



Standards Oversight Council (SOC)

Developing effective technical standards that protect Wisconsin's natural resources

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01 Verification of Land Features in Silurian Bedrock/Karst Areas Standard Team

MEETING NOTES

Thursday, April 25, 2019 ▲ 9:30am – 3:00pm ▲

UW Division of Extension - 625 E. County Road Y, Meeting Room A, Oshkosh, WI

9:30 Welcome, Introduction, Notes Approval (Kate, Team)

Goal: Welcome, review objective for meeting today, review and if needed adjust 3/25/19 draft meeting notes as necessary and approve.

- Welcome back!
- **Present:** Kate Brunner, Mark Jenks, Rachel Rushmann, Joe Baeten, Travis Engels, Amy Haak, David Hart, Maureen Muldoon, Nathen Nysse, Tony Reali, Francisco Arriaga, Matt Komiskey, Jason Nemecek, Jamie Patton, and Matt Woodrow.
Absent: None
Invited Guests (remotely): Dante Fratta, UW Madison; and Eric Cooley, Discovery Farms
Public Guests: None
- Main meeting objective today: We'll discuss the different field verification methods in turn and start filling in a summary table to use as a discussion guide so comparable topics covered for each method. Discussion is expected to include details like qualifications for implementation and interpretation, availability, data quality, output, depth and soil type evaluation, and cost. We'll work out detailed criteria at later meetings.
- Our last meeting was on March 25. Draft meeting notes were circulated via email and hard copies available here. No questions or corrections were raised related to the draft notes. Kate will post online final by next Thursday (May 2) so get in touch with her if you see any adjustments prior to then.

Review standard sideboards (Rachel/Mark)

Goal: Review sideboards for the standard.

In initial review of the key issues and complications, as well as what part of the verification will be in future rule-making (rather than in the standard), DATCP has decided to set a more defined path and specified additional sideboards related to data management and mapping. The standard will focus on actual field verification and not how the data is used or submitted. Previous sideboards remain, with the addition of:

1. Mapping of depth to bedrock is beyond the scope of this technical standard.
2. Data management issues are more appropriately addressed in the revision to ATCP 50 and not in the technical standard.

Team will not decide which maps are starting point.

Team requested that mapping still be considered at a field scale, but restricted at a regional scale. Outputs for each technology will likely be part of our criteria, but submittal requirements will not.

Direct push probe (Geoprobe) (Rachel/Mark with Team)

Goal: Review methodology to gain an understanding of the technology; team discussion of issues.

Eric Cooley from Discovery Farms joins us by phone to discuss his experience with Geoprobings. Some key points from that discussion:

- They purchased a Geoprobe specifically to determine depth to bedrock.
- Geoprobe can be fitted with solid rods just to feel when rock (refusal) is hit, or you can use liners to collect continuous soil samples. Soil sampling could help confirm when rock hit though it is slower probing.
- Existing work for DNR in environmental program, a geologist, engineer or scientist interprets Geoprobe soil samples. Existing work for DNR in water well program, the driller makes determinations and submits paperwork. Documentation in environmental program viewed as more complete and more accurate.
- We review some pros and cons, and enter summary into a comparison table.
- Equipment is widely available and cost for Geoprobe and operator runs about \$1,500/day.
- Key cons: Geoprobings likely not most effective or fastest method for determining depth to bedrock. It leaves hole as conduit, though that can be backfilled with bentonite.
- Tech standard criteria would likely include borehole abandonment requirements. DNR has requirements, such as those detailed in NR 141 for proper abandonment of groundwater monitoring wells.

Geophysics (Dante Fratta, PhD, PE, University of Wisconsin)

Goal: Establish understanding of geophysical techniques, including operating and interpreting data. Team discussion to follow.

At our last meeting we identified that Dante Fratta, PhD, at UW Madison is a great resource in geophysics. He provided background and some detail on a variety of techniques, and the pros and cons for using geophysical methods in determining depth to bedrock. Some key points from that presentation and discussion:

- Geophysical techniques are non-intrusive investigations that read variations in physical properties underground. Requires some training for operating and interpreting data.
- Spatial coverage and time to analyze depends on how variable the bedrock surface is across the area.
- Geophysical techniques would be more effectively used in conjunction with other field methodologies.
- Gravity and magnetic surveys will have limited application unless the depth to bedrock is not constant.
- Ground penetrating radar (GPR) can give detailed images of depth to bedrock as long as the sediment layers have low conductivity.
- Active seismic can provide lines of depth to bedrock (refraction requires simple analysis)

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- Passive seismic HVSR can provide maps of depth to rock at relatively low-cost, but with greater margin of error.
- Capacitively-coupled electrical resistivity and frequency domain electromagnetic can provide both depth to bedrock and information about water quality in the sediments at rapid data acquisition rates.
- EM and resistivity provide continuous profile along a transect. HVSR is individual points.
- **Kate** will work with **Mark and Rachel** to identify some follow-up questions for Dr. Fratta, and ask him help populate our summary table.

12:15 *Lunch, provided*

Hand probing (Rachel/Mark with Team)

Goal: Review protocol for hand probing; team discussion of issues.

We review specifics of hand probing—mostly based on the Kewaunee County policy, but also UWGB and others personal experience with hand probing (e.g. tile probe). Based on our discussions we start filling in summary table. Key points of the discussion are below:

- Hand probing is quick and accurate for shallow bedrock.
- Before probing, useful to identify how manure will be spread (i.e., what is depth interval they really need identified) to focus sampling areas. Probing is more dense (like, every 5') when that interval is encountered to better delineate that key depth. Some sampling is just on a grid with 1 probe per acre, and no additional delineation.
- Some geologists may also focus sampling locations based on what they see on the landscape. Look at outcrops and shape of ground surface and make some assumptions to minimize sampling where bedrock very likely <2'. Farmers tend to know where bedrock is less than 2' in cropland, though not every farmer does deep tillage.
- NRCS soil map used as starting reference before going in the field.
- Probe (like a tile probe) would be used to determine bedrock depth, whereas hand augering would allow soil sampling. There are also slide hammer style probes that would provide some additional power.
- Key cons: most effective with bedrock <4', poor results in frozen ground or very dry or very wet soils

Excavation for Bedrock Identification (Matt W.)

Goal: Issues related to excavation (i.e., using machinery such as a backhoe) for observation of depth to bedrock with team discussion.

Matt starts the discussion based on his engineering experience with excavation. Test pits are excavated for other technical standards. We then start populating our summary table. Key points of the team discussion are below:

- Farmers often have equipment to excavate onsite.
- Typical backhoe reach is 14', typical excavator is 18-20'. Long reach excavators are more expensive and less available.

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- Sandy conditions result in test pit cave in and larger holes.
- Frozen ground hinders excavation.
- Water table can hide the bottom of excavation
- Other Key cons: disruptive to field, causes compaction, mixing of soil reduces fertility, large hole is conduit to water table.

Review Field Methodologies (Kate with Team)

Goal: Recap of all the methodologies discussed today and review summary of key considerations.

No other techniques were brought up for determining depth to bedrock. We can continue to revisit and wouldn't want to eliminate any possible new technologies.

Next Meeting Topics and Plan of Action (Kate, Team)

Goal: Identify and understand the topics, concerns, and goals for next meeting. Review Action Items and agenda items for next meeting.

Action Item review:

- **Kate** will work with **Mark and Rachel** to identify some follow-up questions for Dr. Fratta for field, possibly having him help populate our summary table.
- **Kate** will prepare meeting notes, circulate to Team Leaders **Mark and Rachel** first, then to full **Team**.
- **Kate** will finalize the 3/20 notes and post online.
- Variability of bedrock depth across a field assignments to be discussed in brief at 5/23 meeting. Examples will be provided by:
 - Dave** – geophysics
 - Travis** – hand probe
 - Amy** – geologist interpretation of landscape with educated assumptions for <2'
 - Nathen** – Veris vs EM38

Topics for next meeting:

- Team does not have other technologies to add to list for consideration. We will continue to evaluate and review.
- Team agrees that a field trip not expected to be necessary.
- Variability of bedrock depth across a field – review examples brought from assignments (see Action Items above).
- Methods by depth – **Maureen** will start list/table based on discussions to date.
- Start developing criteria for different technologies – how to sample (frequency, qualifications (e.g., is farmer qualified?)), how will criteria differ if using multiple techniques together?
- Review draft definition (**Mark** will start to prepare).
- List of dates for potential team meetings beyond July will be sent out prior to next meeting.

3:00 End