



## Sandia tests prove Terra Pave is environmentally friendly

**LOS ANGELES: NOVEMBER, 2020** Sandia National Laboratories, acknowledged as one of the top labs in the U.S., finished its testing of Terra Pave in regards to heavy metal contaminants, organic contaminants and water pollution and comparison of the results with those for AEP (Asphalt Emulsion Product). The Sandia National Laboratories is one of three [National Nuclear Security Administration](#) research and development laboratories in the United States. Beckett Solar Energy ([www.beckettsolar.com](http://www.beckettsolar.com)) is pleased to share the results of the report.

- It is Sandia's mission to maintain the reliability and surety of nuclear weapon systems - other missions include research and development in energy and environmental programs, as well as the surety of critical national infrastructures.

Terra Pave products are liquid soil stabilizers that permanently bind and transform the ground into a pavement-like layer. The created surfaces can be used as roads or parking lots.

Terra Pave Top-Seal is engineered to achieve the albedo of snow – for use with bifacial panels.

According to the results, Terra Pave products have clear advantages against AEP (Asphalt Emulsion Product). Today approximately 3 million tons of emulsions are produced in the United States representing about 5% to 10% of asphalt consumption. Approximately 8 million tons of asphalt are used in emulsion form worldwide, about 9% of all asphalt usage.

The inductively coupled plasma mass spectrometry from **SANDIA National Laboratories** have revealed that in most cases, Terra Pave products exhibited far less to no heavy metal contaminants compared to AEP. Road bases, which when subjected to rainwater, are known to leach heavy metals and contaminate water tables.

Large quantities of heavy metals polluted into the environment threaten and compromise animal and human health. Due to the nondegradable state of metals, there can be bioaccumulation of these pollutants in the food chains, with remediation typically requiring extensive physical and chemical sequestrations in soil, air, and/or water. Some Terra Pave products exhibited high levels of titanium, magnesium, potassium and calcium. This is not concerning since these metals are considered safe.

**In addition to metal pollution**, organic contaminants are of concern with asphalt products. Freshly paved roads and tar roofs are a significant source of air and water pollution. VOC and intermediate/semi-volatile organic compounds emissions are responsible for substantial public health effects.

Identification and quantification of compounds within the samples were performed using the NIST Mass Spectral Search Program and Automated Mass Spectral Deconvolution and Identification System.

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The volatile organic analysis revealed extremely low petroleum hydrocarbon content and outgassing in the Terra Pave products, while AEP revealed extremely high levels.

That makes Terra Pave products clearly advantageous for human health and the environment compared to asphalt products like AEP. Beckett Solar's Managing Partner, Sharon Bailey shared, "These advantages make Terra Pave a sound alternative for the creation of albedo-enhancing bifacial solar farms, roads, foot-paths or parking lots.

**Aside from organic pollution**, water pollution can also occur from the leaching of salt into the environment. Increased salinity can have lethal and sublethal effects on aquatic plants and invertebrates, including making freshwater non-potable for human consumption. Ion chromatography reveals that Terra Pave contains higher levels of salt than AEP.

Spraying Terra Pave products is like spraying water with an acceptable sodium content on soil. Terra Pave products contain a natural non-toxic sodium content. Though sodium is present within the newly created pavement-like structure, sodium does not leach into any water supplies beneath Terra Pave products.

- Terra Pave products have a maximum of 0.6 gallons per square yard application rate. Terra Pave layers can be ground up and mixed in with the existing soil. Because of the maximum application rate, the sodium content of the Terra Pave layer will not be a problem for farming operations looking to recycle the treated soil.

Thanks to sponsor Eco Estates International, these tests could take place.

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## MEDIA RESOURCES:

### About Terra Pave

Terra Pave Products were invented at the University of Texas, Austin, Texas, USA and are manufactured at the University of Texas Technology Commercialized Company Terra Pave International (TPI) <http://terrapaveinternational.com/>. Terra Pave is the WINNER of the AMERICAN-MADE SOLAR PRIZE ROUND 2 SEMIFINALIST from NREL (National Renewable Energy Laboratory, Department of Energy USA).

Terra Pave products got their start when David Pham, developer of net zero homes in Texas desired a ecologically sensitive method of provide driveways and homes for his ecologically-sensitive net-zero homes. He brought the idea to Yetkin Yildirim (President/CTO of Terra Pave International) who said, "we've got something like you're describing"!

The University of Texas in Austin has a track-record of developing new technologies—most famous to-date has been the Ion battery.

**Terra Pave International, Inc** is committed to providing its customers around the world with cost-effective, eco-friendly materials for improving roadways, parking lots, airfields, and all other traffic-bearing surfaces. Through its superior products, TPI is promoting sustainability and revolutionizing the field of asphalt pavement preservation.

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**David Pham** is co-founder of Texas-based Ecological Estates Inc (EEI). Prior to joining EEI as the current President and Chief Technical Officer (CTO), Mr. David Pham was a co-founder of Next Level Group Consulting, worked as the Global Solar Products Applications Specialist for Sun Chemical a division of Di-Nippon Chemical Corporation, Solar Product Director for Surfact Technologies, and has also held senior management roles in the semiconductor sector with Rudolph Technologies, Hitachi Semiconductor, Advanced Micro Devices (AMD), and Motorola Semiconductor Product Sector.

**Ecological Estates** <http://ecoestates.us/> operates a full service EPC (engineering, procurement, construction) company and a O&M practice (operation and maintenance) in the solar industry as well as a full service design, project management and construction company that creates innovative, net-zero energy eco-friendly homes. Their EPC company is currently leading a 600 MW project in Vietnam.

### **Dr. Yetkin Yildirim**

[https://www.researchgate.net/profile/Yetkin\\_Yildirim](https://www.researchgate.net/profile/Yetkin_Yildirim)

Dr. Yetkin Yildirim is the President and CTO at Terra Pave International. Dr. Yildirim received his Ph.D. in Civil Engineering in 2000 from the University of Texas at Austin and is registered by the State of Texas as a professional engineer. Dr. Yildirim's areas of expertise include pavement preservation, pavement maintenance, and pavement materials. He served as the director of the Texas Pavement Preservation Center (TPPC) at the University of Texas at Austin and for ten years and served as a faculty member in the civil engineering department at UT Austin for fifteen years.

Dr. Yildirim has also served as the Director of the Engineering Education Research Center (EERC), where he has been conducting research regarding new developments in model-based learning activities in Science, Technology, Engineering, and Math (STEM) education.

**Sharon Bailey Beckett** is Managing Partner of Beckett Solar Energy, a six-year-old manufacturers' representative firm, marketing such brands as Mission Solar, RenewSys India and Terra Pave. Beckett Solar Energy staff are active in Europe, Canada, USA, Mexico, South America and China. She is also a founding partner, and Managing Director of the North American business strategy and market research group known as Beckett Advisors. A member of the Pasadena Angels, one of the most respected angel investment groups in the United States, she has served on its Board of Directors, and has worked as an Advisory Board member for California's largest business incubator-the Los Angeles Business Technology Center in Altadena, California.



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