

**From:** [Dan Masterpole](#)  
**To:** [Ketty Clow](#)  
**Subject:** FW: NSW Study Report  
**Date:** Monday, January 6, 2020 4:10:04 PM  
**Attachments:** [BolandSeep \(1\).pdf](#)  
[BOLAND STAHL 2019 Comments Final Oct 2019 \(1\).docx](#)

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KC

Please find attached the letter received from Katherine Stahl and Lee Boland dated Nov. 1 and the associated attachments.

*DAN MASTERPOLE*

Dan Masterpole  
Dept. Director/County Conservationist  
Chippewa County Land Conservation & Forest Management  
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**From:** Katherine Stahl [mailto:stahland@centurytel.net]  
**Sent:** Sunday, November 03, 2019 6:53 PM  
**To:** Dan Masterpole; Ethan Hau  
**Subject:** NSW Study Report

November 1, 2019

Ethan J. Hau, Land Resource Technician  
Dan Masterpole, Dept. Director/County Conservationist  
Land Conservation and Forest Management  
711 North Bridge St.  
Chippewa Falls, WI 74729-1876

Dear Misters Hau and Masterpole:

We have reviewed the Northern Sands Wisconsin September 13, 2019 submittal for Permit #2015-1 which they claim to be a clarification response to your letter of August 7, 2019. It is our understanding that you have accepted their clarification. We would like to point out inaccuracies and deficiencies in their report and respectfully request you reconsider your acceptance.

In the September 13<sup>th</sup> and the August 7<sup>th</sup> NSW letters, Tom Gapinske and Dr. Brian Mahoney wrote that a full hydrologic inventory of all required

Phase 1 adjacent properties had been completed. This is not accurate. We hired Dr. David Zaber to accompany Dr. Mahoney and Ms. Ann Key during their visit to our property and the Wagner property. He was asked to observe their inventory procedures and not interfere in any way. Dr. Zaber has advised us that Dr. Mahoney and Ms. Key did not visit all of our forty that was required by your office for this inventory (see Dr. Zaber's attached report). Rather, they walked along the pipeline in the middle of our forty. They did not discover, delineate, quantify, or record a single seep anywhere on the forty although we know of at least two. As you know we were concerned about the limited amount of our land you required NSW to study. We are dismayed that they did not even thoroughly study the required forty acres.

Four years ago when permit 2015-01 was issued we requested a review of determination. One of our concerns was the possibility of seeps, springs, and wetland depletion altering or even perhaps eliminating the flow of the small Elk Creek feeder stream that originates on our property. This stream flows from north to south and originates immediately west of the ridge that is included in the mine footprint and contains the single forty you required NSW to study and inventory. We have suggested several times that not only the required forty but the forty immediately south of it plus the east half of each forty directly west of those two be studied to obtain base line flow parameters for that stream. It is our contention that all of the seeps and springs within that 100 acres need to be identified, located and quantified to make the study meaningful. In our opinion none of this has been done.

Mr. Gapinske and Dr. Mahoney's September 13<sup>th</sup> letter states "surface drainage features are the predominate control for the localized wetland development and do not originate from any continuous subsurface feature or layer". This is not an accurate statement. Ridges on our property have several seeps that result from subsurface layers. Dr. Madeline Gotkowitz visited our land and noted the presence of several seeps on the west side of the very ridge that is part of the mine footprint (see Dr. Gotkowitz's attached letter).

Dr. Mahoney has outlined the surficial drainage but has not at all addressed the impact on the capture zone once the excavation of Phase 1a and Phase 1b occur. We have been told by Dr. George Kraft that the change in capture zone as a result of excavation can be calculated. None of this is included in the NSW analysis. Again, one of the major reasons we have been concerned about the mine excavation is that altering the seeps might impact or even dry up the perennial Elk Creek feeder stream on our property immediately west of the area in question.

The NSW report indicates that adjacent wetlands' viability is *principally* dependent upon land use of adjacent parcels west of the NSW permitted

area. We don't doubt that our and Wagners' land use would impact the wetlands, however, NSW's management of surficial drainage is not their only possible impact to the neighboring wetlands and seeps. Nowhere in the study do the study authors acknowledge that perched water tables or aquitards even exist in our ridge or other ridges, much more the authors' consideration of their contribution to cold water feeder stream supply. We contend that this is a regional issue that affects significant areas surrounding the proposed mine in question.

The September 13<sup>th</sup> NSW report refers to the surficial waters flowing under 13<sup>th</sup> Street through "the culvert". It should be noted that there are two 24 inch culverts located 32 feet apart under 13<sup>th</sup> Street. Both of those culverts were observed running absolutely full and flooding a substantial portion of the proposed processing area on July 6, 2015. Lee Boland observed the flood waters flowing north into 18 Mile Creek. You will note that NSW indicates the run off goes only into Elk Creek. If they can't see these obvious surficial things, how confident can we be with their study findings?

Given the omissions and inaccuracies, we question the NSW report as they relate to seeps and wetland that supply the feeder stream on our property and the wetlands found on the Wagners. And we ask you to consider Dr. Zaber's and Dr. Gotkowitz's information relative to the report you've received from NSW. They have addressed additional issues that we have not covered in this letter and NSW did not address in their study.

Sincerely,

Leon Boland, P.E.  
Katherine Stahl

Lee Boland  
Elk Mound, Wisconsin

May 7, 2015

Dear Lee,

I enjoyed touring your property with you, and I appreciate the opportunity to see some of the geology and water features in the area. I was able to use the GPS locations of the seep and the headwater of the stream to develop a couple of diagrams that illustrate the nature of the seep in the uplands and its relation to the water table at lower elevation.

The seep on the property is at the contact of the Tunnel City Formation with the underlying Wonewoc sandstone. The Tunnel City is a glauconitic sandstone. Glauconite is a clay mineral, and at locations where the Tunnel City contains appreciable amounts of glauconite, it can "hold up water". This occurs on your property, at an elevation of about 1,150 feet above sea level. We observed that the water from the seep, which likely varies in flow rate but was on the order of about a liter per minute that day, infiltrated the ground within about 20 feet or so of the seep. This indicates that the water re-enters the subsurface, where it is used by plants or percolates to the water table.

On the day I visited, April 22<sup>nd</sup>, the water table was at an elevation of about 1,055 feet, significantly below the elevation of the seep. I estimated this elevation based on the location of the headwater of the perennial stream on your property. This water table elevation is consistent with measurements made in water wells that are in our database. I've attached a sketch of the water table in the vicinity of your home, based on the stream elevation.

I've also attached a sketch that illustrates infiltrating water flowing out of a seep at high elevation and subsequently re-infiltrating to the subsurface. If the geologic material that leads to the seep formation (in this case, the Tunnel City) is excavated from the other side of the ridge (in Chippewa County), it may or may not reduce discharge at the seep on your property. Identifying the area of infiltration that feeds individual seeps (such as the one we visited) is beyond what we're able to accomplish our regional study.

As you know, we are currently evaluating the effects of industrial sand mining on recharge to the water table. To date, our work suggests that recharge in an actively mined area could fluctuate while bedrock is exposed in that area, but stream baseflow would be somewhat buffered from that because streams typically gain recharged water over areas larger than an individual mine.

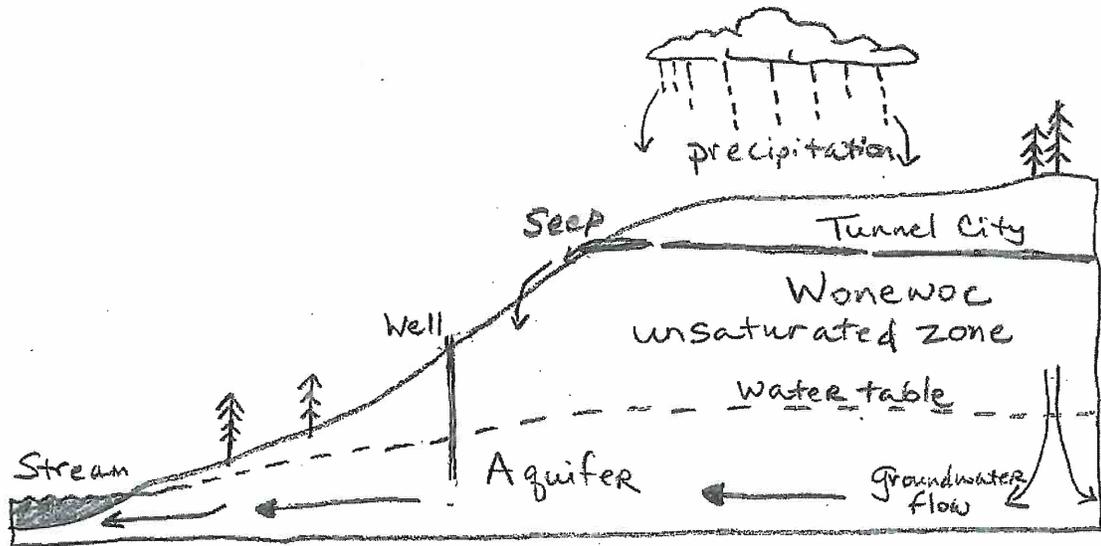
I hope this helps clarify the nature of the seep relative to the water table. Feel free to give me a call, 608 262-1580 if you have questions.

Sincerely,

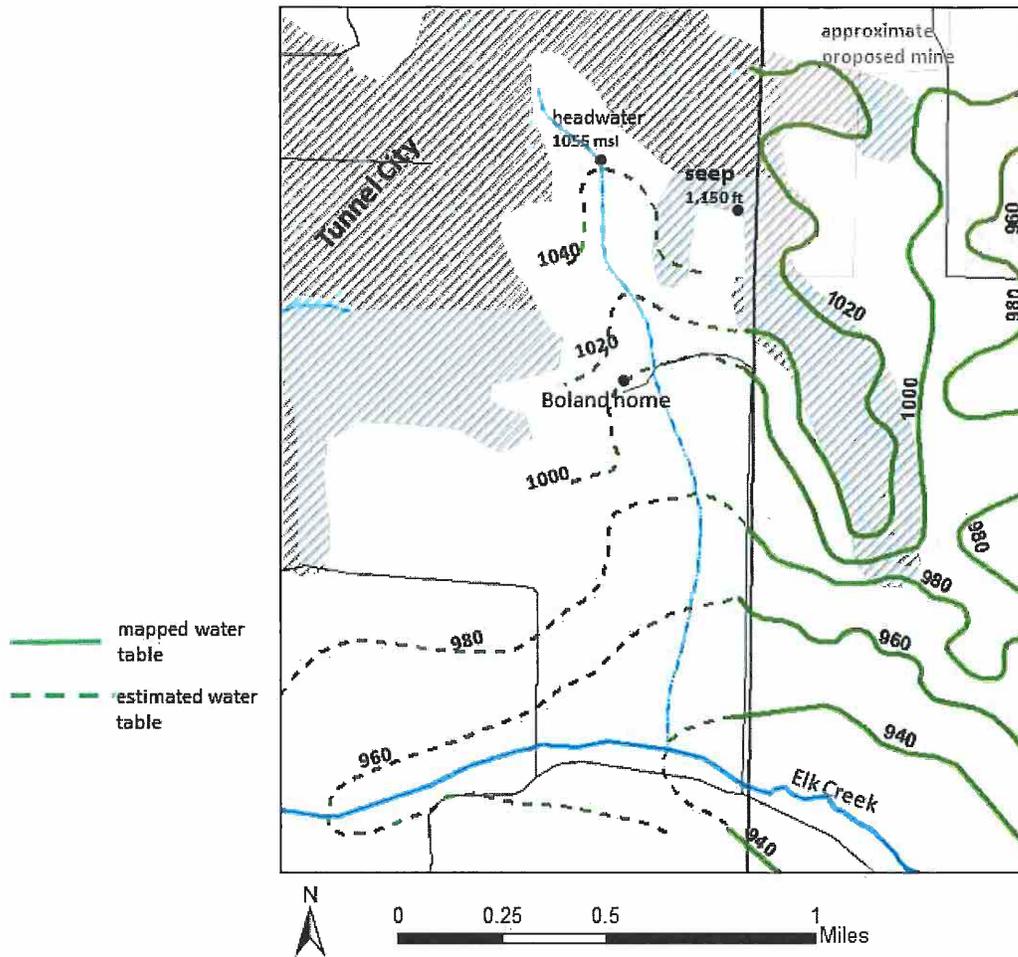
*Madeline Gotkowitz*

Madeline Gotkowitz  
Hydrogeologist

Cc: Dan Masterpole, Chippewa County



This sketch shows precipitation that infiltrates and creates a seep along the valley wall. The water from the seep re-infiltrates into the unsaturated zone, where it may recharge the water table or be used by plants. Clay-rich sediment within the Tunnel City Formation leads to the presence of seeps on the hillslopes. The stream is fed by groundwater. As the water table rises and falls seasonally, the headwaters of the stream will move, too. The headwater will be at higher or lower elevations, coincident with the water table. Wells are drilled into the saturated zone, or aquifer.



This sketch illustrates the estimated water table elevation near the Boland Home. The headwater of the stream reflects the water table elevation at that location. The seep is much higher in elevation, about 100 feet higher than the water table.

October 31, 2019

Leon Boland & Katherine Stahl  
N7607 1010<sup>th</sup> Street  
Elk Mound, WI 54739

Dear Mr. Boland and Mrs. Stahl,

Please find the following comments regarding the Northern Sands Wisconsin LLC (NSW) sand mining project proposed for Chippewa County. These comments and observations document my thoughts regarding the tasks completed on May 14-15<sup>th</sup>, 2019, on your property and adjacent private lands. These tasks included accompanying Northern Sands LLC consultants during their assessment of wetlands on these adjacent properties and determining, to the extent possible, whether that assessment was sufficient for complying with permit requirements. I have also reviewed the “[F]ollow up inventory and assessment” for wetlands submitted by NSW and prepared by Dr. Brian Mahoney (Precision Geo Solutions LLC) and Ms. Ann Key (Wetland & Waterways LLC) as well as responses from Chippewa County.

### **Background:**

In 2015, comments on the draft reclamation plan for the proposed Northern Sands LLC sand mine were submitted to Chippewa County. These comments focused on the adequacy of the proposed reclamation plan and made numerous suggestions to ensure that, at a minimum, sufficient information was available to the public and decision-makers. While these comments focused on the overall sufficiency of the proposed plan, much of my concern focused on the potential direct and indirect hydrological effects of the proposed mine. For example, the following paragraphs taken from those comments outlined my concerns over this issue (emphasis added).

“Given the fact that the proposed mine site comprises a significant portion of the upper watersheds of both waterways, construction and operation of the mine will result in significant adverse impacts to their structure, composition and ecological functions. These include but are not limited to, detrimental changes in flow regimes, damage to aquatic and riparian habitat quality, greater fluctuations in stream temperatures and increased inputs of suspended and dissolved solids in runoff. *Moreover, no information on the many freshwater seeps and springs surrounding the proposed mine is made in the plan. This is particularly problematic given the groundwater recharge function of the mine site and surrounding areas. Perched wetlands and small high elevation seeps are also found in the area and are highly likely to be affected as subsurface features serving as aquatards are damaged or destroyed.* These aquatic features are critical parts of the overall watersheds for both Elk and Eighteen Mile Creeks yet no assessment of, or reclamation plans for these features is provided.

Assessing potential impacts to aquatic systems requires accurate baseline information on surface and subsurface hydrology and existing biological conditions within various components of the system. Without sufficient baseline information, determining adverse changes in the system as a result of a proposed action is made more difficult if not impossible. Although the Permit does require assessment of wetlands, springs, and other surface water resources, these assessments are allowed to be phased in as mining progresses.

Allowing wetland delineations to be “performed over time (in stages)” ignores the potential for interconnections between groundwater, surface wetlands and surface water streams. Assessing the status of wetlands and groundwater resources within the boundary of the proposed sand mine must begin with the understanding that there is a high likelihood that surface and subsurface water sources are connected hydrologically. These relationships are key to understanding the direct, indirect and cumulative impacts of the proposed mine and its

operations. However, allowing for wetland delineations to be completed as mining proceeds ignores this connectivity. Depending upon hydrological conditions at the mine site, any significant ground-disturbing activities have the potential to affect other parts of the system prior to the time at which these systems are delineated.”

On May 7, 2015, Dr. Madeline Gotkowitz provided you with a letter outlining a basic hydrological model describing the hydrological processes creating the small seeps along the eastern valley wall on the eastern drainage basin on your property. Dr. Gotkowitz identified a seepage area at approximately 1,150 feet in elevation as a visible example of the local hydrology:

The seep on the property is at the contact of the Tunnel City Formation with the underlying Wonewoc sandstone. The Tunnel City is a glauconitic sandstone. Glauconite is a clay mineral, and at locations where the Tunnel City contains appreciable amounts of glauconite, it can “hold up water”. This occurs on your property at an elevation of about 1,150 feet above sea level.

As we have observed in previous visits to this site, Dr. Gotkowitz observed water from the seep flowed for approximately 20 feet or so before it re-enters the soil. There are additional moist areas in this vicinity at similar elevation. It is likely that these areas are also discharge zones where water may not reach the land surface but either percolates to the water table or is used by plants (as mentioned by Dr. Gotkowitz).

Dr. Gotkowitz also discussed the potential impacts of excavation on the eastern side of the bluffs for the proposed mine:

“If the geologic material that leads to the seep formation (in this case, the Tunnel City) is excavated from the other side of the ridge (in Chippewa County), it may or may not reduce discharge at the seep on your property. Identifying the area of infiltration that feeds individual seeps (such as the one we visited) is beyond what we’re able to accomplish with our regional study.”

Since that time, Wisconsin Geological Survey published Bulletin 112-2019 *Groundwater Flow Model for Western Chippewa County, Wisconsin, Including analysis of water resources related to industrial sand mining and irrigated agriculture*. This study confirmed the findings outlined in the Gotkowitz letter regarding the seeps/springs on your property as well as on adjacent properties. Specifically, the locations of the economically-viable formations for sand mining make the hydrological connections to groundwater complex. This complexity, and the potential “capture” of shallow groundwater by the proposed mine’s excavations and associated operations, are at the center of concern that seeps and springs on your property and other adjacent properties are not included in the wetland assessment requirements of the permit.

In the western portion of the study area, sedimentary bedrock units act as major aquifers. These Cambrian-aged units consist of alternating layers of sandstones and shales that dip slightly toward the southwest. Several of the upper bedrock units, including the Wonewoc Formation, the primary source rock for industrial silica sand production, are only present within ridges that rise above the local stream elevation. *As a result, the hydraulic connection of any groundwater within these upper bedrock units to streams is complex because local and ephemeral perched water tables and related seeps along the slopes may occur.* Conceptually, if saturated conditions exist within the Wonewoc or other overlying stratigraphic horizons, downward gradients will result in flow into underlying bedrock units or adjacent glacial deposits before discharging to streams. This phenomenon was observed at a location within the study area, with small seeps emanating from the Tunnel City sandstone within an incised valley. The water infiltrated into the soil and colluvium before reaching the headwaters of the nearby perennial stream.

In the western upland bedrock areas, the water table is generally located near the base of the Wonewoc and the top of the Eau Claire sandstone. Groundwater in the Eau Claire and underlying Mount Simon sandstones is conceptualized to flow primarily horizontally until reaching an eroded valley filled with unconsolidated material where the water can discharge to a regional hydrologic feature such as a perennial river. Indeed, although there is about 300 ft of vertical topographic relief in the study area, groundwater flow is predominately horizontal because the aquifers cover hundreds of square miles and streams (where most groundwater discharges) are commonly miles apart.

## **Findings**

On May 14, 2019, I met Dr. Mahoney and Ms. Key and a representative of NSW at the proposed mining site. After an initial introduction the company representative listed safety issues and other parameters for me as requirements for accompanying the consultants as they entered private properties adjacent to the southwestern unit of the proposed mine. After this initial introduction I accompanied both consultants to the Wagner property. The Wagner property contains numerous seepage areas which flow north and/or east from their property to the proposed mine site. The Wagner property is also adjacent to your property which lies to the south and southwest of the proposed mine site.

Beginning at the northernmost boundary of the Wagner property, consultants delineated the small pond at the southeast corner of the Wagner driveway and 810<sup>th</sup> Ave as well as the large seepage zone in the pasture located between the Wagner driveway and eastern property boundary. Several small seepage zones also occur along the Wagner/Northern Sands property boundary from 810<sup>th</sup> Ave south to the top of the bluff and these were also delineated. Consultants proceeded on to your property for a short distance then followed the pipeline right-of-way and finally proceeded north along the Wagner property. Seeps encountered along this route were also delineated.

The following day (May 15, 2019), I took basic water chemistry measurements (pH, Total Dissolved Solids, Temperature, Specific Conductance) in several of the delineated seeps on the Wagner property. In addition, I conducted the same set of measurements in the seep identified by Gotkowitz as well as the headwater stream in the western incised valley on your property. Results of these measurements are provided in Table 1.

These results indicate similar origins for the higher elevation seeps on your property and on the Wagner property as described in the Gotkowitz letter. Differences in water temperature of individual seeps are related to sunlight at the sample points. Differences in pH are related to the degree of photosynthesis occurring in flows (e.g. photosynthesis removes CO<sub>2</sub> from the water resulting in higher or less acidic pH values). Total dissolved solids and specific conductance were generally consistent across seeps and within the springbrooks on your property. However, it is important to note that these results represent conditions at that point in time.

## **NSW Report**

The NSW follow up report identified four main tasks that required completion for compliance with Permit #2015-01 issued by Chippewa County. These include:

- Hydrologic inventory of adjacent properties and reevaluation of the potential for mining operations to affect seeps, springs, wetlands, and surface waters;
- Documentation of stratigraphy and nature of regional groundwater flow;
- A sub-watershed delineation of each hydrological feature or set of features to determine the water source and the approximate percent contribution from each water source to the feature;
- Updated wetland assessment on adjacent properties identified by Chippewa County.

According to the report, the sub-subwatershed area relevant to the Northern Sands Wisconsin project area was based upon a ½ mile buffer and WDNR 1:24K digital elevation data. This delineation excluded watersheds on the majority of your property and limited the spatial extent of seeps, springs and wetlands where the four tasks were applied. This limited scope of analysis failed to reflect the common source of water for higher elevation inventoried seeps and wetlands on the Wagner property and those occurring on your property. The extent of this hydrological connectivity was not addressed in this report.

While the follow up report concluded that developing the mine "...will not impact the upgradient intermittent seeps as this water flows downgradient to Elk Creek", no discussion of the potential impacts of mitigation or the potential for capture of shallow groundwater feeding seeps on your property is included. For example, is there a possibility that changing the topography of areas downgradient of these seeps could alter flows to the south and west of the ridge on the eastern edge (or other portions) of your property? While the source of water to these seeps is upgradient of the proposed mine, changing downgradient hydrology may change flow patterns (e.g. "capture" of groundwater) with potential effects to seeps and springs on your property. Moreover, given the low flows of individual seeps, even seemingly minor changes in hydrology have the potential to alter the biological conditions formed around these zones (on your property). Without sufficient baseline data for seeps and hydrology on your property it will be much more difficult to determine if sand mining is affecting these features.

## **Conclusion**

Based upon my observations and information provided in the NSW report, tasks undertaken by Northern Sands, LLC consultants characterized the spatial extent/size of the seeps and associated wetlands occurring within the land area outlined by Chippewa County at that point in time. Unfortunately, this alone is insufficient for providing the minimal level of information for sound decision-making. Delineating the spatial footprint of a seep/spring alone is not sufficient for a comprehensive assessment of the biological and hydrological conditions and connections in and around the proposed mine site. Without a more comprehensive wetland assessment, including all potentially hydrologically connected sites, it will be difficult to monitor potential adverse effects on these systems as mining proceeds.

As we have discussed, information in the Gotkowitz letter and Chippewa County groundwater study points to the need to include seeps, springs, wetlands and associated streams (upper Elk Creek) on your property in any assessment. The County should require all seeps and springs with possible surface and/or subsurface connections in surrounding areas be fully assessed, not only those in the subwatershed flowing into the mine site itself. In this case, while drainage on the majority of your property flows to a different tributary of Elk Creek, this subwatershed does share a border with the subwatershed flowing to the mine property. Consequently there are potential subsurface hydrological connections to seeps and springs draining to both subwatersheds along that boundary (which is based upon surface elevation).

Similarly, despite the permit requirement for a full assessment of seeps/springs and associated wetlands, this requirement has apparently been interpreted to only require an inventory with spatial delineation rather than a more thorough (and useful) comprehensive assessment. Such an assessment would include measurements of physicochemical water quality parameters, flow rates/regimes and biotic composition for all inventoried features.

This decision by Chippewa County to limit the size of the study area and not require any water chemistry or flow determinations means that potentially-connected seeps/springs and wetlands on your property are being ignored and that no quantitative flow or water chemistry baseline data measurements are available for these aquatic systems. If this assessment is intended to provide baseline conditions for assessing potential future impacts of the mine, the lack of sufficient spatial coverage and monitoring of basic chemical characteristics and flow regimes limits the ability to conduct future monitoring. This serious shortfall limits your and the County's ability to detect possible future changes in hydrology, water chemistry and other important characteristics of these features. Including these measurements would provide the necessary comprehensive

baseline information for assessing potential future changes/damage to these systems. The failure of Chippewa County to require assessment of seeps, springs and wetlands located further south and west on your property, despite the possibility that they may be affected by mining, is a significant oversight.

Given the size of the proposed mine, uncertainty regarding subsurface hydrology for seeps and springs and the prolonged time that it has taken for mine proponents to meet permit conditions, adding these simple measurements and expanding the spatial scope of wetland assessments to include additional portions of your property would have been reasonable and should have been required by the County.

Prepared by David J. Zaber, Ph.D.

**Table 1. Water chemistry results on Wagner & Boland/Stahl properties.**

Site ID/Description	Temp (C)	pH	Total Dissolved Solids (PPM)	Specific Conductance (ms/cm)
Stahl Site 1 Spring/seep at east drainage	8.1	6.1	22	0.02
Stahl Site 2a Springbrook in west drainage	11.2	6.6	24	0.02
Stahl Site 2b Springbrook tributary in west drainage	14.3	7.5	47	0.06
Stahl Site 3 Springbrook east fork, west drainage	15.3	6.6	21	0.02
Stahl Site 4 Springbrook west fork, west drainage	16.6	6.7	19	0.02
Wagner Site 4 Seep near Barn/house draining to east	31	8	61	0.08
Wagner Site 5 Seep originating in plantation south of site 4	18.4	6	13	0.01
Wagner Site 6 Seep originating near plantation south of site 5 near deer blinds	19.9	6.1	12	0.01