Register TODAY to Attend the Perlite Institute’s Annual Meeting in Barcelona, Spain

Join us Oct. 18–21 at the Olivia Plaza Hotel

Don’t miss the opportunity for education and networking while enjoying beautiful Barcelona, Europe’s largest city on the Mediterranean coast. Hurry! The registration deadline is Sept. 18. Click here to see the attendee brochure, which includes registration and hotel information.

MEETING HIGHLIGHTS

Sunday, Oct. 18
- Tour of Barcelona
- Welcome Reception

Monday, Oct. 19
- Educational Sessions
- Enagas Barcelona LNG Terminal Tour
- Evening Reception

Tuesday, Oct. 20
- Educational Sessions
- Annual Business Meeting
- Evening Reception and Annual Dinner

Wednesday, Oct. 21
- Uralita Group Plant Tour
- Lunch in the Medieval Village of Besalu

For a complete agenda, turn to pages 4 and 5.

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Can’t Make it to the Annual Meeting?
PLEASE SUBMIT A PROXY BALLOT

If you are not able to attend the Annual Meeting in October, please complete the proxy ballot so we can count your vote for important membership business being transacted. The deadline to submit your proxy ballot is Aug. 31.

The Perlite Institute’s Core Values:
- Integrity is Our Guiding Principle
- Volunteering is the Best Form of Leadership
- Collaboration Generates Better Ideas
Hello, fellow members. I hope that your business is healthy and 2015 is shaping up to be a great year. The last time I wrote this message we were in the midst of severe West Coast port issues and the challenges that resulted. Now that situation is behind us, and we are past the halfway point in 2015.

At this point in the year, many businesses already know how the year will finish up and feel there is little to be done to affect that. While that may be true in general, I believe there is always time to influence the results, and as business owners you must greet this challenge with enthusiasm every day.

One of the things the Perlite Institute has done to “influence” the market is the improvement of the website and the content contained within. It has taken diligent and dedicated work from some key contributors to the organization, and I think the results show that. If you have not visited the website on a regular basis, I encourage you to do so and see what the organization has offered. Additionally, I would suggest you take a look at your own site (if you have one) and view it as someone would coming to the site for the first time. Is your material up to date and relevant? Is the site easy to navigate?

The big point that you should not overlook is can you track who is visiting your site and convert them into leads and eventually sales of your products?

The web continues to evolve, and social media is incredibly present throughout our lives. Please take advantage of this capability for your own business.

This graphic shows just how important the internet is in the global economy and how it has grown in the last three years.

All that being said, I continue to look ahead to our Annual Meeting in Barcelona with excitement. As with all meetings, it provides a great forum for networking and socializing with the membership. Additionally, your Meetings and Membership Committee continues to try and improve the format and content of the presentations for our meetings, and you will be pleased with the final agenda for this fall.

Please enjoy reading this edition of the newsletter and start making
Core values support the vision of an organization, shape its culture and reflect the values of the company. Core values can help companies in the decision-making processes, educate members and potential members about the organization and can be used to promote the Perlite Institute’s beliefs and philosophies.

Core values are developed by the leadership of the organization. The Perlite Institute’s Board of Directors spent some time and energy developing the core values of the organization during its strategic planning session this past spring. The core values of the Perlite Institute are:

◆ **Integrity Is Our Guiding Principle**
◆ **Volunteering Is the Best Form of Leadership**
◆ **Collaboration Generates Better Ideas**

**Integrity Is Our Guiding Principle:** The Perlite Institute believes strongly that we be open, honest and transparent in all our dealings. We will strive to always share information and details with our members so they have knowledge about the organization and feel comfortable asking for anything they feel they are not receiving.

**Volunteering Is the Best Form of Leadership:** The Perlite Institute truly believes volunteers are the key to a successful organization. We are always looking for new volunteers and those interested in serving in order to reach the Board-approved goals and objectives. Opportunities for volunteers are available in the newsletter, on the website or by contacting a Board or staff member. We want to make it as easy as possible for you to volunteer and help us grow the Perlite Institute!

**Collaboration Generates Better Ideas:** The concept of working with other organizations and individuals makes us stronger as an Institute. We have many opportunities to collaborate through our research projects, educational opportunities, communication vehicles and much more! We encourage anyone with connections to like-minded organizations and individuals to share that information with a Board or staff member so we can follow up on appropriate forms of collaboration. More minds result in better results!

The Perlite Institute will promote these core values on our website, in our newsletter and to members and potential members. We believe strongly in these values and hope you do, too!

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**Message from the President** Continued from page 2

plans for your attendance at the Annual Meeting. Feel free to give me a call or send me an e-mail if there are specific areas you feel the Institute should be focused on for your ongoing success.

I look forward to greeting all of you in Barcelona this year!

—Matt Goecker
### Sunday, October 18, 2015

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>0800 - 1200</td>
<td>Board of Directors Meeting</td>
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<tr>
<td>1300 - 1700</td>
<td>Tour of Barcelona</td>
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<tr>
<td>1830 - 2000</td>
<td>Welcome Reception</td>
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### Monday, October 19, 2015

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>0900 - 0915</td>
<td>Welcome and Introductions - Matt Goecker, EP Minerals, President</td>
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<tr>
<td>0915 - 1000</td>
<td>Hydroponic Growing Media: A Comparison of Perlite to Other Substrates</td>
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<tr>
<td>1000 - 1045</td>
<td>The Effect of Perlite and Biological Systems on Organically Enhanced Growing Media Part II</td>
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<tr>
<td>1045 - 1100</td>
<td>Break</td>
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<tr>
<td>1100 - 1200</td>
<td>Green Roof Panel and Group Discussion</td>
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<tr>
<td>1215 - 1300</td>
<td>Lunch</td>
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<tr>
<td>1315 - 1415</td>
<td>A Presentation on Liquid Natural Gas (LNG)</td>
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<tr>
<td>1430</td>
<td>Bus departs for tour to Enagás Barcelona LNG Terminal</td>
</tr>
<tr>
<td>1830 - 2000</td>
<td>Reception</td>
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</table>
Perlite Institute Annual Meeting, Barcelona, Spain – Tentative Schedule

**Tuesday, October 20, 2015**

0800 - 0900 | 8:00 a.m. - 9:00 a.m.  Board of Directors meeting (if needed)

0900 - 0945 | 9:00 a.m. - 9:45 a.m.  Sketch/Flow Chart of Perlite Processing Systems
Chuck Vogelsang, Technical Spokesperson, Perlite Institute

0945 - 1030 | 9:45 a.m. - 10:30 a.m.  Perlite 2.0: New Market Potentials for Perlite
Erwin Brunnmair, Managing Director, Bublon GMBH

1030 - 1045 | 10:30 a.m. - 10:45 a.m.  Break

1045 - 1100 | 10:45 a.m. - 11:00 a.m.  Technical Committee Report

1100 - 1200 | 11:00 a.m. - 12:00 p.m.  Research Committee Workshop with Break-out Groups/HER Update
Research Committee and Ken Wiener, HER Consultant, Perlite Institute

1200 - 1230 | 12:00 p.m. - 12:30 p.m.  Annual Business Meeting (including Imerys and S&B Merger Update)

1230 - 1330 | 12:30 p.m. - 1:30 p.m.  Lunch

1330 - 1415 | 1:30 p.m. - 2:15 p.m.  Communications Committee Report
Task Groups on New Brochures and Brochure Revisions

1415 - 1500 | 1:30 p.m. - 2:15 p.m.  Perlite Lightweight Concrete Applications/Sustainable Building Applications
Konstantin Mitsiou, Managing Director, Gulf Perlite LLC

1500 - 1515 | 3:00 p.m. - 3:15 p.m.  Break

1515 - 1600 | 3:15 p.m. - 4:00 p.m.  Perlite as a Cost Effective Filter Aid in the Food & Beverage Industry
Dr. Matt Jordan, Filtration Market and New Product Development Manager, Imerys Minerals LTD

1600 - 1700 | 4:00 p.m. - 5:00 p.m.  Presentation of Perlite Institute Test Methods Training Videos
Brad Hess, General Manager, Hess Perlite

1800 - 1900 | 6:00 p.m. - 7:00 p.m.  Reception

1900 - 2200 | 7:00 p.m. - 10:00 p.m.  Annual Dinner and Entertainment

**Wednesday, October 21, 2015**

The group will depart from the hotel to visit one of the six plants owned and operated by the Uralita Group, in Spain. The plant is approximately 90 minutes (135km) from Barcelona and near Besalú, an important medieval village. Every gypsum plant they have has a perlite expander. Uralita is a group of companies listed on the Spanish Stock Exchange with revenues fluctuating around EUR 600 million (http://www.uralita.com/en-GB/Pages/default.aspx).

0800 | 8:00 a.m.  Depart hotel to Beuda

1000 | 10:00 a.m.  Visit plant

1200 | 12:00 p.m.  Depart to Besalú

1330 | 1:30 p.m.  Lunch in Besalú

1430 | 2:30 p.m.  Visit Besalú

1600 | 4:00 p.m.  Depart to Barcelona

1800 | 6:00 p.m.  Arrive at the hotel

[Click here](#) to register for the Annual Meeting and to make hotel arrangements. The deadline for hotel and meeting registration is **Sept. 18**. Hurry! Don’t delay!
Industry News

Perlite Volcanic Popcorn Reduces Building Insulation Costs, Study Shows

Using perlite as “volcanic popcorn” insulation material could reduce building insulation costs by 30 percent, according to research at London’s Brunel University. Vacuum insulation panels made with a core of perlite have been projected to reduce building insulation costs by 30 percent, based on research conducted by the Brunel University team led by Dr. Harjit Singh.

Normally, the insulation panels are made by surrounding a core of fumed silica with metalized PET envelope. Using perlite results in a significantly lower embodied energy content than fumed silica. Perlite is manufactured at less than 1,000 degrees C while the manufacturing of fumed silica requires significantly higher temperatures, up to 3,000 degrees C.

Perlite-based panels less than 2 cm thick perform as well as solid foam of 100 mm so retrofitting existing buildings with high-performance insulation from the inside will be a viable option. Dr. Singh is also investigating other novel ways to use the technology, such as making small panels and embedding them in a flexible framework to make insulating wallpaper.

Source: Science Daily

Imerys Raises Prices on Perlite Products

Imerys Filtration Minerals, Inc., has raised prices for products shipped within North America effective July 1, 2015. The increase will range from 3 to 10 percent, subject to any provisions in individual contracts. The price increase supports continual investments and rising costs in manufacturing, maintenance, quality systems and environmental compliance, according to Imerys. The price increases will apply across all diatomite and perlite products. The energy surcharge will remain in effect.

Source: Business Wire

New Report Sheds Light on Expanded Perlite Market

The global expanded perlite market was valued at $676.7 million in U.S. dollars in 2014 and is expected to reach $1,258.6 million in 2023, expanding at a compound annual growth rate (CAGR) of 7.3 percent during the forecast period. In terms of volume, the global expanded perlite market stood at 2,208.5 kilo tons in 2014.

According to the report, Expanded Perlite Market for Construction Products, Fillers, Horticultural Aggregates, Filtration and Process Aids and Other Applications...2015-2023, the global expanded perlite market is likely to be driven by rising demand for construction products, horticultural aggregates and filtration and process aid applications. Rapid expansion of construction and horticulture industries globally will increase demand for construction products and horticultural aggregates, which in turn will boost demand for expanded perlite.

Filtration and process aids is expected to be the fastest growing segment of the expanded perlite market during the forecast period with global expansion of beer-brewing operations due to a rise in beer consumption fueling demand for expanded perlite in filtration applications.

Source: WhaTech

Report on Global Markets for Perlite Available

Perlite and Vermiculite Global Market Review 2014/2015, published by Research and Markets, provides a thorough study of perlite and vermiculite, covering both global and regional markets. The report provides a proper picture of the market, its trends, perspectives and opportunities by providing comprehensive data showing perlite and vermiculite worldwide production, consumption, trade statistics and prices.

Each country’s market overview covers the following:

- perlite and vermiculite production in the country,
- major manufacturers,
- perlite and vermiculite consumption, and
- perlite and vermiculite trade.

The report offers a five-year outlook on the reviewed market, including perlite and vermiculite market volume predictions and price trends.
Brad Hess Joins Board of Directors

The Perlite Institute welcomes Brad Hess to the Board of Directors. Brad fills the vacancy created by the resignation of Mike Hess earlier this year.

Brad has been part of Hess Pumice Products, Inc. for the past 25 years. He joined the Hess team in 1990, after owning and operating his own general contracting and ready-mix concrete companies for 12 years. These companies provided services for residential construction as well as small commercial construction. After completing many turn-key projects, Brad began to specialize in concrete and excavation services. He has formed and poured several foundations over the years, many of which were poured out of lightweight pumice concrete.

He was also hired as a specialty contractor to build some homes and small apartments where the exterior walls and roofs were built entirely out of a concrete mix consisting of expanded perlite and pumice. Brad also oversaw the construction of a commercial truck shop built from 34-foot-high tilt-up panels poured exclusively with pumice.

When Brad started as plant manager with Hess Pumice Products in September 1990, Hess Pumice Products consisted of the mining operation and one processing plant. Over the years, Brad has had the opportunity to be involved with the expansion of the Hess organization as he has advanced in the company from plant manager to his current position of general manager. Hess operations now include the pumice and perlite mining operations, two pumice processing plants, two perlite expander plants, an ultrafine grout plant, a commercial NAPA automotive repair and heavy duty truck service center and a NAPA automotive parts store.

Brad has been married to his wife, Wendy, for 35 years. They have one daughter, three sons and seven grandchildren. He enjoys spending time with his family, especially the grandchildren. In his spare time, he enjoys the outdoors, recreational flying, riding his motorcycle and helping his friends and neighbors wherever he can.

Water-Holding Capacity of Expanded Perlite Tested

David Yarbrough of the independent laboratory, R&D Services, has completed initial testing designed to illustrate the water-holding capacity of expanded perlite fines. The results were impressive and noticeably consistent, with an average ratio by weight of 7.94 to 1 of water to expanded perlite fines. The tests were performed at the request of the Communications Committee writing the new product guide on using perlite as a sludge absorbant. The results prompted the committee to expand the testing to fines from two additional, different ore sources. The full report, with methodology explained, will be detailed in the final document being prepared for the website – per the request of members who expressed interest in this new market area at the annual meeting in Park City last September. The results will likely be useful in creating another product guide planned to illustrate the water-holding role of expanded fine perlite in agricultural and horticultural soils.

— Jerry Mishler and Rick Willis, Co-Chairs, Brochures Task Force

Perlite Institute Committee Updates

Research – At the July meeting of the committee, Perlite Institute consultant Ken Wiener provided an update on the following items related to some archived research:

Fertilizer Granules – Reporting on research conducted in the late 1960s to create NPK fertilizer granules using perlite, Ken recommended investigating whether perlite expanders can reduce dust levels further than with water spray alone. He doesn’t think university confirmation is needed for dust control or fertilizer analysis for coated perlite. However, if perliters want to market granules to agriculture, university studies are likely needed. Linda Chirico offered to look into whether Scotts Miracle-Gro perlite fertilizer (perlite NPK values of 0.07-0.07-0.07) is successful at reducing dust.

Continued on page 8
Precision Environmental Planting – A planting machine for dropping vermiculite into holes with seeds was reported on in an archived issue of National Future Farmer magazine. The precise planting would reduce vermiculite usage from 10 to 15 bags per acre to 2, and the vermiculite could be a carrier for pesticides and fertilizers. Ken suggested it might be worth investigating whether perlite could be as good a carrier for these purposes as vermiculite.

Underlayment for Highways – The committee discussed studies done in the 1970s on which a stretch of Illinois highway used a four-inch asphalt/perlite mix as an underlayment to thermally isolate the pavement from the ground. Not only was heaving of the pavement reduced on this section, but accidents were reduced by 60 percent. Ken wondered if other perlite-containing products would be a cost-effective alternative today. Linda noted that her company had been involved in the original project until the price of asphalt rose tremendously and the expense meant the project had to be abandoned.

The committee also discussed the possibility of adding perlite to rubber to make it more pliable as a possible way to decrease the impact of surfacing materials under playground equipment.

Communications – During the upcoming Annual Meeting, members will have the opportunity to give Communications Committee Chair Mike Dunlavey feedback on the Institute’s communications. The Brochures Task Force has been hard at work reviewing and preparing brochures and literature so they can be reviewed by the membership at the upcoming Annual Meeting in Barcelona. The task force has been working on brochures on the following topics: Sludge Absorption, Perlite-Insulating Concrete Pool Base for In-Ground Vinyl Pools, Overview of Insulating Perlite Concrete, Perlite Volcanic Glass as a Hollow Microsphere Filler and Perlite for Use in Well Cements.

Meetings and Membership – The Membership and Meetings Committee remains focused on increasing membership and creating a vibrant 2015 Annual Meeting. The committee met in July, and the group reviewed membership data as the association continues to grow. Meeting details were also discussed surrounding speakers, tours and the distribution of meeting information.

Did you know the Perlite Institute website, www.perlite.org, receives thousands of visitors each month? Consider these facts about web traffic to the site during the second quarter of 2015:

• During April, May, June and July 2015, the site had 12,275 visits.
• Of those visits, approximately 78.5 percent were from new visitors.
• A total of 25,509 pages were viewed during this four-month period.
• The average visitor viewed about 2 pages per visit and spent approximately 1.75 minutes viewing each page.

Who’s Visiting www.perlite.org?

Want to learn more about a certain committee without the pressures of joining? Wishing there was a way to “test drive” a committee before making a commitment? The Perlite Institute is offering members the opportunity to get to know the committees better before deciding to join one. Sign up to receive reports, minutes and notice of meetings from any of the Perlite Institute committees. Contact any of the chairs below to be added to the committee distribution list or to learn more about the committee and its work:

- Brochures Task Force
  Jerry Mishler, Co-Chair, jerry@perlite.com
  Rick Willis, Co-Chair, rwillis@silbrico.com

- Communications/Marketing Committee
  Michael Dunlavey, Chair, mike@pvpind.com

- Horticultural Committee
  Kathryn Louis, Chair, kathrynl@sungro.com

- Meetings and Membership Committee
  Matthew Malaghan, Co-Chair matthew.malaghan@perlite.co.nz
  Rick Willis, Co-Chair, rwillis@silbrico.com

- Technical Committee
  Richard Barabé, Chair, info@perlitecanada.com

- Research Committee
  Linda Chirico, Chair, lchirico@carolina.rr.com

GET INVOLVED!

Join a Committee,
Make a Difference
CRYSTALLINE SILICA (RCS) and DUST

South African officials announced a program in May to recompense mine workers with silicosis, tuberculosis and other pulmonary diseases. The total funding is estimated at 1.5 billion rand, which sounds like a lot, but since the exchange rate is about 12 rand to the U.S. dollar and about 700,000 South Africans, plus workers in and from other countries, may be eligible for payouts, individual benefits could be quite small. Mine worker unions seem to be supporting the program so far. Lawyers are still looking for more payouts directly from AngloGold and Harmony Gold Mining Co., reiterating the claims that the companies operated without adequate ventilation for the last 60 years.

In the meantime, two South African mines (one platinum and one coal) have installed real-time monitoring devices aimed at allowing mine operators to change airflows and eliminate spikes in air contamination levels within their mining operations. A search reveals that prototypes have been developed over the past decade or so, with much research being performed in Australia. The South African Chamber of Mines is touting these systems as the closest thing to a “silver bullet” at eliminating the potential for silicosis.

Back in the United States, researchers at Kentucky’s University of Louisville have published information that one website has titled “Researchers Find Link Between Exposure to Silicosis and Lung Cancer.” Of course, my initial thought was that seemed obvious, until I read a little further and discovered that they were talking about the mechanism by which lung cancer develops. The team hopes “that this new information will allow for the more rapid development of treatments for this currently incurable disease.” They have pointed a finger at a certain member of a class of chemicals (leukotrienes, if you would like to look it up) that was only identified and named in 1979. So, it turns out that the animal studies I mentioned in the last issue of Perlite Today may yet lead to something.

OSHA’s proposed new crystalline silica standard keeps being attacked. A paper calls for more testing of different silica polymorphs rather than simply reducing limits on all. The timing for a decision on implementation of the standard has been delayed, but OSHA’s review of comments was to be completed in June. Of course, one way to reduce exposure to crystalline silica is to replace materials with high amounts of crystalline silica with those containing lower amounts.

Conveniently for perliters, perlite appears on the U.S. EPA’s Safer Chemicals Ingredients List (SCIL).

Further, Mine Safety and Health Administration is indicating that it will issue proposed rules on respirable crystalline silica exposure in April 2016.

GLOBAL WARMING & POLITICS

Before I report on conservation efforts such as controlling carbon emissions or measuring water footprints, I want to mention something totally bizarre in the circus known as the U.S. presidential primaries. A new entry on the Democratic side, former Rhode Island Governor Lincoln Chafee, has put in his platform that he would have the United States fully convert to the metric system.

OK, now back to the news. Crops threatened by climate change include cacao, tea and coffee. For instance, tea growing conditions in Assam, India, are approaching the top end (30°C/86°F) of the optimal temperature range for high quality tea. The Indian monsoon is not helping either, bringing more rain that can waterlog the roots of the plants (perlite, anyone, to help aerate the soil and hold moisture for later use?). Communication among farmers of what works and what to avoid can help preserve bushes for decades to come. Tea farmers have a significant investment in the bushes and expect to harvest them for 60 years or more.

Continued on page 10
All farmers depend on the right weather. Anything they can do to communicate workable solutions can wind up helping the chocoholics amongst the rest of us.

Water-use policies may also have to change to ameliorate the effects of climate change, especially in low-lying river delta regions of highly populated nations such as Bangladesh and Vietnam. California also faces such decisions as determining the proper division of available water among urban, agricultural and environmental use. That latter use is not limited to saving a species of small fish found nowhere else in the world, but ensuring that fresh water continues draining into San Francisco Bay and keeping the delta area filled with fresh, not brackish, saline water. Again, preaching to the perlite choir, a gallon of water retained by perlite to irrigate crops means a gallon of water that can be used for other applications.

Other human responses to climate change are projects to offset or help reduce the effects of emissions. As stated here before, much of those take money. In 2014, more than $35 billion USD was raised via so-called “green bonds” to implement such projects. Estimates for 2015 range from about that number to $80 billion or even more. Insurance companies, always looking for a good deal, are alleged to be interested in this type of investment. Also from a financial standpoint is the story of how cap-and-trade has been implemented in California. Derided as “kneecap-and-trade” by those opposed to it, implementation has not caused California’s economy to collapse, has not seemed to act as a drag and has not accelerated business flight to other areas. The process has been smooth, generating close to $1 billion in revenue to be spent on carbon emission reduction projects. The real question now is who gets to spend that money and on what.

For the Paris conference in December, the forecast is for a lot of debate without an agreement to implement a stated goal to cap global temperature rise to 2 degrees C. Perhaps some smaller agreements with smaller goals can be worked out, but in the end, it will involve money. The green bond industry might be on to something.

**REACH, CLP and GHS**

The June 1 deadline for Globally Harmonized System of Classification and Labeling of Chemicals (GHS) for U.S. manufacturers has come and gone. OSHA issued another interim guidance document May 29, in which some labeling relief was offered to those operations where manufacturing of their product occurred prior to June 1, 2015, and inventory was stocked (i.e., boxed, palletized, shrink-wrapped, etc.). The interim guidance indicates that “there is no requirement to re-label packaged for shipment containers with HCS 2012-complaints labels.”

Interestingly, I have lately come across REACh dossiers for various chemicals. They are nicely organized, in much the same way as a GHS Safety Data Sheet would be, and don’t make you go digging for data. Given information is clear and documented where possible, so that statements make sense and are not intended to cover up a lack of data.

Another regional harmonization is being undertaken in Asia by ASEAN, the Association of Southeast Asian Nations. Its work on pharmaceuticals harmonization seems to be going well.

Back to Europe and REACh, the last I heard was that our position that the expansion of perlite did not constitute a chemical treatment was grudgingly accepted. A further backup is found in the U.S. IRS Tax Code. Perlite expansion is specifically used as an example of a “thermal action” [see § 1.613-4 section (6) viii, not vii (the paragraph that defines chemical modification)]. In case anyone wonders, the IRS needed to define operations to clarify what constitutes taxable income and property depreciation.

**MINE SAFETY**

The U.S. Mine Safety and Health Administration (MSHA) is estimating that new rules to assess penalties will be issued in December. MSHA’s current penalty assessment method assigns numerical point values to various criteria in proposing a fine for a violation of a mine safety or health standard. Totaling the values results in a proposed fine from a penalty table. MSHA wants to reallocate the weighting of key criteria. For instance, the proposed penalty point structure gives increased weight to total negligence and
violation history factors, while reducing the weight for mine size.

The new rules on proximity detection devices on underground mobile equipment were due out in July, and a final rule addressing fees for testing, evaluating, and approving mining products should be out this month.

THE ECONOMY

A recent article in the *Los Angeles Times* documented the growth of cargo ships docking at local ports. While the emphasis of the article was on what needs to be done to accommodate these larger and larger ships, the fact remains that these ships are more efficient, both economically and ecologically. The following images illustrate these last two points.

In other shipping news, I just found out that 80 percent of the world’s container shipping fleet is controlled by 16 companies operating under four major corporate alliances. There is enormous pressure on them not only to build the biggest, most efficient vessels possible, but to fill them with containers so that no space is wasted. Even the soon-to-be-opened widened Panama Canal will not accommodate these monsters. Competition between ports will be more and more based on their available infrastructure.

GREEN BUILDINGS

The American Psychological Association’s headquarters in Washington, D.C., has a partial green roof that is open to the public, Monday through Friday, from 7 a.m. to 7 p.m. In addition to the planted area, visitors can walk through a labyrinth there. OK, this doesn’t sound too exciting, but the author of a column connects the water-retention ability of green roofs with public health. In areas with combined sewers (storm and sanitary), heavy rains can overload the system, backing raw sewage up into streets and homes. The more green roofs in such an area, the lower the burden on the combined sewer system during those rainy periods.

A few hours’ drive northeast brings one to Brooklyn, New York, and the Barclays Center, home to the NBA Brooklyn Nets and the NHL New York Islanders. Original plans for the center called for a green roof, but some combination of the 2008 recession and inadequate structural support meant that the green roof was not initially installed.

Additional steel work had to be built to support the sedum and growth medium covering that is currently being installed on the 135,000-square-foot (1.25-hectare) roof. Some environmentalists are bemoaning the carbon footprint of the extra steel but ignoring the long-term benefits of water retention and insulation.

I recently discovered that the green building concept is not limited to buildings. Did you know that 35 golf courses in the world have Audubon International Signature Sanctuary status (15 Silver and 20 Gold), which is the golf course equivalent to LEED certification? The recent U.S. Open Tournament was played, 15 years ahead of schedule, on the first Silver Signature course in the Pacific Northwest.

Reclaimed wastewater is used to water the course, biosolids (treated, of course) are used to fertilize it, and methane emissions are burned to provide energy to run the on-site sewage treatment plant serving 250,000 county residents. Habitat restoration on this former sand and gravel quarry (closed since 1994) has allowed eagles, ospreys, hawks, fox, beaver, deer and coyotes to colonize the area in only eight years. Removing docks has cleaned ocean water to the point that salmon are returning to Chambers Bay.

Critics of the selection of this course as the
treatment site have complained about the brown grass, apparently not understanding that the fescue selected is in keeping with the environment of the area. It would be interesting to compare the progress of restoration of this property to a former perlite property or another property using expanded perlite as part of the soil.

**BIOFUELS & OTHER SUSTAINABILITY ISSUES**

Lower petroleum prices are discouraging the use of ethanol as a blend in gasoline. As a result, mandated use of renewable fuels may not be achieved. So, various other, more comprehensive approaches to this issue are being investigated around the world.

In Abu Dhabi, a pilot plant is being constructed that will provide seafood (fish and shrimp) to local residents. Waste from the facility will fertilize edible plants that grow well in nitrogen-rich saltwater, and what’s left over from that will be pumped into mangrove swamps to improve that habitat’s ability to act as a nursery for aquatic life. If needed, a perlite filter could be installed to remove excess solids from the water.

Research at Oak Ridge National Laboratory has developed a high-performing strain of yeast that can convert 97 percent of biomass sugars in such products as corn stover and bagasse into alcohol, and hence fuel.

**OTHER REGULATORY ISSUES**

Not all regulation comes from government. The craft beer industry has a trade group called the Brewers Association. One recently stated goal of this organization is to have its members account for 20 percent of American beer sales by 2020, and they’re not too picky about how they are going to achieve that. In 2012, craft beer sales volume was about 6.5 percent of the market. Two years later, the market share was 11 percent. So, how did they achieve the almost doubling? By changing the definition of who is a craft brewer!

Some banned brewers that use corn, rice or other forbidden adjuncts are now defined as craft brewers. And, companies such as Boston Beer, which once exceeded production volumes allowed, can now be called craft brewers. What is no longer acceptable, though, is having more than a 25 percent ownership stake by a “big” brewer, such as Anheuser-Busch InBev.

Interestingly, 10 years ago, the United States had about 1,400 permitted breweries. Now, there are more than 3,400, with another 2,000 planned. With about 1,400 local brewpubs, that leaves a lot of small brewers out there for private equity firms and the big brewers to purchase.

In the late 1960s in the United States, a river in Ohio caught fire and spawned our environmental movement. Interestingly, Lake Bellandur in India, near Bangalore, just caught on fire due to overwhelming pollution. Much more is now known about the ability of perlite to trap pollutants before they reach bodies of water, and more has been done with perlite to actually accomplish this. I encourage members in areas such as this to advocate for a cleaner environment and to promote the use of perlite in cleaning up their local environments. The Brochures Task Force is working on a piece of literature that can be used. This concept is also explored in the third research paper reported on in my Perlite Papers column starting on page 14 in this newsletter.

Until next time, happy expanding! Contact me at k_wiener@hotmail.com if you have any questions.

### Have Your Company Featured in *Perlite Today*!

The Perlite Institute is seeking members to feature in its quarterly newsletter, *Perlite Today*. To have your company featured as a member profile, please take some time to tell us about how your company operates and what it’s like for you to be a member of the Perlite Institute. Click here to access the form with the questions for you to answer.

Please return the form to Amy at perliteeditor@hotmail.com. Thank you!
COMPETITION NEWS

Cenospheres, Fracking Filtration and Water Holding are Potential Markets

The word I'm hearing is that 3M has developed a glass bubble product with a specific gravity of about 0.8 that is almost competing financially with cenospheres, the ceramic bubbles that can be floated off the ash resulting from burning coal to generate electricity. Users of cenospheres, tired of years of increasing costs and decreasing quality, are jumping to that 3M product and even taking a first, second or third look at perlite. As a result, cenospheres’ prices are dropping and quality is improving, yet sales have not recovered.

Some fracking sand operations and farms are being targeted for allowing clay emissions from their properties. The clay results from washing the mined sand or disturbed soil, and when this fine-particle-size material is allowed to go off the mining site into streams, the result is poor quality water for aquatic life.

Putting process water through some kind of perlite-containing filter can alleviate the problem and recover resources, such as washing water.

Drought in the western United States is sparking more interest in water-holding mineral products for soil usage, according to an article in *Industrial Minerals Magazine*. A few expanders are well placed to derive some benefit from this. In fact, any success we can point to may have global implications. Below is a graphic from a NASA mission indicating the declining (red) or increasing (blue) status of large aquifers around the world. Superimpose, in your mind, the issues of population and world-trouble spots, and you will get an idea of the importance of perlite’s water-holding capacity.

– Kenneth Wiener  k_wiener@hotmail.com
The Perlite Papers

Innovative Uses of Perlite Explored

by Kenneth Wiener

Research Explores Various Uses for Grinding Perlite

There have some really interesting papers published recently involving perlite. My favorite is reference 1, which actually became available online last quarter. Various pumice producers grind their rock down to several microns in particle size and sell the fine material as a pozzolan. Perlite, with a very similar chemistry and perhaps even less total crystalline content, ought to be just as good a material for this application. Mines often find themselves out of balance with particular sizes of ore and could use an outlet for the unwanted grades.

Grinding for pozzolan

The researchers here took perlite, pumice and granite rock and milled the material for 15 minutes, 30 minutes and 45 minutes. They used the ground material as a pozzolan and reported the results. One interesting observation was that grinding for longer periods of time did not necessarily increase the surface area of the materials. They attribute some of that to agglomeration of the particles. In general, though, the higher the surface area, the better the early strength, until the amorphous nature of perlite and pumice kick in and contribute to strength toward the end of the nominal 28-day curing period.

Also, the effects of the milling process were even more pronounced at a 10 or 20 percent replacement level of Portland cement than at the 30 percent level. The researchers noted that ultrasonic treatment of mortars containing perlite improved early strength even more, regardless of milling time. They conclude that the agglomeration mentioned above can be broken up by the agitation.

One more thing about perlite: The particle size distribution reached a minimum after 30 minutes. The additional 15 minutes of grinding did not create finer material.

Carriers for n-octadecane

The researchers of this paper set out to compare perlite and vermiculite as carriers for n-octadecane, a C18 hydrocarbon with a melting point between 25 and 30 degrees C. And they did, with the caveat that they did not take as-received material. They ground each carrier up and screened out the 100-150 micron material. It was this fraction that got tested further.

Both perlite and vermiculite performed well, with a possible edge to vermiculite. Vermiculite was reported to hold 33 weight percent more n-octadecane than perlite without leaking out, but the authors did not report the volume percents.

There were a couple more odd things about the comparison between perlite and vermiculite. The surface area of the vermiculite was reported to be about four times greater than that of perlite, and the pore volume per gram of vermiculite was six times greater than that of perlite. Yet the overall porosity percents were pretty much equal. One thing in perlite’s favor, however, was the thermal conductivity. If the goal is to absorb heat during the day and release it at night, higher thermal conductivity is good. The perlite/n-octadecane composite had about a 40 percent higher thermal conductivity than the vermiculite/n-octadecane composite.

One more note about phase-change insulation before we move on: To be used successfully in construction, a better, faster and more direct impregnation technique needs to be developed.

Coating on perlite

It has been known for a while that ultrathin layers of material can be deposited on perlite. To date, the main product has been pigments with special color effects. Now, Chinese researchers have found that this kind of combination can be used to clean up polluted bodies of water such as lakes.

Continued on page 15
Titanium dioxide comes in two crystalline forms: rutile and anatase. The form commonly used in paints and plastics is rutile. It seems that anatase has its place as well, but in a different form of coating. Nano-size particles of anatase act as a photocatalyst, along with oxygen, to degrade organic molecules. Companies have added anatase to building coatings to degrade smog. There are a few producers of nano-sized anatase solid and at least one company capable of making dispersions of this chemical. Proper dispersion of the solid appears to be a bit beyond my garage lab ability.

In any case, another problem with anatase must be overcome: It is only activated by ultraviolet light (~5 percent of solar radiation, compared with 45 percent of visible light). Efforts have been made with metal ions and other co-dopants to widen the range of the solar spectrum that will catalyze the activity. Dependent on the component, leakage of the co-dopant could result in more toxins in the environment than they get rid of and further weaken the activity of the material. This group of researchers in Shanghai has created a floating photocatalyst consisting of perlite, anatase and a boron nitrogen compound. Starting perlite particle size is between 1 and 2 mm, but it does get crushed to a “powder” during the process. Exact directions are found in the paper, but in general, best results were obtained with 3 grams of perlite for a mix of chemicals with a combined volume of approximately 75 ml.

Polyurethane foam

A recent paper from Taiwan took a look at adding large and small particle size perlite or vermiculite to polyurethane foam. They found that sound and thermal properties were enhanced, with potential applications in the automotive and construction industries. I find it likely that perlite porosity is different than polyurethane porosity. The additional changes in surface types (glass vs. air to polymer) will give different characteristics.

Double porosity of perlite

In a 2012 book called Unsaturated Soils: Research and Applications, the chapter authors describe what they call the double porosity of perlite, in particular, and how, by studying perlite, they can more fully categorize and predict hydraulic and mechanical aspects of the behavior of more double porosity materials. I would go further and describe perlite as having three types of pores: namely, the volume between the particles, the open-celled pores near the surface and some amount of at least relatively closed pores.

It appears that the terminology has been around a while, but the double porosity concept in perlite has only been investigated for the last five years or so. Given perlite’s ability to hold water, and its light density, I wonder how well it would work as a growing medium in the zero gravity of space, so that space station astronauts could grow their own food and maybe help replenish their oxygen supply.

I continue to look forward to reading about and reporting on innovative thinking out there in both the literature and the real world. For copies of these papers, contact me at k_wiener@hotmail.com.

References:

### Perlite Patents

<table>
<thead>
<tr>
<th>Patent Number(s)</th>
<th>Topic</th>
<th>Topic Description</th>
<th>Role of Perlite</th>
<th>Old Technology</th>
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<tr>
<td>8,999,687</td>
<td>Panels</td>
<td>Insulation with closed cell perlite</td>
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**Perlite Patents Focus on Mushrooms, Antimicrobial Products, Cosmetics**

Well, it seems that the mushroom guys are back, growing parts with various specific fungal species. This time, they do not limit themselves to one grade of perlite. The '687 Bayer, et al. patent mentions that any grade from horticultural perlite to filter aid will work. Some examples of parts that can be grown with this technique are egg cartons, firewalls for automotive use and plant pots.

Elfersey's '363 patent will enable his company to exclusively use antimicrobial products made with perlite. SiShield (referencing Silicon antimicrobial Shields) concentrates on making and selling coatings and materials suitable for manufacturing antimicrobial textiles, polymers and other commercial items.

Two patents this quarter are assigned to L'Oreal. The '648 Barba, et al. patent is written in a manner where the reader can assume that perlite is a valuable and usual component of cosmetics. The '302 Gray, et al. patent also conveys intimate knowledge of perlite (i.e., a particular grade from a particular manufacturer is mentioned, rather than someone listing all of the industrial minerals out there). It is clear that L'Oreal, at least, in the cosmetics industry is aware of our industry and wants to
Q: We are working on a large project that will involve using perlite as insulation for piping systems in the oil and gas industry. We are looking at methods to move perlite from the ground into vertical pipes. Is this method for bulk handling expanded perlite feasible?

A: The approach presented would not work as the perlite will break down to very fine particles when transported in this fashion. It is recommended that perlite be conveyed in a semi-dense phase condition using low pressure (~5 psig) and in a 3- or 4-inch line. The driver should be a pressurized system, such as a pressure pot or a PD trailer.

Q: I am a maintenance engineer in a gas refinery and want to know the effect of butane when it comes in contact with perlite. Should any density change or color change occur in the perlite seeds after we make them dry?

A: Perlite is inert and should not have any reaction to butane. To the best of our knowledge, no one in our industry has experienced color change with perlite from butane. If a color change is occurring, there is a possibility the perlite was contaminated with water and rust that left a stain in the perlite when it was dried.

Q: We are cutting into an existing 12-inch concrete masonry unit (CMU) that has free-flowing white particles in the non-grouted cells. Is there a good method to stop the 20-foot-high column of perlite from flowing out on the ground? Can something be injected into the perlite to stop it from falling down?

A: Try putting a plate in to stop the perlite from flowing out. If the perlite is still dribbling by the plate, try using spray foam to seal it. In addition, it is recommended that you place some fiberglass mat insulation in the disturbed area to insulate it.

Want to see more? Have your own question for Chuck Vogelsang, the Perlite Institute’s technical spokesperson? Visit the Perlite Institute Facebook page or the LinkedIn Group or email techadvice@perlite.org.

Patents:
Two Thumbs Up for Perlite

Continued from page 16

It is clear that L’Oreal, at least, in the cosmetics industry is aware of our industry and wants to take advantage of the properties of our products.

The ’972 patent assigned to Dow Global compares the performance of precipitated silica to that of perlite to absorb material. Precipitated silica is built up, molecule by molecule, while perlite is ground down after expansion. The inventors found that precipitated silica grades with surface areas between 140 and 200 m²/g do a better job than a filter aid grade of perlite with an average particle size of about 30 microns. This observation reminds me of a circa 1959 lecture by Caltech’s Richard Feynman titled, “There’s Plenty of Room at the Bottom.” We cannot duplicate the formation of the precipitated silica, but are there any unique, profitable applications for perlite at the nano scale?

Even if none of the listed patents generate any sales for Perlite Institute members, they keep pushing the boundaries of perlite thinking, production and applications. Thanks for continuing this journey with me.
## Selected Upcoming Trade Shows and Meetings

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<tr>
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<td>and Trade Show</td>
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<td>10/18/2015</td>
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<td>The BIG Fresno Fairgrounds</td>
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<td>Navy Pier</td>
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