Comments on the Dabelstein and Yoder Sand Mining EAWs

The high sensitivity and susceptibility of this karst area requires that particular care be taken to prevent the release of any contaminants to the groundwater. The proposer and the RGU should be mindful of the fact that literally hundreds of people live within less than eight miles of each of these mines (including people in St. Charles and Utica), and the local karst aquifers are the sole source of their drinking water. The descriptions of these projects state that the reject sand and other unusable materials, will be hauled back on-site, or will be permanently left on-site for disposal. The initially high susceptibility of the site to groundwater pollution will be exacerbated by the mining operations. Disposal of mine wastes and/or reject sand from the washing and sizing operations (estimated by the EAW to be 25% of the sand removed) represent an even higher risk of groundwater contamination. That potential contamination would be directly recharged into the Prairie du Chien/Jordan aquifer – the already seriously impaired local water source. The economics of sand mining are dominated by transportation costs. Those economics predict that most of the reject sand will go into the quarries nearest to the processing operation to minimize transportation costs. Such procedures would concentrate the potential contamination close to the major receptors.

The State of Minnesota Groundwater Non-degradation law 2007(MN Rules 7060.0500) states that underground waters are classified as potable water sources. The law specifically prohibits any discharges of waste to the groundwater. For too many decades in this state, wastes that were contaminated with chemicals or other ingredients were simply allowed to be spilled, buried or applied across the land surface, or leaked from damaged or corroded containers. Millions of dollars have been spent over the last several decades in efforts to clean up the contamination, and such clean-up has proven to be never very comprehensive or effective. So the force of law requires that any RGU which permits a new project should ensure that the project will not contaminate the groundwater. The RGU, as well as state regulatory authorities, are required to protect the local aquifers, which are the sole sources of drinking water for most or all residents in the region. The many residents who do not reap any financial rewards from these mines could endure significant financial hardship if their drinking water supplies or stock wells are contaminated.

All reject sand or other unusable material, which is to be replaced into the exhausted mine areas as fill, should be legally defined and considered as a <u>waste product</u>, especially after contact with any chemicals, and therefore regulated by state law as such. In addition to the obvious situations (as mentioned in the EAWs) where a spill or leak of oils, diesel or other fuel, etc. could occur, there are apparently several other aspects of this project where contact with a chemical could occur. Examples of such instances may include (but are not restricted to) when the sand is mined or transported, during sieving or processing, or when sand or other materials are managed on-site. Various chemical additives may be used to control dust, prevent clumping, assist the

washing or sieving, or as pesticides. Any material that may be mixed with or contain chemicals, ingredients or other items could be hazardous, toxic or otherwise a health risk.

As has been demonstrated numerous times locally, nationally and internationally in karst aquifers, chemicals or other ingredients can quickly migrate underground and into the groundwater and then rapidly travel over large distances, often to drinking water wells miles away. Such rapid transit does not allow natural biological processes to break down contaminants into inert compounds or elements, as may occur elsewhere in areas where sediments composed of silt and/or clay retard water flow to only a few feet per year. Such relatively slow water flow in such areas theoretically protects wells at distances beyond a few hundred feet – but local water quality testing information clearly indicates that soluble contaminants such as nitrate can and do penetrate all of the "natural attenuation" of the aquifers in the areas of these EAWs.

It is clear from the intention of the Minnesota non-degradation law, that any region which is sensitive to groundwater contamination should be given the highest protection from contamination. The rules governing the authority of the MPCA to control pollution (MN Rules 7045.0129) also require that the quantities of the waste generated at individual generating sites should be considered, and should take into account the regional basis of that contamination.

This operator states their intention of using approximately 120 acres (i.e., the combined footprints of the Dabelstein and Yoder mines) as disposal sites of the reject sand. The operator also acknowledges a possible interest in mining up to 160 acres in Winona County, presumably following the same plans and procedures. Further, the RGU acknowledges that there are other similar projects proposed in the local area, some of which happen to be just across the county boundary in Fillmore County. Nevertheless, there are approximately 250 acres of new sand mines acknowledged in these EAWs as so far proposed in this immediate karst region. Essentially, that would increase by 250 acres (and potentially more, if future projects are permitted), the amount of landfills that should be monitored *in perpetuity* by the regulating authorities (principally, the MPCA). It is incumbent upon the authorities to consider both, the risks of contamination to the drinking water supplies of hundreds of residents, and also the costs to the taxpayers of adding over 250 acres of landfill monitoring and compliance for decades to come.

The EAWs mention that the MPCA rules for individual sewage treatment systems (ISTSes) require only a minimum of 3 feet of sand for a drainfield. This line of reasoning is irrelevant in the cases of sand mines, which use any type of chemical in any mining or processing activity, and as are proposed in this karst region for the following reasons:

1-The purpose of the minimum requirement is to provide a substrate for pathogens to be removed from the wastewater by the very slow flow of water through silty/sandy soils, so that pathogen-laden water will not reach any drinking water aquifers. The chemicals which may be mixed with this waste sand are not pathogenic bacteria and viruses, so this ISTS rule is

irrelevant. The types of chemicals associated with sand handling and processing include soluble salts and a wide range of synthetic soluble organic compounds which could pose health risks to people, when those contaminants reach drinking water aquifers. Such chemicals are not stopped by “3 feet of sand” and do not need to have a pathogenic risk to be of concern.

2-The ISTS rules require percolation tests (‘perc tests’), to determine whether the drainage characteristics of on-site soils meet the specific range of flow requirements that will provide the ability for pathogen removal. Soils with too slow or too fast rates of drainage are rejected by the tests. There is no information in these EAWs that the reject sand will have the appropriate drainage rates, consistent with ISTS rules. However, natural soils in other areas which are in-place also have a particular structure and which has evolved over time and in-place. So, even if the proposer could assure the sand drainage rates will meet some of the ISTS standards, it is unlikely that just dumping and leveling sand will produce a structure similar to that found in natural soils, and there is no guarantee that the dumped sand will produce any protective structure at all. Further, as these projects are conceived and explained, there is no practical way to provide an analogous percolation test on the material, before the waste sand is disposed of onto the karst bedrock. By the time the contaminated sand is dumped into the exhausted mine, the problem has already become established and it is too late to do appropriate tests.

3-These EAWs comment many times about the well-drained and excessively well-drained soils across the areas of the mining footprints. Therefore, some of these soils in-place now would likely fail the ISTS percolation tests, because of drainage that is too rapid. Without a natural soil structure, it is practically certain that dumped sand would not meet even the minimum ISTS standards that would protect against pathogens. But more importantly, dumped sand almost assuredly could not be protective against chemical contamination, and even if the underlying bedrock were less vulnerable.

4-The EAWs also mention three other very important points: a) There is little overland flow on these properties, except after very intense storm events or rapid snowmelt and runoff conditions. b) Sinkholes are known to be present, at least on nearby properties, and part of the Dabelstein mine footprint actually happens to be within the moderate/high sinkhole probability area. c) The water table is estimated by the proposer to be at least 50 feet below the proposed mining floors.

The percolation tests (required by the ISTS rules) in the field actually involve more than just the top few feet of soil, although that is not necessarily obvious to the naked eye. When water moves as rapidly through soils as these soils are described to do, that water must also be moving both rapidly downward as well as deeply into and through the bedrock. Otherwise, it would not take excessively large rainfalls to cause the water to mound up enough to flow across the land surface as a stream. In fact, the reason that these excessively well drained soils are so permeable is because the underlying karst bedrock of the Shakopee/Prairie du Chien typically has large conduits which allows water to be carried downward and laterally as fast as flow through a system of pipes. In fact, there are many places in southeastern Minnesota (and visible in road

cuts or shown with downhole cameras in well borings) where the underlying integrated drainage of the Prairie du Chien carbonate rocks has such large conduits that some of the system extends upward into the St. Peter sandstone, because the lower formation cannot structurally support it from below. Taken together, all of these conduits, as part of a long-established and highly integrated regional rapid drainage system, exists today and will remain in place after mining occurs. Thus, an understanding of this groundwater drainage system makes it clear that any suggestion of leaving 5 feet or even 50 feet of sand will not be analogous to the minimum ISTS standards and will not protect the Prairie du Chien drinking water aquifer in this area from chemical contamination.

Furthermore, the first paragraph on page 15 of the Dabelstein EAW states that "the mine will maintain a sand filter below the depth to be mined and that undisturbed sand will continue to provide a filter for suspended solids migrating into the underlying Prairie du Chein/Jordan [sic] aquifer." That statement directly contradicts the statement in the first (full) paragraph on page 23, which states: "the bottom of the quarry will be approximately 6 feet into the Shakopee Formation of the Prairie du Chien Group." Therefore, all assurances (throughout these EAWs) by the proposer that their activities will protect water quality are confusing and, in fact, incorrect. This is such an important contradiction, that a full EIS review should be required to both, determine which description of the proposed mining depth is accurate and to consider the full impacts of excavating directly down and into the Shakopee Formation, if that is indeed what is planned.

Finally, the RGU admits on page 24 of the Dabelstein EAW (and page 25 of the Yoder EAW) that: "as a result [of the existence of the "excessively drained Bellechester-Broadale complex" found on-site], the potential for groundwater contamination from chemical inputs under these conditions is high due to the rapid infiltration capacities of the soil." By this acknowledgement, it is clear that the other assurances are misleading, such as that water quality will be improved through mining (Dabelstein, p.15, paragraph 2; Yoder, p. 15, paragraph 4), that the current rating for pollution sensitivity is only "moderate" (Dabelstein, p. 23 paragraph 6; Yoder, p. 24, paragraph 5), or that leaving a sand layer over the Prairie du Chien would be adequately protective (Dabelstein, pp. 15, 17 and other places; Yoder, pp. 14, 18 and other places). Because the EAWs have included so many other instances of contradictory assurances of protection for the groundwater, it appears to be doubtful that the RGU have enough information to adequately consider the importance and full impact of the soil drainage issue and overall the susceptibility for polluting the groundwater, when writing future permits for these projects. The contradictory statements found throughout the EAWs appear to be designed to confuse rather than enlighten the RGU.

It should be noted that newer information on sinkhole locations has become available since the Winona County Geologic Atlas was made. That newer information suggests there are possibly many more sinkholes in Saratoga township, some of which are filled and/or have not been visible for years. A revision of the sinkhole probability map could change the classification of both of these mining areas to moderate/high or even higher. However, it would be pointless to try filling

any sinkhole collapses, as described in the EAWs, because sinkholes are only a surficial expression of the integrated underground karst drainage system. They are simply symptoms, not the problem itself. So proposals in these EAWs of filling any sinkholes encountered in mining would be ineffective. Similarly, agreeing to a requirement that a Professional Geologist would look at any large conduits or other karst features which may be unearthed anywhere in either the St. Peter sandstone or the top of the underlying Shakopee/Prairie du Chien formation would be of little use, because the integrated drainage is so laterally extensive that future precipitation over the mining footprint will find its way easily into that system, even if a few conduits are closed or filled.

Basically, the removal of the topsoil and extraction of the St. Peter sandstone would remove any existing barriers and which currently retard in any way the vertical water flow into the aquifer systems. Thus, these mines will actually make the entire system even more susceptible to contamination than it is now. After this mining, the Shakopee/Prairie du Chien bedrock will be newly exposed at the surface (at the Dabelstein mine) or only covered by a few tens of feet of remaining St. Peter formation (at the Yoder mine), so therefore even more vulnerable than it is today. State regulations no longer allow new hazardous waste landfills to be constructed in any similarly highly susceptible area – even those with multiple, engineered liners and leachate collections systems. These sand mining projects, as designed, are directly analogous to the 1st generation unlined landfills that society has spent many millions of dollars trying to remediate in Minnesota. Why make the same mistake twice?

Most importantly, this heightened susceptibility for contamination of the regional karst system would be exactly the place where the greatest protection from contamination should be required, in accordance with the State groundwater non-degradation law. It is difficult to justify that these projects propose to cover and disseminate chemically contaminated waste sand across this same area. That combination of increased susceptibility, combined with the wide distribution of a source of contamination would be extremely likely to compromise local drinking water sources.

In anticipation of any type of proposal for monitoring that might be proposed for these projects, it is instructive to consider what we already know. The karst literature is replete with examples where monitoring systems simply fail. Contamination of karst groundwater is highly unpredictable. It is difficult, expensive and problematic to design any adequate monitoring system, because of the complexity of the integrated drainage system of highly variable and dispersed conduits which are unpredictably distributed and connected in three dimensions. No technical methods or new technology has yet been demonstrated to adequately determine the layout and connections of such systems.

Contaminated groundwater might not be evident at off-site drinking water wells within a short time, or even a few years – particularly if those wells were not being systematically monitored. But if contamination does occur, it could reside in the system and pollute the drinking water sources for hundreds of local residents for decades to come. Repeated sampling for groundwater

tracers, or for pollutants accidentally released, have been shown to be detected at widely diverging points, unpredictably through time, and in variable concentrations under changing wet-dry cycles. Therefore there is no way to design a monitoring system that would be protective enough to ensure that an early warning of contamination would provide security for local drinking water wells. Certainly, the proposal to sample and analyze a few (undefined) 'nearby' wells for nitrate and bacteria, or even to add monitoring for acidic water, falls far short of any useful strategy. The pollutants that typically are associated with this type of sand handling and processing may not include either nitrate or bacteria to any significant degree. Any acid from mine drainage would be neutralized (but not rendered harmless) by the buffering capacity of the karst aquifers. Once again, by the time pollution would be detected, the problem would have been established over large areas, and the possibility for clean-up would both, be extraordinarily expensive and probably doomed to failure. Thus, the sampling proposals in these EAWs appear to be uninformed or disingenuous. They also deflect focus from a strategy that will protect drinking water supplies. The correct strategy should simply prohibit any material that has come into contact with any chemical, ingredient or other item from being placed over the top of the Shakopee/Prairie du Chien formation.

Finally, it should be noted that the original versions of both EAWs failed to include many (perhaps nearly half) the wells within the 2-mile buffer which are listed in the Minnesota Department of Health (MDH) County Well Index (CWI). Although a few additional wells are shown on the images in the republished versions, the included lists are still incomplete. A close look at those missing wells shows they were all either entered or updated in CWI before the initial EAWs were first published in Fall, 2012, so that information should have been easily available to the proposer. Many of the missing wells draw water from either the St. Peter sandstone or the Prairie du Chien aquifer and have higher measured static water levels (SWLs) than some of those included in the EAWs. It is always possible that there are other older wells still in use that were never reported in the CWI; older wells are typically shallower and may be obtaining water from these upper aquifer(s).

Recommendations. Therefore, we recommend all of the following actions should be followed.

On-site conditions. Chemicals or additives of any kind should not be allowed to be used on-site in any form, unless strict handling protocols are followed, which should be established by the Minnesota Pollution Control Agency. Prior identification of the exact chemicals or ingredients and amounts used should be disclosed, and permission should be obtained, before the chemical or ingredient is used. This includes any additives to waste biomass, to topsoil, to any overburden encountered, as well as to any bedrock or sand derived therefrom. This restriction should be applicable to any material in-situ (i.e., undisturbed), any material excavated or removed from its original place, any material moved and/or stored on-site, as well as any material screened, conveyed or loaded on-site for hauling, as well as all materials returned to the site for disposal.

The CUP should specify that if any abandoned or unknown well is discovered, all work should be halted until it is properly sealed by a Minnesota-licensed water well contractor.

Transported material. As a waste product, all reject material should be handled in one of only two ways, as follows:

Choice A: -disposed of off-site at a properly designed and regulated waste disposal site; or

Choice B-demonstrated to be completely inert, with no possible health risk.

Choice A: If the reject material is disposed of at a hazardous waste disposal site, the proposer should pay all disposal fees, permit compliance and other attendant costs, etc., as any other waste generator is required.

Choice B: If the proposer wishes to demonstrate that the reject material has no possible health risk, then the RGU should require the proposer's compete cooperation to allow appropriate and thorough sampling and analysis of the reject material, regardless of any theoretical or lab-calculated solubility of any chemical or ingredient therein. Too many times, theoretical models of chemicals do not adequately describe the actual behavior of that chemical in the environment.

Complete health risk information should be available to the MPCA for all proposed chemicals, prior to their use.

Groundwater. Additional investigation of the water table in the local area during the EIS evaluation process is warranted, particularly because water levels can vary substantially in the upper karst bedrock aquifers, in response to multi-year wet/dry cycles of precipitation. Although we have recently been in a period of drought for the last few years in southeastern Minnesota, historically this has not always been the case. It is certainly possible that, if a wet period began during the next 20 years, the water table levels in this area could rise. The EIS must consider whether, in that case, mining excavation could encounter the water table. Responsible contingency plans for this scenario should be a part of the permit requirements.