Sustainable Remediation Forum

Newsletter
Winter 2019

Volume 10, No. 1

The SURF Report

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2018: The Year In Review

Happy New Year!

SURF accomplished many great things in 2018 — from pushing the boundaries of sustainable remediation by advancing ongoing initiatives to starting new working groups and once again hosting two successful meetings on opposite sides of the country. As anyone who has participated in a non-profit organization knows, these accomplishments are only possible because of the efforts of our dedicated members. I want to personally thank each and every SURF member for their continued support to our organization year after year.

The Climate Change and Resiliency Technical Initiative is one of SURFs most active working groups and one of their efforts in 2018 culminated in the recently published article "Resilient Remediation – Addressing Extreme Weather and Climate Change, Creating Community Value" in the Winter 2018 edition of *Remediation*. (Download a copy from the SURF Library here.)

Given the increased frequency and severity of storms in the past few years, the information and recommendations in this article are important considerations now more than ever.

At the end of 2017, SURF members discussed starting a working group to publish a 10-year anniversary edition of SURF's Sustainable Remediation White Paper—more formally known as "Integrating Sustainable Principles, Practices, and Metrics into Remediation Projects." In 2018, interested members formed a team and ideas were put to paper. Writing and editing is in full swing, and the team plans to submit the paper for publication in mid-2019 (see page 3 if you want to help). Keep an eye out for what is sure to be an informative and engaging publication.

2018 also brought some changes to SURF's membership management platform. The automated system will be useful during membership renewal time (i.e., automated emails!) and will help our newly revitalized Membership Committee track efforts to expand membership.

By the end of 2018, SURF had partnered with the Association of Environmental Health Sciences (AEHS) for three meetings. Each meeting has featured SURF technical sessions and a membership meeting. Meeting planning efforts have been cut in half, allowing SURF's volunteer army to focus more on the technical content of the meetings and use saved time to participate in technical initiatives.

Finally, as my term as President nears its end, I am encouraged by the resurgence of energy and commitment to SURF and our mission. This new year begins, as always, with the election of new Board members, which means new ideas, possible new directions, and new initiatives for our members.

Let's get after it!

Contributed by Gerlinde Wolf, SURF President, AECOM

SURF
SUSTAINABLE REMEDIATION FORUM

About SURF

The Sustainable Remediation Forum (SURF) promotes site assessment and remediation that protects human health and the environment while maximizing environmental, social, and economic benefits throughout the project life cycle by:

- Advancing the science and application of sustainable remediation
- Developing best practices
- Exchanging professional knowledge
- Providing education and outreach

About The SURF Report

This newsletter is published quarterly by the SURF Communications Committee to provide you with highlights of SURF's activities and opportunities and developments in the field of sustainable remediation.

Deadline for newsletter submissions is the 15th of March, June, September, and December for the following quarterly issue.

Contact the Newsletter Editor by email for submittal: Mike Smilley, newsletter@sustainableremediation.org

Submissions are subject to editing for space considerations.

Circulation: The newsletter is circulated to about 1,000 individuals directly and is posted online at www.sustainableremediation.org.

Address Changes: Please submit to the SURF Secretary at secretary@sustainableremediation.org.

The SURF website, www.sustainableremediation.org, is our primary resource for sharing the latest and greatest news about SURF and sustainable remediation. Our Online Resources page provides a one-stop shop for resources, tools, information, and documents. The Calendar shows remediation, sustainability, and related conferences, as well as deadlines for submitting abstracts. Suggestions for additions and improvements are welcome by using the Contact SURF form on the website or by emailing administrator@sustainableremediation.org.

Making a Difference through Technical Initiatives

At SURF's Spring 2018 Membership Meeting, SURFers were adamant in their belief that our organization needs to focus on efforts that increase our relevancy. What better way than through a technical initiative (TI)? The knowledge gained and communicated through TIs has proven to be integral in SURF's efforts to advance the practice of sustainable remediation. Past and current TI team members have enjoyed the opportunities that active participation on a TI provides—discussing innovative ideas about sustainable remediation topics, representing SURF through outreach activities (see page 9), and publishing papers, to name a few.

See our TI Roundup below for a current listing of active SURF TIs (completed TIs are listed on page 14). Additional ways to contribute your talents to SURF are also listed below. Contact the leaders if you want to learn more or want to become a team member.

As a member, your contributions are vital to the continued success of these initiatives. Please help us change the way we view and practice sustainable remediation by participating in or leading TIs in 2019.

Contributed by Mike Smilley,
SURF At-Large Board Member,
Georgia Environmental Protection Division

TI Roundup! Join or Create a TI Today

Name	Brief Description	Help Needed	Leader
Case Study Initiative	Collect case studies in which sustainable principles are applied.	Download the Case Study Template (click here), complete, and submit to Leader.	Amanda McNally
Climate Change and Resiliency	Support ongoing research into Climate Change and Resilience (see highlight on page 5).	Help us partner with private and public sectors to support pilot studies and build capacity.	Barbara Maco
10-Year White Paper	Revisit topics in initial 2009 White Paper, write update, and publish.	Provide peer review in late February.	Paul Favara

Other Ways to Become Involved and Help…

Name	Brief Description	Help Needed	Leader (click to contact)
Meetings and Programs	Plan Spring and Fall Membership Meetings and organize SURF group dinner.	Brainstorm ideas with team to establish meeting purpose and intended outcomes.	Matt Ambrusch
Membership	Retain established SURF members and recruit new members in key areas (e.g., academia).	Join our committee, get your colleagues to join SURF, and send Leader an email explaining the benefits you derive from membership.	Cathy Rockwell
Partnership with AEHS	Plan SURF Technical Sessions at Spring and Fall Conferences.	Chair a session, brainstorm ideas with team for session topics, and recruit speakers.	Maile Smith
Government Outreach	Enhance awareness of SURF, sustainable remediation, and related issues among government employees and representatives (see article on page 9).	Reach out to government personnel and work with team to present a sustainable remediation topic that interests them.	Paul Hadley

Sustainable Remediation — The Bigger Picture

Three presentations were featured during one of SURF's technical sessions "Sustainable Remediation — The Bigger Picture," at the Fall 2018 Association for Environmental Health and Sciences Foundation (AEHS) East Coast Conference on October 15-18, 2018. Gerlinde Wolf (SURF President, AECOM) and Matt Ambrusch (SURF Vice President, Langan Engineering & Environmental Services) chaired the session.

The Business Value Case for Sustainable Remediation

Betsy Collins (SURF Member, Jacobs) provided an overview of sustainable remediation—its current state, the business value it provides today, and where the practice may go in the future. Throughout her presentation, Betsy emphasized that sustainable remediation is a way of thinking and, in terms of application, it is a lens to figure out how to enhance what we're doing.

The current state of sustainable remediation? Guidelines, guidelines, guidelines (vs. regulation) and three commonly used tools: best management practices (BMPs), footprinting analyses, and life-cycle analyses (LCAs). Betsy described the challenge of knowing which tool to use and when to use it and presented a decision tree to help practitioners determine how to use the right tool for a particular project.

Real and perceived barriers exist when demonstrating the business case for sustainable remediation. Topping the list of barriers is the myth that sustainable remediation is too expensive and too slow when meeting cleanup objectives. To combat this perception, Betsy presented two case studies that showed the benefits of a "bottom-up" approach of systems thinking where sustainability underpins the entire process.

In the future, Betsy believes outreach and community involvement will appear more frequently in guidance and standards (e.g., ASTM E2348-06) and sustainable remediation assessment tools will continue to be streamlined.

Superfund, Sustainability, and Trump: Progress or the Emperor's New Clothes?

Norman Dupont (Ring Bender) and Howard Cumberland (Geosyntec Consultants) provided a tag-team presentation focused on the impacts of some of the Trump Administration's official announcements about Superfund reforms. The main messages?

- Proposed rules and reforms will take years to be determined
- Do not assume that regulatory changes apply everywhere across the country with equal force. Geographic location is important in determining how Superfund reforms and sustainability rules are actually applied.

Norm gave an energetic presentation that can be summed best by stating, "...it ain't necessarily so." He referenced two of Trump's Executive appointments (Alex Dunn and Peter Wright) as evidence against the party line that Trump is appointing anti-environmentalists. He wondered aloud if the EPA's proposed rule, "Strengthening Transparency in Regulatory Science," announced in April 2018 is actually a disguise to "retrench transparency in science." The Natural Resources Defense Council (NRDC) opposes the plan and told the EPA to "drop this unfounded and illegal idea." Norm encouraged participants to track this rulemaking

Big Picture, cont'd on p. 5

Presenters (L to R) Betsy Collins, Sabine Apitz, Howard Cumberland, and Norman Dupont gather for a group photo.

Big Picture, cont'd from p. 4

and recognize its significance to potentially affect the data on which we rely and base decisions.

Howard's presentation focused on how remediation is being expedited as a result of the "Superfund Task Force Recommendations" that were developed in response to Former Administrator Scott Pruitt's prioritization of the Superfund program. He has observed EPA Headquarters interacting and collaborating more with regions to achieve progress, citing the Portland Harbor Superfund site in Region 10 as an example. Howard encouraged participants to check out the following sediment projects as additional examples: San Jacinto Waste Pits (TX), Gowanus Canal (NY), Lower Passaic River (NJ), Berry's Creek (NJ).

Sustainable Remediation: Whose Values Are We Sustaining?

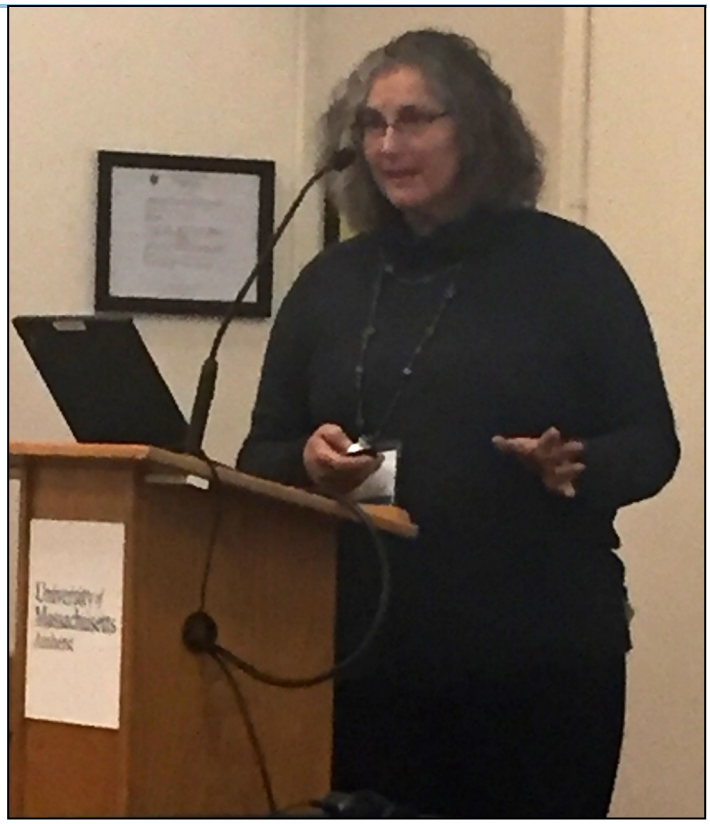
Sabine Apitz (SURF Member, SEA Environmental Decisions) described the need to use a values-based sustainability assessment for remedial and disposal decision making. Practitioners should engage a broad group of stakeholders and communicate impacts and trade-offs in terms of the values they wish to sustain. Approaches for determining stakeholder priorities were discussed, including the Standard Guide for Framework for a Consensus-Based Environmental Decision-Making Process (ASTM E2348-06). The document outlines a stakeholder-focused process to prioritize and select actions, optimizing environmental decisions that may affect communities.

How we decide what is sustainable depends on the questions we ask and the measures and scales we apply. Sabine presented four questions rooted in societal values that must be answered when promoting sustainability in decision making :

1. What attribute or condition does the decision aim to sustain?
2. Who benefits from such actions?
3. For what period will such actions convey benefits?
4. At what cost?

Then, she asked an important fifth question: Who provides the answers to the first four questions?

With this in mind, Sabine promoted a tiered framework that is continually adapted and modified based on stakeholder input. Simple sustainability concepts should be integrated early in the project to save time and money, and practitioner metrics should be translated into terms that stakeholders care about. She noted that this approach defies the "decide, announce, defend" approach that exists for remediation projects today.



Sabine Apitz reminded participants that "stakeholders must decide on the values they wish to sustain...one man's redevelopment is another man's gentrification."

TI Team Publishes Paper

SURF's Climate Change and Resiliency Technical Initiative (TI) Team recently published "Resilient Remediation: Addressing Extreme Weather and Climate Change, Creating Community Value" in *Remediation*. The paper outlines general principles, state-of-the-art assessment tools, and site-specific protocols and provides global examples of mitigation and adaptation strategies. SURF's recommendations in the document can guide owners and project managers in developing a site resiliency strategy.

For more information or to join the team, contact Barbara Maco.

OH! The Places You'll Go...When Volunteering

In 2018, I was fortunate to take part in two delegations as a volunteer for the TechWomen program, travelling to Nigeria and Malaysia to engage and encourage women to consider a career path in science, technology, engineering, and mathematics (STEM).

While women are gaining numbers in traditionally male-dominated fields, they remain significantly outnumbered in STEM. Among girls, interest in STEM begins to wane in early adolescence. If we hope to solve the world's most pressing challenges, it's critically important to cultivate their interest, provide them with positive role models, and show them that women can have fulfilling and interesting careers in these fields. These delegation exchanges have lasting impact on the girls and young women that we meet, demonstrate real-world pathways between education and career, and provide inspiration to use STEM skills to directly benefit their communities.

In Nigeria, we provided mentoring sessions in Lagos and Abuja for young women at the start of their STEM careers, led workshops on topics such as design thinking and basic web development at a number of schools and universities, and facilitated networking events for women in STEM teaching and learning at several tech incubators and innovation hubs.

In Malaysia, we held roundtable discussions with the semi-finalists of the National Science Challenge and shared our personal journeys to a career in STEM, mentored youth entrepreneurs at a co-working space sponsored by the Young Southeast Asia Leadership Initiative program, and participated in a networking event at the Petrosains Discovery Center. At the event, we gave feedback on business pitches from women entrepreneurs and held a panel discussion on how adversity and challenges can help build leadership skills.

Both delegations were organized by the U.S. Department of State to develop cultural understanding between U.S. citizens and citizens of other countries. TechWomen is a professional mentorship and exchange program sponsored by the U.S. Department of State's Bureau of Educational and Cultural Affairs that brings 100 women from the Middle East, Africa, and Central and South Asia to the San Francisco Bay Area each year for five weeks. Women and men volunteer to host and mentor the TechWomen "emerging leaders" during their time in the US and, hopefully, after the emerging leaders return to implement action plans in their home countries as fellows of the program.

Students at the STEM Workshop held at Bandar Uda Utama High School in Johor Baru, Malaysia

Volunteering, cont'd on p. 7

If you'd like to be a SURF sponsor, contact Jason McNew, SURF Treasurer

Thank You to SURF's Sponsors

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Volunteering, cont'd from p.6

Although volunteering can be difficult to fit into our busy work and home lives, the benefits of volunteer work reach far and wide with a ripple effect that begins with the individual, reaching the larger community and beyond, benefiting everyone in its wake. The rewards of service are far deeper than a paycheck. In addition to personal satisfaction and deeper understanding of your industry and community, volunteering allows you to:

⇒ Build upon your experience and skills while sharing them with people and organizations;

⇒ Meet new people and expand your networks;

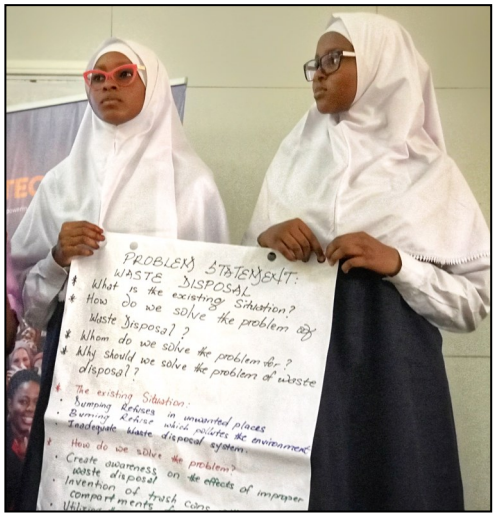
⇒ Explore different occupations and industry sectors; and

⇒ Make your resumé or application stand out.

As you're setting your new year's resolutions, consider volunteering and sharing your skills and expertise with your broader community. Volunteers are a tremendous resource for non-profits such as SURF, without whom SURF would not be able to conduct technical initiatives, raise funds, or organize technical exchanges and conference sessions.

Start 2019 right: join your colleagues on the SURF Board of Trustees, chair a committee, or lead or contribute to a technical initiative! If you know me, you know that I've been involved as a participant and volunteer with SURF since its very early days (2007 to be exact). I promise you that the return on investment is well worth your time.

Contributed by <u>Maile Smith</u>, Past SURF President, Northgate Environmental Management



(1) Students participate in a Design Thinking Workshop at Baze University in Abuja, Nigeria; (2) A 13-year old inventor shows her project, which is a result of incorporating plastic waste into a structural brick (Bandar Uda Utama High School in Johor Baru, Malaysia); (3) Maile Smith joins other volunteers and students at the Penang Science Cluster (Penang, Malaysia).

Organizational Drivers for Sustainable Remediation

A panel discussion was featured during one of SURF's technical sessions at the Fall 2018 Association for Environmental Health and Sciences Foundation (AEHS) East Coast Conference on October 15-18, 2018. The session, "Organizational Drivers for Sustainable Remediation," included the following panelists:

- Nick Garson (Boeing)
- James Henderson (DuPont)
- Scott Pittenger (Norfolk Southern)
- Tom Potter [Massachusetts Department of Environmental Protection (MassDEP)]

Paul Hadley (SURF At-Large Board Member, Retired - California Department of Toxic Substances Control) and Jake Torrens (SURF Member, Haley & Aldrich) chaired the session.

Panelists discussed the opportunities, challenges, and drivers that they have found to be successful in developing and implementing sustainable remediation programs within their organizations.

Five Takeaways

1. Know what is material to your sustainable remediation program and use it to make the business case.
2. Align your sustainable remediation program with your company vision.
3. Develop your supply chain.
4. Measure and share your progress.
5. Lead by example.

Sustainable Remediation Programs and Perspectives

Organization	Program Description	Drivers for Success
Boeing	Company guidelines developed in 2010. Key program tenets: compliance, footprint reduction, lifecycle integration, partnering, public awareness, safety, risk management, and return on investment.	• "Keep it sold" - Share successes through various communication channels (e.g., fact sheets, webinars). • "Replicate to win" - Apply successful approaches and concepts throughout portfolio.
DuPont	In Latin America, sustainable remediation implemented on a project-by-project basis, emphasizing brainstorming with key stakeholders about all possibilities followed by a technical "reality check."	• Have aspirational (i.e., no limits) conversations with stakeholders to brainstorm site strategy. • Think of environmental liability as an investment (e.g., donate technology or clean land instead of demolishing remediation systems).
Norfolk Southern	Sustainable remediation implemented on a project-by-project basis using guidance document and off-the-shelf tools. Currently evaluating lessons learned and looking to implement more programmatically.	Be a thought leader and push conversation about sustainable remediation and resilience and sustainability.
MassDEP	Sustainable remediation program grew out of 2008 Green Communities Act and Global Warming Act aimed to build out clean energy economy. In 2014, regulatory amendments made to include greener cleanups as part of cleanup standards.	Think differently about how we do things.

SURFers Present at State Agency

In June 2018, Paul Hadley (SURF At-Large Board Member) and Jason McNew (SURF Treasurer) traveled down to sunny Montgomery, Alabama and provided a lunch-time presentation to about 10 representatives from the Alabama Department of Environmental Management (ADEM).

The gathering started with a brief discussion of sustainability in general, and then participants shared ADEM's perspective on the topic. Participants said that sustainable and green environmental practices are encouraged and noted that the "integration of green and sustainable remediation (GSR) practices" is identified in their remediation guidance.

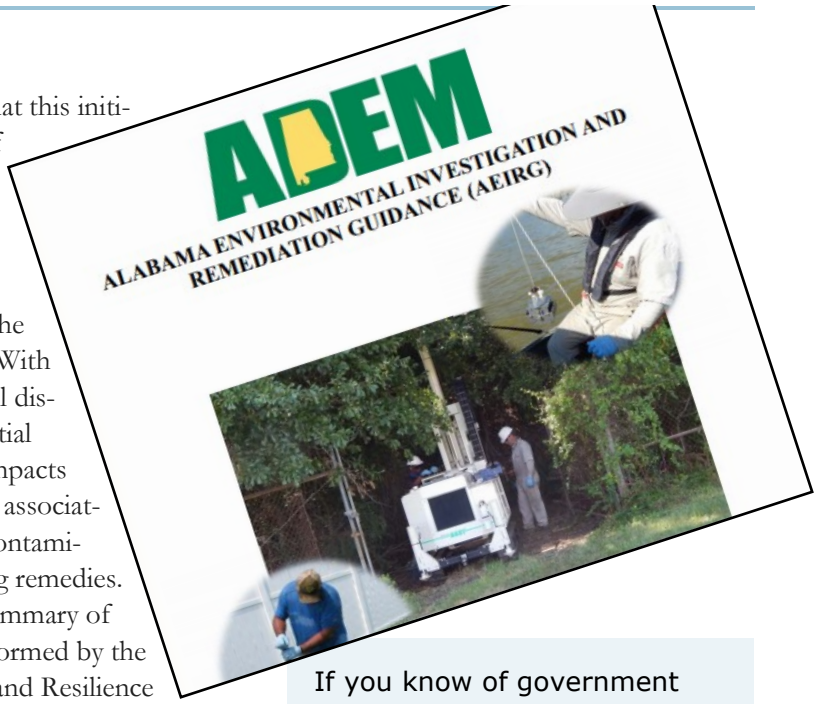
Jason presented an overview of SURF and several examples of how GSR was integrated into projects. He mentioned SURF's on-going partnership with AEHS and opportunities for collaborating with the ADEM. He and Paul were both sure to mention that membership fees for regulators were waived in 2018.

Paul's presentation focused on extreme weather and resiliency planning, a current SURF technical initiative (TI).

SURF believes that this initiative would be of interest to Alabama regulators given the state's extreme weather and location on the Gulf of Mexico. With that in mind, Paul discussed key potential climate change impacts (including social) associated with on-site contaminants and existing remedies. He provided a summary of the research performed by the Climate Change and Resilience TI team and discussed how participants could contribute to the TI and SURF in general.

The presentations were well received and Jason and Paul were happy to meet some new folks and spread the word about SURF.

Contributed by Jason McNew, SURF Treasurer, EA Engineering



If you know of government personnel who are interested in a similar lunch-time presentation, contact Paul Hadley, Leader of the Government Outreach Initiative.

Or, better yet, join our team (!) and help us provide more of these presentations to regulatory and government agencies.

Get Social with SURF!

Do you have sustainable remediation news to share? We have several ways to get your words out!

In addition to SURF's website, you can find us on Twitter and LinkedIn.

The SURF Communications Committee also manages a LinkedIn group, which can be used to spread the word about case studies and project successes, ask questions, solicit feedback, and connect with fellow SURF members.

To join SURF's group on LinkedIn, search for "Sustainable Remediation Forum" and look for the SURF logo.

To make a news post on SURF's website, contact Jake Torrens.

Sustainable Remediation: The Proof Is In The Practice

Success stories of integrating sustainable remediation during all phases of the project life cycle were presented during one of SURF's technical sessions at the Fall 2018 Association for Environmental Health and Sciences Foundation (AEHS) East Coast Conference on October 15-18, 2018. The session, "Sustainable Remediation: The Proof Is In The Practice," was chaired by Gerlinde Wolf (SURF President, AECOM) and Matt Ambrusch (SURF Vice President, Langan Engineering & Environmental Services).

Phytoremediation — A Green and Sustainable Approach to Groundwater Restoration

Erik Pearson (Ramboll) presented a case study of a site where phytoremediation is remediating volatile organic compounds (VOCs), primarily trichloroethene (TCE) in groundwater, at concentrations up to 20,000 micrograms per liter. The site is a former industrial facility in Southern California, and Erik described the challenges associated with achieving successful phytoremediation in a location with less than desirable site conditions (i.e., arid environment, rocky soil with very low mass flux, pests, and shallow water areas with saline). However, he also emphasized that the technology was the best option to achieve remedial action objectives and align with potential future site use.

A pilot study was conducted to determine the proper amendments for soil types, the poplar cultivar that grows best, and the feasibility of endophyte inoculation to improve survival and enhance TCE uptake.

The full-scale system includes over 300 trees planted 4 to 8 feet deep and inoculated with a PDN3 endophyte, soil amended with peat moss, diverted water from the pump-and-treat system, and a gravity-flow system with a solar light timer for irrigation. The deep-rooting approach has shown success in the third year of growth, TCE uptake is occurring, and the endophyte inoculation appears to facilitate better tree health in a difficult environment.

Proof in the Practice, cont'd on p. 11

These photos show successful tree growth despite the arid environment and site conditions at this former industrial facility in Southern California

Proof in the Practice, cont'd from p. 10

Sustainability Advantages of Using Institutional Controls to Achieve Site Closure

Jeff Hullinger (SME) discussed the importance of institutional controls and the need to ensure that risk assessment (including worker safety) is a central basis for remedial action decisions. He reviewed the four-step risk assessment process and cited EPA's definition of institutional controls as "...non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy." Jeff believes institutional controls need to embody technically sound use limitations and carefully consider property use needs (including property owner input), and other sustainability parameters. He noted that institutional controls are largely unmentioned in green and sustainable remediation documents and initiatives and emphasized the need to include worker safety as part of the human health risk assessment at remediation sites. (Veteran SURFers may remember hours of debate regarding this topic in the early days of our organization.)

At the end of his presentation, Jeff recommended that participants recognize explicitly that institutional controls, frequently accompanied by one or more engineering control(s), can serve as the focal point of sustainable site remediation while providing protection with minimal expenditure and resources. One participant commented on the importance of aligning institutional and engineering controls with future use and stakeholder needs and values, which are important aspects of the social and economic factors that are the foundation of sustainable remediation.

SURFers catch up at the SURF Group Dinner.

L to R: Scott Stromberg, Jeff Hullinger, and Erik Pearson gave "proof" of the benefits of sustainable remediation.

Incorporating Sustainability into Remedial Decision Making Led to Closure at a Petroleum Site

Scott Stromberg (Orion Environmental) described how prioritizing sustainability in a site management approach resulted in a revised timeline for site closure four years earlier than the original estimate. With the exception of air emissions, the revised timeline will result in environmental impact reductions of about 60% to 70% and societal benefits such as less noise and fewer trucks on-site.

The former retail gas station site is located near a residential neighborhood and contains a chlorinated plume; a drinking water supply well is located 1,200 feet downgradient of the site. In 2016, a path to closure was agreed upon that involved continued oxygen injection with intermittent soil-vapor extraction for about three years followed by two years of monitoring. A sustainability assessment indicated that mechanical remediation systems accounted for large environmental impacts at the site.

The team worked closely with the regulatory agency, communicating the idea of a possible new approach and transitioning to a data gap investigation and risk assessment. The risk assessment showed that the downgradient drinking well was not a viable risk. A consultant trusted by the regulator evaluated 20 years of data and the new findings and agreed that the new approach resulted in environmental, economic, and social benefits while meeting regulatory goals.

Tools to Support Your Sustainable Remediation Strategy

Three presentations were featured during one of SURF's technical sessions "Tools to Support Your Sustainable Remediation Strategy," at the Fall 2018 Association for Environmental Health and Sciences Foundation (AEHS) East Coast Conference on October 15-18, 2018. Maile Smith (Past SURF President, Northgate Environmental Management) chaired the session.

Kristin Brickman, Jason McNew, and Ian Hers described sustainable remediation tools.

New Toolkit of Remediation Technologies and Sustainability for Management of Petroleum Hydrocarbon Sites

Ian Hers (Golder Associates) described two new toolkits (Remediation Technology and Sustainability) that build on two previously developed toolkits and a dashboard for impact assessments.

The Remediation Technology Toolkit uses a step-by-step screening approach to provide a short list of applicable technologies based on site-specific considerations. This short list is integrated into the Sustainability Toolkit, which can address all three elements of the triple-bottom line. Ian described how these toolkits provide a structured framework for evaluating technologies based on a site-specific concern (e.g., vapor concentration) and then provides goals, objectives, and metrics that incorporate sustainability and appropriate endpoints for closure.

Ian described a new dashboard for impact assessments that combines footprint and multi-criteria analyses (MCA) tools. The result is a more holistic approach that considers all elements of the triple-bottom line and has the flexibility to include site-specific considerations (e.g., regulatory defaults). He acknowledged that combining quantitative and qualitative factors can be challenging, but said that the simple spreadsheet-based tool lets users input site-specific data and weight critical parameters to support holistic decision making.

A Survey of Decision Support Tools for Comparing Clean-up Options and Increasing Decision-Making Confidence

Kristin Brickman (SURF Member, Jacobs) discussed the uncertainty involved in remediation projects, provided an overview of available decision-making tools and project examples, and recommended specific tools depending on the uncertainty of a project's attributes and objectives. Kristin encouraged participants to consider the current uncertainty associated with a particular remediation project and make decisions with this knowledge. The table below outlines her "pros" list for select decision-making tools.

Tools for Addressing Uncertainty

Tool	Good for understanding…
Multi-Objective Decision Analysis (MODA)	…stakeholder uncertainty
Excel-Based "What If?" Analyses	…uncertainty in design parameters
Excel Solver	…different remedial options
Decision Tree Management Software	…uncertain remediation complete timeframe or different remedial options
Monte Carlo Analysis	…uncertain design parameters

Development and Evaluation of GSR Metrics for a Shooting Range Remediation

Jason McNew (SURF Treasurer, EA Engineering) jumped into action to fill an unexpected gap in the session and described a retrospective green and sustainable remediation (GSR) evaluation using SiteWise.

Tools, cont'd on p. 13

Tools, cont'd from p.12

The remediation was performed at former trap and skeet ranges at an active Air Force Base under the Munitions Military Remediation Program and involved the excavation, stabilization, and off-site disposal of soil. In addition, 24 tons of lead shot were separated and recycled. During the review of the Post-Removal Action Report, the Environmental Protection Agency (EPA) requested a GSR evaluation.

The evaluation focused on the decision making involved in selecting the remedial alternative. Other remedial alternatives were identified, and quantitative and qualitative metrics were selected. Common components of the alternatives were compared, and input parameters were put into SiteWise. The evaluation results indicated a reduction of about 460 metric tons of greenhouse gas emissions and 6,200 MMBtu of energy used, as well as habitat restoration and lead shot recycling.

After the Fall 2018 Membership Meeting, SURFers gathered at the SURF Group Dinner. A fun time was had by all!

SURF Represents!
The 1st Tsinghua Forum on Environmental Remediation

John Simon, Past SURF President, represented SURF at The 1st Tsinghua Forum on Environmental Remediation sponsored by Tsinghua University and the Chinese Society for Environmental Scientists held in Beijing, China on August 13-14, 2018. John was invited to provide an international perspective on remediation and, specifically, sustainable remediation. His presentation, titled *Sustainable Remediation and Other Developments in the U.S. Remediation Field*, focused on sustainable remediation, SURF activities, and remediation technology developments in the U.S. Presentations were made by sustainable remediation practitioners from Italy, New Zealand, Canada, and Australia.

John appended his trip with a visit to the Great Wall, about a dozen temples, and a trip to Shanghai.

The conference focused on various aspects of remediation developments in China, including *The Action Plan for Prevention and Control of Soil Pollution*, which has spurred remediation studies and projects throughout the country. Although the remediation industry in China is not as developed as it is in many other parts of the world, the government, academicians, and practitioners are focusing on green and sustainable remediation concepts and have shown a strong inclination to integrate these concepts into remediation programs as the programs are developed.

An interesting topic that surfaced frequently in various presentations was the concept of using biochar for soil and groundwater remediation. Although this technology is available in the U.S. and Europe, it has been applied on a limited basis. Biochar, which can be produced from waste wood products, has similar adsorptive properties as activated carbon and is being studied and, to date, employed on a limited basis in Asia and Australia for both soil and groundwater remediation. Given the focus on biochar as a remediation technology, it appears that China, as well as Australia and New Zealand, are likely to promote its use on a far greater scale than in the U.S. and Europe.

Contributed by John Simon,
Past SURF President,
Nathan Associates

FYI: Completed TIs

As a follow-up to a request at our Fall 2018 Membership Meeting, we're presenting the status of SURF's technical initiatives (TIs). Completed TIs are below; active TIs are listed on page 3. Contact the Leaders for more information.

Name	Brief Description	Leader (click to contact)
Communicate the Value of Sustainable Remediation	SURF surveyed active members regarding the value of green and sustainable remediation. Survey results were presented at the AEHS East Coast Conference.	Gerlinde Wolf
Green and Sustainable Remediation Products Database	SURF created a database of green and sustainable products. The new 2019 Board of Trustees will determine the next steps for sharing the information.	John Simon
Groundwater Conservation and Reuse	SURF published a paper and performed outreach to communicate the benefits of groundwater conservation and reuse.	Paul Hadley

Join us at the Sustainable Remediation Forum

Join SURF or Renew your Membership TODAY!

SURF provides great value to our members, the public, and the practice of remediation. We do this by supporting:

- Alignment with organizational sustainability goals
- Environmental footprint reduction
- Social responsibility and public outreach
- Reduced remediation costs and long-term liabilities
- Innovative thinking, research, and real world application
- Peer benchmarking (domestic and international)
- Access to leading-edge case studies
- Opportunities to collaborate on publications
- Networking and access to subject matter experts
- Academic outreach and mentoring

By joining SURF, you establish partnerships and build relationships with a wide variety of remediation stakeholders: industry and agency peers, customers, clients, academia, technology vendors, and the public. Our website, meetings, and communications provide a clearinghouse and source for the latest information about policy, case studies, best practices, and educational opportunities.

As a member, you have the opportunity to participate in SURF's Technical Initiatives. SURF has published several groundbreaking guidance documents, and recent or current initiatives include examining more sustainable practices for water use and reuse, compiling sustainable remediation case studies, assessing the social aspects of sustainable remediation, and exploring the viability of a sustainable remediation site rating and professional certification system.

SURF has several membership levels based on an individual's qualifications: Regular Member (dues are $150 annually for new members and $140 for renewing members), Government Member (Free!!), Student Member (dues are $25 annually), Retiree Member ($60 annually), and Academia Member ($50 annually). The term for all classes of Members is February 1 through January 31 of the following year.

Learn more and apply for membership at www.sustainableremediation.org/membership/.

Sponsorship

Sponsorship is a great way to demonstrate to your communities, clients, employees, or shareholders that you are committed to advancing the science and application of sustainable remediation.

As an appreciation for sponsorship, your company or organization will receive the following benefits:

- Complimentary SURF memberships and meeting registrations
- Use of the SURF Sponsor logo
- Name displayed on the SURF website and hyperlinked to your webpage
- Name displayed in the SURF newsletter
- Name announced during SURF events

If you'd like to be a SURF sponsor, contact Jason McNew, SURF Treasurer