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Eastern Pennsylvania Chapter International Society of Explosives Engineers www.easternpaisee.com

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The Eastern PA ISEE welcomes requests for topics, and invites readers' letters and other contributions that relate to drilling, blasting, seismology and explosives engineering.

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Prizes Awarded! Gun Raffle!

### 2022 Clay Shoot & BBQ

Friday, November 4, 2022 11:30am - 5:30pm Lehigh Valley Sporting Clays 2750 Limestone St., Coplay, PA

The event is FREE for Members or \$35 for Non-Members

Sponsorship Opportunities Available!

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### Letter from The President

Dear Members,

On Friday, November 4, 2022 the Eastern PA Chapter will host the 6th Annual Clay Shoot & BBQ at the Lehigh Valley Sporting Clays in Coplay, PA. We are again looking forward to seeing everyone come out and participate. As a sponsor you will be

acknowleged in the upcoming newsletter, on the website and with event signage at the Clay Shoot. Please consider sponsoring this event. Our sponsorship opportunity form is featured on page 5.



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Best regards,

Scott



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# Drilling for One of Nature's Tiniest Particles

Adapted from Information by Fermilab Reprinted with Permission from WorldWide Drilling Resource®

A flurry of activity is happening nearly a mile underground in South Dakota. Three shifts of 30 construction workers labor around the clock, carving out subterranean space for science in a



The drill head broke through the roof at the 4850-foot level to complete the pilot hole for the raise-bore ventilation.

huge effort centered on one of the tiniest things in nature, the neutrino.

Neutrinos are fascinating particles. Trillions of them pass through you every second without a trace. They are produced by almost everything, including Earth, the sun, supernovae, bananas, and people. These bizarre building blocks could hold the key to understanding why matter exists in the universe, rather than antimatter, or nothing at all.

To better study these elusive particles, an international collaboration of more than 1000 scientists are building the Deep Underground Neutrino Experiment (DUNE) hosted by the U.S. Department of Energy's Fermi National Accelerator Laboratory (Fermilab). Researchers will study a beam of neutrinos as it leaves Fermilab in Illinois and again when it reaches the Sanford Underground Research Facility in South Dakota. The particles will travel 800 miles straight through the earth to go from lab to lab with no tunnel needed.



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# Drilling Continued

The DUNE detector in South Dakota will be the largest neutrino detector of its kind ever made. Each of the four detector modules will hold 17,000 tons of liquid argon, in which neutrinos will interact and leave their signature traces. Creating the Long-Baseline Neutrino Facility involves making space for massive instruments and their support equipment. It will require moving roughly 800,000 tons of rock, creating caverns big enough to hold the bodies of four jumbo jets.

Before large-cavern excavation can begin, prep work must be completed. The first step is widening existing underground tunnels, called drifts, and creating a ¼-mile-long vertical ventilation shaft. The opening will improve the flow of air needed for excavation a mile underground where the main construction work will take place.



### Eastern Pennsylvania Chapter Clay Shoot & BBQ



### **Sponsorship Commitment Form**

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Send to: Ethan Huff, c/o Vibra-Tech Engineers, Inc. 109 East First Street, Hazleton, PA 18201



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# Drilling Continued

Raise-bore drilling will be used to create the ventilation shaft. First, construction workers drilled a 1200-foot-long pilot hole about a foot in diameter from the 3650-foot level down to the 4850-foot level. The drill bit used sensors called inclinometers to detect any deviation from vertical, sending real-time data to a computer that issued corrections to the steering mechanism. The pilot hole was completed with the drill emerging mere inches from its target in the cavern.

With the pilot hole complete, workers at the 4850-foot level replaced the drill bit with a large reamer. The circular tool is about 12 feet wide and spins as the construction crew pulls it up through the ceiling, chewing out rock as it goes. The debris falls down to the 4850-foot level, where it is scooped up, transported to the Ross Shaft, and taken for a mile-long ride to the surface. A conveyor system then brings the rock another <sup>3</sup>/<sub>4</sub>-mile to a former open-pit mining site called the Open Cut.

### Continued on page 8



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# Drilling Continued

The raise-bore technique "is probably the best method to build circular shafts," said James Rickard, the Fermilab resident engineer managing the excavation. "And it's very good for hard rock," the type present at the facility.

Along with excavation of the main caverns, crews will also enlarge some of the drifts and the area around the Ross Shaft to create more space for transporting DUNE equipment. For this excavation, as well as eventual excavation of the main caverns, teams will switch to the drill and blast technique, using explosive charges placed in small holes.

When the space is ready, researchers will begin bringing in components needed for the massive experiment underground and assembling the detector, like a ship in a bottle.

DUNE will address three major science goals: determine why matter exists in the universe; watch for neutrinos from a supernova in our galaxy; and look for unexpected subatomic processes, such as proton decay, a phenomenon which has never been observed before.





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# Nitroglycerin Exposure in Blasting Operations

*By Brian Lewis This article was reprinted with permission from RESPEC.* 

Employees working on mining and construction sites are exposed to unique hazards. One such hazard is acute methemoglobinemia, which is a blood disorder that decreases the oxygen delivered to your cells. When methemoglobinemia occurs, the results are dizziness, drowsiness, headache, shortness of breath, blue skin and lips, a rapid heart rate, unconsciousness, and, possibly, death. Methemoglobinemia can arise from overexposure to nitroglycerin.



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Handling dynamite can lead to nitroglycerin overexposure. While dynamite is more often found in construction blasting applications, it has also been identified at abandoned mine sites and wherever blasting operations occur. Employees need to understand the risks associated with overexposure to nitroglycerin when dynamite is used.

### Continued on page 12





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Nitroglycerin overexposure can result from inhalation (airborne particles) or absorption (skin contact). Inhalation and absorption can occur when handling dynamite or when the dynamite's protective wrapping is damaged or has deteriorated. When both air and skin contact occur, overexposure is possible even when particles in the air are very low.

Continued on page 13



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Nitroglycerin levels vary depending on the explosive product being used. A "powder headache" is a common early warning sign of overexposure. Once a powder headache and dyspnea (labored breathing) occur, the methemoglobinemia levels in the bloodstream are already 20 to 30 percent. Seizures and/or coma can result from methemoglobinemia levels as low as 50 percent, while death is expected at 70 percent and higher.

Preventative measures should always be taken when working where possible nitroglycerin exposure could occur. Nonporous, chemical-resistant nitrile gloves should be added to standard personal protective equipment when handling any explosives containing nitroglycerin. If nitroglycerin builds up on the gloves, avoid rubbing your hands on your face or touching exposed skin. If the dynamite has deteriorated, only experienced personnel with explosives and Hazardous Waste Operations and Emergency Response (HAZWOPER) training should handle the explosives. Employees that are not actively handling dynamite should remain out of the blast area and 500 feet from any operation actively using nitroglycerin products.



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Employees that have been exposed to nitroglycerin should take the following first-aid measures:

- General Guidelines: Never give anything by mouth to an unconscious person. If you do not feel well, get medical attention, and show the label where possible.
- Inhalation: When symptoms occur, move to open air and keep at rest in a position comfortable for breathing. Get medical attention. Ventilate the suspected area.
- Skin Contact: Wash contact areas with soap and water. Remove and dispose of contaminated clothing.

Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to remove. Continue rinsing. Get medical attention if irritation persists.

• Ingestion: Rinse mouth. DO NOT induce vomiting. Get medical attention.

Employees are always encouraged to speak up when they feel unsafe or exposed to risks in a setting where they have little experience. While most employees will never be exposed to nitroglycerin levels high enough to cause acute methemoglobinemia, knowing how to avoid any potential exposure is important.





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### Mine Safety and Health Administration

MINE FATALITY – On January 11, 2022, a 32 year-old miner died while driving on a mine road when a tree fell from a highwall onto the cab of his pickup truck.

**Best Practices** 

- Examine highwalls frequently and from as many perspectives as possible (bottom, sides, and top/crest). Look for signs of instability such as cracks, sloughing, loose ground, and for fall of material hazards such as large trees and rocks.
- Train all miners to recognize hazardous highwall conditions.
- Conduct additional examinations as conditions warrant, especially during periods of changing weather conditions.
- Clear loose or potentially hazardous material from near the edge of highwalls and slopes, especially when persons will work or travel below.
- Develop and follow a ground control plan that addresses all potential hazards.

Learn more at <u>https://www.msha.gov/data-reports/</u> fatality-reports/2022/january-11-2022-fatality/finalreport

Miners and mine operators can find safety and health information on <u>MSHA.gov</u>.



Michael J. Pruss Consulting, LLC

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# Time to Renew Your Membership

Membership in the Eastern PA Chapter of the ISEE keeps you connected to news and events in the drilling, blasting and seismic fields. Members receive benefits such as quarterly newsletters, training opportunities, regulatory and safety updates as well as informational/social events. A yearly membership costs only \$35.

To become a member or renew your membership, please complete the form

featured on page 18. You can also find the membership form online.

#### Save with a Corporate Membership!

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