



TERRATHERM

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GORM HERON, Ph.D.

Chief Technology Officer, Senior Vice President

PROFESSIONAL HISTORY

TerraTherm, Inc.	(April 2004 – present)
SteamTech Environmental Services, CA	(1999 – 2004)
University of California Berkeley, CA	(1998 – 1999)
Rice University, Houston TX	(1997 – 1998)
EPA National Research Lab, Ada OK	(1995 – 1997)
Technical University of Denmark	(1990 – 1995)

EDUCATION

Ph.D. (Environmental Science and Engineering) Technical University of Denmark, 1994
M.S. (Civil Engineering) Technical University of Denmark, 1990

TECHNICAL SPECIALTIES

Dr. Heron has 21 years of experience, with the following special areas of expertise:

- Contaminant plume geochemistry and characterization.
- NAPL migration, fate and transport (LNAPL and DNAPL).
- Design and implementation of in-situ thermal treatment systems for contaminated soil and groundwater.
- Bench-scale thermal treatability study design, implementation, and evaluation.
- Field-scale thermal treatability/pilot study design, implementation, and evaluation.
- Engineering design analysis of remedial alternatives.
- In-situ monitoring techniques for tracking progress during thermal remediation.

He is directing TerraTherm's international license holders and overseeing projects from a technical standpoint.

SUMMARY OF EXPERIENCE: PROJECT DIRECTION AND TECHNICAL OVERSIGHT

Dr. Heron was instrumental in designing, construction, operating, and documenting several field scale thermal cleanups:

- Terminal One Site, Richmond, CA. Dr. Heron assisted with the direction of this major ISTD project (reference Alan Wolken, Richmond Redevelopment Agency; 510-307-8140).
- NASA Marshall Space Flight Test Center, Site 13 ISTD Demonstration, Huntsville, AL. Dr. Heron designed, directed and oversaw this ISTD implementation (reference Jason Cole, CH2M HILL, 865-483-9005).
- Confidential Brownfields Site, Syracuse, NY. Dr. Heron designed and directed this major ISTD redevelopment project where more than 300 ISTD wells were used to treat three PCE source zones, paving the way for rapid site development (reference Thomas Barba, C&S Engineers, Syracuse, 315-455-2000).
- Beale Air Force Base, Beale, CA (reference Dr. Arun Gavaskar, Battelle, Columbus, OH. 614-424-6424).
- Edwards Air Force Base, Edwards, CA (reference Scott Palmer, Earth Tech, San Jose CA, 408-232-2826).
- Loring Air Force Base, Limestone, ME (reference Naji Akladiss, Maine Department of Environmental Protection, 207-287-7709).
- Area A at Young-Rainey STAR Center, Largo, FL (reference Randall Juhlin, Stoller, 970-248-6502).
- Alameda Point, Oakland, CA (reference Prof. Kent Udell, UC Berkeley, 510-642-2928). Portsmouth, Ohio (reference Dr. Roger Aines, LLNL, 925-423-7184).
- Northrop-Grumman site, Danville, PA. Dr. Heron directed this major thermal project, where a volume of 68,000 cubic yards of CVOC-contaminated soil was treated using a steam enhanced extraction (reference Kevin Dyson, Panther Technologies, 609-714-2420).
- Dunn Field, Memphis Depot, Memphis, TN. Dr. Heron designed and directed the ISTD remediation of eight separate CVOC source areas with a treatment volume of 48,000 cubic yards (reference Tom Holmes, e²M, 404-237-3982).
- Santa Fe Springs, CA. Design and technical direction of large-scale thermal project for DNAPL removal, using TCH and steam injection (reference: Lisa van Tassell, Geosyntec, 510-836-3034).
- Groveland Superfund Site, MA. Design and oversight of ET-DSP remediation of a source area partly below a building (reference Eva Davis, US EPA, 580-436-8548).
- Arnold AFB Site SWMU-10, Tullahoma, TN. Design and technical direction of large-scale thermal project for DNAPL removal, using TCH and steam injection (reference Jason Cole, CH2MHill, 865-483-9005).
- Hedehusene, Copenhagen, Denmark. Dr. Heron reviewed the design and assisted in developing the operational strategy.
- Oesterbro, Aalborg, Denmark. Dr. Heron assisted in review of the design, and consulted during operation to optimize the performance. This project was completed in 2001, with a ground-breaking result. The source was removed from the site, thereby this site was the first ever to have had complete removal of separate phase solvents located below the water table (reference Tom Heron, NIRAS, Aarhus, Denmark, Phone 00-45-87323232).
- Harwell Site, England: Six years of full-scale ISTD treatment of disposal pits at the former UKAEA site (work on-going via Provectus, UK).
- Knullen, Odense, Denmark. Full-scale ISTD and SEE combination treatment under an active dry-cleaner.
- Skuldelev, Denmark. Full-scale ISTD treatment of a PCE DNAPL site.

- Reerslev, Copenhagen, Denmark. Full-scale ISTD treatment of a PCE DNAPL site.
- Vadsbyvej, Denmark. Full-scale ISTD remediation.
- MOE demonstration, Japan. Pilot-scale demonstration of thermal treatment of dioxin-contaminated soils.
- Sao Paulo, Brazil. Pilot-scale thermal treatment of a liquid waste landfill.

SELECTED PUBLICATIONS (THERMAL REMEDIATION RELATED ONLY)

- Heron, G., K. Parker, J. Galligan and T.C. Holmes. 2009. "Thermal Treatment of 8 CVOC Source Areas to Near Nondetect Concentrations." *Ground Water Monitoring and Remediation*. 29 No. 3 / Summer 2009, pp. 56-65.
- Heron, G., R.S. Baker, J.M. Bierschenk and J. LaChance. 2008. Use of Thermal Conduction Heating for the Remediation of DNAPL in Fractured Bedrock. Paper P-003, in: Bruce M. Sass (Conference Chair), *Remediation of Chlorinated and Recalcitrant Compounds—2008*. Proceedings of the Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds (Monterey, CA; May 2008). Battelle Press, Columbus, OH.
- Nielsen, S.G., H.E. Steffensen, T. Heron, G. Heron, M. Kuhlman, H. Skou, N. Just and L. Dissing. 2008. First Thermal Remediation Using a Combination of Steam and ISTD. Paper P-015, in: Bruce M. Sass (Conference Chair), *Remediation of Chlorinated and Recalcitrant Compounds—2008*. Proceedings of the Sixth International Conference on Remediation of Chlorinated and Recalcitrant Compounds (Monterey, CA; May 2008). Battelle Press, Columbus, OH.
- Heron, G., R.S. Baker, J.M. Bierschenk and J.C. LaChance. 2006. "Heat it All the Way - Mechanisms and Results Achieved using In-Situ Thermal Remediation." *Remediation of Chlorinated and Recalcitrant Compounds: Proceedings of the Fifth International Conference* (May 22-25, 2006). Battelle, Columbus, OH.
- LaChance, J., G. Heron and R. Baker. 2006. "Verification of an Improved Approach for Implementing In-Situ Thermal Desorption for the Remediation of Chlorinated Solvents." *Remediation of Chlorinated and Recalcitrant Compounds: Proceedings of the Fifth International Conference* (May 22-25, 2006). Battelle, Columbus, OH.
- Heron, G., S. Carroll and S. G. D. Nielsen. 2005. Full-Scale Removal of DNAPL Constituents using Steam Enhanced Extraction and Electrical Resistance Heating. *Ground Water Monitoring and Remediation* 25 (4), Fall, 92-107.
- Heron, G., R. Baker, J. LaChance and A. Kirketerp Friis. 2005. "Using Heat to Accelerate Remediation". Paper D-23, in: B.C. Alleman and M.E. Kelley (Conference Chairs), *In Situ and On-Site Bioremediation—2005. Proceedings of the Eighth International In Situ and On-Site Bioremediation Symposium* (Baltimore, Maryland; June 6–9, 2005). ISBN 1-57477-152-3, published by Battelle Press, Columbus, OH.
- SteamTech Environmental Services. 2003. *In-situ remediation to remove non-aqueous phase liquids located in the subsurface at the North-East site Area A, Young-Rainey STAR Center, Largo, Florida*. Final Report, August.
- Earth Tech and SteamTech. 2003. *Site 61 Treatability Study Report, Steam Injection. Northwest Main Base, Operable Unit 8*. Final report submitted to US Air Force Flight Test Center, Environmental Restoration Division, Edwards AFB, California.
- Heron, G., D. LaBrecque and H. Sowers. 2000. Steam Stripping/Hydrous Pyrolysis Oxidation for in-situ remediation of a TCE DNAPL Spill. In *Proceedings of the 2000 Battelle Conference on Chlorinated and Recalcitrant Compounds*, Monterey, CA, Volume C2-5 pp. 149-156. Battelle Press, Columbus, OH.

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- Udell, K., G. Heron, M. McDonald and W. Mabey. 2000. *Steam Enhanced Extraction Demonstration at Site 5, Alameda Point*. Field Feasibility Demonstration for the US Navy, DO-9. Berkeley Environmental Restoration Center, University of California at Berkeley. Berkeley, CA. Final report.
- Heron, G., T.H. Christensen and C.G. Enfield. 1998. Henry's Law Constant for Trichloroethylene between 10 and 95 C. *Environmental Science and Technology*, 32 (10), 1433-1437.
- Heron, G., T.H. Christensen, T. Heron, and T.H. Larsen. 1998. Thermally enhanced remediation at DNAPL sites: The competition between downward mobilization and upward volatilization. In *Proceedings of The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds*, May 18-21, Monterey, CA, Battelle Press 1(2): 193-198.
- Heron, G., T.H. Larsen, T. Heron and T.H. Christensen. 1998. *Potential for using soil heating for removal of organic contaminants from soil and groundwater*. Technology review report prepared for the Danish EPA, (100 pages, In Danish).
- Heron, G., M. Van Zutphen, T.H. Christensen and C.G. Enfield. 1998. Soil heating for enhanced remediation of chlorinated solvents: A laboratory study on resistive heating and vapor extraction in a silty, low-permeable soil contaminated with trichloroethylene. *Environmental Science and Technology*, 32 (10), 1474-1481.