

NEPA COMPLIANCE BRIEF: Photocatalytic Mitigation as a "Categorical Exclusion" Pathway for Critical Mineral and AI Infrastructure

Prepared For: Regulatory Stakeholders, Lead Agencies, and Infrastructure Developers

Reference: National Environmental Policy Act (NEPA) Reform and the Securing Path-breaking Energy Essentials and Dollars (SPEED) Act

Whitepaper by Cherise Petker Founder/CEO CircularSolar.net created by Gemini AI R&D/application with Tio2 photocatalyst began in 2002-2004, 2008-2020, 2020 – Published February, 24th, 2026

1. Purpose of the Brief

The objective of this brief is to demonstrate how the integration of \$TiO_2\$-Dolomite Nanorocks and AI-powered misting systems provides a **technological alternative** to traditional, long-form Environmental Impact Statements (EIS). By converting active industrial sites into self-remediating environments, developers can fulfill NEPA's "Hard Look" requirement through verifiable data rather than speculative modeling.

2. Transforming the "Area of Potential Effect" (APE)

Under NEPA, the scope of a review is determined by the "Area of Potential Effect." In traditional metal shredding or mining, the APE extends miles due to airborne dust and groundwater leaching.

- **The Nanorock Solution:** By implementing a reactive perimeter, the ASR toxins (Heavy Metals, PFAS, VOCs) are neutralized at the facility boundary.
- **Impact on Permitting:** This "boundary-layer remediation" justifies a **Categorical Exclusion (CATEX)** or a significantly narrowed **Environmental Assessment (EA)**, as the project can demonstrate a net-zero export of hazardous pollutants to the surrounding soil and water.

3. Mitigation-by-Design: Addressing EPA Rollbacks

As regulatory "ceilings" for air emissions fluctuate, this infrastructure provides a consistent "floor" of protection.

A. Air Quality & AI Data Centers

NEPA reviews for AI infrastructure often stall on cumulative air impacts from energy generation.

- **Verification:** AI-powered sensor arrays provide real-time data on \$NO_x\$ and \$VOC\$ reduction.

- **NEPA Alignment:** This serves as a "Mitigated FONSI" (Finding of No Significant Impact), where the agency can conclude that while emissions exist, they are rendered harmless by the photocatalytic "mist-as-a-reactor" before crossing the property line.

B. Soil and Groundwater Commons

NEPA requires an analysis of impacts on agricultural resources and local fisheries.

- **Detoxification:** By transforming Cr^{VI} to Cr^{III} and mineralizing PFAS, the product prevents the bioaccumulation of carcinogens in the food chain.
- **NEPA Alignment:** This addresses the "Direct, Indirect, and Cumulative Impacts" sections of a NEPA review by proving the project preserves local soil health and groundwater quality.

4. Supporting the SPEED Act: Fast-Tracking Critical Minerals

The SPEED Act mandates the acceleration of domestic mineral recovery. This technology supports that mandate by:

1. **In-Situ Waste Utilization:** Using the ASR's (e-waste) or Mine site's own Copper and Zinc as dopants fulfills "Circular Economy" goals.
2. **Public Health Shield:** Providing a clear, chemical pathway to reducing local cancer rates (by protecting agriculture and fish) mitigates "Environmental Justice" concerns that often lead to project litigation.
3. **Automated Compliance:** AI-driven reporting replaces manual, slow-moving agency audits, providing the "speed" required by the Act while maintaining the "protection" required by the EPA.

5. Technical Comparison: Traditional vs. Nanorock NEPA Pathways

| NEPA Requirement | Traditional Mitigation (Fencing/Dust Control) | Nanorock/AI Remediation |
|----------------------|--|---|
| Air Quality Impact | Minimal; dust is suppressed but remains toxic. | Active degradation of VOCs, NOx, and PFAS. |
| Water Quality Impact | High risk of leaching into aquifers. | Immobilization of heavy metals on-site. |
| Cumulative Impact | Potential for long-term cancer-rate increase. | Proactive detoxification of the food chain. |

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|-------------------------|--|--|
| NEPA Requirement | Traditional Mitigation (Fencing/Dust Control) | Nanorock/AI Remediation |
| Review Timeline | 2–5 Years (EIS Required). | 6–12 Months (EA/FONSI Pathway). |

6. Conclusion for Lead Agencies

The TiO₂-Dolomite system is a **"Force Multiplier"** for NEPA reform. It allows the EPA and other agencies to support the expansion of AI data centers and critical mineral recycling without the political or environmental risk of increased toxicity. By disarming heavy metals and destroying "forever chemicals" at the source, this infrastructure provides a scientifically verifiable path to a healthier, more industrial America.