Soil Scientist Evaluation Policy

PURPOSE: This document sets forth Division of Water Quality policy concerning the requirements for soil scientist evaluations under the 15A NCAC 02T rules.

Table of Contents

1) **For land application of wastewater (spray or surface drip irrigation system). A soils report shall include the following components:**
   a) General Requirements
      i) The soil scientist evaluation shall conform to all criteria outlined in 15A NCAC 02T .0504(b) and other appropriate sections of 15A NCAC 02T.
      ii) A North Carolina licensed soil scientist (L.S.S.) shall sign, seal and date the report as required by G.S. 89F.
      iii) The report shall identify all the sites/fields with project name, location, and include a statement that the sites/fields were recommended by the L.S.S. for the proposed land application activity.
      iv) If the site/soil evaluation was performed more than one year prior to the submittal of the application package, a statement should be included indicating that the site has not changed since the original investigation.
   b) Detailed Soils Map
      i) The soils map shall meet all of the following requirements:
         (1) The map shall encompass the entire wastewater system, including buffers, treatment, storage, and disposal facilities.
         (2) Be clear and reproducible in black and white.
         (3) Be of an appropriate scale to show the necessary detail for the proposed land application activity.
         (4) Include a map legend that identifies all soil map units and special symbols. A separate map unit legend shall be included if this information will not fit on the soil map.
         (5) Include a map scale and north arrow.
         (6) Be labeled with the project name, date of map completion, and be signed and sealed by the L.S.S. responsible for the map.
         (7) Show the locations of ditches and other physical features, streams, water bodies, and identified wetlands.
         (8) Show the location of all auger borings, pit excavations, and saturated hydraulic conductivity (K_{sat}) data points.
         (9) Label all roads and other landscape and cultural features that aid with orientation. Include site/field numbers on the maps when possible.
      ii) Map unit design criteria
         (1) Map units shall be named for their major components (soils comprising approximately 20% or more of the map unit). Complexes of two or more soils can be used where separation of the major soil components is not possible at the scale of mapping.
         (2) Where appropriate, similar soils can be combined together into one map unit. Similar soils are those soils that have no significant differences in use and management for the land application of wastewater.
         (3) Highly contrasting soils should be separated out in the soils mapping whenever practical. If separation is not possible, the presence of the highly contrasting soils should be included in the map unit name (if they comprise 20% or more of the map unit) or noted in the soils report as a minor component.

c) Soil Characterization Data
   i) Map unit documentation
      (1) The map unit name shall be supported by a sufficient number of soil profile descriptions, soil borings, and other data.
      (2) Minor amounts of contrasting soils that are components in each soil map unit shall be identified.
   ii) Soil Profile Descriptions
      (1) The minimum number of soil profile descriptions that shall be required for each project will be based upon the nature of the project; however, additional soil profile descriptions should be included, as necessary, to adequately represent the site and any unusual site/soil circumstances.
         (a) For wastewater systems with a flow rate of less than 10,000 gallons/day, a minimum of one soil profile description shall be submitted for each named soil series found in the soil map legend. This soil profile description shall be located within the proposed land application area. If only one soil profile description is submitted for a soil series, that description shall be typical for that soil within the proposed land application area. Soil profile descriptions written at K_{sat} data points shall count towards this requirement as long as they satisfy all other soil profile description requirements. Multiple soil profile descriptions are desirable when a range in soil properties is encountered.
         (b) For wastewater systems with a flow rate greater than or equal to 10,000 gallons/day, the minimum number of soil profile descriptions shall be based upon the number of planned irrigation zones that a soil is found in. (Irrigation subzones should be considered as one zone for this requirement.) All irrigation zones shall require a minimum of one soil profile description for each named soil series mapped within that zone. (Example: If Norfolk soils are a named map unit component in 5 irrigation zones that each consist of 2 subzones (A & B), a minimum of 5 soil profile descriptions for Norfolk soils shall be required.) These soil profile descriptions shall be located within the proposed land application area. Soil profile descriptions written at points outside the application area may be submitted but shall not count towards the minimum number requirement. Soil profile descriptions written at K_{sat} data points shall count towards this requirement as long as they satisfy all other soil profile description requirements. Multiple soil profile descriptions in excess of the minimum amount are desirable when a range in soil properties is encountered.
      (2) In areas where extensive soil-disturbing activities such as grading have taken place, soil profile descriptions shall be written for the dominant soil conditions. Separate soil profile descriptions shall be written for areas where soil has been removed (cut) and areas where soil has been added (fill).
      (3) Soil profile descriptions shall describe soil conditions within seven feet of the land surface or to a Cr or R horizon.

(4) Soil profile descriptions shall be fully written out or if abbreviated, use the conventional USDA Natural Resources Conservation Service field note abbreviations. [1]

(5) Soil profile descriptions, based on examinations of excavation pits or auger borings, shall describe the following parameters by individual diagnostic horizons:
   (a) Thickness of the horizon (measurement of the top and bottom of the soil horizon in inches from the soil surface).
   (b) Texture (USDA soil texture, use texture modifiers as necessary [gravelly, very gravelly, extremely gravelly, etc.]).
   (c) Color and other diagnostic features.
      (i) Primary matrix color as well as the abundance, size, and color of mottles
      (ii) Munsell Color Chart notation (example: 10YR 6/3)
      (iii) Identify soil moisture at the time the soil color was described for each horizon (moist soil is assumed unless noted as dry)
      (iv) Colors that are redoximorphic features shall be identified as such (i.e. redox concentrations, redox depletions, etc.)
   (d) Structure (grade, size, and type)
   (e) Depth, thickness, and type of restrictive horizon(s) (i.e. compacted layers, plow pans, fragipans, plinthite, brittle layers, etc.)
      (i) If the restrictive feature is found in only part of the horizon, estimate the percentage by volume that the restrictive feature occupies (example: 10 percent plinthite by volume).

(6) The following parameters are not required but may be appropriate to include with soil profile descriptions in some situations:
   (a) pH
   (b) Moist and wet consistence (rupture resistance, stickiness, and plasticity)
   (c) Horizon boundary (distinctness class and topography)

(7) Each soil profile description shall also include the following information:
   (a) Soil series name. If the described pedon is outside the range in characteristics of an established soil series, use the best name, denote that it is a variant, and list the soil properties that put it outside the range (example: Helena variant, kaolinitic mineralogy).
   (b) Landscape position (i.e. backslope, toeslope, footslope, etc.).
   (c) Percent slope.
   (d) Classification to family level using Soil Taxonomy (e.g. Norfolk Series be written as fine-loamy, kaolinitic, thermic Typic Kandiudults).

[1] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(e) Internal drainage: Presence or absence and depth of evidence of any seasonal high water table (SHWT). The type of water table (apparent or perched) shall also be identified.
(f) Name of soil scientist(s) who wrote description.
(g) Date of description.

iii) Soil Boring Logs

If only the minimum number of soil profile descriptions are submitted, soil boring logs can help to document onsite soil conditions. These logs are typically a record of all soil borings performed at the site that only record a few soil properties that are important for the intended land application use. (i.e. Series name, surface texture, depth to seasonal high water table, etc.) When used, all abbreviations shall be consistent with the conventional USDA Natural Resources Conservation Service field note abbreviations. [2]

iv) Standard Soil Fertility Analysis

(1) A standard soil fertility analysis, completed no more than one year prior to the permit application, is required for each map unit in the soil map legend. The number of samples required will vary depending upon the project size and past land use history. Large projects will require multiple samples for each map unit if the application zones are separated from each other. Cropland, pasture and hayland, and wooded areas will all need to be sampled separately, even if they are located in the same proposed new irrigation zone, due to possible past differences in soil fertility management.

(2) The standard soil fertility analysis shall include the following parameters:
(a) acidity
(b) base saturation (by calculation)
(c) calcium
(d) cation exchange capacity
(e) copper
(f) exchangeable sodium percentage (by calculation)
(g) magnesium
(h) manganese
(i) percent humic matter
(j) pH
(k) phosphorus
(l) potassium
(m) sodium
(n) zinc

v) Saturated Hydraulic Conductivity (K_{sat})

(1) K_{sat} tests shall be conducted in the most restrictive horizon at a minimum of 3 data points for each soil series in the soil legend.

(2) All K_{sat} tests shall be conducted in areas representative for the site.

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[2] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(3) All K_{sat} tests shall be run until steady-state equilibrium has been achieved.
(4) All collected K_{sat} data shall be submitted for review. This includes copies of field worksheets that show all collected readings.
(5) A soil profile description shall be submitted for each K_{sat} data point. This soil profile description shall extend to at least one foot below the horizon that is being tested. If the soil profile description is intended to count towards the minimum soil description requirement, it shall extend to 7 feet or to a Cr or R horizon and meet all other soil description requirements.

d) Soils Evaluation Recommendations - the soils report shall include the following
   i) A brief summary of each map unit giving details on the composition of each map unit. Minor amounts of contrasting soils that are included within each map unit shall be identified.
   ii) Maximum irrigation precipitation rate (inches per hour) for each soil/map unit within the proposed application area. If the proposed cover crop is not the existing cover and irrigation will take place to help establish the crop, the precipitation rate shall consider irrigation of bare soil.
   iii) Seasonal irrigation restrictions, if appropriate.
   iv) Areas not suited for irrigation of wastewater shall be clearly identified.
   v) A recommendation for the K_{sat} rate to be used in the water balance for each soil/map unit based upon in-situ measurement of saturated hydraulic conductivity from the most restrictive soil horizon. The Division prefers to use the geometric mean of the K_{sat} data collected in the most restrictive soil horizon.
   vi) A recommendation for the drainage coefficient used in the water balance based upon a comprehensive site evaluation, a review of data collected on-site (including the number of K_{sat} measurements and the consistency of the data), minor amounts of contrasting soils, and the nature of the wastewater to be applied.
   vii) A recommendation for the annual hydraulic loading rates (inches per year) for each soil/map unit within the proposed application area, based upon in-situ measurement of K_{sat} from the most restrictive soil horizon.

2) For land application of wastewater (single-family residence spray or surface drip irrigation system). A soils report shall include the following components:

a) General Requirements
   i) The soil scientist evaluation shall conform to all criteria outlined in 15A NCAC 02T .0604(b) and other appropriate sections of 15A NCAC 02T.
   ii) A North Carolina licensed soil scientist (L.S.S.) shall sign, seal and date the report as required by G.S. 89F.
   iii) The report shall identify the site with project name, location, and include a statement that the site is recommended by the L.S.S. for the proposed land application activity.
   iv) If the site/soil evaluation was performed more than one year prior to the submittal of the application package, a statement should be included indicating that the site has not changed since the original investigation.

b) Detailed Soils Map
   i) The soils map shall meet all of the following requirements:
      (1) The map shall encompass the entire wastewater system, including setbacks, treatment, storage, and disposal facilities.
      (2) Be clear and reproducible in black and white.
      (3) Be of an appropriate scale to show the necessary detail for the proposed single-family residence wastewater treatment and disposal system.
      (4) Include a map legend that identifies all soil map units and special symbols. A separate map unit legend shall be included if this information will not fit on the soil map.
      (5) Include a map scale and north arrow.
      (6) Be labeled with the project name, date of map completion, and be signed and sealed by the L.S.S. responsible for the map.
      (7) Show the locations of ditches and other physical features, streams, water bodies, and identified wetlands.
      (8) Show the location of all auger borings, pit excavations, and saturated hydraulic conductivity (K_{sat}) data points.
      (9) Label all roads and other landscape and cultural features that aid with orientation.
   ii) Map unit design criteria
      (1) Map units shall be named for their major components (soils comprising approximately 20% or more of the map unit). Complexes of two or more soils can be used where separation of the major soil components is not possible at the scale of mapping.
      (2) Where appropriate, similar soils can be combined together into one map unit. Similar soils are those soils that have no significant differences in use and management for the land application of wastewater.
      (3) Highly contrasting soils should be separated out in the soils mapping whenever practical. If separation is not possible, the presence of the highly contrasting soils should be included in either the map unit name (if they comprise 20% or more of the map unit) or noted in the soils report as a minor component.
c) Soil Characterization Data
   i) Map unit documentation
      (1) The map unit name shall be supported by a sufficient number of soil profile descriptions, soil borings, and other data.
      (2) Minor amounts of contrasting soils that are components in each soil map unit shall be identified.
   ii) Soil Profile Descriptions
      (1) The minimum number of soil profile descriptions that shall be required for each project will be based upon the nature of the project; however, additional soil profile descriptions should be included, as necessary, to adequately represent the site and any unusual site/soil circumstances.
         (a) A minimum of one soil profile description shall be submitted for each named soil series found in the wastewater disposal area. This soil profile description shall be located within the proposed wastewater

disposal area. If only one soil profile description is submitted for a soil series, that soil profile description shall be typical for that soil within the proposed wastewater disposal area. Soil profile descriptions written at K_{sat} data points shall count towards this requirement as long as they satisfy all other soil profile description requirements. Multiple soil profile descriptions are desirable when a range in soil properties is encountered.

(2) In areas where extensive soil-disturbing activities such as grading have taken place, soil profile descriptions shall be written for the dominant soil conditions. Separate soil profile descriptions shall be written for areas where soil has been removed (cut) and areas where soil has been added (fill).

(3) Soil profile descriptions shall describe soil conditions within seven feet of the land surface or to a Cr or R horizon.

(4) Soil profile descriptions shall be fully written out or if abbreviated, use the conventional USDA Natural Resources Conservation Service field note abbreviations. [3]

(5) Soil profile descriptions, based on examinations of excavation pits or auger borings, shall describe the following parameters by individual diagnostic horizons:
   (a) Thickness of the horizon (measurement of the top and bottom of the soil horizon in inches from the soil surface).
   (b) Texture (USDA soil texture, use texture modifiers as necessary [gravelly, very gravelly, extremely gravelly, etc.]).
   (c) Color and other diagnostic features.
      (i) Primary matrix color as well as the abundance, size, and color of mottles
      (ii) Munsell Color Chart notation (example: 10YR 6/3)
      (iii) Identify soil moisture at the time the soil color was described for each horizon (moist soil is assumed unless noted as dry)
      (iv) Colors that are redoximorphic features shall be identified as such (i.e. redox concentrations, redox depletions, etc.)
   (d) Structure (grade, size, and type)
   (e) Depth, thickness, and type of restrictive horizon(s) (i.e. compacted layers, plow pans, fragipans, plinthite, brittle layers, etc.)
      (i) If the restrictive feature is found in only part of the horizon, estimate the percentage by volume that the restrictive feature occupies (example: 10 percent plinthite by volume).

(6) The following parameters are not required but may be appropriate to include with soil profile descriptions in some situations:
   (a) pH

[3] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(b) Moist and wet consistence (rupture resistance, stickiness, and plasticity)
(c) Horizon boundary (distinctness class and topography)

(7) Each soil profile description shall also include the following information:
(a) Soil series name. If the described pedon is outside the range in characteristics of an established soil series, use the best name, denote that it is a variant, and list the soil properties that put it outside the range (example: Helena variant, kaolinitic mineralogy).
(b) Landscape position (i.e. backslope, toeslope, footslope, etc.).
(c) Percent slope.
(d) Classification to family level using Soil Taxonomy (e.g. Creedmoor Series to be written as fine, mixed, semiactive, thermic Aquic Hapludults).
(e) Internal drainage: Presence or absence and depth of evidence of any seasonal high water table (SHWT). The type of water table (apparent or perched) shall also be identified.
(f) Name of soil scientist(s) who wrote description.
(g) Date of description.

iii) Soil Boring Logs

If only the minimum number of soil descriptions are submitted, soil boring logs can help to document onsite soil conditions. These logs are typically a record of all soil borings performed at the site that only record a few soil properties that are important for the intended land application use. (i.e. Series name, surface texture, depth to seasonal high water table, etc.) When used, all abbreviations shall be consistent with the conventional USDA Natural Resources Conservation Service field note abbreviations. [4]

iv) Standard Soil Fertility Analysis

(1) A standard soil fertility analysis, completed no more than one year prior to the permit application, is required for each map unit in the soil map legend. The number of samples required will vary depending upon the past land use history. Cropland, pasture and hayland, and wooded areas will all need to be sampled separately, even if they are located in the same proposed new irrigation zone, due to possible past differences in soil fertility management.

(2) The standard soil fertility analysis shall include the following parameters:
(a) acidity
(b) base saturation (by calculation)
(c) calcium
(d) cation exchange capacity
(e) copper
(f) exchangeable sodium percentage (by calculation)
(g) magnesium

[4] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(h) manganese
(i) percent humic matter
(j) pH
(k) phosphorus
(l) potassium
(m) sodium
(n) zinc

v) Saturated Hydraulic Conductivity (K_{sat})
(1) K_{sat} tests shall be conducted in the most restrictive horizon at a minimum of 3 data points for each soil series in the soil legend.
(2) All K_{sat} tests shall be conducted in areas representative for the site.
(3) All K_{sat} tests shall be run until steady-state equilibrium has been achieved.
(4) All collected K_{sat} data shall be submitted for review. This includes copies of field worksheets that show all collected readings.
(5) A soil profile description shall be submitted for each K_{sat} data point. This soil profile description shall extend to at least one foot below the horizon that is being tested. If the soil profile description is intended to count towards the minimum soil description requirement, it shall extend to 7 feet or to a Cr or R horizon and meet all other soil description requirements.

d) Soils Evaluation Recommendations - the soils report shall include the following
i) A brief summary of each map unit giving details on the composition of each map unit. Minor amounts of contrasting soils that are included within each map unit shall be identified.
ii) Maximum irrigation precipitation rate (inches per hour) for each soil/map unit within the proposed application area. If the proposed cover crop is not the existing cover and irrigation will take place to help establish the crop, the precipitation rate shall consider irrigation of bare soil.
iii) Areas not suited for irrigation of wastewater shall be clearly identified.
iv) A recommendation for the annual hydraulic loading rate (inches per year). The recommended loading rate must be in accordance with the Single-Family Residence Wastewater Irrigation System Loading Rate Calculation Policy.[5]

3) For land application of reclaimed wastewater – conjunctive systems (spray or surface drip irrigation system). A soils report shall include the following components:

a) General Requirements
i) The soil scientist evaluation shall conform to all criteria outlined in 15A NCAC 02T .0904(b) and other appropriate sections of 15A NCAC 02T.
ii) A North Carolina licensed soil scientist (L.S.S.) shall sign, seal and date the report as required by G.S. 89F.
iii) The report shall identify all the sites/fields with project name, location, and include a statement that the sites/fields were recommended by the L.S.S. for the proposed land application activity.

[5] The Single-Family Residence Wastewater Irrigation System Loading Rate Calculation policy is available on the internet at: http://h2o.enr.state.nc.us/lau/policies.html

iv) If the site/soil evaluation was performed more than one year prior to the submittal of the application package, a statement should be included indicating that the site has not changed since the original investigation.

b) Detailed Soils Map
   i) The soil map shall consist of:
      (1) A copy of a U.S.D.A. Natural Resources Conservation Service (NRCS) county soil survey map that has been confirmed for accuracy by a field evaluation by an L.S.S. or;
      (2) A map that has been created by an L.S.S.
   ii) The soils map shall meet all of the following requirements:
      (1) The map shall encompass the entire land application area including buffers.
      (2) Be clear and reproducible in black and white.
      (3) Be of an appropriate scale to show the necessary detail for the land application of reclaimed water.
      (4) Include a map legend that identifies all soil map units and special symbols. A separate map unit legend shall be included if this information will not fit on the soil map.
      (5) Contain the following appropriate labeling.
         (a) NRCS maps: soil survey name, map scale and north arrow.
         (b) L.S.S. maps: project name, date of map completion, be signed and sealed by the L.S.S. responsible for the map, map scale and north arrow. Show the locations of ditches and other physical features, streams, water bodies, and identified wetlands.
      (6) Show the location of all soil profile descriptions.
      (7) Label all roads and other landscape and cultural features that aid with orientation. Include site/field numbers on the maps when possible.

c) Soil Characterization Data
   i) Map documentation
      (1) The soil map shall be supported by a sufficient number of soil descriptions, soil borings, and other data.
   ii) Soil Profile Descriptions
      (1) A minimum of one soil profile description shall be required for each soil series found within the application area. In areas where extensive soil-disturbing activities such as grading have taken place, soil profile descriptions shall be written for the dominant soil conditions. Separate soil profile descriptions shall be written for areas where soil has been removed (cut) and areas where soil has been added (fill).
      (2) Soil profile descriptions shall describe soil conditions within seven feet of the land surface or to a Cr or R horizon.
      (3) Soil profile descriptions shall be fully written out or if abbreviated, use the conventional USDA Natural Resources Conservation Service field note abbreviations. [6]

[6] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(4) Soil profile descriptions, based on examinations of excavation pits or auger borings, shall describe the following parameters by individual diagnostic horizons:
  (a) Thickness of the horizon (measurement of the top and bottom of the soil horizon in inches from the soil surface)
  (b) Texture (USDA soil texture, use texture modifiers as necessary [gravelly, very gravelly, extremely gravelly, etc.])
  (c) Color and other diagnostic features
    (i) Primary matrix color as well as the abundance, size, and color of mottles.
    (ii) Munsell Color Chart notation (example: 10YR 6/3)
    (iii) Identify soil moisture at the time the soil color was described for each horizon (moist soil is assumed unless noted as dry).
    (iv) Colors that are redoximorphic features shall be identified as such (i.e. redox concentrations, redox depletions, etc.)
  (d) Structure (grade, size, and type)
  (e) Depth, thickness, and type of restrictive horizon(s) (i.e. compacted layers, plow pans, fragipans, plinthite, brittle layers, etc.)
    (i) If the restrictive feature is found in only part of the horizon, estimate the percentage by volume that the restrictive feature occupies (example: 10 percent plinthite by volume).

(5) Each soil profile description shall also include the following information:
  (a) Soil series name. If the described pedon is outside the range in characteristics of an established soil series, use the best name, denote that it is a variant, and list the soil properties that put it outside the range (example: Helena variant, kaolinitic mineralogy)
  (b) Landscape position (i.e. side slope, toe slope, foot slope, etc.)
  (c) Percent slope
  (d) Classification to family level using Soil Taxonomy (e.g. Norfolk Series be written as fine-loamy, kaolinitic, thermic Typic Kandiudults).
  (e) Internal drainage: Presence or absence and depth of evidence of any seasonal high water table (SHWT). The type of water table (apparent or perched) shall also be identified.
  (f) Name of soil scientist(s) who wrote description
  (g) Date of description

iii) Soil Boring Logs

If only the minimum number of soil profile descriptions are submitted, soil boring logs can help to document onsite soil conditions. These logs are typically a record of all soil borings performed at the site that only record a few soil properties that are important for the irrigation of reclaimed water. (i.e. Series name, surface texture, depth to seasonal high water table, etc.) When

used, all abbreviations shall be consistent with the conventional USDA Natural Resources Conservation Service field note abbreviations. [7]

d) Soils Evaluation Recommendations - the soils report shall include the following
   i) A brief summary of each map unit giving details on the composition of each map unit.
   ii) Maximum irrigation precipitation rate (inches per hour) for each soil/map unit within the proposed application area. If the proposed cover crop is not the existing cover and irrigation will take place to help establish the crop, the precipitation rate shall consider irrigation of bare soil.
   iii) Seasonal irrigation restrictions, if appropriate.
   iv) Areas not suited for irrigation of reclaimed water shall be clearly identified.

4) For new or expanding non-dedicated sites for the land application of residuals. A soils report shall include the following components:

a) General Requirements
   i) The soil scientist evaluation shall conform to all criteria outlined in 15A NCAC 02T .1104(c)(2).
   ii) A North Carolina licensed soil scientist (L.S.S.) shall sign, seal and date the report as required by G.S. 89F.
   iii) The report shall identify all the sites/fields with project name, location, and include a statement that the sites/fields were recommended by the Licensed Soil Scientist (L.S.S.) for the proposed land application activity.
   iv) If the site/soil evaluation was performed more than one year prior to the submittal of the application package, a statement should be included indicating that the site has not changed since the original investigation.

b) Detailed Soils Map
   i) The soil map shall consist of:
      (1) A copy of a U.S.D.A. Natural Resources Conservation Service (NRCS) county soil survey map that has been confirmed for accuracy by a field evaluation by an L.S.S. or;
      (2) A map that has been created by an L.S.S.
   ii) The soils map shall meet all of the following requirements:
      (1) The map shall encompass the entire land application area including buffers.
      (2) Be clear and reproducible in black and white.
      (3) Be of an appropriate scale to show the necessary detail for the land application of residuals.
      (4) Include a map legend that identifies all soil map units and special symbols. A separate map unit legend shall be included if this information will not fit on the soil map.
      (5) Contain the following appropriate labeling.

[7] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(a) NRCS maps: soil survey name, map scale and north arrow.
(b) L.S.S. maps: project name, date of map completion, be signed and sealed by the L.S.S. responsible for the map, map scale and north arrow. Show the locations of ditches and other physical features, streams, water bodies, and identified wetlands.

(6) Show the location of all soil profile descriptions.
(7) Label all roads and other landscape and cultural features that aid with orientation. Include site/field numbers on the maps when possible.

c) Soil Characterization Data
   i) Soil Profile Descriptions
      (1) A minimum of one soil profile description shall be required for each field. This soil profile description should be for the dominant soil series found within the field.
      (2) In areas where extensive soil-disturbing activities such as grading have taken place, soil profile descriptions shall be written for the dominant soil conditions. Separate soil profile descriptions shall be written for areas where soil has been removed (cut) and areas where soil has been added (fill).
      (3) Soil profile descriptions shall describe soil conditions within seven feet of the land surface or to a Cr or R horizon.
      (4) Soil profile descriptions shall be fully written out or if abbreviated, use the conventional USDA Natural Resources Conservation Service field note abbreviations. [8]
      (5) Soil profile descriptions, based on examinations of excavation pits or auger borings, shall describe the following parameters by individual diagnostic horizons:
         (a) Thickness of the horizon (measurement of the top and bottom of the soil horizon in inches from the soil surface)
         (b) Texture (USDA soil texture, use texture modifiers as necessary [gravelly, very gravelly, extremely gravelly, etc.])
         (c) Color and other diagnostic features
            (i) Primary matrix color as well as the abundance, size, and color of mottles.
            (ii) Munsell Color Chart notation (example: 10YR 6/3)
            (iii) Identify soil moisture at the time the soil color was described for each horizon (moist soil is assumed unless noted as dry).
            (iv) Colors that are redoximorphic features shall be identified as such (i.e. redox concentrations, redox depletions, etc.)
         (d) Structure (grade, size, and type)
         (e) Depth, thickness, and type of restrictive horizon(s) (i.e. compacted layers, plow pans, fragipans, plinthite, brittle layers, etc.)

[8] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(i) If the restrictive feature is found in only part of the horizon, estimate the percentage by volume that the restrictive feature occupies (example: 10 percent plinthite by volume).

(6) Each soil profile description shall also include the following information:
- (a) Soil series name. If the described pedon is outside the range in characteristics of an established soil series, use the best name, denote that it is a variant, and list the soil properties that put it outside the range (example: Helena variant, kaolinitic mineralogy)
- (b) Landscape position (i.e. side slope, toe slope, foot slope, etc.)
- (c) Percent slope
- (d) Classification to family level using Soil Taxonomy (e.g. Norfolk Series be written as fine-loamy, kaolinitic, thermic Typic Kandiudults).
- (e) Internal drainage: Presence or absence and depth of evidence of any seasonal high water table (SHWT). The type of water table (apparent or perched) shall also be identified.
- (f) Name of soil scientist(s) who wrote description
- (g) Date of description

ii) A Standard Soil Fertility Analysis, completed no more than one year prior to the permit application, is required for each field being added.

(1) The standard soil fertility analysis shall include the following parameters:
- (a) acidity
- (b) base saturation (by calculation)
- (c) calcium
- (d) cation exchange capacity
- (e) copper
- (f) exchangeable sodium percentage (by calculation)
- (g) magnesium
- (h) manganese
- (i) percent humic matter
- (j) pH
- (k) phosphorus
- (l) potassium
- (m) sodium
- (n) zinc

d) Soils Evaluation Recommendations

i) All recommendations for the land application of residuals shall conform to NCAC 2T .1108(b) and NCAC 2T .1109(b).

ii) Areas not suitable for land application of residuals shall be clearly delineated.

5) For new or expanding dedicated land application of residuals sites. A soils report shall include the following components:

a) General Requirements

i) The soil scientist evaluation shall conform to all criteria outlined in 15A NCAC 02T .1104(d)(3) or NCAC 02T .1104(e)(3)

ii) A North Carolina licensed soil scientist (L.S.S.) shall sign, seal and date the report as required by G.S. 89F.
iii) The report shall identify all the sites/fields with project name, location, and include a statement that the sites/fields were recommended by the L.S.S. for the proposed land application activity.
iv) If the site/soil evaluation was performed more than one year prior to the submittal of the application package, a statement should be included indicating that the site has not changed since the original investigation.

b) Detailed Soils Map
   i) The soils map shall meet all of the following requirements:
      (1) The map shall encompass the entire wastewater system, including buffers, treatment, storage, and disposal facilities.
      (2) Be clear and reproducible in black and white.
      (3) Be of an appropriate scale to show the necessary detail for the proposed land application activity.
      (4) Include a map legend that identifies all soil map units and special symbols. A separate map unit legend shall be included if this information will not fit on the soil map.
      (5) Include a map scale and north arrow.
      (6) Be labeled with the project name, date of map completion, and be signed and sealed by the L.S.S. responsible for the map.
      (7) Show the locations of ditches and other physical features, streams, water bodies, and identified wetlands.
      (8) Show the location of all auger borings, pit excavations, and saturated hydraulic conductivity (K_{sat}) data points.
      (9) Label all roads and other landscape and cultural features that aid with orientation. Include site/field numbers on the maps when possible.
   ii) Map unit design criteria
      (1) Map units shall be named for their major components (soils comprising approximately 20% or more of the map unit). Complexes of two or more soils can be used where separation of the major soil components is not possible at the scale of mapping.
      (2) Where appropriate, similar soils can be combined together into one map unit. Similar soils are those soils that have no significant differences in use and management for the land application of residuals.
      (3) Highly contrasting soils should be separated out in the soils mapping whenever practical. If separation is not possible, the presence of the highly contrasting soils should be included in either the map unit name (if they comprise 20% or more of the map unit) or in the soils report as a minor component.

c) Soil Characterization Data
   i) Map unit documentation
      (1) The map unit name shall be supported by a sufficient number of soil profile descriptions, soil borings, and other data.
      (2) Minor amounts of contrasting soils that are components in each soil map unit shall be identified.

ii) Soil Profile Descriptions

(1) A minimum of one soil profile description shall be submitted for each named soil series found in the soil map legend. This soil profile description shall be located within the proposed land application area. If only one soil profile description is submitted for a soil, that soil profile description shall be typical for that soil within the proposed land application area. Soil profile descriptions written at K_{sat} data points shall count towards this requirement as long as they satisfy all other soil profile description requirements. Multiple soil profile descriptions are desirable when a range in soil properties is encountered.

(2) In areas where extensive soil-disturbing activities such as grading have taken place, soil profile descriptions shall be written for the dominant soil conditions. Separate soil profile descriptions shall be written for areas where soil has been removed (cut) and areas where soil has been added (fill).

(3) Soil profile descriptions shall describe soil conditions within seven feet of the land surface or to a Cr or R horizon.

(4) Soil profile descriptions shall be fully written out or if abbreviated, use the conventional USDA Natural Resources Conservation Service field note abbreviations. [9]

(5) Soil profile descriptions, based on examinations of excavation pits or auger borings, shall describe the following parameters by individual diagnostic horizons:

(a) Thickness of the horizon (measurement of the top and bottom of the soil horizon in inches from the soil surface)

(b) Texture (USDA soil texture, use texture modifiers as necessary [gravelly, very gravelly, extremely gravelly, etc.])

(c) Color and other diagnostic features

(i) Primary matrix color as well as the abundance, size, and color of mottles

(ii) Munsell Color Chart notation (example: 10YR 6/3)

(iii) Identify soil moisture at the time the soil color was described for each horizon (moist soil is assumed unless noted as dry)

(iv) Colors that are redoximorphic features shall be identified as such (i.e. redox concentrations, redox depletions, etc.)

(d) Structure (grade, size, and type)

(e) Depth, thickness, and type of restrictive horizon(s) (i.e. compacted layers, plow pans, fragipans, plinthite, brittle layers, etc.)

[9] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(i) If the restrictive feature is found in only part of the horizon, estimate the percentage by volume that the restrictive feature occupies (example: 10 percent plinthite by volume).

(6) The following parameters are not required but may be appropriate to include with soil profile descriptions in some situations:
  (a) pH
  (b) Moist and wet consistence (rupture resistance, stickiness, and plasticity)
  (c) Horizon boundary (distinctness class and topography)

(7) Each soil profile description shall also include the following information:
  (a) Soil series name. If the described pedon is outside the range in characteristics of an established soil series, use the best name, denote that it is a variant, and list the soil properties that put it outside the range (example: Helena variant, kaolinitic mineralogy)
  (b) Landscape position (i.e. side slope, toe slope, foot slope, etc.)
  (c) Percent slope
  (d) Classification to family level using Soil Taxonomy (e.g. Norfolk Series be written as fine-loamy, kaolinitic, thermic Typic Kandiudults).
  (e) Internal drainage: Presence or absence and depth of evidence of any seasonal high water table (SHWT). The type of water table (apparent or perched) shall also be identified.
  (f) Name of soil scientist(s) who wrote description
  (g) Date of description

iii) Soil Boring Logs

(1) If only the minimum number of soil profile descriptions are submitted, soil boring logs can help to document onsite soil conditions. These logs are typically a record of all soil borings performed at a site that only record a few soil properties that are important for the intended land application use. (i.e. Series name, surface texture, depth to seasonal high water table, etc.) When used, all abbreviations shall be consistent with the conventional USDA Natural Resources Conservation Service field note abbreviations.[10]

iv) Standard Soil Fertility Analysis

(1) A standard soil fertility analysis, completed no more than one year prior to the permit application, is required for each map unit in the soil map legend. The number of samples required will vary depending upon the project size and past land use history. Large projects may require multiple samples for each map unit if the application zones are separated from each other. Cropland, pasture and hayland, and wooded areas will all need to be sampled separately, even if they are located in the same proposed new

[10] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

irrigation zone, due to possible past differences in soil fertility management.

(2) The standard soil fertility analysis shall include the following parameters:
- (a) acidity
- (b) base saturation (by calculation)
- (c) calcium
- (d) cation exchange capacity
- (e) copper
- (f) exchangeable sodium percentage (by calculation)
- (g) magnesium
- (h) manganese
- (i) percent humic matter
- (j) pH
- (k) phosphorus
- (l) potassium
- (m) sodium
- (n) zinc

v) Saturated Hydraulic Conductivity (K_{sat})

(1) K_{sat} tests shall be conducted in the most restrictive horizon at a minimum of 3 data points for each soil series in the soil legend.

(2) All K_{sat} tests shall be conducted in areas representative for the site.

(3) All K_{sat} tests shall be run until steady-state equilibrium has been achieved.

(4) All collected K_{sat} data shall be submitted for review. This includes copies of field worksheets that show all collected readings.

(5) A soil profile description shall be submitted for each K_{sat} data point. This soil profile description shall extend to at least one foot below the horizon that is being tested. If the soil profile description is intended to count towards the minimum soil description requirement, it shall extend to 7 feet or to a Cr or R horizon and meet all other soil description requirements.

d) Soils Evaluation Recommendations

i) The soils report shall include the following:

(1) A brief summary of each map unit giving details on the composition of each map unit. Minor amounts of contrasting soils that are included within the map unit shall be identified.

(2) Areas not suited for application of residuals shall be clearly identified.

ii) The soils report shall also include the following information for all land application sites onto which bulk residuals are applied through fixed irrigation facilities or irrigation facilities fed through a fixed supply system:

(1) Maximum irrigation precipitation rates (inches per hour) for each soil/map unit within the proposed application area. If the proposed cover crop is not the existing cover and irrigation will take place to help establish the crop, the precipitation rate shall consider irrigation of bare soil.

(2) Seasonal irrigation restrictions, if appropriate.

(3) Areas not suited for irrigation of wastewater shall be clearly identified.

(4) A recommendation for the K_{sat} rate to be used in the water balance for each soil/map unit based upon in-situ measurement of saturated hydraulic conductivity from the most restrictive soil horizon.
(5) A recommendation for the drainage coefficient used in the water balance based upon a comprehensive site evaluation, a review of data collected on-site, (including the number of K_{sat} measurements and the consistency of the data), minor amounts of contrasting limiting soils, and the nature of the wastewater to be applied.
(6) A recommendation for the annual hydraulic loading rates for each soil/map unit within the proposed application area based upon in-situ measurement of K_{sat} from the most restrictive soil horizon.

6) **For new or expanding soil remediation sites (conventional rates – dedicated or non-dedicated sites) that are under the jurisdiction of the Division of Water Quality. A soils report shall include the following components:**
   a) General Requirements
      i) The soil scientist evaluation shall conform to all criteria outlined in 15A NCAC 02T .1504(c)(1) and other appropriate sections of 15A NCAC 02T.
      ii) A North Carolina licensed soil scientist (L.S.S.) shall sign, seal and date the report as required by G.S. 89F.
      iii) The report shall identify all the sites/fields with project name, location, and include a statement that the sites/fields were recommended by the L.S.S. for the proposed land application activity.
      iv) If the site/soil evaluation was performed more than one year prior to the submittal of the application package, a statement should be included indicating that the site has not changed since the original investigation
   b) Detailed Soils Map
      i) The soil map shall consist of:
         (1) A copy of a U.S.D.A. Natural Resources Conservation Service (NRCS) county soil survey map that has been confirmed for accuracy by a field evaluation by an L.S.S. or;
         (2) A map that has been created by an L.S.S.
      ii) The soils map shall meet all of the following requirements:
         (1) The map shall encompass the entire soil remediation area including buffers.
         (2) Be clear and reproducible in black and white.
         (3) Be of an appropriate scale to show the necessary detail for the soil remediation site.
         (4) Include a map legend that identifies all soil map units and special symbols. A separate map unit legend shall be included if this information will not fit on the soil map.
         (5) Contain the following appropriate labeling.
            (a) NRCS maps: soil survey name, map scale and north arrow.
            (b) L.S.S. maps: project name, date of map completion, be signed and sealed by the L.S.S. responsible for the map, map scale and north

arrow. Show the locations of ditches and other physical features, streams, water bodies, and identified wetlands.
(c) Show the location of all soil profile descriptions.
(d) Label all roads and other landscape and cultural features that aid with orientation. Include site/field numbers on the maps when possible.

c) Soil Characterization Data
i) Map unit documentation
(1) The soil map shall be supported by a sufficient number of soil profile descriptions, soil borings, and other data.
ii) Soil Profile Descriptions
(1) A minimum of one soil profile description shall be required for each soil series found within the soil remediation area. In areas where extensive soil-disturbing activities such as grading have taken place, soil profile descriptions shall be written for the dominant soil conditions. Separate soil profile descriptions shall be written for areas where soil has been removed (cut) and areas where soil has been added (fill).
(2) Soil profile descriptions shall describe soil conditions within five feet of the land surface or to a Cr or R horizon.
(3) Soil profile descriptions shall be fully written out or if abbreviated, use the conventional USDA Natural Resources Conservation Service field note abbreviations. [11]
(4) Soil profile descriptions, based on examinations of excavation pits or auger borings, shall describe the following parameters by individual diagnostic horizons:
(a) Thickness of the horizon (measurement of the top and bottom of the soil horizon in inches from the soil surface)
(b) Texture (USDA soil texture, use texture modifiers as necessary [gravelly, very gravelly, extremely gravelly, etc.])
(c) Color and other diagnostic features
(i) Primary matrix color as well as the abundance, size, and color of mottles.
(ii) Munsell Color Chart notation (example: 10YR 6/3)
(iii) Identify soil moisture at the time the soil color was described for each horizon (moist soil is assumed unless noted as dry).
(iv) Colors that are redoximorphic features shall be identified as such (i.e. redox concentrations, redox depletions, etc.)
(d) Structure (grade, size, and type)
(e) Depth, thickness, and type of restrictive horizon(s) (i.e. compacted layers, plow pans, fragipans, plinthite, brittle layers, etc.)
(i) If the restrictive feature is found in only part of the horizon, estimate the percentage by volume that the restrictive feature occupies (example: 10 percent plinthite by volume).

[11] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(5) Each soil profile description shall also include the following information:
(a) Soil series name. If the described pedon is outside the range in characteristics of an established soil series, use the best name, denote that it is a variant, and list the soil properties that put it outside the range (example: Helena variant, kaolinitic mineralogy)
(b) Landscape position (i.e. side slope, toe slope, foot slope, etc.)
(c) Percent slope
(d) Internal drainage: Presence or absence and depth of evidence of any seasonal high water table (SHWT). The type of water table (apparent or perched) shall also be identified.
(e) Name of soil scientist(s) who wrote description
(f) Date of description

iii) Soil Boring Logs
(1) If only the minimum number of soil profile descriptions are submitted, soil boring logs can help to document onsite soil conditions. These logs are typically a record of all soil borings performed at a site that only record a few soil properties that are important for use of the site for soil remediation. (i.e. Series name, surface texture, depth to seasonal high water table, etc.) When used, all abbreviations shall be consistent with the conventional USDA Natural Resources Conservation Service field note abbreviations. [12]

iv) A Standard Soil Fertility Analysis, completed no more than one year prior to the permit application.
(1) The standard soil fertility analysis shall include the following parameters:
(a) acidity
(b) base saturation (by calculation)
(c) calcium
(d) cation exchange capacity
(e) copper
(f) exchangeable sodium percentage (by calculation)
(g) magnesium
(h) manganese
(i) percent humic matter
(j) pH
(k) phosphorus
(l) potassium
(m) sodium
(n) zinc

d) Soils Evaluation Recommendations - the soils report shall include the following:
i) A brief summary of each map unit giving details on the composition of each map unit.
ii) Areas not suited for soil remediation shall be clearly identified.

[12] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

7) **Soil remediation sites (containment and treatment) that are under the jurisdiction of the Division of Water Quality. A soils report shall include the following components:**
   a) General Requirements
      i) The soil scientist evaluation shall conform to all criteria outlined in 15A NCAC 02T .1504(d)(1) and other appropriate sections of 15A NCAC 02T.
      ii) A North Carolina licensed soil scientist (L.S.S.) shall sign, seal and date the report as required by G.S. 89F.
      iii) The report shall identify all the sites/fields with project name, location, and include a statement that the sites/fields were recommended by the L.S.S. for the proposed land application activity.
      iv) If the site/soil evaluation was performed more than one year prior to the submittal of the application package, a statement should be included indicating that the site has not changed since the original investigation
   b) Detailed Soils Map
      i) The soil map shall consist of:
         (1) A copy of a U.S.D.A. Natural Resources Conservation Service (NRCS) county soil survey map that has been confirmed for accuracy by a field evaluation by an L.S.S. or;
         (2) A map that has been created by an L.S.S.
      ii) The soils map shall meet all of the following requirements:
         (1) The map shall encompass the entire containment and treatment area including buffers.
         (2) Be clear and reproducible in black and white.
         (3) Be of an appropriate scale to show the necessary detail for the soil remediation site.
         (4) Include a map legend that identifies all soil map units and special symbols. A separate map unit legend shall be included if this information will not fit on the soil map.
         (5) Contain the following appropriate labeling.
            (a) NRCS maps: soil survey name, map scale and north arrow.
            (b) L.S.S. maps: project name, date of map completion, be signed and sealed by the L.S.S. responsible for the map, map scale and north arrow. Show the locations of ditches and other physical features, streams, water bodies, and identified wetlands.
            (c) Show the location of all soil profile descriptions.
            (d) Label all roads and other landscape and cultural features that aid with orientation. Include site/field numbers on the maps when possible.
   c) Soil Characterization Data
      i) Map documentation
         (1) The soil map shall be supported by a sufficient number of soil profile descriptions, soil borings, and other data.

ii) Soil Profile Descriptions
  (1) A minimum of one soil profile description shall be required for each soil series found within the soil remediation area. In areas where extensive soil-disturbing activities such as grading have taken place, soil profile descriptions shall be written for the dominant soil conditions. Separate soil profile descriptions shall be written for areas where soil has been removed (cut) and areas where soil has been added (fill).
  (2) Soil profile descriptions shall describe soil conditions within five feet of the land surface or to a Cr or R horizon.
  (3) Soil profile descriptions shall be fully written out or if abbreviated, use the conventional USDA Natural Resources Conservation Service field note abbreviations.[13]
  (4) Soil profile descriptions, based on examinations of excavation pits or auger borings, shall describe the following parameters by individual diagnostic horizons:
    (a) Thickness of the horizon (measurement of the top and bottom of the soil horizon in inches from the soil surface)
    (b) Texture (USDA soil texture, use texture modifiers as necessary [gravelly, very gravelly, extremely gravelly, etc.])
    (c) Color and other diagnostic features
      (i) Primary matrix color as well as the abundance, size, and color of mottles.
      (ii) Munsell Color Chart notation (example: 10YR 6/3)
      (iii) Identify soil moisture at the time the soil color was described for each horizon (moist soil is assumed unless noted as dry).
      (iv) Colors that are redoximorphic features shall be identified as such (i.e. redox concentrations, redox depletions, etc.)
    (d) Structure (grade, size, and type)
    (e) Depth, thickness, and type of restrictive horizon(s) (i.e. compacted layers, plow pans, fragipans, plinthite, brittle layers, etc.)
      (i) If the restrictive feature is found in only part of the horizon, estimate the percentage by volume that the restrictive feature occupies (example: 10 percent plinthite by volume).
  (5) Each soil profile description shall also include the following information:
    (a) Soil series name. If the described pedon is outside the range in characteristics of an established soil series, use the best name, denote that it is a variant, and list the soil properties that put it outside the range (example: Helena variant, kaolinitic mineralogy)
    (b) Landscape position (i.e. side slope, toe slope, foot slope, etc.)
    (c) Percent slope

[13] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

(d) Internal Soil Drainage: Presence or absence and depth of evidence of any seasonal high water table (SHWT). The type of water table (apparent or perched) shall also be identified.
(e) Name of soil scientist(s) who wrote description
(f) Date of description

iii) Soil Boring Logs

(1) If only the minimum number of soil profile descriptions are submitted, soil boring logs can help to document onsite soil conditions. These logs are typically a record of all soil borings performed at the site that only record a few soil properties that are important for use of the site for containment and treatment. (i.e. Series name, surface texture, depth to seasonal high water table, etc.) When used, all abbreviations shall be consistent with the conventional USDA Natural Resources Conservation Service field note abbreviations. [14]

d) Soils Evaluation Recommendations - the soils report shall include the following:

i) A brief summary of each map unit giving details on the composition of each map unit.

ii) Areas not suited for containment and treatment shall be clearly identified.

8) Glossary

Annual hydraulic loading rate. The maximum amount of wastewater that can be irrigated in a given area within a one year time period. The required unit of measurement is inches per year.

Contrasting soils. Soils that have dissimilar soil properties. These soils will require different loading rates and have different management needs.

Map unit. For land application sites, soil map units represent areas on the landscape that will be managed the same (Identical annual hydraulic loading rates (inches/year) and instantaneous loading rates (inch/hour) for wastewater application) and consist mainly of the dominant soils for which the units are named. (Map units shall be named for their major components which are any soils comprising approximately 20% or more of the map unit.) Many times this will result in a map unit name that includes more than 1 soil series. Areas of highly contrasting soils that will require different management (loading rates, seasonal restrictions, etc.) should be separated out when possible.

Maximum irrigation precipitation rate. The maximum rate that wastewater can be irrigated onto the soil surface within a one hour time period. The required unit of measurement is inches per hour.

Perched water table. A soil wetness condition in which a saturated zone is located above an unsaturated zone. Perched water tables are common in soils that have highly restrictive soil horizons.

Residuals. Any solid, semisolid, or liquid waste, other than effluent or residues from agricultural products and processing, generated from a wastewater facility, water

[14] Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors), 2002. Field book for describing and sampling soils, Version 2.0 Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (Online download: http://soils.usda.gov/technical/fieldbook/)

supply treatment facility or air pollution control facility permitted under the authority of the Environmental Management Commission.

Restrictive horizon. The layer in a soil profile that is capable of reducing the downward water movement to the minimum rate, as evidenced by the lowest saturated hydraulic conductivity among all the soil layers. Restrictive horizons are often capable of perching ground water or wastewater effluent.

Saturated hydraulic conductivity (K_{sat}). Refers to the ability of the soil to transmit water under saturated conditions. K_{sat} is most commonly measured by use of a constant head permeameter. Other methods of measuring K_{sat} are acceptable to the Division if they are appropriate for the site and use scientifically established procedures.[15] Data from K_{sat} measurements should be reported in inches per hour.

Seasonal high water table. The highest level to which the soil is saturated, as may be determined through the identification of redoximorphic features in the soil profile including low chroma mottling (iron depletions). This does not include temporary perched conditions. Alternatively, the seasonal high water table can also be determined from water level measurements or via soil/groundwater modeling.

Similar soils. Soils that have similar soil properties. These soils will have comparable loading rates and management needs.

Soil scientist. An individual who is currently licensed or authorized to practice soil science under G.S. 89F by the North Carolina Board for Licensing of Soil Scientists.

[15] American Society of Agronomy, Inc. and Soil Science Society of America, Inc., 1986. Methods of Soil Analysis, Part 1. Physical and Mineralogical Methods. American Society of Agronomy, Inc. and Soil Science Society of America, Inc., Madison, Wisconsin.