Ms. Judy Melville
Iredell County Health Department,
Environmental Health Section
610 Center Ave
Mooresville, NC, 28625

Dear Ms. Melville;

Subject: Ring 1201 testing

Thank you for talking with me concerning the testing proposed for the Ring 1201 product on the Honeycutt property on Woodridge Lane. I believe this site is exceptionally well suited for the testing proposed. There is excellent exposure along an east facing slope and the soil is well suited for a soil based system. The test protocol has been approved by the I and E Committee.

We propose to install 3 test 1201 lines, three control gravel lines. This configuration will provide excellent opportunity to compare performance of approved distribution methods with the test method. One tremendous benefit I perceive with the 1201 product is potential for use where slope imposes design limitations. The Honeycutt site is not limited by slope, but this site provides opportunity to test this configuration on a slope.

Liquid level in the trenches will be monitored with the Hobo instruments.

Site and soil resources are ideal for the testing and monitoring proposed. I look forward to working with you.

Sincerely;

A. R. Rubin, Professor Emeritus, NCSU – BAE

ATCH: 1. Report
2. Site Plan

Initial Site Investigation
Honeycutt Property
Iredell County, NC
For submission to
Iredell County Health Department
Environmental Health Section
By
A. R. Rubin

The Honeycutt Site is located north of Mooresville in the eastern side of Iredell County. The site has been examined by representatives from the Iredell County Health Department, Environmental Health Section and had been approved for a traditional, gravity based wastewater treatment system by that department. The system has malfunctioned and a repair is required. The soil resources on the site are typically thick sandy loam over red clay subsoil. The soil ranged between 36 and 48 inches in depth. The slope is moderately steep along the back of the property and relatively gentle near the home. Drainage from the site migrates in an easterly direction. The site is very well suited to host an onsite wastewater treatment system repair using the 1201 product. Based on the preliminary assessment performed in summer, 2007 by the Ring Project team and the evaluation by the Iredell County Health department, there are no significant limitations to use of the site as a receiver for domestic wastewater, but liquid loadings to the site must be maintained at conservative rates to assure the long term and successful operation of the land based system proposed as this repair.

The soil resources encountered over the site are typically gray to pale brown loamy sand to a depth of between 16 and 24 inches. Underlying this loamy topsoil is a red clay horizon that extends to over 36 inches. The clay is typically well structured with a weak, fine sub-angular blocky structure. No complex or mixed mineralogy was detected. At 48 inches, a mix of loamy saprolite and clayey soil was encountered; this b/c horizon extends to between 50 and 60 inches. At between 50 and 60 inches the saprolite dominated the profile to the bottom of the boring. No hard rock was encountered to a depth of 60 inches at which depth the boring was terminated. No evidence of seasonal saturation was encountered in any of the borings advanced over the area proposed as the receiver for domestic wastewater.

The area proposed as the receiver site for the domestic wastewater occupies an east facing linear slope. This is the same area identified by the Iredell County Health Department on the site approval for the proposed repair. The slope terminates in a drainage-way exiting the site in an north-easterly direction and terminating in a stream along the eastern border of the site. Surface drainage from the site is excellent, but an interceptor drain will be required up-slope from the proposed repair and a diversion will be required for the roof water entering the area.

The hydraulic loading rate recommended in 0.25 gallons per square foot per day. This liquid loading is consistent with the clay to sandy clay texture encountered in the 24 to 30 inch depth in the soil. The total square footage required for the onsite wastewater system is based on a flow

of 480 gallons per day. The recommended liquid loading is slightly more conservative than that recommended in the Iredell County Health Department approval. Conservative loading rates are recommended to assure long term, successful performance of the onsite wastewater system installed at the Honeycutt Home.

A typical soil profile description is:

0 – 16 in: Light brown to gray loamy sand, weak, fine granular structure, many fine roots
16 – 20 in: Yellow loam to sandy loam, weak, fine sub-angular blocky structure
20-40 in: Red sandy clay loam, weak, fine sub-angular blocky structure, friable
40-60 in: Red sandy clay loam and saprolite
60 in: Boring terminated, end-of-auger, no refusal

System Proposed:

The wastewater system proposed is designed as a partial repair for the Honeycutt Residence. The system is designed to accommodate a wastewater flow of 240 gallons per day and the remaining 240 gallons from the system is specified to be returned to the initial system. This diversion of the 240 gallon per day flow should alleviate the malfunction observed in the initial system installed.

The system proposed consists of a 1201 system to accommodate 120 gallons per day and a traditional gravel control system to accommodate the remaining 120 gallons per day required for the experimental system design. The system is intended to serve the four (4) bedroom modular home on the site. The design flow required in rule is 480 gallons per day. The system proposed will accommodate that volume as a repair and a return of excess flow to the initial system.

The wastewater system proposed consists of using the 1200 galloon to 1500 gallon septic tank installed for primary settling, installation of a pump tank of equal capacity, a small septic tank effluent pump (0.25 to 0.4 H.P), a control panel, a six-way pressure manifold, 0.75 to 1.0 inch diameter class 160 PVC tight lines to each field line, and a series of field lines consisting of the demonstration 1201 product and standard gravel lines as a control section in the demonstration. The pump proposed is a 0.25 to 0.4 H.P. septic tank effluent pump. The small pump is recommended, but may not be available locally. The "test" component is designed to accommodate 50% of the flow. The remaining 50 % of the flow will return to the already installed septic tank treatment system as "overflow" to be placed in a distribution box at the head of the gravity system installed.

A lay-out of the system is provided as an attachment to this site report. The liquid levels will be monitored with a series of Hobo$_{tm}$ water level monitors. These devices are transducers that are capable of monitoring liquid levels to a 0.1 inch height. The transducers are connected into a

monitoring network capable of storing 90 days monitoring data collected on a 5 minute interval around dosing events.

Dosing events are planned at least three (3) times per day. Each dosing event is planned to distribute 80 gallons of wastewater to the test fields, the three dosing events will distribute the 240 gallons required in the test. Forty (40) gallons will be distributed to the 1201 field and 40 gallons to the gravel control at each dose event.

The design load recommended in 0.25 gallons per square foot per day. The 120 gallons in the test trench and the control trench will require the equivalent of 480 square feet. This load is to be distributed into three (3) trenches in each protocol (1201 and gravel). The three (3) will be equivalent length as defined in the Ring approval. The gravel system will consist of three (3) trenches 3 feet wide and 42 feet in length. The Ring 1201 product will be installed in a trench 50 feet in length. These trench length dimensions will allow area for the tight lines from to the systems and permit establishment of a 10 buffer between the distal end of each line and the property lines.

The installation depth is 24 to 30 inches. The standard gravel system is to be installed at a depth of 30 inches typically. The 1202 system is to be placed at a depth of 24 inches typically. A total of eight (8) to twelve (12) inches of soil cover is to be placed over the trench system.

Monitoring and reporting:

The liquid levels will be monitored following dosing events. The test will continue for twenty four (24) months after the installation has been completed. Interim status reports will be provided to the Iredell County Health Department if requested. A final project completion report shall be provided to the North Carolina Department of Environment and Natural Resources, Division of Environmental Health. A copy of that final report shall be provided to Iredell County.

The final report will describe the decay in the height/time curve associated with liquid applied to the system. No water quality monitoring is proposed. The assumption is that soil provides treatment of liquid applied just as any other soil absorption system in clay soil. No water quality testing is required in the approved Ring 1201 test protocol.

Conclusions:

The Honeycutt site is ideally suited as a test facility for the "Ring 1201" protocol. The soil resources are suitable to accommodate a traditional, sub-surface wastewater system. The liquid loading proposed is consistent with the long term acceptance rate for the soil material. Site exposure is ideal for the system proposed. The aspects where the system is to be located facilitate treatment through the soil.

Reports will be submitted as requested by the Iredell County Health Department or as described herein. Presentations describing the outcome of this project will acknowledge the participation by local agencies if that participation is requested.

Respectfully Submitted;

A. R. Rubin, Professor Emeritus

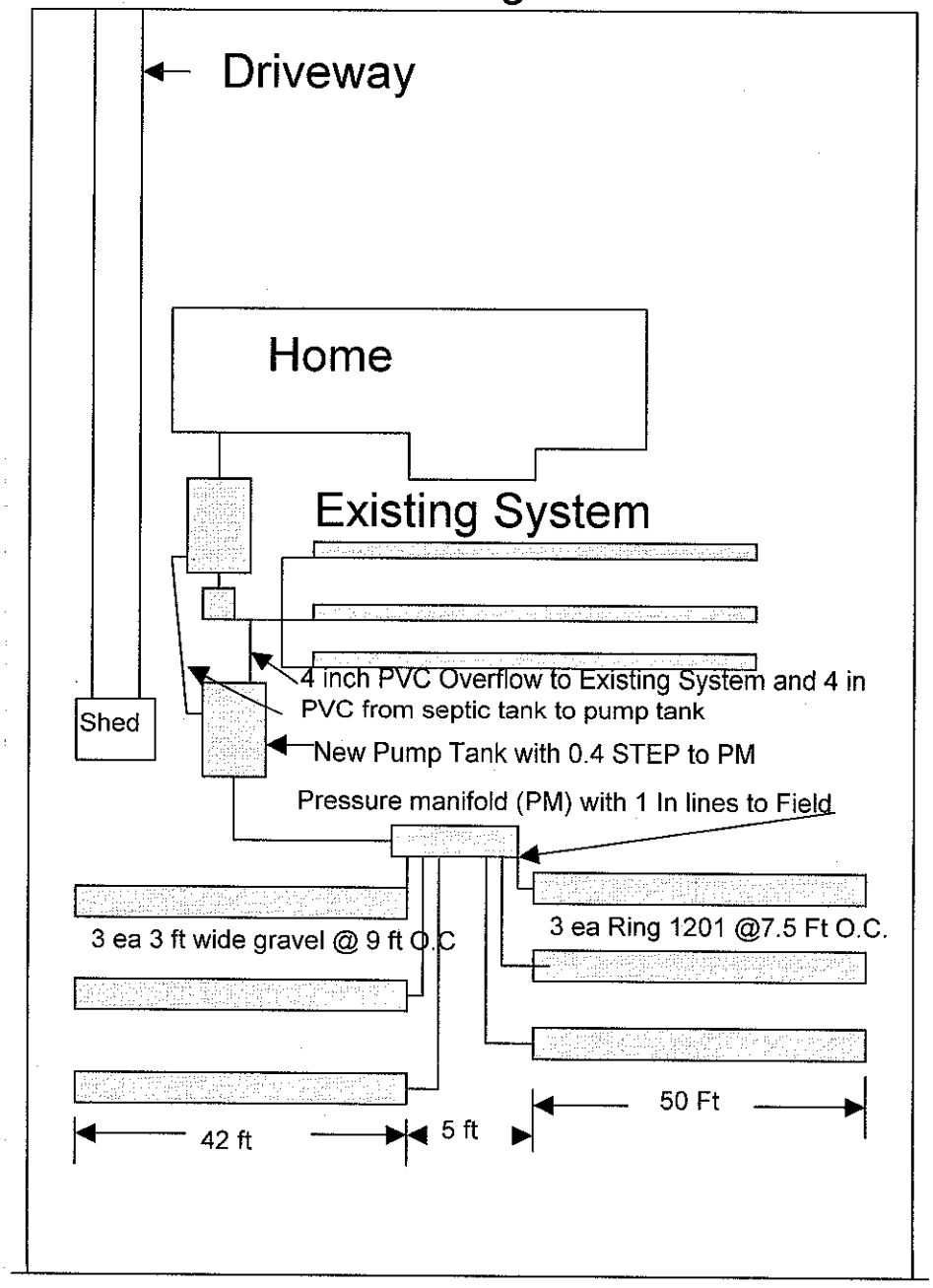
168 Woodbridge Rd

Notes:

1. System is designed to meet 10 foot setback to property lines

2. Overflow from pump tank To existing system specified for 240 gal/d

3. Pump setting specified as In report, as approximately 13.3 Gal/dose per line.



Lot Dimension approximately 117 X 380

Drawn for Ring Industrial by
A. R. Rubin, Emeritus Professor

S&ME

November 5, 2007

Ring Industrial Group
65 Industrial Park Road
Oakland, Tennessee 38060

Attention: Mr. Ben Berteau

Reference: **Technical Assistance – 168 Woodridge Lane**
Iredell County, N.C.
S&ME, Inc. Project No. 1588-07-083

Dear Mr. Berteau:

S&ME, Inc (S&ME) has conducted a soil scientist evaluation per S&ME Proposal No. 1588-07-P123 dated October 17, 2007 and LOA 1-07 dated October 17, 2007 on the above referenced approximate 1 acre lot in Iredell County, North Carolina (N.C.). The subject property is comprised of Iredell County Tax Parcel Identification No. 4668594992. The evaluation was performed to evaluate and assess the general suitability of the site soils with regard to the installation of an on-site wastewater treatment and disposal system associated with repair of a failing system. All ratings were determined in accordance with the "Laws and Rules for Sewage Treatment and Disposal Systems (15A NCAC 18A .1900)".

BACKGROUND

A soil scientist evaluation for on-site wastewater treatment and disposal systems was conducted by an S&ME Soil Scientist on October 19, 2007. The referenced property evaluated is located at 168 Woodridge Lane in Iredell County, North Carolina (Figure 1). The topography across the property is moderately sloping (Figure 2). The site consisted of a residential lot with a mobile home and a fenced back yard (failing subsurface system within fenced area), mixed hardwoods, and bordered to the north by an unnamed creek.

METHODS AND PROCEDURES

The soil scientist evaluation was conducted to assess the general suitability of the site soils with regard to the installation of a repair to an existing on-site subsurface wastewater treatment and disposal system. The evaluation consisted of review of topographic / aerial maps, reconnaissance and visual inspection of the site, and the

evaluation of subsurface soils observed by hand auger borings at select locations across the lot (Figure 3).

The soils were evaluated for the following site specific characteristics: texture; color; structure; soil depth; depth and thickness of any restrictive horizon(s) if present; depth (if present) of a seasonal high water table; and topography and landscape position. With this information the hand auger borings evaluated were rated in accordance with the "Laws and Rules for Sewage Treatment and Disposal Systems (15A NCAC 18A .1900)".

RESULTS AND DISCUSSION

Two hand auger borings were advanced to an approximate depth of 6 feet, and described to evaluate soils on the lot. The locations of the hand auger borings have been identified in the field with a sub-meter Global Positioning System (Figure 3).

Based on information obtained from the site review and hand auger borings, a Hand Auger Boring Location Map (Figure 3) was produced to summarize soil depths according to their rating for use with on-site subsurface wastewater treatment and disposal systems. The hand auger borings locations are approximate and are intended for preliminary planning in locating a potential repair to an existing failing on-site wastewater treatment and disposal system.

The following is a narrative description of the general suitability of the hand auger borings advanced on the lot and their classifications:

Provisionally Suitable (soil depths of ≥ 42")

The soils associated with these hand auger borings are rated as provisionally suitable due to soil depth, topography and landscape position, soil wetness and soil morphology. These hand auger borings contain a minimum of 42 inches of provisionally suitable soil. This classification allows areas to be considered for use involving conventional wastewater treatment and disposal systems, and wastewater treatment and disposal systems that qualify for reductions under State rules. S&ME proposes a Long Term Acceptance Rate (LTAR) of 0.3 gallons per day per square foot (gpd/ft^2) for the repair area.

This report identifies the general location of potentially useable soils for on-site wastewater treatment and disposal systems, and does not constitute or imply approval for permit, as required by the local health department. Soil evaluations are done based on interpretations of the rules governing wastewater treatment and disposal systems and are not guarantees for site approval. Site and system location will need detailed site specific evaluations. The local health department will need to evaluate and permit each individual system. Current soil science and environmental health sampling procedures have been used for this evaluation.

SITE PREPARATION

One of the most important concerns for an on-site system is to protect the site from soil disturbance by heavy equipment. Now that the absorption area has been designed and flagged, **it should be roped off and protected from construction traffic**. No site preparation or construction work should occur if the soil is wet. **Do Not Grade!** Care should be used in removing trees from the field area. Stumps should be ground out or cut flush with the soil surface. Any stump holes or minor depressions should be filled with clean, imported soil material. Provisions must be made for intercepting or diverting surface water away from the absorption area. After the area has been cleared and shaped, the location of the lateral lines and supply manifold should be accurately re-flagged according to design specifications. Each lateral line must be laid out along a level contour using a transit. This step can be completely avoided if flags are protected during clearing.

FINAL LANDSCAPING

After the system is installed, the following should be checked to ensure that the system will not be overloaded with excess rainwater and runoff:

- The distribution field is shaped to shed rainwater and is free of low areas.
- Grassy swales or ditches for diverting surface water are properly installed.
- Gutter and downspout drains are directed away from the system.

Finally, the entire area should be planted with grass in order to prevent erosion. The soil should be properly tilled, limed (if necessary) and fertilized before planting. After applying an appropriate grass seed, the area should be heavily mulched with straw or other suitable material.

SYSTEM DESIGN

It is S&ME's understanding that the design of the repair to the on-site subsurface wastewater treatment and disposal system will be performed by Dr. Bob Rubin, with McKim & Creed. Dr. Rubin indicated that the repair of the failing system would be sized based upon 480 gallons per day (gpd) (4 Bedrooms) comprised of six total lines. Three of which would be conventional gravel trenches followed in series by an additional three lines comprised of the experimental EZflow 1201GEO subsurface wastewater system. A pump tank would be placed beside the existing septic tank to feed the system. Any wastewater that may pass through the six repair lines would be diverted back to the existing failing system to be recaptured.

CLOSING

S&ME appreciates the opportunity to provide soil scientist services to you. A soil scientist evaluation has been completed on 168 Woodridge Lane. If you have any questions or comments or require additional information please contact us at your convenience.

Sincerely,

S&ME, Inc.

Toney Jacobs

RPW Toney Jacobs, L.S.S.
Senior Soil Scientist

Rob Willcox

Rob Willcox, L.S.S.
Natural Resources Department Manager

LICENSED SOIL SCIENTIST
ROBERT P. WILLCOX, JR.
RPW 11/5/07
1098
STATE OF NORTH CAROLINA

Figures

Figure 1: Vicinity Map
Figure 2: USGS Topography Map
Figure 3: Hand Auger Boring Suitability Map

Attachments: Hand Auger Boring Profile Descriptions