

MACHINATORES VITAE

Engineer and Architect Newsletter

From the Chief Engineer Officer



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Rear Admiral, US Public Health Service
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What is Our Impact?

The impact we make as engineers in the Public Health Service (PHS) is through our service, leadership, and the choices we make in our careers. Many years ago I made choices that led me down the path to where I am now, just as you have done and are doing. Those choices many times are compromises as the needs of our service are not driven by our individual desires. Certainly those choices are combined with the influences of assignments, colleagues, family, friends, and supervisors. Choosing to make an impact through your work and to be an exemplary employee benefits the people we serve and all of us who serve. Now is always a good time to make the choice of having a positive impact through our efforts. I sometimes feel that it is easier for each of us to only think about our individual needs instead of a bigger picture. Does the bigger picture think of us? Who is looking out for our interests? I can surely say that I will never individually accomplish what

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could be collectively accomplished by the Public Health Engineer Corps (PHEC). What you do every day, the excellence we strive for, and the integrity we bring to the challenge makes us our Best. If your assignment is not working for you, find another one; if you are not challenging yourself, find something that will; and if you are not inspiring someone else, then reach out to someone who needs to be inspired. Don't get me wrong, the PHEC needs your individualism, your accomplishments, your pride in your work, which are all ways we succeed. Fully applying ourselves and embracing teamwork while building relationships with others (engineers, PHS colleagues, supporters, etc.) is how we produce a network that is invincible.

If you are in uniform, don't forget that you represent our Nation and you are visible in her eyes. One of the biggest compliments I recently received was in a grocery store from a retired naval officer. I was in a hurry in my service dress blue and he approached me as I was looking for an item on a grocery shelf. He said that when he saw me walk into the store he had to say "thank you" for how good I looked in my service dress and how well I represented the Service. I have always had a lot of respect for the men and women who serve our country. I told him who I was and he did the same. I thanked him for his service and we parted ways. Again, it hit me that I was not only representing the PHEC but all of the uniformed services just as we do every day. It's not only in how we wear the uniform, but in the work we perform in our daily assignments that connect us. So, if we in the PHS come to work late, leave early, and do half our best, then we all (Navy, Air Force, Marines, etc) are impacted. We wear a similar uniform and at a glance, we are the same in the public eye.

Our civilian counterparts are also visible in the eyes of the public. Over the years we have all heard about federal employees and the sentiment of what the public pays for our services. How we think and portray ourselves has a real impact on how others see us. The accomplishments we have in the federal engineering community are remarkable. Our service is noteworthy and we are not likely to hear "job well done," but we can tell each other; "strive for excellence", and "build a better government response to the needs of the Nation." To our Civil Servants, "Thank you for your Service!"

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In closing, I want to take an additional moment to thank those engineer officers who serve the Commonwealth of the Northern Mariana Islands (CNMI) and the engineers and staff that support them. I also want to acknowledge the collective efforts of the HHS and EPA legal counsels, who have worked through the issues surrounding those detail assignments and come to a resolution that continues to support the Public Health missions of the CNMI. Job well done!

Very Respectfully,
RADM Randall J.F. Gardner

P.S. Hats off to CAPT Nelson Mix with EPA for his perseverance in getting the CNMI issue resolved!

If you have any questions or comments related to the Engineering Category or EPAC activities, feel free to contact any of the following EPAC members.

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Chair	CDR Nathan Epling	NPS	Nathan_Epling@nps.gov
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EPAC Website			http://www.usphsengineers.org/

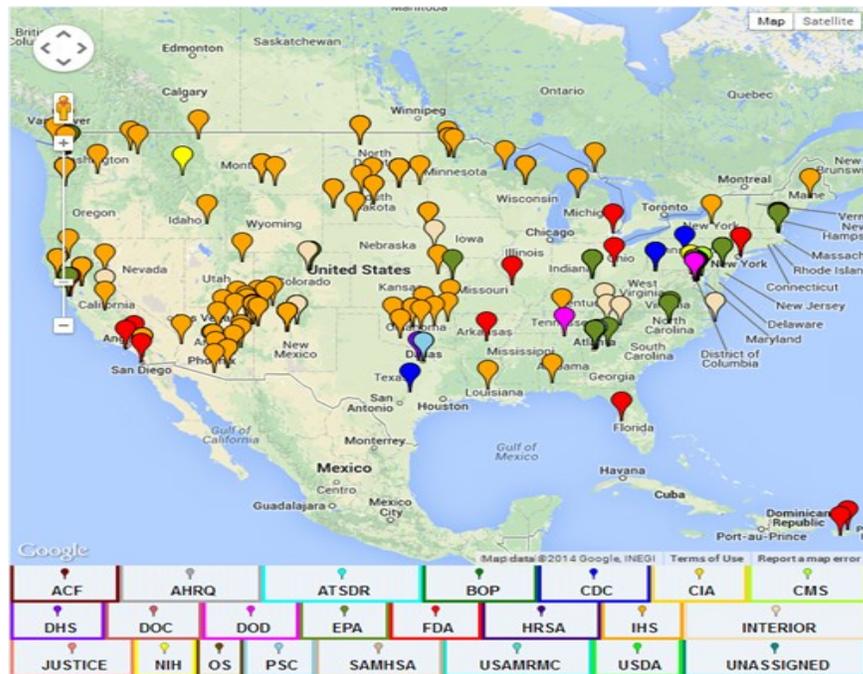


2014 EPAC Chair

CDR Nathan Epling, P.E.

A True Officer Corps

Like most Commissioned Officers of the USPHS, we are geographically and professionally varied throughout the Nation (and other nations), to best meet today's health challenges. How do we, as Engineer Officers, make sure we have a home—a common place to network with peers, express our concerns, improve our skills, or learn about the impacts of our work to raise health outcomes? While we don't have a common engineering academy, nor recurring training programs that might unite us as a category like some sister services, we can do what engineers are especially keen to do – look to technology for the solution.



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Recently, the EPAC has been testing new ways to reach out and connect officers to form a truer officer corps:

- Live webinars introduced by the Career Development Subcommittee last year, continue this year to help engineer officers better achieve their goals and develop leadership skills.
- The Information Subcommittee is updating the website with announcements, archiving presentations, events and photos. Social media, still just out of reach for broad use as a category, will certainly be a key tool in connecting us.
- The success of the Deployment Preparedness Subcommittee's online survey a few years ago demonstrated the need for more direct feedback from the category to learn what resources we have and where we can improve.
- The Mentoring Subcommittee has online resources to make this critical element of everyone's development more accessible and meaningful.
- Since attending annual engineering events is often challenging, the Events Subcommittee has incorporated video recording and presentation sharing to make some of the experience available to officers not attending.
- The Public Health Engineering Practice Subcommittee continues to connect us through professional involvement with technical issues, including recent opportunities with Engineers Without Borders.
- The Recruitment and Retention Subcommittee continues to provide feedback to DCCPR on new online recruitment procedures and assist applicants remotely in their progress toward a commission.
- And finally our Awards Subcommittee showcases their efforts to recognize the many excellent works of our officers using the EPAC website. This serves not only as a legacy of achievements by PHS engineers, but inspiration to us all to achieve more.

I appreciate everyone's patience and willingness to assist as we get these initiatives underway. Especially, I thank the dedication and time generously given by the members of EPAC and our EPAC Subcommittees.

As always, my virtual door (nepling@nps.gov) is open for any officer to receive your comments, suggestions and concerns.

Respectfully,
CDR Nathan Epling, P.E.
2014 EPAC Chair



Potable Water Challenges: Island Style

LTJG Kelly Hoeksema, EIT

Surrounded by the beautiful blues of the Caribbean Sea, the mountainous terrain of St. John, part of the U.S. Virgin Islands (USVI), is easily one of the most beautiful places in the world. But with the beauty comes the beast, in all manner of ways, hindering the production of potable water. This is witnessed through the obstacles associated with land mass, source water, and operation costs. St. John is first hindered by its limited land mass, tipping the scales at a mere 20 square miles, approximately 60% of which is owned by the Virgin Islands National Park. This leaves a meager 8 square miles for development. Much of this area is steep, rocky terrain, not well-suited for development.



View of Cruz Bay (the town) and Great Cruz Bay (the bay), on St. John, USVI

Stateside, potable water plants draw water from freshwater sources, like lakes and rivers. St. John has salt ponds and the salt water of the Caribbean Sea. Sea-water is the primary source for the public water system's desalination plant. The plant produces a mere 155,000 gallons per day and serves businesses and government buildings in the immediate Cruz Bay area. To put this in perspective, there are approximately 4,200 residents of St. John, and only 3% of those residents live in a household whose sole water source is the public water system. The water source for 81.1% of the island's households is from a cistern, tanks, or drums. The stated percentages are from the 2000 census of St. John.

With the limited reach and capability of the public water system, the majority of residents and many businesses must rely on other water production means. For instance, the Virgin Islands National Park uses ground water wells for their water

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sources at Trunk Bay and Cinnamon Bay. The well water is processed through reverse osmosis plants and used in the immediate area. Both plants produce about 10,000 gallons per day of potable water.

The majority of islanders collect rainwater to meet their potable water needs. Rainwater is stored in cisterns and treated using a series of filters and chlorination. Ideally, filters are arranged from largest to smallest, each removing contaminants of a different size. Unfortunately, there are no water filters available for purchase on St. John. Two of the EPA recommended filter sizes are available on St. Thomas, the next island over. But it is the absolute rated filters, those that filter out cysts (such as cryptosporidium and giardia), which are not commercially available in the USVI.

Filters, along with the majority of technical replacement parts, have to be ordered from the States, which presents a number of challenges. It is often difficult to find a company that will ship to the island, and the companies that do, tend to charge high shipping rates. It is also not uncommon for parts to take upwards of five weeks to be delivered, not counting fabrication time for the part.

After overcoming those obstacles, a potable water system is still not in the clear. Producing potable water, regardless of source, size, or location, comes at a cost. Time and money are lost while waiting for critical replacement parts to arrive. Then there is the direct cost from producing potable water: the electric bill. At 54¢/kWh, electricity costs over five times the national average (10¢/kWh, according to the US Energy Information Administration).

In summary, while the island is beautiful beyond compare, it faces some ugly challenges. There is little space, limited fresh water, insufficient parts, and high operating costs as the price of electricity continues to soar.



LTJG Kelly Hoeksema checks valve orientations on media filter tank at Trunk Bay's reverse osmosis plant, Virgin Islands National Park.



Engineer Category Day 2014

LT Diana Wong, PhD

The USPHS Scientific and Training Symposium Engineer Category Day, at Raleigh, NC on June 12, 2014, was a successful and educational event. Contributors to its fruitful experience included the over 35 engineers who attended (largely self-funded), the nine speakers with their presentations covering a breadth and depth of engineering challenges, and the special events subcommittee.



Engineers and four admirals: RADM Randall Gardner, Deputy Surgeon General RADM Scott Giberson, Surgeon General RADM Boris Lushniak, Chief of Staff CAPT Robert DeMartino, and RADM (Retired) Sven Rodenbeck



A number of officers were honored during Career Day for their great contributions towards engineering and/or EPAC. Those present included (from left to right): RADM Lushniak, LCDR Frank Chua, LT Praveen K.C. (Ian K. Burgess Outstanding Young Engineer), LCDR Kurt Kesteloot (Robert C. Williams Engineering Literary Award), CDR Ed Zechmann (PHS Engineer of the Year), CDR Ramsey Hawasly (John C. Villforth Leadership Award), and RADM Gardner.

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LCDR Kathol and LCDR Guess had the engineer crowd rolling in the aisles after lunch with USPHS Engineer Jeopardy trivia questions ranging from the obvious to the historically obscure. Who was the first Chief Professional Officer for

the Engineer Category and starting in what year? (Find the answer here: http://www.usphsengineers.org/index.php/history_of_phs_engineers)

LT K.C., RADM Gardner, and LCDR Guess set up the EPAC booth, complete with slide show and a mannequin donning a vintage PHS Engineer's uniform.



Engineers had a great participation rate (over 35%) at the 2014 Surgeon General 5K. Additionally, LCDR Frank Chua and LCDR Kurt Kesteloot captured first and second place, respectively. Go EPAC!

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For those that missed it, video presentations from Engineer Category Day can be found at the links below. Additional photographs and videos are available on the EPAC website:

<http://www.usphsengineers.org/index.php/photos-videos>

Presenter	Title	Hyperlink
CAPT Dan Beck Director of Readiness and Deployment Operations OS	Updates on Current Deploy- ments	https:// collaboration.fda.gov/ p6ib1xx8bt6/
CDR Eric Hanssen, P.E. Senior Engineering Project Manager ANTHC	Alternative Energy Technolo- gies and Web-Based Remote Monitoring	https:// collaboration.fda.gov/ p4uegewqhvg/
LCDR Sean Bush, P.E. District Engineer IHS	Engineers Without Borders International Projects	Same as above (starting at minute 30)
Claudia Gunsch, Ph.D. Associate Professor Dept. of Civil and Environmental Duke University	Emerging Contaminants, Emerging Solutions	https:// collaboration.fda.gov/ p8h78o9j715/
CDR Jonathan Rash, P.E. Chief, Project Engineering and Management Branch IHS	A New Model for Addressing Rural Water and Sanitation Needs	https:// collaboration.fda.gov/ p1k0axkoc90/
CDR John Nichols, P.E. Alaska Rural Utility Collabo- rative Manager ANTHC	Documented Energy Savings from ARUC Communities	https:// collaboration.fda.gov/ p2eui6igide/

***Next year's symposium will take place
May 18-21, 2015 in Atlanta, GA!***



Hazardous Noise Prevention

CDR Edward Zechmann, MS, PE, INCE Board Certified

Impulse noise can cause immediate damage to the inner ear; furthermore, tinnitus and hearing loss are the #1 and #2 disabilities for military veterans. Impulse noise is a serious problem for law enforcement, the military, construction, manufacturing, and other industries. Research has established that impulsive noise has a greater risk of causing hearing impairment than for continuous noise at the same sound level. In the same way a laser light can damage the retina of the eye before the pupil can naturally contract to protect it, impulsive noises “sneak up” on the ear and pass through to the inner part of the ear causing permanent damage before the middle ear bones stiffen up and provide natural protection. Unfortunately, existing sound level meters and noise dosimeters do not account for the increased damage of impulsive over continuous noise hazards. Actually, in the measurement and analysis of impulsive sound signals, only techniques for continuous noise currently exist. PHS engineers are working to solve this problem by developing and evaluating new measurement and data analysis techniques.



Figure 1: Assessment of impulsive noise from fire arms, jack hammers, and a framing nailer.

NIOSH Engineers are working with all of the branches of the Department of Defense as well as other federal and state agencies to develop measurement techniques for impulsive noise, to assess the hearing damage risk, and to identify effective acoustical treatments and noise controls. As shown in Figure 1, PHS engineers at NIOSH conduct field and laboratory studies on various impulsive noise emitting activities such as firing range events, jackhammering concrete, or operating a framing nailer. Some preliminary results suggest that reverberant impulse

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noise exposures in the firing range can be reduced by up to 6 dB by adding sound absorbing materials to the facility, and impulse noise levels can be reduced by 10 to 20 dB through the use of firearm suppressors. Jack hammers can be reduced by up to 10 dB by using a damped chisel and covering the body of the jack hammer with a sound absorbing noise barrier. Much of the noise from a framing nailer is structural noise that can be reduced using a sound absorbing noise barrier.

A broader effort to reduce noise emissions by PHS engineers seeks to motivate manufacturers of noisy equipment and machinery to invest in quiet technologies. As part of that effort NIOSH has recently launched its Buy Quiet initiatives website encouraging the purchase and use of quieter equipment (<http://www.cdc.gov/niosh/topics/buyquiet/default.html>). We encourage the reader to visit the website and, at a minimum, watch the 5 minute Buy Quiet video produced by NIOSH PHS engineers. Buy Quiet is part of the NIOSH effort in Prevention through Design. "Prevention through Design" encourages designing safety in our workplace processes and machinery during initial planning stages. Typically, Prevention through Design is a less expensive and more effective method of providing safer workplaces than are downstream retrofits and reactionary efforts made to mitigate an existing hazard.

An appropriate illustration of the motivation behind Prevention through Design and Buy Quiet efforts is shown in Figure 2. The hierarchy of controls rank orders the effectiveness of various methods used to prevent hazardous exposures or workplace injuries. As you move from the bottom of the hierarchy to the top, note that less action is required of the worker or end user to ensure the safety of the work environment. Additionally, the higher up the hierarchy of controls, the more effective and efficient the safety systems tends to be.

For noise, this equates to quieter processes, machines, tools, and equipment being used in the workplace. As the noise levels drop below 85 dBA the risk of hearing impairment becomes less than 10% and the workers are almost assured of maintaining a most important element of human communication – their hearing.



Figure 2: Hierarchy of controls from the NIOSH website <http://www.cdc.gov/niosh/docs/2013-136/>



Engineering Leadership: Considering an Interdisciplinary Approach

LCDR Matthew Palo

Hopefully by now we are all aware of RADM Gardner's goal to increase the number of engineers in leadership positions. What isn't always clear is the path to finding a leadership position. There are traditional career paths that evolve from first-line employee, to supervisor, and perhaps to director. However, there are many other opportunities outside this traditional path and we may not always realize the leadership potential in these positions.

I think of engineers as professional problem solvers. Our multidisciplinary training allows us not only to quickly adapt to emerging issues, but also to successfully coordinate with individuals of significantly different training, technical or otherwise. As engineers, we are trained to anticipate barriers and incorporate resolutions to those barriers in our planning and design. Our strength as a discipline and category is not limited to the development of full-fledged, working systems. We may also be called on to communicate the benefits and results of these systems to decision and policy makers.

The challenge is to find opportunities to apply these professional skills outside the traditional engineering settings. At FDA for example, a typical engineering challenge may be to develop a protocol to test a biomedical device. However, the same problem solving skills can be applied to assessing regulated industries after a natural disaster or developing a system to track employee performance and development. As engineers, we should take advantage of opportunities to solve problems, however conventional or unconventional they may be.

As officers, we should take advantage of leadership roles, which may not be limited to supervisory functions or even permanent positions. Temporary positions such as a Logistics Section Chief or Incident Commander are not only examples of leadership opportunities, but these types of positions would benefit greatly from the skills that engineers can bring to the table. The EPAC subcommittees and committees of professional organizations, such as SAME and APHA, are also excellent opportunities to showcase our professional skills. Potential leadership roles also exist within our Operating Divisions; such roles include leading a task force or chairing a workplace committee. As officers, we should also strive to

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identify and lead special projects that can benefit the agencies to which we are assigned.

Our Nation's public health system is among the most complex and challenging in the world, and it is ripe with opportunities for engineers to apply their problem solving skills. USPHS engineers are uniquely trained and have the experience to develop the systems we need – whether comprised of interworking parts or of interacting people – to protect, promote, and advance the health and safety of our Nation.

FDA's Social Media Program: A Conversation with Paul Bove



LCDR Stephen Fields, PhD

Mr. Paul Bove has been FDA's Social Media Lead since 2012. The intent of this article is to share FDA's success with social media and lessons learned to assist other HHS OPDIVs who want to develop a robust social media program. Provided below are responses from a recent interview. CAPT Jamie Natour contributed to the development of this article.

In your opinion, how has social media affected FDA's outreach to its stakeholders?

Overall, social media has boosted outreach not just for the FDA, but for government initiatives as a whole. We can easily find which sites various stakeholders participate on and tailor messaging for them. Plus there is a level of ease with posting messages to gain optimal reach and we are hoping to reach new stakeholders via our sites.

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How do you believe FDA's decision making has benefited with the use of social media?

The main advantage to decision making is that we can provide some simple metrics, like comments or discussions that are occurring, and prove the point that perhaps some kind of message should be put out about the topic. Social media gives us a real-time pulse on what's on the public's mind. And that can come from stakeholders, patients, medical professionals, and organizations. So ideally, it helps inform our decisions.

What lessons can other HHS agencies use to establish a robust social media system similar to FDA?

The biggest lesson is to gather as many resources as possible; not just content, but also people. There are so many colleagues who have great ideas on how to share and collaborate in the social realm. After you've worked in this realm of communications for a long time, it helps to get fresh, new perspectives from other people. Ask folks in your office if they have experience on a social site, or if they have ideas. Then use that to create a strategy. Also, be sure to establish a policy and strategy early on. Policy may not be the most fun thing to discuss, but it's necessary for building a sustainable program that will engage the stakeholders and give results.

What are some "hot" FDA issues/topics that received attention within your media outreach (e.g., opioids)?

There is a very fervent base of the citizenry that has a lot of opinions about the FDA. Many are not good opinions, but over time we've seen some people being swayed by educating them about what FDA does. Opioids are certainly a hot topic. The Real Cost tobacco campaign was a big topic in February. For as much good as the program should do, there was still a subset of folks saying they have every right to smoke and we should mind our business. We hear that refrain from the electronic cigarettes community as well. They think FDA has no right to regulate e-cigs, or other tobacco products as was discussed in the recent deeming rollout. The hottest topic overall is definitely GMOs. We can post a message that says, "The sun is shining. Have a great day." And people will say that we need to label GMOs.

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What has been the reaction from media outlets (e.g., newspapers, trade journals) to FDA's social media program?

Based on the feedback we've received from the Office of Media Affairs, the reaction is positive. The media is using social media to contact our press officers (and we're working with the Media Affairs folks to create a social media strategy). Additionally, some health-related journals have inquired about our program to learn more about how we're using social media to inform health. So, it's been pretty positive all in all.

Was there specific funding used to establish FDA's social media program? If not, would funding expedite this program for other HHS agencies?

Not to my knowledge. The first iteration of the program came before I started in the role of Social Media Lead in 2012. Overall, the primary expense is salary of employees to run a program, unless you're going to assign social media to a pre-existing employee. Money can be spent on everything from research to graphics to metrics, but overall, you can create a program using free resources. Again, you need to have people who can run the program.

What obstacles did you face when trying to establish a social media program? If so, how did you address these obstacles?

Again, the basics of FDA's sites were established when I arrived, but there were some issues that needed to be cleaned up (like strategy and policy). Leadership was pretty well on board with the idea of the program. The best way to address the obstacles is through research. Show the proof and point to your leadership via research and best practices. Cite examples of government agencies or organizations or companies who are increasing their outreach through social media and explain how it can benefit your organization.

What is typically the process of approval you go through in order to get social media campaigns publicized?

That depends on where the material is coming from. If the campaign is coming from OC (Office of the Commissioner), we're there from the start to help strategize with the subject matter experts or office that is creating the material. They handle clearing the actual material and then we distribute it.

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If a campaign is coming from another office, it's already gone through a clearance process from their communications team, so they simply need to send it to us for posting on the social sites. We have a loose editorial calendar that we use so that we have topics every day, but that shifts often because you never know how something might get held up in review.

Dear Readers,

The *Machinatores Vitae* newsletter is a publication of the EPAC, but we need help in bringing you the information and stories that you want to read. Please consider submitting an article for an upcoming issue or let us know when you or a colleague have reached a milestone, been recognized for an accomplishment, or have an experience to share. If you are an accomplished writer, send something along that is already polished. If you don't feel like a Hemingway or Dickinson, just send enough detail so the writing team can take hold of it and build the story for you.

The writing staff can only see a bit of the big world that is public health engineering. There are numerous accomplishments even within our readership that remain unknown except in the relatively small circles around you. If you have not presented at a national meeting, the likelihood is that no one outside of your agency, or possibly even Office, ever heard about your pet project that you nearly exhausted yourself completing. Here is your chance to shine!

All ideas are welcomed. Remember that we do not have to solely focus on work going on within the PHS. Let us know if you hear of new technologies or applications, or just find an interesting story from the outside world. The rule of thumb is that if you as an engineer are interested in it, then others will be too!

Send your thoughts, suggestions, or a brief synopsis of a proposed article to the EPAC Information Subcommittee at postings@usphsengineers.org.

Thank you,

EPAC Newsletter Team

The *Machinatores Vitae* is published twice annually and posted on the USPHS Engineer Professional Advisory Committee website. The deadline for submitting articles for the Spring edition is **February 28, 2015**.