MAXWELL WILMARTH
Senior Consulting Geologist
Geologica Geothermal Group, Inc

Maxwell Wilmarth has 12 years of experience in the Geothermal and Environmental Consulting Industries. Mr. Wilmarth has provided technical geological, environmental and geochemical office and field support for resource analysis, reservoir modeling, resource exploration, development and operation for geothermal projects as well as geological and hydrogeological, tasks on environmental, redevelopment, and water resources projects. He has field experience at a large number of sites in California, Oregon, Nevada, Chile, and New Zealand.

Education

- B.A. Geology, University of California, Berkeley
- M.A. Geology, University of California, Berkeley

Languages

- English
- Spanish

Select Geothermal and Environmental Experience Highlights

- Completed and presented Annual Reports for two operating geothermal fields (Ngatamariki and Kawerau) to regulatory agencies at the Waikato Regional Council and Bay of Plenty Regional Council In New Zealand. Reports included assessments of impact from geothermal energy developments to surface thermal features, vegetation, shallow groundwater aquifers, agriculture, human health, and communities from production, injection, surface river discharges, H2S emissions, and noise.
- Completed and submitted to Waikato Regional Council the Ngatamariki System Management Plan (SMP), including strategy to mitigate impacts to neighbouring geothermal field with high cultural and touristic value.
- Competed and presented to local community the Kawerau Liaison Group Monitoring Report, a community-focused progress report on environmental issues related to a 153 MW geothermal development including H2S monitoring and micro-seismicity.
- Designed, procured, installed, telemetered, and monitored meteorological stations at geothermal exploration sites in northern and southern Chile exposed in extreme environments. One site (Puchuldiza) was a t 4500 m elevation and the other (Tolhuaca) experienced >10 m of snowfall with blizzard conditions.
- Contributed to Environmental Impact Assessments (EIAs) approved by the Chilean Ministry of Energy for hydrological and geothermal well drilling at Tolhuaca.
- Permitted water supply, temperature gradient, and geothermal exploration wells with Bureau of Land Management and Nevada Bureau of Mines and Geology at three sites in Nevada including evaluation of environmental impacts of drilling.

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- Conducted and reported on numerous environmental investigations of shallow groundwater aquifers in Northern California, including remediation plans, and reported to local and state regulatory agencies.
- Reviewed all available well data in northeast sector of The Geysers for hydrological study evaluating availability of shallow groundwater aquifers for supplementary injection.
- With Bill Cumming, designed, contracted, filed-supported, processed, and interpreted MT and TDEM surveys at four geothermal exploration prospects in Chile (Tolhuaca, Alitar, Puchuldiza, and Mariposa).
- Performed geochemical sampling of hot springs and fumaroles at seven geothermal exploration projects in Chile and five in the western US.
- Contracted and participated in shallow temperature (2 m) probe survey at geothermal exploration prospect in Nevada with the Desert Research Institute. The study successfully mapped elevated shallow temperatures consistent with a geothermal outflow from the range-front fault.
- Contracted for construction and helped design an improved shallow temperature (2 m) probe drilling rig mounted on a 4WD UTV for exploration in northern Chile. Shipped rig from northern California to Chile. Planned, organized, managed and executed two shallow temperature surveys at Puchuldiza with team of five people. Surveys identified prospective extensions of thermal anomalies from known thermal areas.
- Designed and planned soil gas pilot exploration project for Puchuldiza.
- Reviewed all available well data for Salton Sea Geothermal Field and developed cross-sections of reservoir in support of major investment in the resource.
- Mapped shallow temperature anomaly and designed temperature gradient (TG) drilling program for Hudson Ranch (Salton Sea Geothermal Field).
- Contributed to resource exploration plan for successful grant application to the US Department of Energy (DOE) to explore Gabbs Valley prospect in Nevada.
- Reviewed and built conceptual model for East Kilauea Rift Zone, Hawaii in support of investment decision in greenfield geothermal exploration.
- Reviewed exploration data for numerous green and brownfield geothermal prospects in Chile, Peru, Argentina, the Caribbean, California, Nevada, Oregon, Idaho in support of investment decisions.
- Performed original research on the power density method of resource capacity evaluation using calibrated data from over 80 operating geothermal fields. Published in Stanford Geothermal Workshop and World Geothermal Congress.
- Performed original research on mapping of normalized well injectivities for targeting of production and injection wells. Published in World Geothermal Congress.
- Performed original research on relationship of geothermal wells' productivity index (PI) with initial injectivity index (II) as a function of feedzone enthalpy.
- Targeted, planned, wrote prognosis and business case for, and oversaw logging program for first make-up production well at Ngatamariki. Well targeted high-enthalpy, high permeability upflow of system and well was successful, capable of generating >40 MW_{net}.
- Targeted, planned and wrote prognoses for make-up injection and production wells at Kawerau.
- Targeted, helped build well pad and cellar for, performed well-site geology for, and logged with Kuster K10 temperature-pressure tool the first exploration well at Tolhuaca (southern Chile)

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discovering a moderate-temperature vapour-dominated resource and a high-temperature liquid-dominated resource.

- Targeted, planned, wrote prognosis for, performed wellsite geology for, and logged with Kuster K10 temperature-pressure tool the first exploration well in Puchildiza in over 30 years.
- Helped target, plan, wrote prognoses, performed wellsite geology and testing of three additional exploration wells at Tolhuaca. One well (Tol-4) was the most productive geothermal well ever drilled in South America (12 MW).
- Contributed to targeting, well site geology, and testing of four production and injection wells during development drilling of the Blue Mountain geothermal field in Nevada.
- Mapped geology and explored for thermal features at Tolhuaca, discovering and naming numerous hot springs and fumaroles and taking first temperature measurements and geochemical samples.
- Contributed to conceptual models and resource capacity estimates for four exploration projects in Chile, two projects in Nevada, two projects in California, and three projects in New Zealand.
- Built electronic system for cataloguing and tracking geological core and drill cuttings samples for >100 well library in New Zealand.

Publications

Wilmarth, M., Bardsley, C., Buscarlet, E., Quinao, J., Wallis, I.C., Make-up Well Targeting at Ngatamariki – NM12, Proceedings 37th New Zealand Geothermal Workshop (2015) *Accepted for publication*

Coolbaugh, M., Shevenell, L., Hinz, N.H., Stelling, P., Melosh, G., Cumming, W., Kreemer, C.., **Wilmarth, M**., Preliminary Ranking of Geothermal Potential in the Aleutian and Cascade Volcanic Arcs, Part II, Geothermal Resource Council Transactions, v.39 (2015). *Accepted for publication*

Chambefort, I., Buscarlet, E., Wallis, I.C., Sewell, S., **Wilmarth, M.**, A Review of the Ngatamariki Geothermal Field, *Geothermics* (2015).

Wilmarth, M. and Azwar, L., Permeability Mapping, Proceedings World Geothermal Congress 2015, Melbourne, Australia (2015).

Wilmarth, M. and Stimac, J., Power Density in Geothermal Fields, Proceedings World Geothermal Congress 2015, Melbourne, Australia (2015).

Wilmarth, M. and Stimac, J., Worldwide Power Density Review, Stanford Geothermal Workshop, Palo Alto, California (2014).

Lohmar, S., Stimac, J., Colvin, A., González, A., Iriarte, S., Melosh, G., **Wilmarth, M.**, Sussman, D.: Tolhuaca volcano [Southern Chile, 38.3° Latitude S]: New learnings from surface mapping and geothermal exploration wells, Congreso Geológico Chileno, 13, Antofagasta, Chile (2012).

Wilmarth, M., Cumming, W., Melosh, G., Sussman, D., A Resistive Donut Hole Interpreted as a Shallow, Fractured, Vapor-Dominated Geothermal Reservoir, Invited Speaker, American Geophysical Union, San Francisco, California (2011).

Wilmarth, M., Melosh, G., Sussman, D., Swanson, R., Cumming, W., Colvin, A., Iriarte, S., and Lohmar, S., Tolhuaca Drilling Update, Poster Session at Geothermal Resource Council Annual Meeting in Sacramento, California (2010).

Melosh, G., Cumming, W., Benoit, D., **Wilmarth, M.**, Colvin, A., Winick, J., Soto-Neira, E., Sussman, D., Urzúa-Monsalve, L., Powell, T., and Peretz, A., Exploration Results and Resource Conceptual Model

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of the Tolhuaca Geothermal Field, Chile, Proceedings World Geothermal Conference 2010, Bali, Indonesia (2010).

Melosh, G., Cumming, W., Sussman, D., Benoit, D., Soto-Neira, E., **Wilmarth, M.**, Colvin, A., Winick, J., and Fredes, L., Rapid Exploration of the Tolhuaca Prospect, Southern Chile, Geothermal Resource Council Transactions, Vol. 33, p. 505-508. (2009).