands by federal definition was conducted according to the *Corps of Engineers Wetlands Delineation Manual*, dated January 1987. The routine method was used in conjunction with a September 9, 1991 Corp memorandum document titled *Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States*. I have attached a copy of this document for your review. The differences between the federal manual and the New England region interpretation should explain the concerns the EPA has over the accuracy of the wetland boundaries and the supporting data forms. The Wetland Delineation Area A report satisfies the requirements for federal wetland delineation in accordance with the Corps guidance document.

The first concern noted by the EPA was the omission of a data form for the actual federal boundary line. Attachment 1 (Performance Standards and Supplemental Definitions for Use with the 1987 Corps Manual) of the *Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States* specifies that one observation plot (documenting details about vegetation, soils and hydrology) be established upgradient and another downgradient from the wetland boundary. Therefore, no observation plot for the actual boundary is required.

The second concern noted by the EPA was with respect to methodology and establishment of transects. The methodology used is as described in the second paragraph of this letter. Attachment 1 of the Corps guidance document, regarding transects, states that a baseline is used to establish and recover locations of transects and observation points.

> *Transects are used to represent conditions along the boundary of federal jurisdiction. The number of transects must be sufficient to insure that all plant community types in the impact area along the wetland/nonwetland interface are revealed in the sampling. Generally, transects will be sampled at a rate of 3 per linear mile of baseline and increase at a rate of 1 transect per additional 0.5 mile of baseline length. Ideally, the intervals between transects should be equal;*

P.O. BOX 297 188 NORWICH AVENUE COLCHESTER, CONNECTICUT 06415 (203) 537-0751 FAX (203) 537-6347
— Offices in Colchester, CT • St. Louis, MO • Syracuse, NY —

however, this consideration is subordinate to the stated need to sample all plant community types and represent conditions is close proximity to the areas of the most direct impacts.

A baseline was established perpendicular to the hydrologic gradient along the edge of Area A Landfill, the area of potential impact. Since the baseline was 1,700 feet (0.3 mile) in length and the vegetative community was generally homogeneous throughout the area of potential impact, two transects were judged sufficient and established within the area of potential impact to document vegetation, soils and hydrology conditions on both the wetland and nonwetland sides of the boundary. No transects were established elsewhere along the wetland boundary in Area A since no other areas of potential impact are planned. If future plans include potential impacts to other areas of the wetland in Area A, additional appropriate transects should be established within the impact areas in order to document the federal boundary and wetland/nonwetland conditions in these areas.

With respect to your comments in Attachment A, the typographical errors will be corrected in the final submission of the wetland delineation report. Item 2 in EPA's Attachment A discusses the closeness of Transect B, Plots 1 and 2 (14 feet), to the vegetation cutoff of 50 percent at Plot 2. This is likely caused by the lack of herbaceous vegetation at the time the plots were recorded. In this particular case, a reevaluation of these plots may be warranted once the herbaceous vegetation has leafed out, if mitigation is required.

Should you have any further questions or comments regarding these issues, feel free to contact Mark Evans or us.

Sincerely,

ATLANTIC ENVIRONMENTAL
SERVICES, INC.

Dean Gustafson
Professional Soil Scientist

Barry Giroux
Barry L. Giroux, P.E.
Project Manager

DG/BLG:sr
Enclosures

cc: Mark Evans (NOR-DIV)
Mark Lewis (CTDEP)
Jean-Luc Glorieux (Halliburton NUS)

DRAFT

CENED-OD-R (1145-2-303B) 9 September 1991

MEMORANDUM THRU Chief, Policy Analysis Branch

FOR Chief, Regulatory Division, Operations Directorate

SUBJECT: Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States

1. On July 4, 1989 this Division disseminated a public notice announcing the "Mandatory Technical Criteria" from the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. It described a format and a protocol to be used by our staff to support wetland jurisdictional determinations throughout New England. During the two years since that notice, this Division has reviewed or generated documents for innumerable wetland delineations. While the 1989 form was a vast improvement over earlier formats, our staff has noted many inadequacies. I have also received countless comments and suggestions from the regulated public, scientists and other professionals outside the Corps of Engineers. As you know we are now required to use the Corps of Engineers Wetlands Delineation Manual (1987 Manual) However, the technical criteria for hydric soils are the same in both manuals. The efforts made to refine our use of the 1989 Manual are still of value since the information can also be used with the 1987 Manual. I have attached a draft revised dataform for use with the 1987 Manual. We issued a public notice on September 4, 1991 that supersedes the 1989 public notice and informs the public of the required use of the 1987 Manual.

2. A basic weakness in the Mandatory Technical Criteria found in the 1989 Manual has been the use of soil drainage classification. In the past, this interpretation related to agricultural use and did not require any level of precision. Throughout New England, interviews with hundreds of soil scientists suggests that most of them use soil morphology to determine drainage class; yet, the range of their differences has made it difficult to uniformly interpret soils throughout our region. In the recent past, our staff was augmented by Soil Scientist Peter Fletcher under contract from the U.S. Soil Conservation Service in Massachusetts. Peter collated the regional concepts of soil drainage classification and enabled us to develop concise guidelines and a revised dataform for use by our staff. These guidelines for soils determinations and the dataform are consistent with the 1987 Manual. By putting our ongoing operating concepts into text and illustrations, I expect improved consistency among our staff in their field interpretations. Consistency and predictability are in the interest of the regulated public.

CENED-OD-R
SUBJECT: Guidance for the Interpretation of Wetland Boundaries Using the 1987 Corps Manual in the Six New England States

3. The enclosed materials have considered the views of numerous experts from our region. It is my belief that nobody knows New England wetlands better than its community of practicing wetland scientists. The final products may not address every concern; nevertheless, without holding them completely accountable, I am grateful to the following for their continuing contributions and criticisms: Jim Gove, Steve Hundley, Norman Kalloch, Kipen Kolesinskas, Dr. Harvey Luce, Kenneth LaFlamme, Tom Peragallo, Sid Pilgrim, David Rocque, Jerry Rosenburg, Dick Scanu, Frank Smigelski, Matt Schweisburg, Chris Smith, Ralph Tiner, David Van Houten, Dr. Peter L.M. Veneman, Thomas Villars, Dr. William R. Wright. We are also indebted to the Soil Conservation Service staff in each of the six New England States for escorting our staff to the field and sharing their insights and interpretations on numerous unique and difficult soils. I also thank the Maine Association of Professional Soil Scientists, the Societies of Soil Scientists of Southern and Northern New England, the New England Chapters of Soil and Water Conservationists; as well as the New Hampshire Association of Consulting Soil Scientists, the New Hampshire Association of Wetland Scientists, and the New Hampshire Board of Certification of Natural Scientists. Several hundred of the members of these organizations participated in the field examination of versions of the enclosed materials.

Michael J. Sheehan
Senior Wetland Scientist
Environmental Resources Section

Enclosures:

1. Wetland Delineation Guidelines
   a. Performance Standards and Supplemental Definitions
   b. Sample Wetland Delineation Dataform
   c. Sample Illustration of Wetland Delineation Details
   d. Blank -- Delineation Dataform -- Version 24Aug91
2. Guidelines For Soil Drainage Class Determinations Operational Draft [Text Version 27Feb91, Illustrations 1Aug91]
3. Soil Interpretation References -- Addresses
4. Important Resource Information -- Addresses

PERFORMANCE STANDARDS AND SUPPLEMENTAL DEFINITIONS FOR USE WITH THE 1987 CORPS MANUAL

KNOWN STATION -- an easily recognizable, accessible and reasonably permanent cultural or natural feature used as a reference point for horizontal survey control and included with the plan of the project site. A known station must be available within 1000 feet of recorded observation plots. Where such reference points are not available, known stations should be established by land survey, visibly marked and illustrated on the plan view. The land survey must be verifiable with an accuracy of 1/500 ratio of error.

BASELINE -- A wetland survey control feature used to establish and recover locations of transects and observation points. It is usually parallel to the water course or perpendicular to the hydrologic gradient. The length of the baseline may be used to guide the minimum number of transects.

TRANSECT -- A line on the ground along which observations are made. Transects are used to represent conditions along the boundary of federal jurisdiction. The number of transects must be sufficient to insure that all plant community types in the impact area along the wetland/nonwetland interface are revealed in the sampling. Generally, transects will be sampled at a rate of 3 per linear mile of baseline and increase at a rate of 1 transect per additional 0.5 mile of baseline length. Ideally, the intervals between transects should be equal; however, this consideration is subordinate to the stated need to sample all plant community types and represent conditions in close proximity to the areas of the most direct impacts.

OBSERVATION PLOT -- Sites along a transect where the details about vegetation, soils and hydrology are observed and recorded. Minimally, one observation plot upgradient and another downgradient from the wetland boundary will be recorded. Together, these two points are the delineator's reasoning behind his wetland boundary. Consequently, it's important that these plots are fair representations of the site conditions along the boundary. It's also important that the two documented plots can be recovered and confirmed by the authenticating agency. Ideally, the centers of these 2 plots should be in the range 5 to 15 feet from one another. Record plot locations must be recoverable from a known station.

VEGETATION SAMPLING: -- 6 strata are defined:

A. WOODY OVERSTORY: stems in 30-ft. radius from center of observation point
   1. TREES -- woody, nonclimbing, at least 5.0in. dbh (diameter at breast height) and at least 20ft. tall.
   2. LIANAS -- woody vines, climbing on trees, shrubs or saplings.
B. WOODY UNDERSTORY: foliage in 15-ft. radius from center of observation plot
   3. SAPLINGS -- woody, nonclimbing, at least 0.4in., but less than 5.0in. dbh, and at least 20ft. tall.
   4. SHRUBS -- woody, nonclimbing, at least 3ft. tall, but less than 20ft. tall
C. HERBACEOUS UNDERSTORY: foliage in 5-ft. radius from center of observation plot
   5. SEEDLINGS & HERBS -- woody, less than 3ft. tall, or nonwoody (any height)
   6. MOSSES & LIVERWORTS -- Only when considered an important component of the community

DOMINANT VEGETATION -- Using the dominance measures below, estimate and list the species in each stratum of the plot that, when ranked in descending order of abundance (i.e. Percent Dominance) and cumulatively totalled, immediately exceeds 50% of the total dominance measure for the stratum plus any additional species that comprise 20% or more of the dominance measure for that stratum.

DOMINANCE MEASURES -- as indicated for the strata below:

Trees -- BASAL AREA (i.e. the cross sectional area at BREAST HEIGHT (4.5 ft.)

Lianas -- number of stems (i.e. at ground level) or basal area, as appropriate

Other Strata -- percent areal coverage (i.e. estimated peak growing season foliage)

TOTAL DOMINANCE MEASURE -- the sum of the dominance measure of all species in a stratum.

PERCENT DOMINANCE -- The sum of the dominance measure of a species divided by total dominance measure for a stratum, expressed as a percent. For example -- the total cover by Carex stricta compared to the total cover of all species in the herb layer.

HYDROPHYTES are considered to be prevalent when more than 50% of the list of dominant vegetation are within the range OBL through FAC on the current National List of Plant Species That Occur in Wetlands: Northeast (Region 1). NOTE: FAC-, FACU and UPL species are considered hydrophytes when observable morphological or physiological adaptations to wetland hydrology are found in the observation plot. Except FAC-, the other + and - signs may be ignored when processing the wetland indicator status data, i.e. OBL-, FACW+, FACW-, FAC+, FACU+, FACU- are considered OBL, FACW, FAC and FACU, respectively.

OBSERVABLE PLANT ADAPTATIONS TO WETLAND HYDROLOGY:

Pneumatophores	Buttressed Trees	Hypertrophied Lenticels
Staoling	Adventitious Roots	Inflated Leaves, Stems, or Roots
Shallow Root Systems	Floating Leaves	Rhizospheric Oxidation
Polymorphic Leaves	Floating Stems	

HYDRIC SOIL -- a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.

SOIL SURFACE -- For organic soils (Histosols) or mineral soils with a thick organic surface layer (histic epipedon), the soil surface is the uppermost organic horizon or layer that is, or has been, saturated for prolonged periods. Otherwise, the soil surface is the top of the mineral soil. (This will be used to describe the depth to the horizons or layers, and their thickness.)

WETLAND HYDROLOGY -- permanent or periodic inundation, or soil saturation for a significant period (usually two weeks or more) during the growing season.

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

Project Title: Martel Cafo-bolism, Inc. File Number:

Transect: T2 Plot: 2 Date: 1 Nov 91

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
Tree	Acer rubrum	320/440	73	FAC
	Pinus strobus	120/440	27	*FACU
Liana	Smilax glauca	several	100	FACU
Sapling	Acer rubrum	63/72	88	FAC
Shrub	Clethra alnifolia	10.5/21	50	FAC+
	Vaccinium corymbosum	10.5/21	50	FACW
Herb	Osmunda cinnamomea	10.5/36	29	FACW
	Clethra alnifolia	10.5/36	29	FAC+

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
0	2	4		1			1	

SUBTOTAL (HYDROPHYTES): 7 SUBTOTAL: 1

TOTAL: 8

100 x SUBTOTAL (HYDROPHYTES) / TOTAL = 100 x 7/8 = 88 = PERCENT HYDROPHYTES

DESCRIBE VEGETATION DISTURBANCE: None

DESCRIBE ADAPTATIONS: Shallow root system

NOTE: This form reflects changes that are consistent with the guidance of the Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1) January 1987

Wetland Determination Data Form -- Version 2-MWVCI

DATA -- SOIL Soil Taxonomy: Aeric Haplaquept

Corps of Engineers Regional Drainage Class: Poorly Drained Criterion: B3b(1)

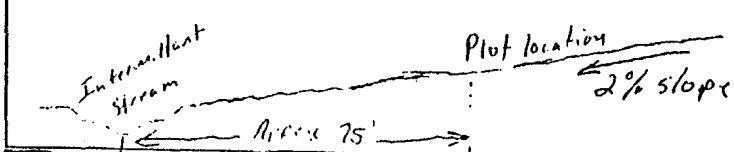
Is Published Soil Survey Available? Yes ☒ No ☐ Title/Date: Wayne Co. 1 Apr. 190

Soil Type Mapped: Ridgebury fine sandy loam Field Observations Confirm Type Mapped? Yes ☒ No ☐

Depth inches	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
3-2	Oi	-	-	fibric (maple leaves pine needles)
2-0	Oa	5YR 2.1/1	-	Sapric
0-3	A	10YR 2/1	-	fsl, oxidized root channels, many med. + coarse roots
3-9	Bw	10YR 5/3	2.5Y 5/2 md	fsl, common fine + v. fine roots in upper part, no roots below
9-20	Bg	2.5Y 5/2	10YR 5/4 fp	fsl
20-30	Cd	2.5Y 5/4	10YR 5/2	fsl, compact basal till (restrictive layer)
≥30	-	-	-	- Not observed below 30"

Remarks: Pit + mound topography, pits comprise more than 50% of the surface area. Profile describes typical pit. This data point is approximately 75' from intermittant stream

Sketch Landscape Position:



FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☐	☑	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☑	☐	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes	NO	
☐	☐	1. Within 6 inches of the soil surface there are:
☐	☐	a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
☐	☐	b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
☐	☐	c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.
☐	☐	2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:
☐	☐	a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
☐	☐	b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☑ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 8"

Depth to Saturation: Saturated to surface

Describe Altered Hydrology: None

☐ Inundated

☑ Saturated in upper 12 inches

☐ Water Marks

☐ Drift Lines

☐ Sediment Deposits

☑ Drainage Patterns within Wetlands

Remarks:

NOTE: This form reflects changes that are consistent with the substance of the Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1) January 1987

Wetland Delineation Datasform -- Version 24JUL91

CONCLUSIONS

Project Title: Martel Catabolism Inc.

Delineator: Bob Sixpack

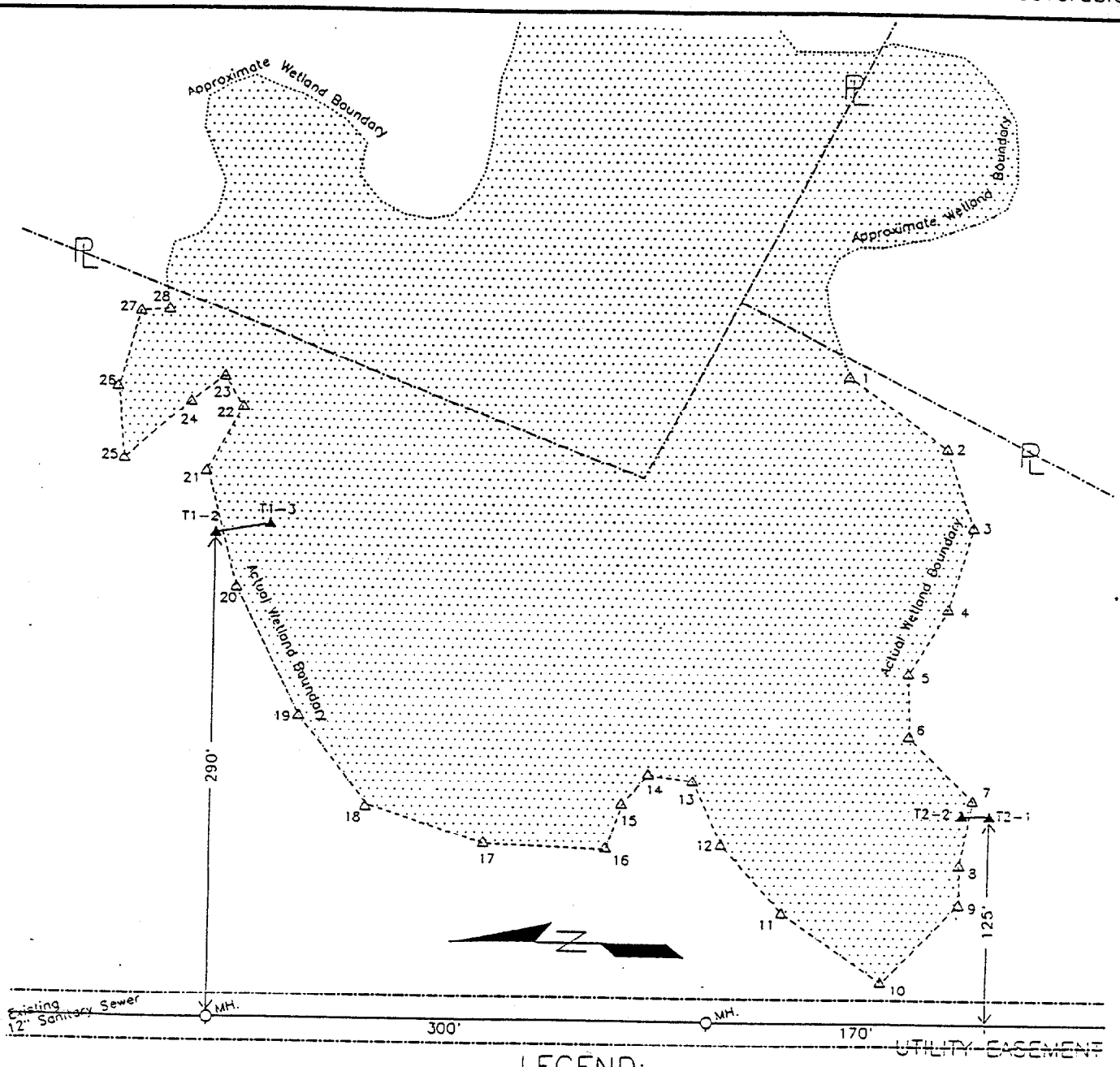
Transect: T2 Plot: 2 Date: 1 Nov. 91

	Yes	No
Greater than 50 Percent Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Present?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

Remarks: The recorded upland datapoint, T2-1 is approximately 35' due South. The wetland boundary is 10' due South in the vicinity of boundary flag #7

Contour and project features have been removed to illustrate ground controls and recoverable points.



LEGEND:

- Property Boundary
- Approx. Wetland Limits
- Actual Wetland Limits
- 10 Wetland Flags
- T6-4 / T6-5 Transect & Datapoints
- Sanitary Sewer used as Baseline
- MH. Manhole used as Known Station

0 50 100
SCALE IN FEET

PURPOSE:
Regional Flea Market for the Culturally Disadvantaged
DATUM: NGVD = 0.0
ADJACENT PROPERTY OWNERS:
1. Willie Prophet
2. Reginald O'Day

DETAILS OF WETLAND DELINEATION

MARTEL CATABOLISM INC.
P.O. Box 404B
Wazoo, MA 02254

LANDSCAPING IMPROVEMENTS
IN: Wetlands adjacent to Fetid Brook
AT: Quasi, MA
COUNTY OF: Whatnot
APPLICATION BY:
Daniel Martel, Esq.

Sheet 2 of 13 DATE: 1 NOV 91

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes No

☐ ☐ Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).

☐ ☐ The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☐ The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☐ The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO

☐ ☐ 1. Within 6 inches of the soil surface there are:

Yes No

☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test ($\alpha,\alpha,$-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:

Stream, lake or tidal gage — Identification: _____

Aerial Photograph — Identification: _____

Other — Identification: _____

☐ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

☐ Inundated

☐ Saturated in upper 12 inches

☐ Water Marks

☐ Drift Lines

☐ Sediment Deposits

☐ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title:

Delineator:

Transect: Plot: Date:

	Yes	No
Greater than 50 Percent Hydrophytes?	☐	☐
Hydric Soils Criterion Met?	☐	☐
Wetland Hydrology Present?	☐	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☐

Remarks:

NOTE: This form reflects changes that are consistent with the guidance of the Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1) January 1987

Wetland Delineation Datasheet -- Version 2.4WUC91

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

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3. This interpretive routine may be inappropriate in unusual cases.

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☐ ☐ The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☐ The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO

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Yes No

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☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

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1. Hydrology is often the most difficult feature to observe.
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Stream, lake or tidal gage — Identification: _____

Aerial Photograph — Identification: _____

Other — Identification: _____

☐ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology: _____

☐ Inundated

☐ Saturated in upper 12 inches

☐ Water Marks

☐ Drift Lines

☐ Sediment Deposits

☐ Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title:

Delineator:

Transect: Plot: Date:

	Yes	No
Greater than 50 Percent Hydrophytes?	☐	☐
Hydric Soils Criterion Met?	☐	☐
Wetland Hydrology Present?	☐	☐

	Yes	No
IS THIS DATAPOINT WITHIN A WETLAND?	☐	☐

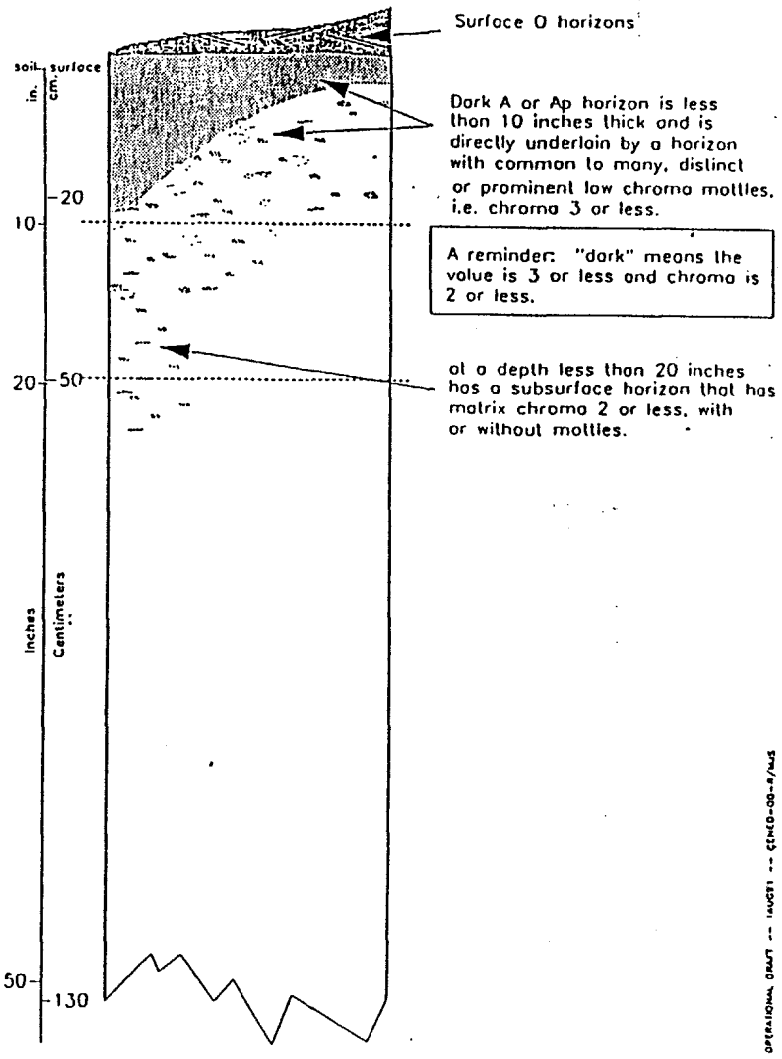
Remarks:

NOTE: This form reflects changes that are consistent with the guidance of the Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1) January 1987

Wetland Delineation Datasheet -- Version 2 Jul/91

B3c(1') POORLY DRAINED

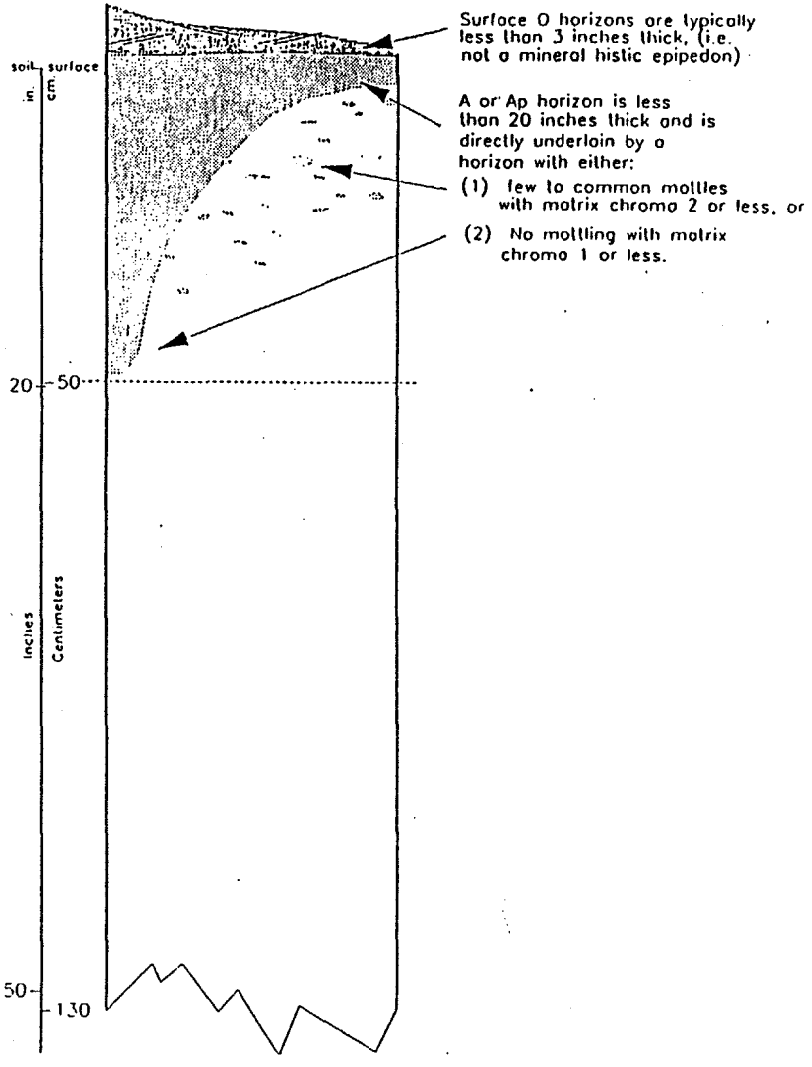
No spodic horizon, textures are loamy fine sand or coarser in all subhorizons within 20 inches of the soil surface



OPERATIONAL DRAFT -- 1AUG91 -- CEMED-00-R/MJS

B3a POORLY DRAINED

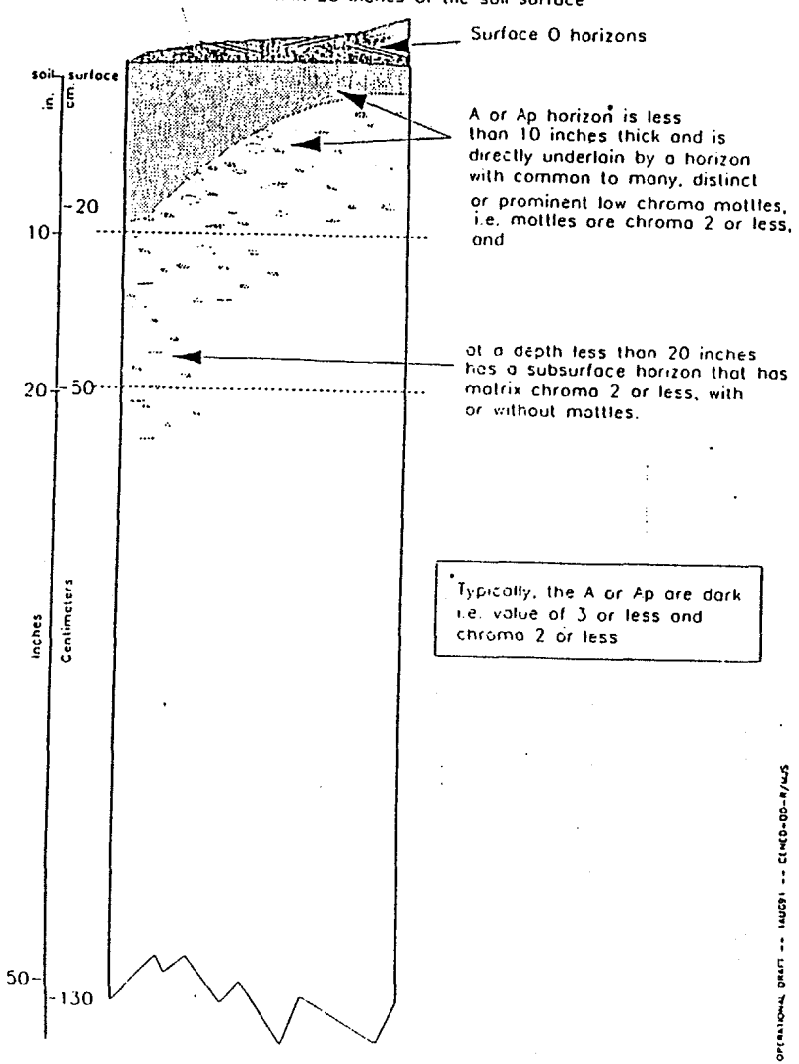
No spodic horizon, and no textural criteria



OPERATIONAL DRAFT -- 1AUG91 -- CEMED-00-R/MJS

B3b(1) POORLY DRAINED

No spodic horizon, textures are finer than loamy fine sand in any or all subhorizons within 20 inches of the soil surface



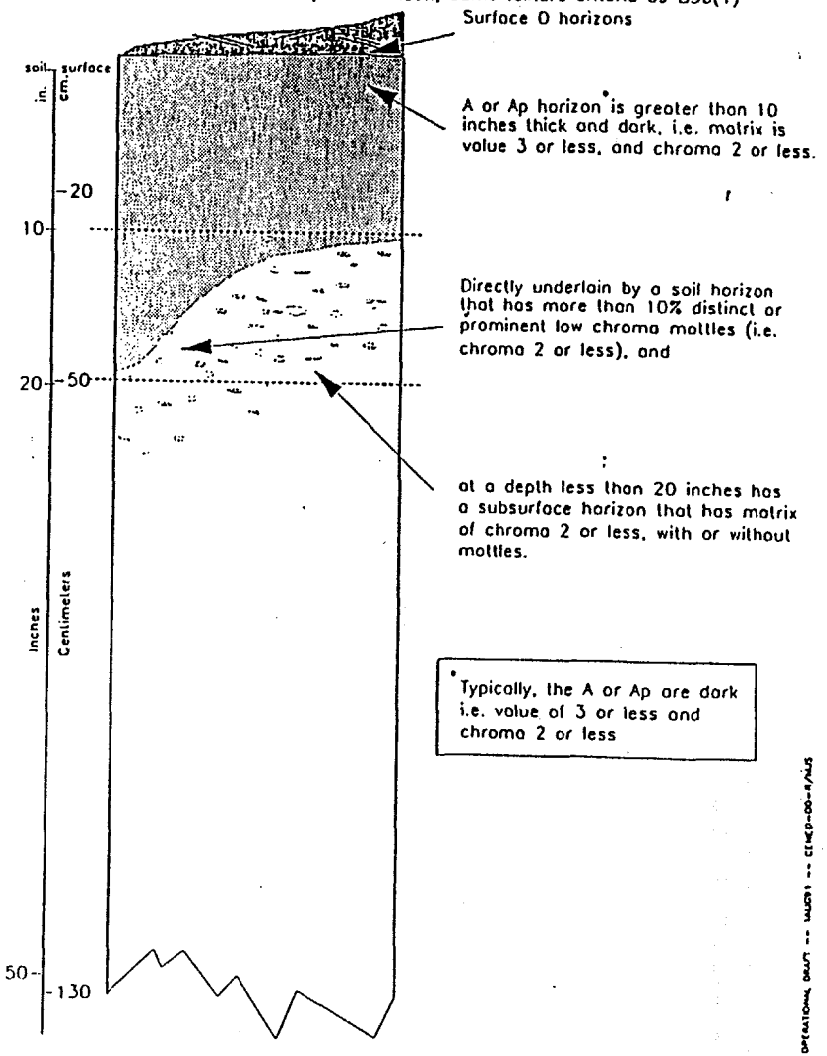
*Typically, the A or Ap are dark i.e. value of 3 or less and chroma 2 or less

OPERATIONAL DRAFT -- 1AUG91 -- CENED-DD-R/NJS

Fold or Cut Along this Line

B3b(2) POORLY DRAINED

No spodic horizon, same texture criteria as B3b(1)

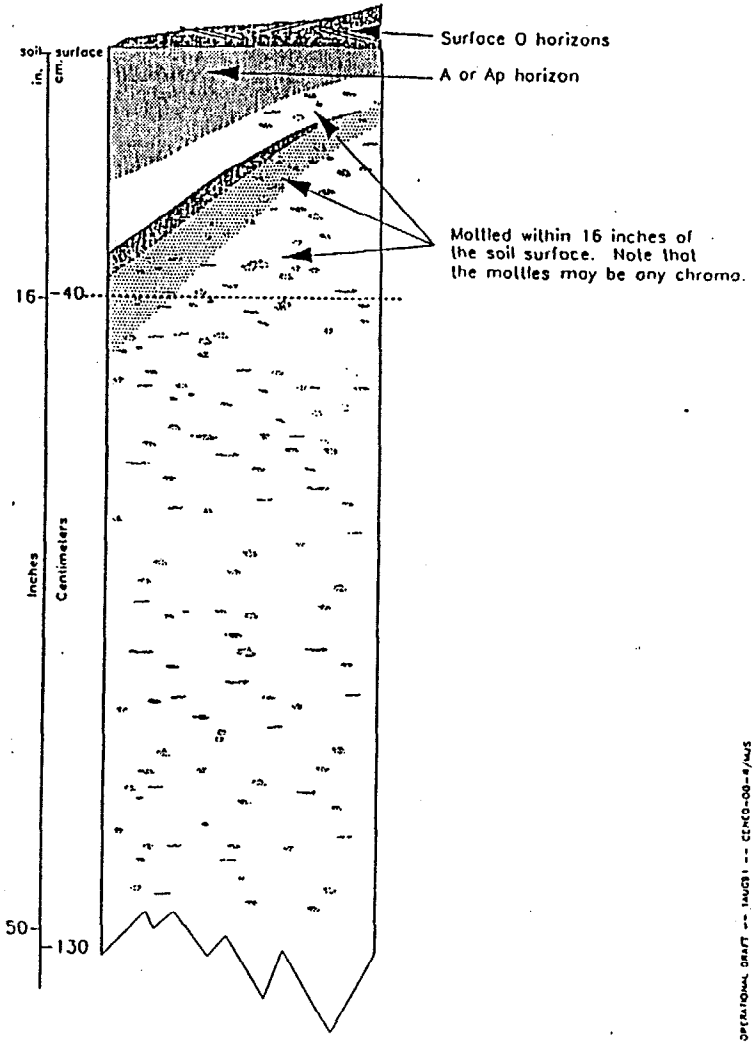


*Typically, the A or Ap are dark i.e. value of 3 or less and chroma 2 or less

OPERATIONAL DRAFT -- 1AUG91 -- CENED-DD-R/NJS

C1 SOMEWHAT POORLY DRAINED

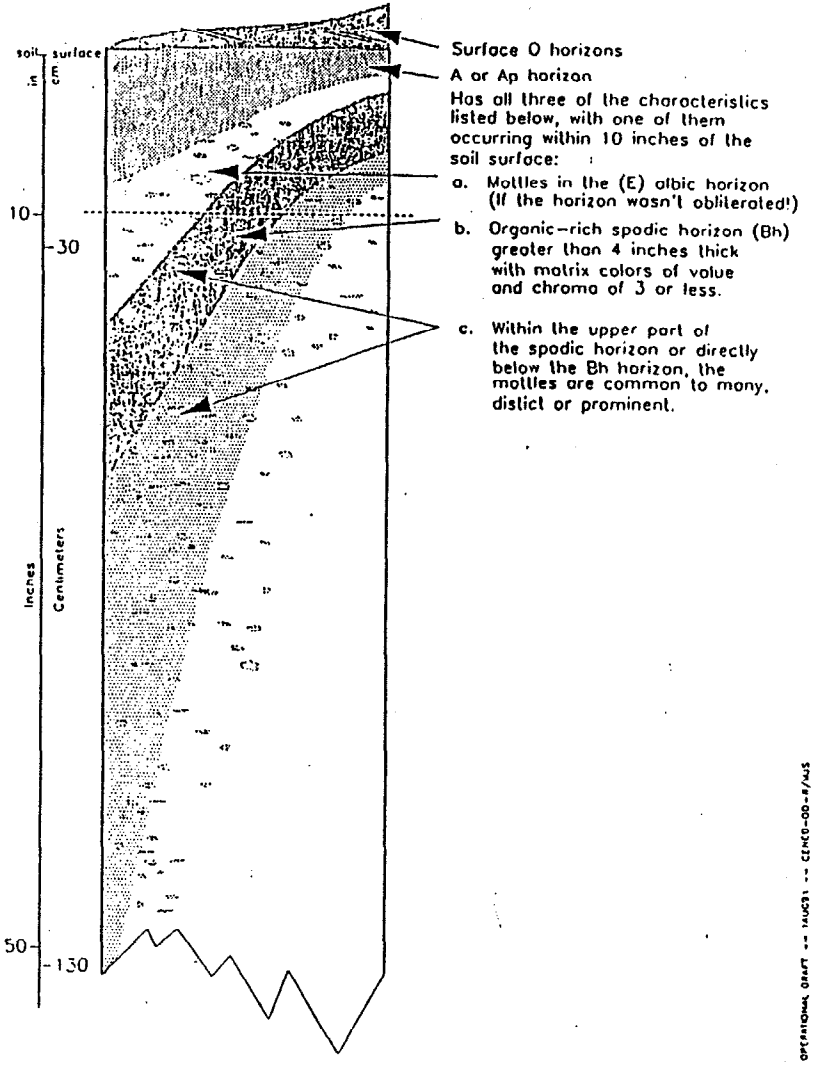
Spodosols, and no texture criteria
(Both aquic and udic soils may be included)



OPERATIONAL DRAFT -- 14UG91 -- CENCO-OD-R/NJS

B1 POORLY DRAINED

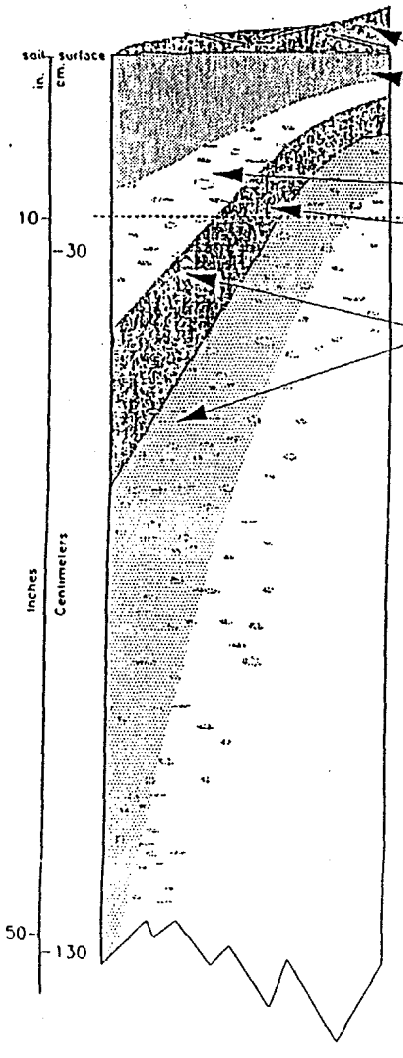
Spodosol with textures that are finer than loamy fine sand in any or all subhorizons within 20 inches of the soil surface, and



OPERATIONAL DRAFT -- 14UG91 -- CENCO-OD-R/NJS

B2 POORLY DRAINED

Spodosol with textures that are loamy fine sand or coarser in all subhorizons within 20 inches of the soil surface, and



Surface O horizons

A or Ap horizon

Has all three of the characteristics listed below, with one of them occurring within 10 inches of the soil surface.

a. Mottles in the (E) albic horizon (If the horizon wasn't obliterated!)

b. Organic-rich spodic horizon (Bh) greater than 2 inches thick with matrix colors of value and chroma of 3 or less.

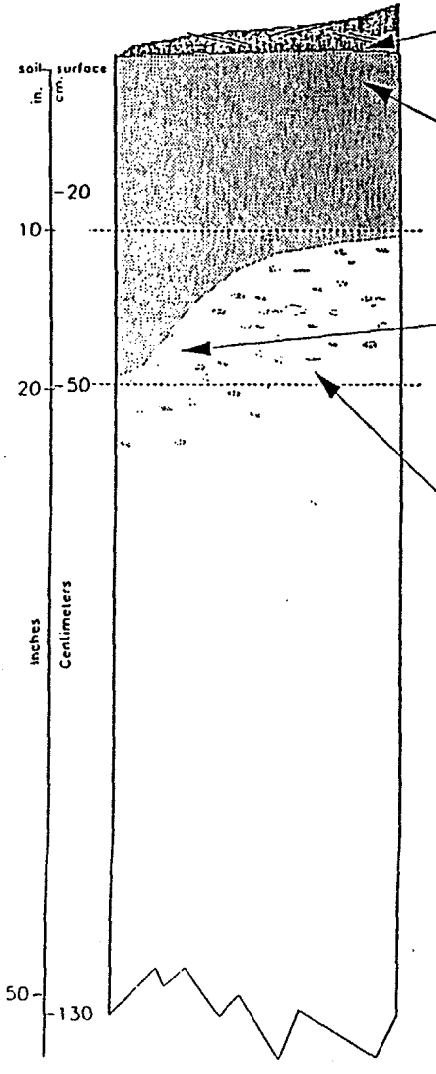
c. Within the upper part of the spodic horizon or directly below the Bh horizon, the mottles are common to many, distict or prominent.

NOTE: The difference between this and B1 are related to texture and the thickness of the Bh.

OPERATIONAL DRAFT -- 1AUG91 -- CEMCO-OO-R/MJS

B3c(2) POORLY DRAINED

No spodic horizon, same texture criteria as B3c(1)



Surface O horizons

A or Ap horizon* is greater than 10 inches thick and matrix is value 3 or less, and chroma 2 or less.

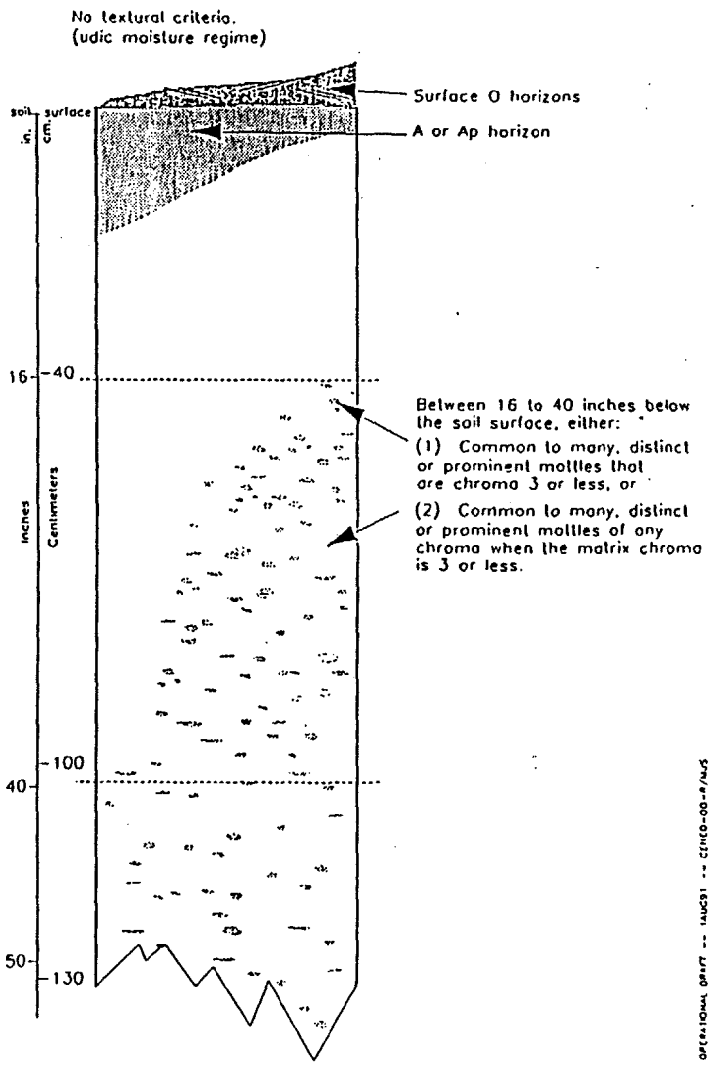
Directly underlain by a soil horizon that has more than 10% distinct or prominent low chroma mottles (i.e. chroma 3 or less), and

at a depth less than 20 inches has a subsurface horizon that has matrix of chroma 3 or less, with or without mottles.

*Typically, the A or Ap are dark i.e. value of 3 or less and chroma 2 or less

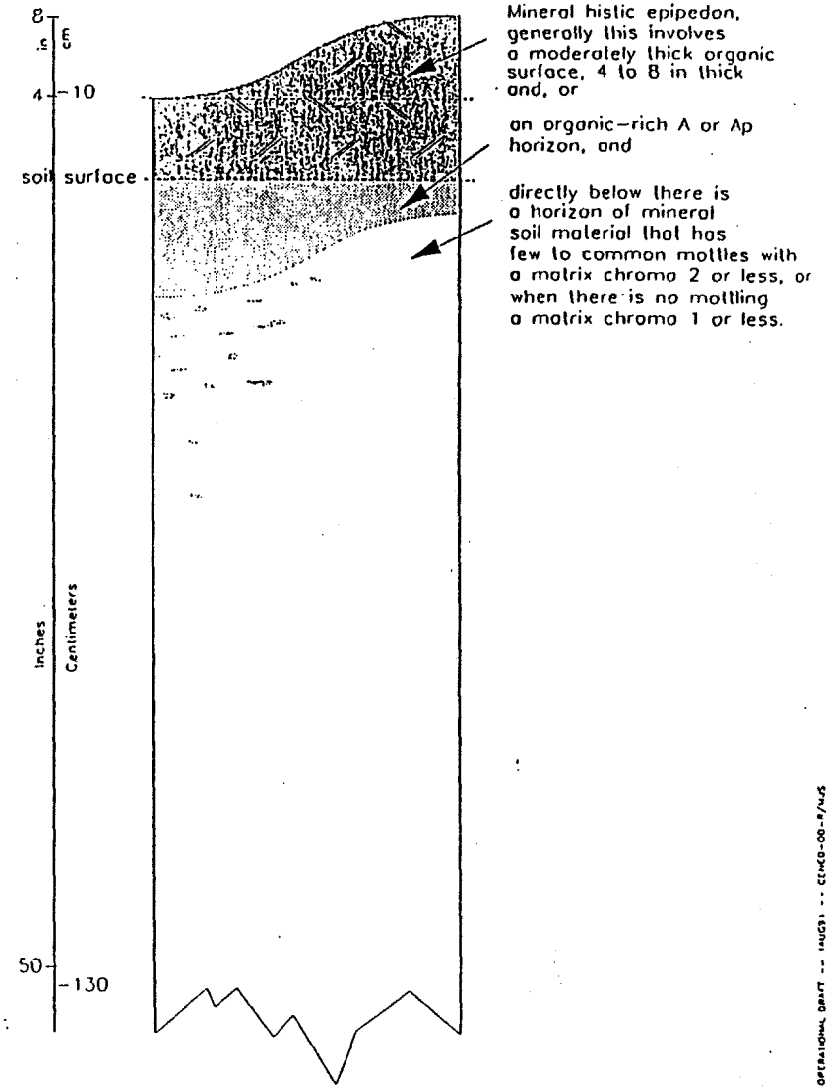
OPERATIONAL DRAFT -- 1AUG91 -- CEMCO-OO-R/MJS

D MODERATELY WELL DRAINED



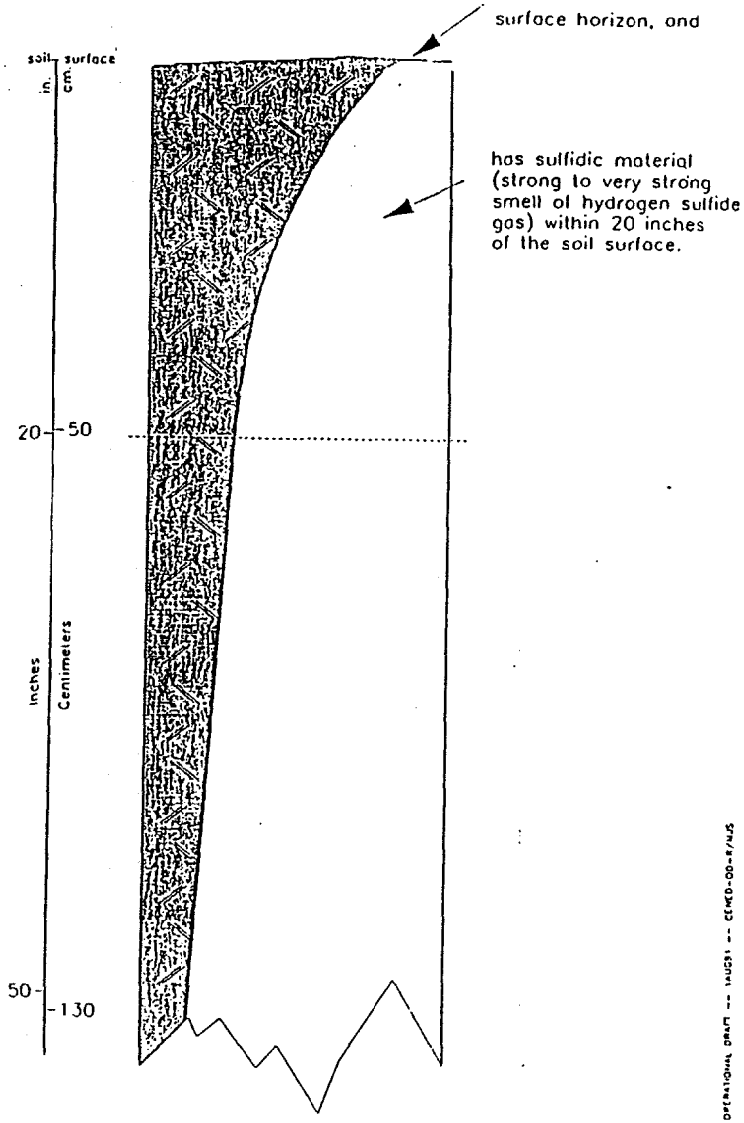
OPERATIONAL DRAFT -- 1AUG91 -- CENCO-00-R/NJS

A3 VERY POORLY DRAINED



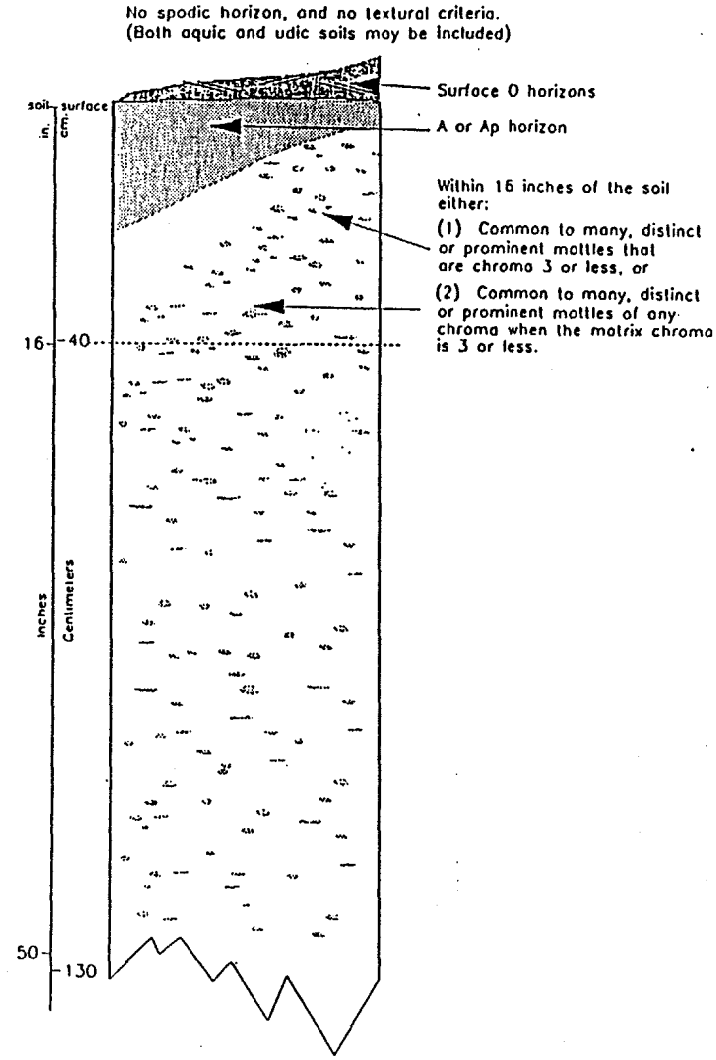
OPERATIONAL DRAFT -- 1AUG91 -- CENCO-00-R/NJS

A4 VERY POORLY DRAINED



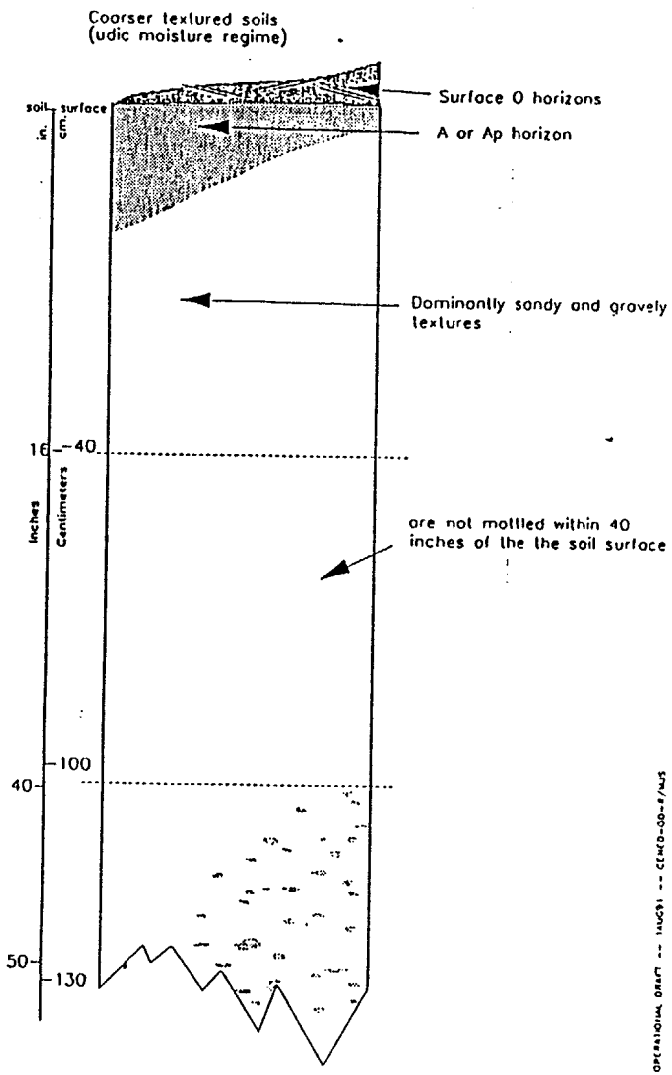
OPERATIONAL DRAFT -- 14JUL91 -- CEWCD-DO-R/MJS

C2 SOMEWHAT POORLY DRAINED

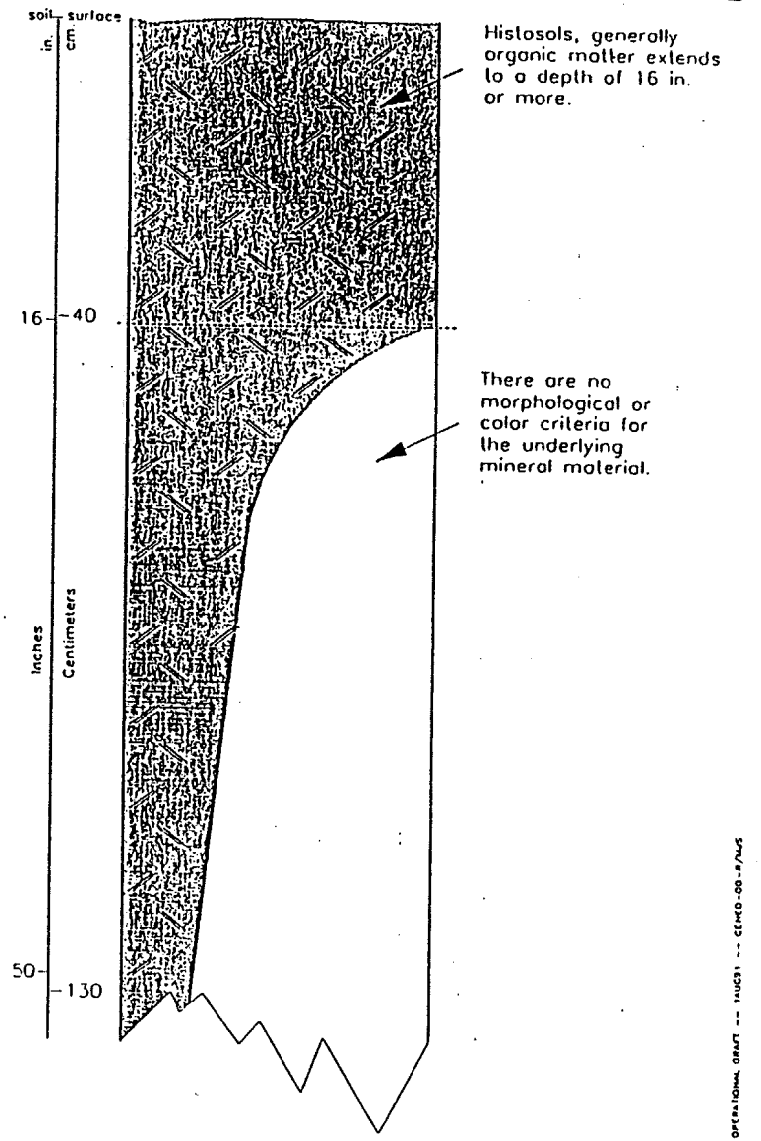


OPERATIONAL DRAFT -- 14JUL91 -- CEWCD-DO-R/MJS

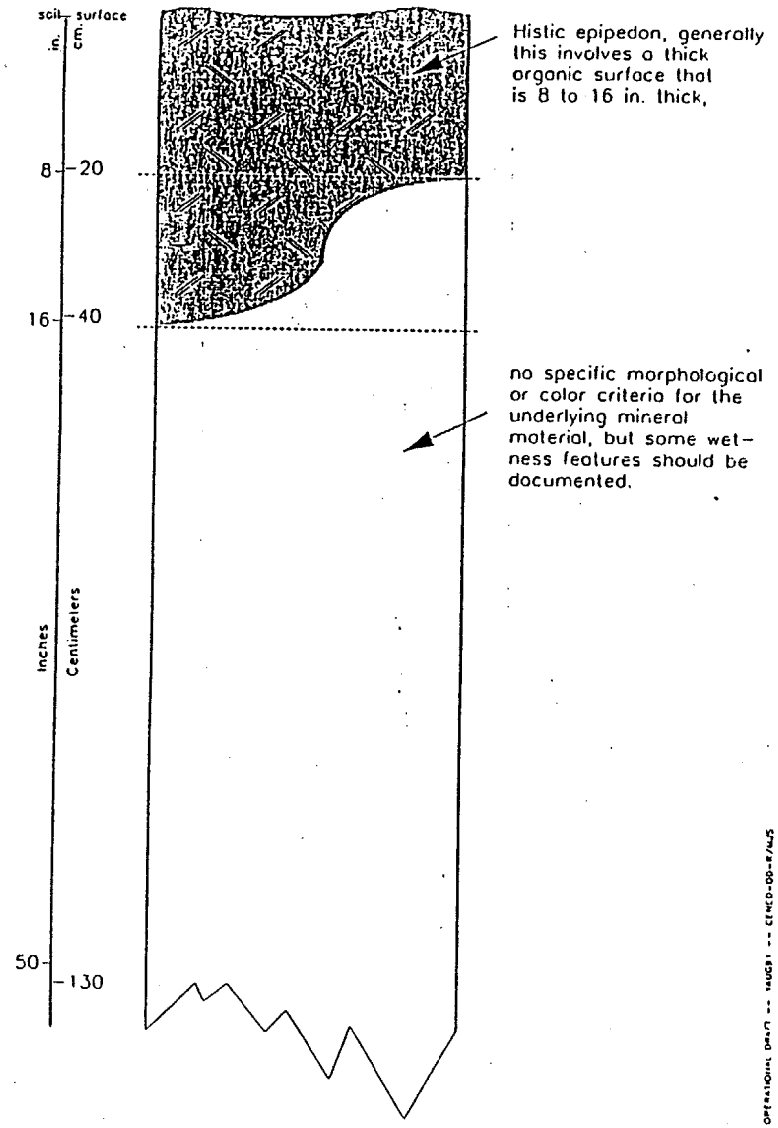
F SOMEWHAT EXCESSIVELY TO EXCESSIVELY DRAINED SOILS



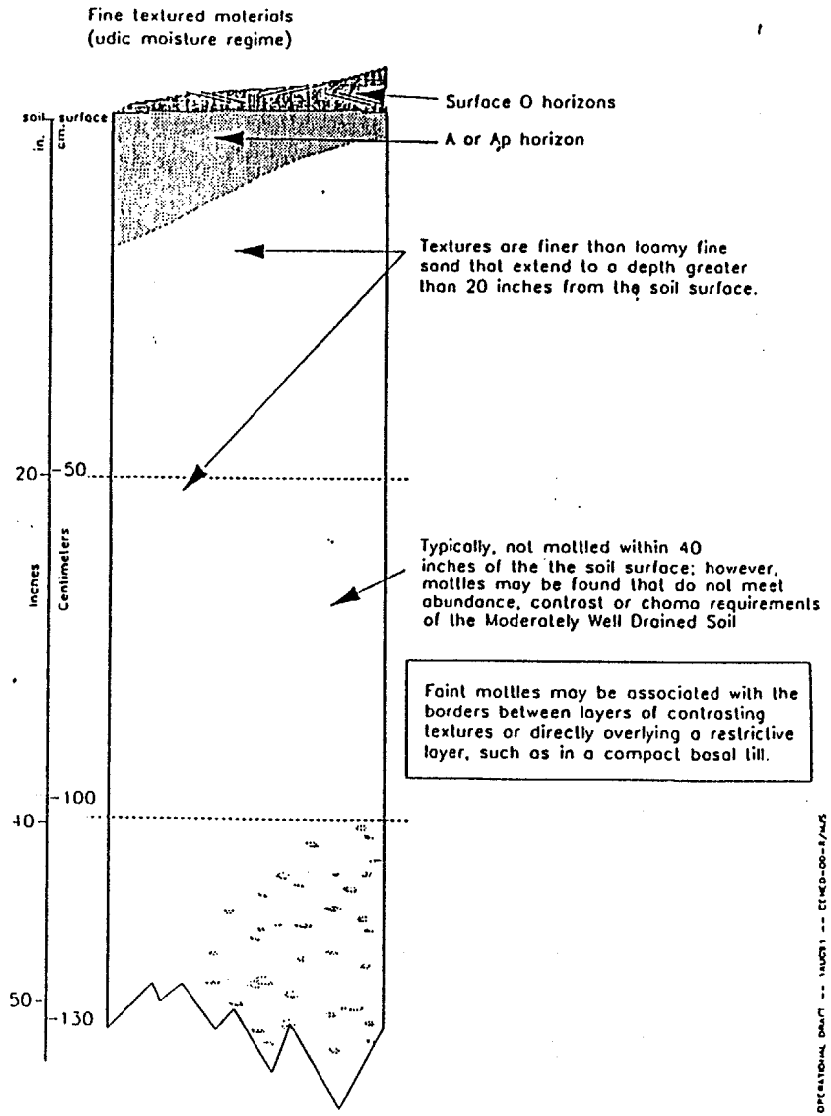
A1 VERY POORLY DRAINED



A2 VERY POORLY DRAINED



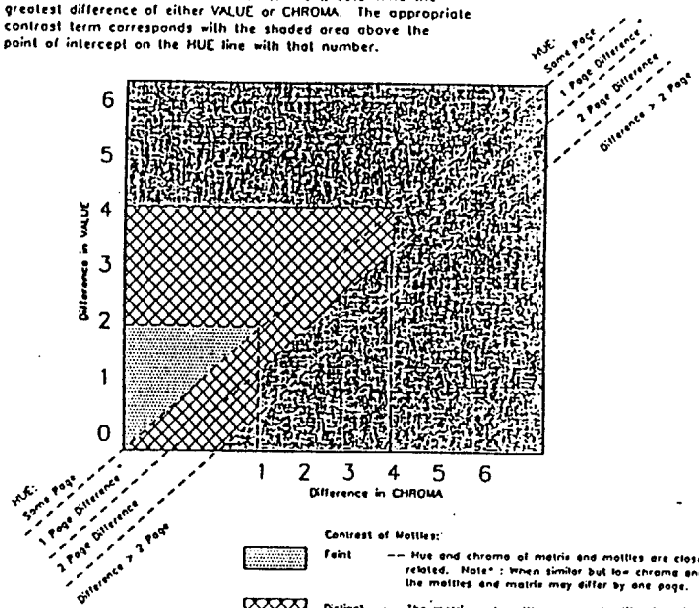
E WELL DRAINED



CONTRAST OF MOTTLES

For use with Munsell Color Charts

Directions: First, select the number of pages between the Hue of the matrix and the HUE of the mottle. Next, determine the greatest difference of either VALUE or CHROMA. The appropriate contrast term corresponds with the shaded area above the point of intercept on the HUE line with that number.



Contrast of Mottles:

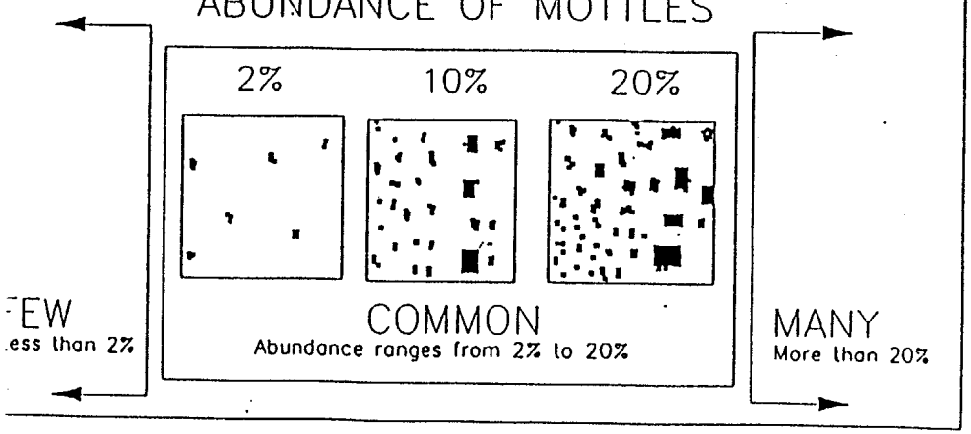
Faint -- Hue and chroma of matrix and mottles are closely related. Note*: When similar but low chroma and value the mottles and matrix may differ by one page.

Distinct -- The matrix and mottles commonly differ 1 to 2 hues or several units in chroma and several units of value

Prominent -- The matrix and mottles commonly differ several units in hue and/or several units in value and chroma

CEMED-OD-R/m-s Iwerji

ABUNDANCE OF MOTTLES



GUIDELINES FOR SOIL DRAINAGE CLASS DETERMINATION
used for Section 404 of Clean Water Act Jurisdictional Interpretations by
U.S. Army Corps of Engineers, New England Division
-- OPERATIONAL DRAFT --
(Version 27Feb91)

the range of soil profile conditions are illustrated on the pages following the entire text. Above each stylized drawing there are large letters and numbers corresponding to the paragraphs in the text. The full range of conditions that are described in the text is represented by vertical section through each profile.

A. VERY POORLY DRAINED SOILS are soils that have an aquic moisture regime and one of the following:

1. Organic soil materials that extend from the soil surface[a] to a depth of 16 or more inches (i.e. Histosols).
2. Organic soil materials that extend from the soil surface to a depth of 8 to 16 inches (i.e. histic epipedon).
3. A mineral histic epipedon (e.g. organic surface layers that are 4 to 8 inches thick and/or have an organic-rich A or Ap horizon) and, in the soil horizon that lies directly under an O, A, or Ap horizon there are few to common mottles with the matrix chroma[b] of 2 or less or, if there are no mottles in this underlying layer, the matrix chroma is 1 or less.
4. Sulfidic materials[c] within 20 inches of the soil surface.

B. POORLY DRAINED SOILS are soils that have an aquic moisture regime and one of the following:

1. A spodic horizon and a texture that is finer than loamy fine sand in some or all subhorizons within 20 inches of the soil surface; and have all the following characteristics, with one of these characteristics evident within 10 inches of the soil surface:

   a. Mottles within the albic horizon.[d]
   b. Organic-rich spodic (Bh) horizon greater than 4 inches thick with matrix colors of value and chroma of 3 or less.
   c. Mottles[e] that are common to many, distinct or prominent, are within the upper part of the spodic horizon or are directly below the organic-rich (Bh) horizon.

2. A spodic horizon and a texture that is loamy fine sand or coarser in all subhorizons within 20 inches of the soil surface; and have all the following characteristics, with one these characteristics evident within 10 inches of the soil surface:

   a. Mottles within the albic horizon.[d]
   b. Organic-rich spodic (Bh) horizon greater than 2 inches thick with matrix colors of value and chroma of 3 or less.
   c. Mottles[e] that are common to many, distinct or prominent, are within the upper part of the spodic horizon or are directly below the organic-rich (Bh) horizon.

3. Do not have a spodic horizon and have one of the following:

   a. Any soil texture, and the matrix of the soil horizon which is within 20 inches of the surface and directly underlying an O, A, or Ap horizon, is chroma 2 or less when mottles are few to common; or if there are no mottles in this horizon, the matrix chroma is 1 or less.

   b. Within 20 inches of the soil surface, both the texture is finer than loamy fine sand in some or all subhorizons, and there is a subsurface horizon with a matrix color of chroma 2 or less, and one of the following:
   (1) In the soil horizon directly underlying an A or Ap horizon and within 10 inches of the soil surface, there are mottles that are common to many, distinct or prominent, and that are chroma 2 or less.
   (2) In the soil horizon directly underlying a thick, dark A or Ap horizon[f], there are mottles that are distinct or prominent, greater than 10% in abundance and that are chroma 2 or less.

   c. Within 20 inches of the soil surface, the texture is loamy fine sand or coarser in all subhorizons, and there is a subsurface horizon with a matrix color of chroma of 3 or less, and one of the following:
   (1) In the soil horizon directly underlying a dark[g] A or Ap horizon and within 10 inches of the soil surface, there are mottles that are common to many, distinct or prominent, and that are chroma 3 or less.
   (2) In the soil horizon directly underlying a thick, dark A or Ap horizon[f], there are mottles that are distinct or prominent, greater than 10% in abundance, and that are chroma 3 or less.

C. SOMEWHAT POORLY DRAINED SOILS are soils that have an aquic or udic moisture regime and either of the following:

1. A spodic horizon that is mottled within 16 inches of the soil surface, regardless of the chroma of those mottles.

2. No spodic horizon and, within 16 inches of the soil surface, there is one of the following:
   a. Mottles that are common to many, distinct or prominent, and have a chroma of 3 or less.
   b. A matrix chroma of 3 or less with mottles which are common to many, distinct or prominent, regardless of their chroma.

D. MODERATELY WELL DRAINED SOILS are soils that have a udic moisture regime and, between a depth of 16 to 40 inches below the soil surface, have one of the following:

1. Mottles that are common to many, distinct or prominent, and that are chroma 3 or less.

2. A matrix chroma of 3 or less and mottles that are common to many, distinct or prominent, regardless of their chroma.

E. WELL DRAINED SOILS are soils that have a udic moisture regime and textures finer than loamy fine sand that extend below 20 inches, and are not mottled[h] within 40 inches of the soil surface.

F. SOMEWHAT EXCESSIVELY TO EXCESSIVELY DRAINED SOILS are all other soils.[i]

Endnotes:

a. SOIL SURFACE -- For Organic Soils (Histosols) or mineral soils with a thick organic surface layer (histic epipedon), the soil surface is the top of the uppermost organic horizon that is, or has been saturated for prolonged periods. Otherwise, the soil surface is the top of the mineral soil. This definition is intended to be used throughout these guidelines.

b. SOIL COLORS -- All soil colors are documented under moist conditions using a Munsell system standardized soil color book. The terms "value" and "chroma" are soil color descriptors used in these guidelines. The term matrix refers to the dominant color that occupies the greatest volume of the horizon or layer.

c. Sulfidic materials -- In a sample from within a 20 inch depth, hydrogen sulfide gas is present if a strong to very strong odor of rotten eggs is immediately detected. This procedure is accomplished in the field, generally when you open up your pit to describe the soil profile.

d. It is our intent to require this criterion only when an albic horizon is evident. When the horizon is evident, mottling should appear within 10 inches of the soil surface. Obliteration of the albic horizon may occur in areas of poorly drained Spodosols where repeated tree throws mix and often disguise any evidence of a discrete albic (E) horizon above the spodic horizon. Plowing may produce a similar result. Mottling of the albic horizon may be difficult to interpret and may involve faintly contrasting shades of gray.

e. Mottles may be of any chroma.

f. To be thick and dark, this horizon must have a thickness greater than 10 inches and the matrix color must be a value 3 or less and chroma 2 or less.

g. To be dark, this horizon must have a matrix color that is value 3 or less and chroma 2 or less.

h. Faint mottling is allowed within 40 inches of the soil surface for some well drained soils when the soil mottling is associated with contrasting textures or directly overlying a restrictive layer, such as in a compact glacial till.

i. Not all wet soils have been excluded by the morphological criteria used in these guidelines for moderately well drained or better. Some soils within the New England region have developed within mineral parent materials that mask or inhibit the development of soil morphology. These difficult interpretations may include soils developed in Triassic red sandstones, carboniferous schists, strongly calcarious sediments, recently deposited sediments, and some soils adjacent to brackish and salt water bodies, etc. In this region, we recognize the need to identify the general locations of these unique soils and the need to develop reliable field criteria for these exceptions.

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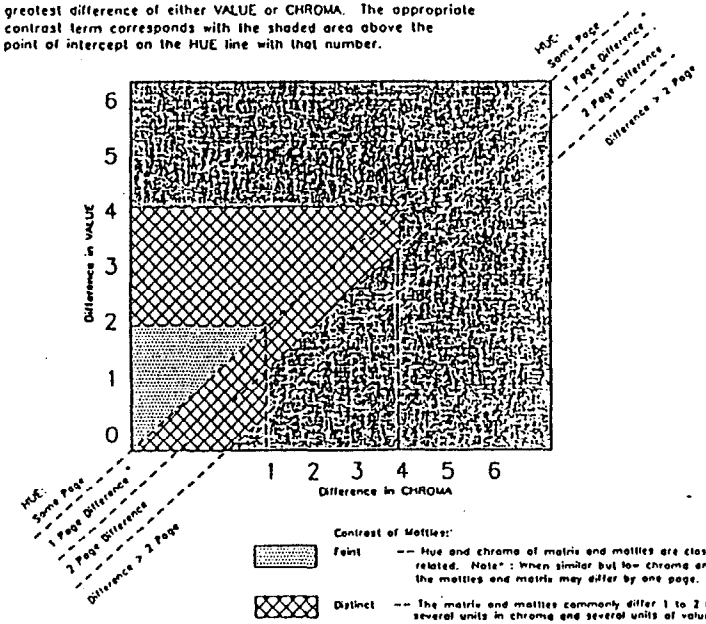

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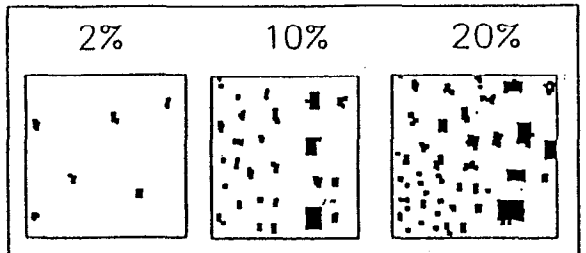
Prominent -- The matrix and mottles commonly differ several units in hue and/or several units in value and chroma

CENED-OO-R/mg 1ug91

ABUNDANCE OF MOTTLES



FEW
less than 2%

COMMON
Abundance ranges from 2% to 20%

MANY
More than 20%

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3. A mineral histic epipedon (e.g. organic surface layers that are 4 to 8 inches thick and/or have an organic-rich A or Ap horizon) and, in the soil horizon that lies directly under an O, A, or Ap horizon there are few to common mottles with the matrix chroma[b] of 2 or less or, if there are no mottles in this underlying layer, the matrix chroma is 1 or less.
4. Sulfidic materials[c] within 20 inches of the soil surface.

B. POORLY DRAINED SOILS are soils that have an aquic moisture regime and one of the following:

1. A spodic horizon and a texture that is finer than loamy fine sand in some or all subhorizons within 20 inches of the soil surface; and have all the following characteristics, with one of these characteristics evident within 10 inches of the soil surface:

   a. Mottles within the albic horizon.[d]
   b. Organic-rich spodic (Bh) horizon greater than 4 inches thick with matrix colors of value and chroma of 3 or less.
   c. Mottles[e] that are common to many, distinct or prominent, are within the upper part of the spodic horizon or are directly below the organic-rich (Bh) horizon.

2. A spodic horizon and a texture that is loamy fine sand or coarser in all subhorizons within 20 inches of the soil surface; and have all the following characteristics, with one these characteristics evident within 10 inches of the soil surface:

   a. Mottles within the albic horizon.[d]
   b. Organic-rich spodic (Bh) horizon greater than 2 inches thick with matrix colors of value and chroma of 3 or less.
   c. Mottles[e] that are common to many, distinct or prominent, are within the upper part of the spodic horizon or are directly below the organic-rich (Bh) horizon.

3. Do not have a spodic horizon and have one of the following:

   a. Any soil texture, and the matrix of the soil horizon which is within 20 inches of the surface and directly underlying an O, A, or Ap horizon, is chroma 2 or less when mottles are few to common; or if there are no mottles in this horizon, the matrix chroma is 1 or less.

   b. Within 20 inches of the soil surface, both the texture is finer than loamy fine sand in some or all subhorizons, and there is a subsurface horizon with a matrix color of chroma 2 or less, and one of the following:
   (1) In the soil horizon directly underlying an A or Ap horizon and within 10 inches of the soil surface, there are mottles that are common to many, distinct or prominent, and that are chroma 2 or less.
   (2) In the soil horizon directly underlying a thick, dark A or Ap horizon[f], there are mottles that are distinct or prominent, greater than 10% in abundance and that are chroma 2 or less.

   c. Within 20 inches of the soil surface, the texture is loamy fine sand or coarser in all subhorizons, and there is a subsurface horizon with a matrix color of chroma of 3 or less, and one of the following:
   (1) In the soil horizon directly underlying a dark[g] A or Ap horizon and within 10 inches of the soil surface, there are mottles that are common to many, distinct or prominent, and that are chroma 3 or less.
   (2) In the soil horizon directly underlying a thick, dark A or Ap horizon[f], there are mottles that are distinct or prominent, greater than 10% in abundance, and that are chroma 3 or less.

SOIL INTERPRETATION REFERENCES:

1. Soil Taxonomy:

Keys to Soil Taxonomy 4th Ed.
SMSS Technical Monograph No. 19
Virginia Polytechnical Institute
and State University
Mail to: International Soils
$12 Check -> Crop & Soil Environmental
Sciences Department
Virginia Tech
Blacksburg, VA 24061-0404

Keys to The Taxonomic
Classification of New England
Soils
$14 -> Michael Cuomo
22 Jewett Avenue
S. Berwick, ME 03908

2. Published Soil Surveys:

Connecticut:
USDA-SCS
16 Professional Park Road
Storrs, CT 06268

Massachusetts:
USDA-SCS
451 West Street
Amherst, MA 01002

Rhode Island:
USDA-SCS
46 Quaker Lane
West Warwick, RI 02893

Maine:
USDA- SCS Office Building
University of Maine
Orono, ME 04473

New Hampshire:
USDA-SCS
Federal Building
Durham, NH 03824

Vermont:
USDA-SCS
69 Union Street
Winooski, VT 05404

3. Horizons, Mottles, USDA Texture and
Other Appropriate Features:

Soil Survey Manual
Chapter 3
"Examination and Description of Soils"

4. Soil Colors:

Munsell Soil Color Charts
Macbeth Division of
Kollmorgen Corporation
2441 North Calvert Street
Baltimore, MD 21218