

Community Comment Letter with Evidence-Based References

Formal Submission to Knox County Commissioners Regarding Proposed Dixie Lee Quarry Expansion

Subject: Evidence-Based Community Concerns Regarding Proposed Dixie Lee Quarry Expansion Near Hickory Meadows

To: Knox County Board of Commissioners

From: [Kevin E. Smith, 1717 Hickory Meadows Dr Knoxville TN 37932]

Date: [07/05/2026]

Re: Vulcan Materials Dixie Lee Quarry 58-Acre Expansion Proposal

Dear Commissioners:

I am a resident of Hardin Valley living adjacent to Vulcan Materials' Dixie Lee Quarry and near the Hickory Meadows residential community. I am submitting this letter to formally express serious, evidence-based concerns regarding the proposed 58-acre quarry expansion that would place active mining and blasting operations approximately **300 feet from existing homes**.

This proposal raises significant public health, safety, environmental, and land-use compatibility issues that warrant careful scrutiny. My concerns are grounded in peer-reviewed scientific literature, regulatory standards, documented case precedents, and enforcement records, as detailed below.

1. Inadequate Residential Setback: International Best Practices vs. Proposed 300 Feet

The proposed 300-foot setback is grossly inadequate compared to recognized quarry safety standards.

Multiple jurisdictions have established minimum residential setbacks of **500–800 meters (1,640–2,625 feet)** based on documented public safety risks from blasting, flyrock, dust, and noise:

- **Nova Scotia, Canada:** 800 meters (2,625 feet)
- **New Brunswick and Quebec, Canada:** 600 meters (1,969 feet)

- **India (DGMS standards), Malaysia, and Victoria, Australia:** 500 meters (1,640 feet)¹

The proposed 300-foot setback represents only 11–15% of these international minimums. These standards reflect decades of operational experience, incident investigations, and public health research.

In a legally significant case, the **Vermont Environmental Court** upheld denial of the Rivers Quarry permit in 2010, finding that a **1,500-foot setback** was insufficient to prevent "undue harm" to neighboring residents from blasting impacts and flyrock hazards.² The proposed Dixie Lee expansion setback is **only 20% of the distance Vermont found inadequate.**

2. Structural Damage and Blasting Vibration: Tennessee's Outdated Standards

Tennessee's blasting vibration standards, based on 1983 federal research, do not adequately protect residential structures, particularly in karst geology.

Tennessee Code § 68-105-104 establishes maximum ground vibration limits based on the **U.S. Bureau of Mines Report of Investigations 8507 (1980)**, which allows peak particle velocities (PPV) up to **2.0 inches/second** for residential structures at certain frequencies.^{3 4}

Critical limitations of this standard:

- The USBM RI-8507 study was based on **76 wood-framed structures** and explicitly excludes historic buildings, structures on unstable foundations, and those subject to repeated vibration exposure over many years.⁴
- The standard does not account for **cumulative damage** from hundreds or thousands of blasts over decades of operation.
- Tennessee's rocky karst limestone geology differs significantly from the soil conditions used in the original USBM research.

Documented Tennessee residential damage: Homeowners near Vulcan Materials' West Meade quarry in Nashville reported foundation damage requiring **\$10,000–\$30,000 in repairs** despite Vulcan's compliance with Tennessee's 2.0 in/sec standard. One resident stated: "Tennessee is following a rule set in 1983 that didn't take into account our rocky soil."⁵ Tennessee legislators are now considering updated blasting regulations in response to these incidents.⁵

Tennessee law also allows blasting operations to proceed at vibration levels *exceeding* statutory limits if affected property owners provide written consent—shifting the

burden of protection from regulatory enforcement to individual homeowners who may lack technical expertise.³

3. Flyrock Hazards: Documented Incidents Exceeding Proposed Setback

Flyrock—rock fragments violently ejected during blasting—poses severe public safety risks that cannot be fully controlled through engineering.

The **Mine Safety and Health Administration (MSHA)** has documented flyrock incidents where rocks traveled at speeds exceeding **400 mph** and reached distances of **several thousand feet**. MSHA guidance states that where flyrock has occurred, "the blast area should as a minimum be one-and-a-half times the furthest distance that any previous flyrock has traveled."⁶

Documented incidents demonstrating inadequacy of short setbacks:

- **Pakenham Quarry, Ontario (2009):** Flyrock traveled **300 meters (984 feet)**, damaging vehicles and striking a worker. Investigators determined the control zone should have been **500 meters**.¹
- **Miller Braeside Quarry, Ontario (2005–2007):** Despite a 300-meter setback, flyrock traveled **over 400 meters** into a residential neighborhood, damaging homes, wells, and driveways. One property owner claimed **\$250,000 in damages**.¹
- **City Sand Quarry, Newfoundland:** Flyrock damaged homes in a residential subdivision despite a 300-meter setback. The provincial Department subsequently required a **1,000-meter buffer** from residences.¹
- **Documented maximum distances (Pit & Quarry, 1991):** Flyrock has been documented traveling as far as **11,360 feet (3,463 meters)** at a Minnesota taconite mine and **6,293 feet (1,918 meters)** at a New York limestone quarry.¹

Industry research estimates that actual flyrock incidents are **five to ten times higher** than reported, as many go unnoticed or unreported.¹

A 300-foot setback provides no reasonable margin of safety against flyrock hazards.

4. Air Quality and Respiratory Health: Peer-Reviewed Evidence of Harm

Quarry operations generate harmful airborne particulate matter that causes measurable respiratory health impacts in nearby residential populations.

A 2020 peer-reviewed cross-sectional study published in *Environmental Health Insights* examined 158 residents living near quarries in Palestine, comparing those living **within 500 meters** (exposed group, n=79) to those living **beyond 500 meters** (control group, n=79).⁷

Key findings among residents within 500 meters:

Exposure prevalence:

- 98% reported dust exposure at home
- 97% observed plant leaves covered with dust
- 92% reported inability to grow crops
- 75% reported noise pollution from quarry activities

Respiratory and health impacts (exposed vs. control):

- Eye and nasal allergies: **22% vs. 3%**
- Eye soreness: **18% vs. 1%**
- Chronic cough: **11% vs. 0%**
- Chest tightness: **9% vs. 1%**

Measurable lung function deterioration:

- Mean Forced Vital Capacity (FVC): **3.35 L (exposed) vs. 3.71 L (control)**, p=0.001
- Mean Forced Expiratory Volume (FEV₁): **2.78 L (exposed) vs. 3.17 L (control)**, p=0.001
- Higher levels of airway restriction among exposed group
- **Lung function parameters worsened with increasing proximity to quarry**⁷

The study concluded: "This study demonstrates the negative health effects of environmental dust exposure among two communities living near quarry sites... The results highlight the importance of developing and strictly enforcing rules and regulations... to protect population health."⁷

Crystalline silica hazard: Limestone quarrying generates respirable crystalline silica (RCS), classified by OSHA and CDC as causing **silicosis, lung cancer, and chronic obstructive pulmonary disease (COPD)**.⁸ While MSHA regulates worker exposure, **no comparable residential exposure limits exist**, leaving nearby communities unprotected.

5. Noise Pollution: WHO Standards and Health Impacts

Chronic noise from quarry blasting, crushing, and truck traffic causes documented health impacts at levels commonly generated by quarry operations.

The **World Health Organization (WHO) Community Noise Guidelines** establish health-based thresholds:⁹

- **Sleep disturbance:** 30 dB(A) continuous nighttime indoor levels; individual events should not exceed 45 dB(A) to avoid sleep disruption
- **Daytime annoyance:** 50–55 dB(A) outdoor levels during daytime; evening/night levels should be 5–10 dB lower
- **Speech interference:** Background noise should not exceed 35 dB(A) for clear speech perception
- **Cardiovascular effects:** Chronic exposure at 65–70 dB(A) increases risk of hypertension

Documented health consequences of chronic noise exposure include:

- Sleep disturbance, reduced sleep quality, increased fatigue
- Impaired cognitive performance in children, including reading acquisition and problem-solving
- Elevated blood pressure and hypertension
- Increased stress hormone levels⁹

Quarry operations—including blasting, rock crushing, conveyor systems, and heavy truck traffic—routinely generate noise levels **exceeding WHO health-protection thresholds** at distances of 300 feet.

6. Groundwater and Karst Aquifer Vulnerability

Tennessee's karst limestone geology creates unique and severe groundwater risks from quarry dewatering and excavation.

Approximately **two-thirds of Tennessee is underlain by limestone**, and karst aquifers serve as critical groundwater sources for domestic wells. The U.S. Geological Survey (USGS) has extensively documented Tennessee's karst systems, which are characterized by:¹⁰

- **Rapid groundwater flow** through interconnected fractures, conduits, and solution cavities
- **High vulnerability to contamination** due to minimal natural filtration

- **Direct hydraulic connection** between surface activities and drinking water wells
- **Irreversible aquifer damage** from excavation below the water table

Documented impacts of quarry operations on karst aquifers include:

- Dewatering operations that lower the water table, potentially drying residential wells
- Disruption of karst flow paths that can redirect or eliminate spring flow
- Rapid sediment and contaminant transport through karst conduits
- Long-term or permanent aquifer damage¹⁰

The Dixie Lee Quarry is located in carbonate bedrock susceptible to karst development. Expanding the quarry 300 feet from homes creates substantial risk of well interference, water supply loss, and contamination pathways.

While site-specific hydrogeologic studies for the Dixie Lee expansion are not publicly available, **standard practice in karst terrain requires comprehensive groundwater impact assessment prior to approval**, including mapping of karst features, groundwater flow modeling, and inventory of domestic wells within at least 2,000 feet.

7. Property Values and Quality of Life

Proximity to active quarries has documented negative effects on residential property values and quality of life.

A peer-reviewed study titled "Blasting Quarry Operations: Land Use Compatibility Issues and Potential Property Value Impacts" published in the *Journal of Environmental Law and Policy* (2022) concluded that quarries have the potential to:¹¹

- Reduce property values
- Damage, sterilize, or diminish the use and enjoyment of residential properties
- Cause permanent environmental degradation
- Destabilize communities over multiple generations

The study noted: "Because a quarry can remain operational for 100+ years, impacting five or more generations, quarries have the potential to cause permanent environmental degradation [and] reduce property values."¹¹

Documented Tennessee financial impacts: As noted earlier, West Meade homeowners near a Vulcan quarry face \$10,000–\$30,000 in foundation repair costs.⁵ These expenses represent significant financial harm and property devaluation that persists over the life of the quarry operation.

8. Vulcan Materials' Environmental Compliance Record

Vulcan Materials has a well-documented history of environmental and safety violations nationwide.

According to the Violation Tracker database (maintained by the Corporate Research Project), Vulcan Materials has accumulated **\$4,832,157 in penalties across 150 enforcement records since 2000:**¹²

Primary violation categories:

- Environment-related offenses: **\$3,068,431** (36 records)
- Air pollution violations: **\$1,908,573** (15 records)
- Water pollution violations: **\$725,720** (9 records)
- Workplace safety/health violations: **\$1,380,094** (101 records)

Notable enforcement actions:

- Illinois (2006): **\$1,301,003** air pollution penalty
- New Jersey (2018): **\$633,340** water pollution penalty
- EPA (2020): **\$250,000** air pollution penalty
- California (2023): **\$228,000** air pollution penalty¹²

Tennessee operations: A fatal machinery accident occurred at Vulcan's Sevierville Quarry in Sevier County on January 4, 2023, documented in MSHA fatality reports.¹³

This enforcement record demonstrates a **pattern of environmental non-compliance** that raises legitimate concerns about Vulcan's ability or willingness to operate the expanded Dixie Lee Quarry without adverse impacts on the Hickory Meadows community.

9. Regulatory Gaps in Knox County and Tennessee

Knox County zoning ordinances do not appear to establish specific minimum setback requirements for extractive industries from residential zones, representing a critical gap in local protection.

Legal precedent establishes that municipalities have authority to impose setback requirements that **exceed state minimums**. In *Uxbridge Township v. Timber Brothers* (Ontario Court of Appeal, 1975), the court held: "The provincial legislation does no more than set the minimum set-back requirements or standards and in no way attempts to restrict the right of a municipality to enhance these standards."¹⁴

Knox County has both the legal authority and the public health obligation to impose protective setbacks that exceed Tennessee's minimal regulatory framework.

Request for Action

Given the substantial body of evidence documenting risks to public health, safety, property, and environmental quality, I respectfully request that the Knox County Commission take one or more of the following actions:

- 1. DENY the proposed expansion as currently configured** due to inadequate residential setback and unmitigated risks.
- 2. REQUIRE substantially increased setbacks** consistent with international best practices (minimum 500 meters / 1,640 feet from occupied residential structures).
- 3. MANDATE comprehensive, independent third-party studies** before any approval, including:

- Hydrogeologic assessment of karst aquifer impacts and well interference
- Air quality modeling and baseline PM2.5/PM10 monitoring
- Structural pre-blast surveys of all homes within 1,500 feet
- Noise impact assessment against WHO health-based guidelines

- 4. IMPOSE enforceable protective conditions** if any approval is granted, including:

- Reduced vibration limits (0.75 in/sec PPV maximum) to account for cumulative impacts and karst geology
 - Real-time vibration and air quality monitoring with public data access
 - Restricted blasting hours (e.g., 10 AM–3 PM, weekdays only)
 - Performance bond (\$5+ million) for property damage claims and environmental remediation
 - Independent structural engineer certification and damage claim process
 - Immediate cease-operations triggers for standard violations
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Conclusion

A blasting quarry 300 feet from homes is fundamentally incompatible with residential land use and poses unacceptable risks that will persist for generations. The evidence presented in this letter—drawn from peer-reviewed science, regulatory standards, case law, and documented enforcement history—demonstrates that:

- The proposed setback is a small fraction of recognized safety standards

- Tennessee's regulatory framework is outdated and insufficient
- Vulcan Materials has a poor environmental compliance record
- Measurable harm to health, property, and quality of life is highly probable

I urge the Commission to prioritize the health, safety, and property rights of Knox County residents and reject this proposal or impose conditions that genuinely protect the Hickory Meadows community.

Thank you for your careful consideration of these evidence-based concerns. I appreciate the opportunity to submit this letter for the public record.

Respectfully submitted,

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References and Supporting Documentation

1. Lisk, B. (2012). "Blasting Quarry Operations: Recommended Setback Distances and Best Practices." *Journal of Environmental Planning and Management*, comparative analysis of international quarry setback standards. [Documented incidents from regulatory investigation reports: Ontario Ministry of Labour, Newfoundland Department of Municipal Affairs]
2. *Vermont Environmental Court Decision: Rivers Quarry, Moretown Village* (2010). Court finding on inadequacy of 1,500-foot setback for quarry operations near residences.
3. Tennessee Code Annotated § 68-105-101 et seq., "Blasting Standards Act." Available at: <https://law.justia.com/codes/tennessee/2022/title-68/chapter-105/>
4. Siskind, D.E., et al. (1980). *Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting*. U.S. Bureau of Mines Report of Investigations 8507. U.S. Department of the Interior.
5. WSMV Nashville (2024). "West Meade residents report foundation damage from Vulcan quarry blasting; Tennessee lawmakers consider new regulations." News report, Tennessee legislative response to residential damage claims.
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 9. World Health Organization (WHO). *Guidelines for Community Noise* (1999). WHO Expert Task Force, Geneva. Available at: <https://www.who.int/publications>
 10. U.S. Geological Survey (USGS). *Karst Groundwater Systems in Tennessee: Hydrogeology, Vulnerability, and Water Resources*. USGS Water Resources Investigations. Available at: <https://www.usgs.gov>
 11. Lisk, B. (2022). "Blasting Quarry Operations: Land Use Compatibility Issues and Potential Property Value Impacts." *Journal of Environmental Law and Policy*, 45(2):55-89.
 12. Violation Tracker, Corporate Research Project. *Vulcan Materials Company Enforcement History* (2000–2024). Available at: <https://violationtracker.goodjobsfirst.org/parent/vulcan-materials>
 13. Mine Safety and Health Administration (MSHA). *Fatality Report: Sevierville Quarry, Vulcan Construction Materials LLC, Sevier County, Tennessee* (January 4, 2023). MSHA Accident Investigation Database.
 14. *Uxbridge Township v. Timber Brothers Sand & Gravel Ltd.*, Ontario Court of Appeal (1975). Municipal authority to impose quarry setbacks exceeding provincial minimums.
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Additional Resources for Commission Review:

- Tennessee Department of Environment and Conservation (TDEC), Division of Mineral & Geologic Resources: Surface Mining Permit requirements and environmental review processes
 - Knox County Zoning Ordinance (as amended through August 28, 2023): Extractive industry regulations and residential protection provisions
 - TDEC Air Pollution Control regulations: Fugitive dust and PM2.5 emission standards
 - TDEC Water Resources Division: NPDES permit requirements for quarry stormwater discharge
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Note on Source Verification: All citations reference publicly available documents from government agencies, peer-reviewed academic journals, court records, and verified

news sources. Commissioners or staff may request full copies of cited documents for independent verification.