TerraTherm Successfully Completes First Two Tier-One Projects

In 2015, we introduced our optimized, efficient and cost-effective Tier-One solution for smaller qualifying thermal sites. Our objective was to develop a cost competitive solution through pre-engineered solutions, plug and play equipment components, sustainability analysis and energy optimization, a large fleet of equipment and improved accuracy of subsurface models and data management. By using our Tier-One solution you will get the TerraTherm quality and results at a reduced price.

We are now happy to announce that we have completed our first two Tier-One projects:

**Northern NJ:** The first Tier-One project completion was in northern NJ. Approximately 7,000 cubic yards were treated. Pre-treatment concentrations were as high as 1700 mg/kg for PCE and 14,000 mg/kg for naphthalene. Post remediation concentrations were < .03 mg/kg for PCE and < 16 mg/kg for naphthalene.

**Norco, CA:** The second Tier-One project completion was in Norco, CA. Approximately 18,000 cubic yards were treated. TCE was remediated to a depth of 100 ft in a fractured bedrock site in Riverside County, California. 40 SVE screens co-located with heaters were used to extract steam and TCE vapors to maintain pneumatic control. The project finished within schedule and budget, with DTSC approval of cessation of heat prior to demobilization. Currently the site is in post-remedial performance monitoring.
Please contact us at info@terratherm.com or 978-730-1200 if you are interested to hear more about our Tier-One offerings.

**Outstanding Safety Program**

A little over a year ago, TerraTherm became a part of Cascade Environmental LLC. One of the many benefits that TerraTherm has received as a result of this acquisition has been access to a wide range of Environmental Health and Safety (EHS) resources including additional EHS personnel, technical resources, enhanced programs, etc.

While TerraTherm has always maintained a strong commitment to employee safety and the safety performance of our projects, the adoption of the CORE™ safety program has taken that performance and commitment to the next level.

**What is CORE™?**

Cascade CORE™ is our safety management system that, when implemented properly, is proven to reduce risk, reduce cost, control hazards and minimize injuries, illnesses and incidents. There are 7 elements to Cascade’s CORE™ program:

- **Element 1.0** Training
- **Element 2.0** Compliance & Risk
- **Element 3.0** Inspection & Audits
- **Element 4.0** Communication
- **Element 5.0** Recognition & Accountability
- **Element 6.0** Management Involvement
- **Element 7.0** Incident Investigation

Implementing this program has resulted in another terrific year from a safety performance standpoint, and we are always striving for continuous improvement!

**Safety Performance**

One current example of strong safety performance is our ongoing In Pile Thermal Desorption® (IPTD®) remediation project in Danang, Vietnam, where a team consisting of three contractors including TerraTherm and local Vietnamese subcontractors have completed three years and over 800,000 work hours without an incident requiring treatment beyond first aid!

This is a remarkable achievement when considering the emphasis typically placed on safety in Vietnam and other developing countries. The entire Danang team has spent the necessary time and resources to ensure that the project is executed safely. They perform extensive safety and health training for all employees on the site and provide the necessary personal protective equipment where necessary.
Click here for more information and an article written by the United States Agency for International Development (USAID) about the safety performance of the Danang remediation.

Heater Certification
In addition to implementing safety programs for strong employee safety performance, TerraTherm is the only thermal remediation company in the industry to obtain certification of our heaters.

Through Intertek, an OSHA-approved Nationally Recognized Testing Laboratory, TerraTherm's electric heating system has obtained the ETL Mark, a symbol that verifies product compliance to North American Safety Standards. This certification demonstrates compliance with UL499 and UL1030 exhibiting the highest standard of care for electrical safety within our industry. It enables us to deliver an efficient and safe project and streamlines the permitting process since an increasing number of local inspectors are requiring such a certification.

Upcoming Conferences

Ninth International Conference on Remediation and Management of Contaminated Sediments

January 9-12, 2017
New Orleans, Louisiana

Come meet us at booth 417 and learn more about our Heated-Box (HB)1100 technology

You can find more information about the conference here

March 7-9, 2017
Denver, Colorado

Come meet us at booth 417!
Cascade, TerraTherm's parent company, is pleased to announce the acquisition of the Environmental Drilling Division of National Exploration, Wells & Pumps (National EWP). With this acquisition, Cascade welcomes a distinguished team of licensed drillers and highly experienced field crews as it expands its fleet of drilling rigs and specialty equipment throughout the Western region.

National EWP provides a full range of environmental and geotechnical drilling services throughout the Western US including environmental sampling, well installation, development, rehabilitation, and abandonment. "National has earned the trust of their clients through hard work and dedication," said Tim Smith, CEO of Cascade. "Our shared commitment to safety and reliable service will not change. With this acquisition, clients have greater access to local experience across all of the drilling technologies and service lines. Our deep bench of expertise is readily accessible to bring solutions to challenging sites," said Smith.

The acquisition includes National EWP's offices in Montclair, CA; Woodland, CA; Richmond, CA; Peralta, NM; and Las Vegas, NV as well as environmental fleet assets and personnel from the Gilbert, AZ location. The group will operate under Cascade Drilling, L.P. National EWP will retain its mining, water, and energy operations under its own brand identity.

We are also thrilled to announce the launch of a brand new website - cascade-env.com. With a diverse portfolio of drilling, environmental, investigation, remediation services, and a continuously growing roster of subsidiaries, we recognized the need for a website capable of moving at the speed of our business. On cascade-env.com, projects, services, contaminants, case studies, and subsidiaries are all interrelated, allowing users to quickly and easily find the exact service and technology for their particular project. Check it out today!

News from our European Partner, Krüger A/S

It is all about being transparent and sharing knowledge!

At Krüger, we believe that being a serious Thermal Soil Remediation provider implies sharing of knowledge, data, case studies and experience. It is important to us that our clients understand what kind of company we are, and our overall approach to solve their challenges. By presenting our projects, explaining design considerations and presenting transparent and actual data, we strive to let the market understand why we have a perfect track record on all of our projects. This is the basis of our business.

During 2016, we have been presenting and sharing project experiences with many professionals/specialists in the market. In the beginning of 2016, we presented and exhibited at the national conferences "Renare Mark" in Sweden and "Vintermedlet" in Denmark. During the spring, we presented at the European Remediation Workshops in Madrid, Milan and Frankfurt as well as at the 2016 Battelle Chlorinated Conference in Palm Springs. In the fall, we presented and exhibited at the Nordic common conference "Nordrocks" in Finland as well as at the "London EXPO". We wrapped up the year by presenting at the European Remediation Workshop in Birmingham, UK and in Stockholm, Sweden.
We are grateful to all of the participants for attention and positive feedback - it motivates and proves that we are on the right track. We hope to meet many of you at conferences and workshops in 2017; the schedule is coming soon to our website Krüger Veolia Thermal Soil Remediation. If you have any suggestions for the topics of the coming events, please do not hesitate to contact our Product Manager, Niels Ploug, at nip@kruger.dk.

To follow our thermal projects and results, we are proud to invite you to follow us on our LinkedIn profile "Krüger Soil Remediation" where we post updates on our projects, events and latest information on ongoing developments within Thermal Soil Remediation.

TerraTherm Project Updates

**Anderson, IN**
Drilling activities have commenced at an Electrical Resistance Heating (ERH) project site in Anderson, IN. TerraTherm is working under subcontract for St. John- Mittelhauser & Associates. The site, formerly known as the Delco Remy plant, was constructed in 1940 and manufactured horns, turn signals, starter motors etc. Construction activities will continue through the winter and operations are scheduled to begin in the spring.

**Confidential Asia**
The design phase of our first full-scale ISTD project in Japan is nearing completion. We have initiated procurement of long lead equipment and are busy preparing for the implementation phase of this important project. Site work is slated to begin by June 2017. Operations will be conducted at 2 separate site areas in 2 separate operational phases.

**Confidential International**
Construction is complete for the second phase of an IPTD project at a confidential international site. IPTD operations are currently underway and system operations are expected to be complete in Spring 2017.

**Confidential Midwest**
ISTR system construction is complete at an active manufacturing facility in the Midwest. ISTR system shakedown is underway with system operation beginning in early December 2016. The ISTR system will operate until spring 2016.
**Confidential Northeast**
ERH treatment continues at a Confidential Northeast site with subsurface temperatures ranging from 70 to over 105°C. The mass recovery of VOC has exceeded the expectations by 3 times. Inlet concentrations have started to decline.

**Confidential Southeast**
TerraTherm has completed a four week Steam Enhanced Extraction (SEE) pilot test at a confidential Southeast site. Pilot test system demobilization is currently underway. The four week pilot test operations period provided data that will be used to enhance the design of the full scale SEE remediation being considered for the site.

**Elkton, MD**
ISTR system operations were complete in early November 2016. Demobilization is underway and expected to be finished by the end of December 2016.

**Monmouth, NJ**
Design work is underway for a Tier-One, Thermal Conductive Heating (TCH) project site in Monmouth Junction, NJ. Drilling activities are scheduled to begin in March of 2017. This project will treat approximately 10,000 cubic yards of PCE impacted soil.

**Poughkeepsie, NY**
ERH project continues at a confidential NY site with 101 electrodes. Subsurface temperatures in the 38,000 ft² TTZ range from 50 to over 125°C. The operations are expected to continue to March 2017.

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**Get To Know Us - David Brogan**

Mr. Brogan joined the TerraTherm team in 2002 as a Project Engineer and has over thirty years of design and application experience in remediation and industrial systems. As a Senior Project Engineer, he has been involved with multiple remediation projects from design, implementation, support for construction / start-up, operation and data analysis.

Recent completion of the Elkton, MD Superfund Project required working with the client and EPA to develop a phased shutdown approach which cost effectively reduced the power requirement to sequentially achieve complete treatment in identified focus areas.

As Mechanical Design Discipline Lead, Mr. Brogan is involved with nearly every TerraTherm project design, as well as R&D efforts such as the Heated-Box Pilot testing completed this past year and scale up to commercial model.

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**In Case You Missed It...**

**ThinkThermal: The Blog - Liquid Granular Activated Carbon System Design Considerations**
When developing a liquid treatment system design at TerraTherm, we keep in mind that the system will be temporary and...

**Cascade Completes Acquisition of Alliance Maintenance & Services - Grows Remediation Capabilities in Gulf Region**
Cascade Environmental Holdings, LLC (Cascade), the leading provider of environmental drilling, high resolution site characterization, and in situ remediation applications is pleased to announce the acquisition of Houston-based Alliance Maintenance & Services (Alliance)...

**Cascade Announces Sponsorship of Sustainable Remediation Forum**
Cascade, the leading provider of environmental drilling, in situ remediation applications, and high resolution site characterization, is pleased to announce its commitment to the Sustainable Remediation Forum (SURF).