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April 22, 2024

Ms. Lillian Butler, Section Manager
Edwards Aquifer Protection Program
Texas Commission on Environmental Quality
Region 13 Office – San Antonio
14250 Judson Road
San Antonio, Texas 78233-4480

Via Email: eapp@tceq.texas.gov

Re: Comments regarding the Application of Vulcan Construction Materials LLC for Edwards Aquifer Permit No. 13001906.

Dear Ms. Butler:

We are submitting the following comments on behalf of Preserve Our Hill Country Environment and its sister organization, Preserve Our Hill Country Environment Foundation (together, "PHCE"), regarding the Application of Vulcan Construction Materials LLC ("Vulcan") for Edwards Aquifer Permit No. 13001906 (the "Application"). These comments are in addition to, and do not replace, any other comments submitted on behalf of PHCE.

Preserve Our Hill Country Environment is a 501(c)(4) organization whose mission is to preserve, protect, and restore the land, water, air, wildlife, unique features, and quality of life in the Texas Hill Country from the aggressive and insufficiently regulated expansion of the aggregate industry. Preserve Our Hill Country Environment Foundation is a Texas 501(c)(3) nonprofit which conducts research on environmental hazards in the surrounding areas; educates communities on the preservation of natural resources; and advocates for the development of environmental protection legislation and regulations.

I. The Vulcan Quarry WPAP is not consistent with the Edwards Aquifer Protection Plan regulations.

The TCEQ's rules governing Edwards Aquifer Protection Plans are in place to protect existing and potential uses of groundwater and maintain the Texas Surface Water Quality Standards. The goals clearly articulate that existing groundwater quality not be degraded:

> (1) Consistent with Texas Water Code, §26.401, the goal of this chapter is that the existing quality of groundwater not be degraded, consistent with the protection of public health and welfare, the propagation and protection of

terrestrial and aquatic life, the protection of the environment, the operation of existing industries, and the maintenance and enhancement of the long-term economic health of the state.

(2) Nothing in this chapter is intended to restrict the powers of the commission or any other governmental entity to prevent, correct, or curtail activities that result or may result in pollution of the Edwards Aquifer or hydrologically connected surface waters. In addition to the rules of the commission, an applicant may also be required to comply with local ordinances and regulations providing for the protection of water quality.

30 Tex. Admin. Code § 213.1.

In other words, the TCEQ has the authority to prevent activities that will result in pollution of the Edwards Aquifer or that it deems *may* result in pollution to the Edwards. Vulcan's Application does not demonstrate that its WPAP will prevent pollution of the Edwards, as described in more detail below. In addition, Technical Comments submitted by Douglas A. Wierman with Blue Creek Consulting on the Needmore Quarry Ranch WPAP (included as **Attachment A**), document a connection between quarry operations and residuals from ammonium nitrate/fuel oil explosives (ANFO) found in the Edwards Aquifer. For these reasons, the Application should be rejected as inconsistent with Chapter 213.

II. The Vulcan Quarry site is located in an environmentally-sensitive area, and the WPAP grossly underestimates the potential pathways to the Edwards Aquifer.

As shown in the Application, the proposed Vulcan quarry operations will occur on an area approximately 1,515 acres in size, with the mining area of approximately 956 acres. The property is entirely within the Edwards Aquifer Recharge Zone and also contains a 100-year floodplain. Furthermore, only 37 sensitive (recharge) features have been documented on the proposed property, 12 of which are categorized as wells or manmade boring holes. The number of features appears anomalously low when compared to the fact that a 158-acre tract directly to the north across Highway 46 contained 38 identified sensitive features—nearly the same number, but on a property approximately 1/10 the size. (Smith, 2024).[1] The presence of these features both indicates that stormwater can easily enter the water table of the underlying aquifer; however, the anomalously low number calls into question the accuracy of the required geologic assessment.

Pursuant to 30 Tex. Admin. Code § 213.5(b)(3), the applicant's geologic assessment "must identify all potential pathways for contaminant movement to the Edwards Aquifer." Due to the lithologies beneath the proposed quarry site, contaminants will have a very direct and rapid impact on the underlying aquifer. As explained below, there is also concern that contaminated water will make its way to Comal Springs, which is habitat of several protected, endangered aquatic species. For all these reasons, the Application should be rejected as deficient under Rule 213.5(b)(3).

[1] Brian A. Smith, Ph.D, *Hydrogeology of the Edwards and Trinity Aquifers in the Vicinity of the Proposed Vulcan Quarry, Comal County, Texas* (2024) (submitted with other PHCE comments).

III. The Application does not demonstrate that the quarry bottom will not reach the aquifer beneath, thereby contaminating groundwater.

The Application states that the Mining Areas will not be mined below 1040 ft-msl. Attachment C: General Information Form (TCEQ-0587) at 2. TCEQ typically requires a 25' separation distance between the floor of the quarry and groundwater. This requirement is meant to afford some protection from mining impacts to the Edwards Aquifer, particularly in the Recharge Zone. The WPAP does not provide any explanation or factual reference for a quarry floor base elevation of 1040 ft-msl, but simply indicates that because it will take 5 to 10 years for the mining activities to reach that level, its proposal is to monitor the local water levels at the local wells and determine how those water levels correlate to established monitored water levels offsite. This is not a substitute for evaluating water levels *before* obtaining the requisite WPAP. In fact, available water level data from several wells close to the perimeter of the quarry boundary showed water levels greater than 1015 ft-msl, meaning the proposed 1040 ft-msl mining floor may lead to increased infiltration of contaminants to the Edwards Aquifer. As this is not the purpose of the Edwards Aquifer regulations, the WPAP should be denied.

IV. The WPAP wholly fails to account for blasting processes as a potential source of contamination, as required.

Vulcan's "Project Description" acknowledges that blasting agents will be utilized in the mining process, however, the WPAP does not identify the types of blasting agents or include any plan to control their release. Attachment C: General Information Form (TCEQ-0587) at 1. (As an initial matter, the proposed buffer zone of only 100 feet adjacent to all neighboring properties is insufficient to protect those properties.) In fact, the description contains very little information about the blasting method and potential contaminants period.

Pursuant to 30 Tex. Admin. Code § 213.5(b)(4)(A)(iv), the WPAP must include a technical report that "must describe any activities or processes which may be a potential source of contamination." The Application includes only a general description of the quarry process:

- Clear
- Strip
- Drill
- Blast
- Load into haul vehicles
- Haul to plant
- Process rock at plant
- Load to trucks for export.

Attachment C, General Information Form (TCEQ-0587) at 1. However, in identifying the potential sources of contamination, the Application only identifies temporary sources during construction and potential sources that may affect stormwater discharges from the site after development (*see* Attach. A, WPAP Application Form (TCEQ-0584) at 1; Attach. B, Temporary Stormwater Section (TCEQ-0602)). But Rule 213.5(b)(4)(A)(iv) does not allow for such a limited consideration.

Elsewhere, Rule 213.5 makes the distinction between contaminants generated only during construction or contaminants that may flow across the site and then flow offsite, as well as the distinction between contaminants of surface water, groundwater, and stormwater. *See, e.g.*, Rule 213(b)(4)(B) (distinguishing between BMPs to be used during and after construction and BMPs to prevent pollution of surface, groundwater, and stormwater). In other words, the requirement to describe activities and processes which may be a potential source of contamination is broad. Vulcan's Application does not describe in any way the activities and processes that may be a potential source of contamination of the blasting agent, such as ANFO, and neither does the WPAP propose measures to protect the Edwards from such contamination. For that reason, the WPAP must be denied.

Additionally, the blasting method involves drilling a borehole, which meets the definition of an injection well, which is defined and prohibited by TCEQ's Edwards Aquifer regulations. 30 Tex. Admin. Code § 213.3(39) (defining "well" as "A bored, drilled, or driven shaft, or an artificial opening in the ground made by digging, jetting, or some other method, where the depth of the well is greater than its largest surface dimension. A well is not a surface pit, surface excavation, or natural depression"). TCEQ's own Edwards Aquifer regulations clearly and unambiguously prohibit this injection well in the Edwards Aquifer:

> For applications submitted on or after September 1, 2001, injection wells that transect or terminate in the Edwards Aquifer, as defined in § 331.19 of this title (relating to Injection Into or Through the Edwards Aquifer), are prohibited except as provided by § 331.19 of this title.

30 Tex. Admin. Code § 213.8(c). Vulcan's Application does not demonstrate that its planned blasting method does not constitute drilling into the Edwards Aquifer. For this reason, also, the Application should be denied.

V. The Vulcan Quarry site will jeopardize threatened and endangered species.

The Vulcan Quarry activities will jeopardize numerous threatened and endangered species, particularly aquatic species, because they are most sensitive to elevated nitrate levels in water. As previously explained, limestone aggregate quarries use large quantities of ANFO as their primary explosive, which is a combination of ammonium nitrate (fertilizer) and diesel fuel. Ammonium nitrate is highly soluble in water, with studies showing 28 percent not consumed by the explosion (Smith, 2024; Wierman, 2023). Because of the ecological sensitivity of this location (in the Recharge Zone) to groundwater contamination, pollution (nitrates) from the Vulcan mining activities is highly likely to enter the Edwards Aquifer and make its way to Comal Springs and Hueco Springs in Comal County via identified flowpaths (Johnson et al., 2006), and even further downgradient to San Marcos Springs in Hays County.

The Comal Springs and its ecosystem is home to threatened and endangered aquatic species, including the Fountain Darter (*Etheostoma fonticola*), Comal Springs dryopid beetle (*Stygoparnus comalensis*), Comal Springs riffle beetle (*Heterelmis comalensis*), and Peck's cave amphipod (*Stygobromus pecki*). In 2013, the U.S. Fish & Wildlife Service enlarged the critical habitat for the Comal Springs dryopid beetle, Comal Springs riffle beetle, and the Peck's cave

amphipod that live in the Comal Springs complex to specifically include subsurface critical habitat. *See* 78 Fed. Reg. 63100.

Vulcan's BMPs do not constitute a defense or an excuse for violations of the Endangered Species Act. Because Vulcan's WPAP does not accurately assess the high potential for contamination that could jeopardize listed species, and therefore does not provide for protections to avoid the take of listed species, the WPAP should be denied.

VI. Conclusion

For the reasons described above, PHCE urges the Staff to deny Vulcan's Application for Edwards Aquifer Permit No. 13001906. In the alternative, the Application should be returned and Vulcan required to provide the additional information outlined above.

Please contact us with any questions.

Respectfully submitted,

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Counsel for PHCE

ATTACHMENT A

Technical Comments – TCEQ Water Pollution Abatement Plan (WPAP)

Far South Mining LLC - Needmore Quarry Ranch

Blue Creek Consulting LLC has prepared the following technical comments regarding the TCEQ Water Pollution Abatement Plan (WPAP) prepared for Far South Mining LLC - Needmore Quarry Ranch, dated 9/1/2023, prepared by Westward, Boerne (TCEQ reference numbers 11003759 and 11003760).

The proposed quarry is located on the recharge zone of the Edwards Aquifer. Recharge occurs from the surface through fractures and faults, surficial karst features, such as caves, sink holes and direct recharge from streams. Numerous dye studies conducted in the region over the years indicate that San Marcos Springs is a regional discharge point for the Edwards Aquifer, including the proposed site area (Johnson, et al, 2012). Sink Creek has been identified as a local source of recharge to San Marcos Spring (Johnson, et al, 2012). Contaminants entering the aquifer from the quarry site can rapidly migrate through the fractured and karstic aquifer and impact San Marcos Springs.

The WPAP states" It is not expected that any significant amount of groundwater will be encountered in the quarry excavation. In order to maintain appropriate separation from the groundwater the quarry floor will not be lower than 686ft.amsl."

TCEQ typically requires a 25' separation distance between the floor of the quarry and groundwater. This requirement is meant to afford some protection from mining impacts to the Edwards Aquifer, particularly in the recharge zone. The WPAP does not provide any explanation or factual reference for a quarry floor base elevation of 686ft.amsl.

Texas Water Development Board monitored a well very near the proposed quarry excavation for a number of years (SWR# 6808601). Well information can be found at: https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=6808601&Type=GWDB)

The reference well is 275' deep from the surface, or elevation 686' amsl, which also is the depth of the proposed quarry floor. Per the TWDB, the well is a shallow Edwards Aquifer well. Previous groundwater levels measured at the well ranged from elevations 746 and 819 feet amsl. These elevations are significantly higher than 686 ft amsl. The applicant needs to provide explanation for the proposed elevation of the floor of quarry, including, the bore depth after drilling a test well at the proposed quarry location to support their proposal that the quarry operations including the deepest depth of boring, blasting, and rock removal will maintain at least a 25' buffer above the highest water level of the Edwards Aquifer in the footprint and impacted area of the quarry operations.

The project proposes mining across a mapped 100-year flood plain. The flood plain is a headwaters tributary to Sink Creek. In numerous places in the WPAP, the applicant states they will obtain permits for mining across 100-year flood plain at a later date. Sink Creek enters the San Marcos River just above Spring Lake and San Marcos Springs (Spring Lake). The tributary is a direct surface water pathway for increased sediment impacts to the creek and downstream receptors as well as a pathway for other contaminants such as residual ANFO. Due to the karstic nature of the aquifer, increased contaminant loads to the creek may also contribute to impacts to the aquifer.

Hays County requires a permit for any construction activities within the 100-year flood plain. Rerouting the tributary around the excavation will be difficult and will likely reduce the carrying capacity of the tributary. Any reduction in size of the flood plain due to mining activities will increase to potential of downstream flooding on downstream properties. A permit from Hays County, including remapping the floodplain, must be obtained prior to reviewing the WPAP.

It has been documented that quarry operations have impacted the Edwards Aquifer with residuals from ammonium nitrate/fuel oil explosives (ANFO). Quarries are known to be sources of nitrate pollution of groundwater. (Alberts, 2016). The proposed quarry on the Needmore Ranch is located on the Edwards recharge zone where the Edwards Limestone is at the surface. If it goes forward as planned it will contribute nitrate contamination to the Edwards Aquifer.

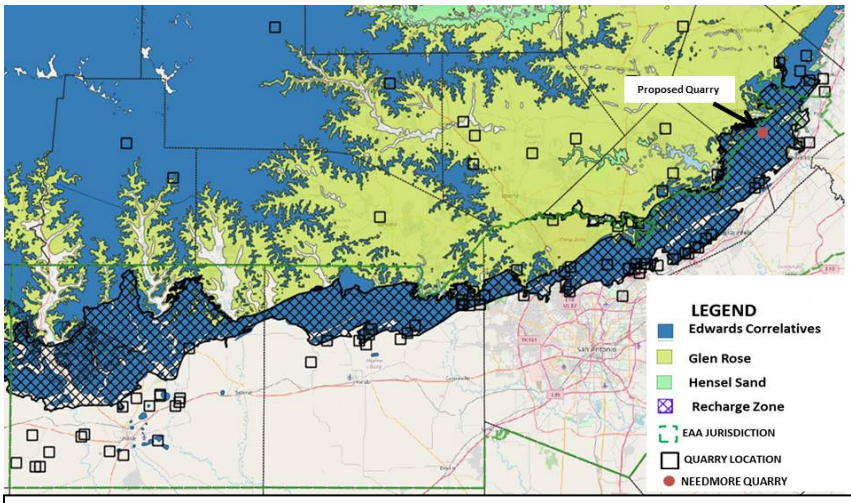


Figure 1. Quarry locations are shown with reference to outcrops of units correlative to the Edwards and Trinity Groups. Surface geology is from the USGS . Recharge zone and Edwards Aquifer Authority jurisdiction outline is from the EAA.

The aggregate industry mostly uses an ammonium nitrate fuel oil mixture (ANFO) as an explosive. ANFO mixtures vary somewhat, but typically are a stoichiometric composition of 94.5% ammonium nitrate (NH_4NO_3) and 5.5% fuel oil (Brochu, 2010). Ammonium nitrate is a salt which disassociates in water to NH_4^+ and NO_3^- and dissolves readily. Loss of ANFO by leaching from boreholes is variable and influenced by a number of factors including specifications of the explosive, nature of the site being mined, design of boreholes and explosive patterns and length of time between loading boreholes and detonation (Brochu, 2010, and Konya and Konya, 2019). ANFO is used in large quantities, typically 0.4-0.5 kg/m^3 (DynoNobel, 2010). Since about 28%-30% of ANFO used is not consumed in the blast (Alberts,

2016) it can also be dissolved after blasting. Once in groundwater, nitrification converts ammonium to nitrate (Musgrove and others, 2016) which is stable.

The Edwards limestone has been quarried extensively in the recharge zone of the San Antonio segment of the Edwards Aquifer, and the proposed Needmore quarry falls in that trend (Figure 1). Studies of nitrate in the Edwards Aquifer have noted that levels are elevated above an expected background level of 4.4 mg/L nitrate as NO_3 (1 mg/L nitrate as N) or less (Dubrovsky and others, 2010) but not offered an explanation, e.g., Bush and others, (2000). More recently, Musgrove and others (2016) ruled out contributions of nitrate from surface water and agriculture as causes of the higher measurements. Instead, they concluded that high nitrate levels in the eastern part of the San Antonio Segment result from urbanization on the recharge zone since 2000. However, they lacked historical data on nitrate concentrations and did not use data from rural counties to the west where they expected concentrations to be low.

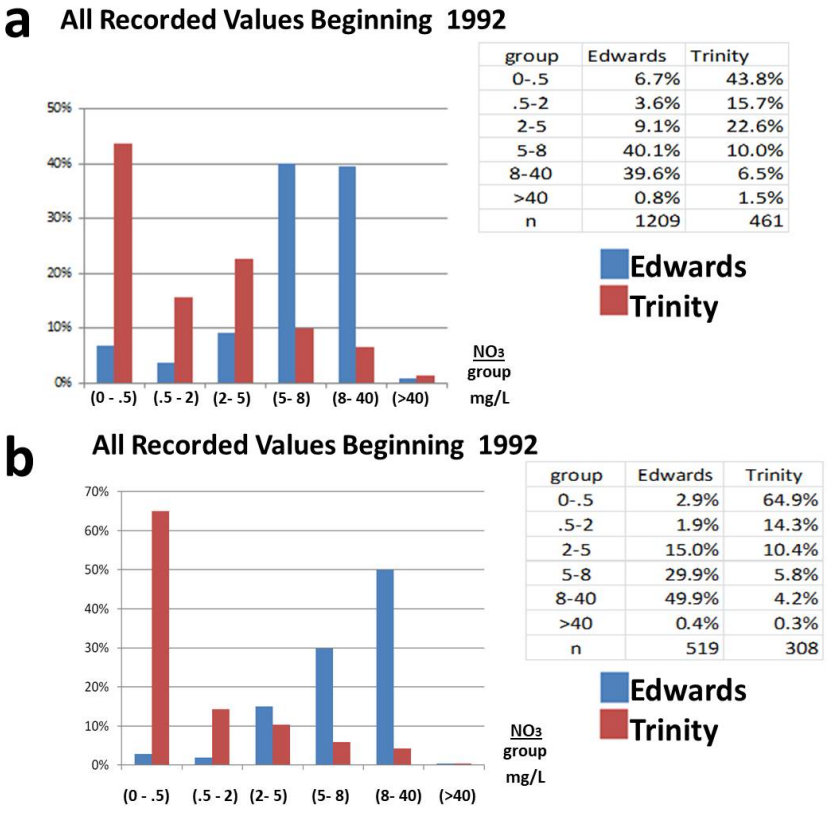
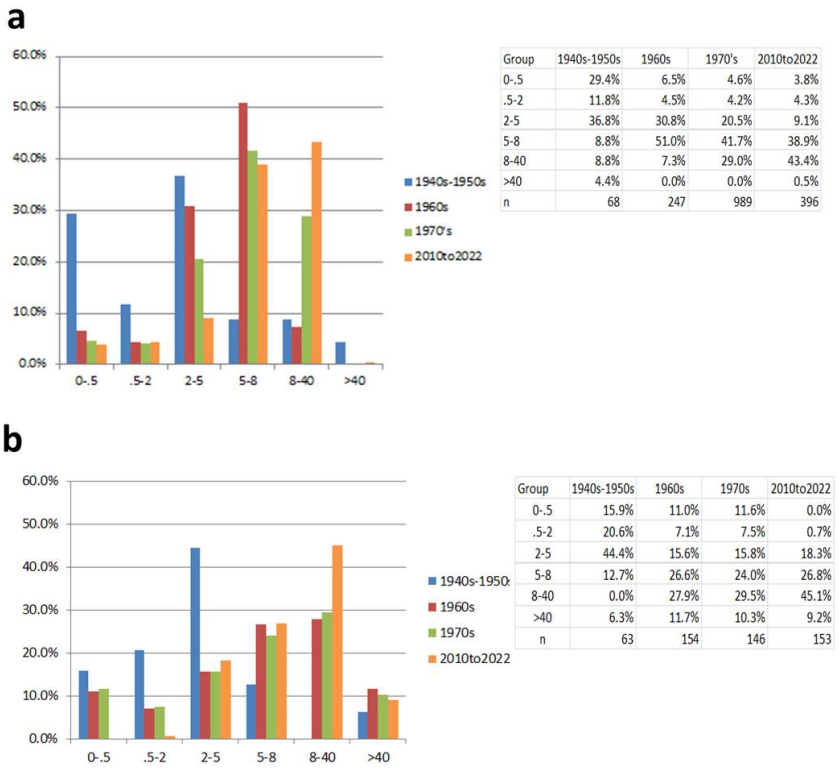


Figure 2. NO_3 measurements from the TWDB for wells in a) the Edwards Aquifer in Bexar, Guadalupe and Hays counties and Trinity Aquifer measurements in Bexar, Kendall, Comal and Hays counties and b) Edwards Aquifer measurements from wells in Medina and Uvalde counties and Trinity Aquifer measurements in Bandera, Kerr, Medina, Real and Uvalde Counties. The lowest three nitrate groups are consistent with background levels of nitrate.

Data from the Texas Water Development Board show urbanization alone cannot explain the geographic distribution of nitrate as shown by elevated concentrations in Medina and Uvalde counties (Figure 2). Besides surface water, the Edwards Aquifer is charged by cross-fault flow from the Trinity Aquifer which is clearly lower in saturation than the Edwards (Figure 2). Also, by the 1960's nitrate levels were elevated compared to background levels observed in the 1940's and 1950's, and levels have continued to increase since (Figure3). So, an additional explanation is required for both geographic distribution and timing of the increase in aquifer nitrate levels.

Quarrying of the Edwards Limestone in the recharge zone has been intense for at least 80 years Forster, 2010) and covers the entire extent from Hays to Uvalde counties (Figure 1). Both distribution and timing of elevated nitrate measurements show quarries are necessary to explain the increase in nitrate in the Edwards Aquifer. In particular, the increase in nitrate concentrations throughout the San Antonio Segment (Figure 3) fits well with the history of ANFO use. ANFO was introduced on large scale to the explosives market in the mid 1950's and dominated the market by the 1960's (Moreira,2012). Levels have continued to rise coincident with increase in aggregate production. Recently measured levels mostly remain below concentrations harmful to humans which is 44 mg/L N as NO^3 (10 mg/L N), but most measurements are above 8 mg/L N as NO^3 (2 mg/L N) which is harmful to some freshwater aquatic organisms (Monson and others, 2016).

The Needmore Quarry is proposed to be $8.09X10^5$ m^2 (200 acres). Applying typical industry usage values of $0.45kg/m^3$ of ANFO would yield an estimate of $3.64X10^5$ kg of ANFO used for every 1 meter of rock removed over that area. In turn, applying 28% unexploded residual would lead after nitrification of ammonium to 1.49X105 kg (165 tons) of nitrate potentially available to leach into the formation from that single meter thickness. That ANFO is used in large volumes is confirmed by a report that the Servtex Plant in Comal County in a single day used 5897 kg (13000) pounds of explosives to break up $1.81X10^7$ kg (20,000 tons) of rock (Chasnof, 2021). That corresponds to ~.5 kg/m^3 of ANFO per cubic meter.



Group	1940s-1950s	1960s	1970's	2010to2022
0-.5	29.4%	6.5%	4.6%	3.8%
.5-2	11.8%	4.5%	4.2%	4.3%
2-5	36.8%	30.8%	20.5%	9.1%
5-8	8.8%	51.0%	41.7%	38.9%
8-40	8.8%	7.3%	29.0%	43.4%
>40	4.4%	0.0%	0.0%	0.5%
n	68	247	989	396

Group	1940s-1950s	1960s	1970s	2010to2022
0-.5	15.9%	11.0%	11.6%	0.0%
.5-2	20.6%	7.1%	7.5%	0.7%
2-5	44.4%	15.6%	15.8%	18.3%
5-8	12.7%	26.6%	24.0%	26.8%
8-40	0.0%	27.9%	29.5%	45.1%
>40	6.3%	11.7%	10.3%	9.2%
n	63	154	146	153

Figure 3. NO3 measurements from the TWDB for wells in a) the Edwards Aquifer in Bexar, Guadalupe and Hays counties and b) Medina and Uvalde counties show that across the San Antonio Segment nitrate in the Edwards was t background levels in the 1940s-1950s and were elevated beginning in the 1960s. Nitrate values since 2010 are shown for comparison and are the highest observed.

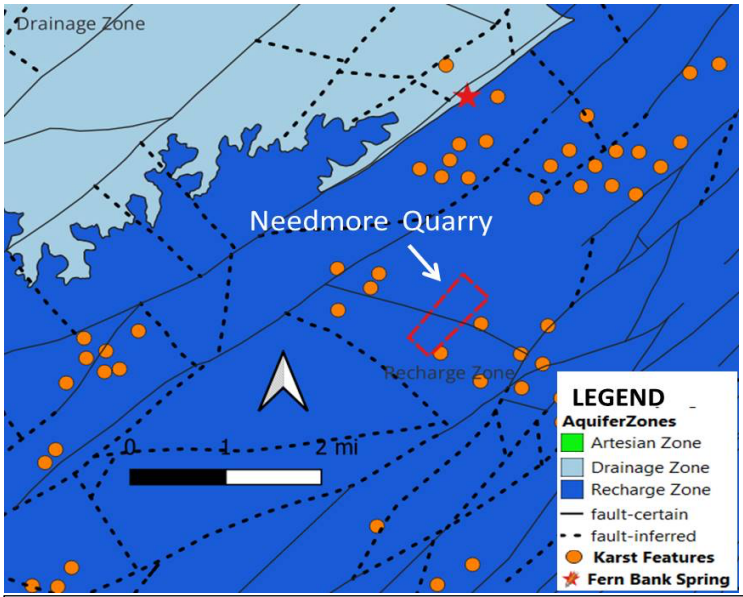


Figure 4. The proposed Needmore quarry is crossed by a fault (Clark and Others,2018) and nearby karst features (Wierman and Hunt, 2010) make it likely that a well developed fracture system will be present.

The geological report in the Needmore WPAP reported no sensitive features, even though the USGS mapped a fault crossing the proposed quarry (Figure 4). Faults will commonly have a zone of deformation including fractures that may be several hundred feet wide (Ferrill and others, 2011). The prevalence of karst features aligning with faults and in close proximity to the proposed quarry make it likely that a natural fracture system will be encountered. During the course of mining induced fractures from blasting will enhance passage of dissolved nitrate to the aquifer. Decreasing the distance between the quarry floor and the aquifer will increase that risk as well (Polemio and others, 2009). In short, with no modifications to the proposed WPAP, the Needmore Quarry will contribute to the problem of rising nitrate concentrations in the Edwards Aquifer.

Another impact from ANFO can be organic compounds, such as residual benzene from fuel oil has also been shown to potentially impact groundwater resources in

the vicinity of mining operations. In Miami –Dade County, it was found that benzene attributable to mining operations caused the seven of fifteen municipal water supply wells to be shut down. (Sierra Club v. Strock, 495 F. Supp. 2d 1188, 1196–97 (S.D. Fla. 2007), vacated sub nom. Sierra Club v. Van Antwerp, 526 F.3d 1353 (11th Cir. 2008).

Fern Bank Spring also known as Little Arkansas Spring, issues from the south bank of the Blanco River, several miles north of the proposed quarry, A dye trace study performed in 2008 (Johnson, et al, 2012) indicated there was a groundwater flow to the spring from the south.

Conclusion

There are two direct pathways for contaminants to reach the Edwards Aquifer and San Marcos Springs, home to several endangered species. Contaminants include ANFO residuals, such as nitrates and benzene, and sediment. Sink Creek and its tributaries provide a direct surface water contaminant pathway to the San Marcos River and San Marcos Springs. Groundwater flow through the fractured and karstic Edwards Aquifer is a pathway to groundwater users in vicinity and to the springs. Given the risk of widespread impacts to surface and groundwater and their users, this application should not be granted.

Respectfully,

Blue Creek Consulting LLC

Douglas A. Wierman, P.G. #4062

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