March 17, 2015
Kleinfelder Project No.: 20154702.001A

Heather Muñoz
Project Engineer
Amec Foster Wheeler
2000 S. Colorado Blvd., Suite 2-1000
Denver, CO 80222

Subject: **RESPONSES TO COMMENTS**
Comments by Tom Myers, Ph.D. and Comments by the Santa Clara Valley Audubon Society and the Sierra Club, on the Draft Supplement Environmental Impact Report for the Panoche Valley Solar Project

DR. TOM MYERS, PHD

COMMENT p. 3

One way this project increases impacts is to have higher pumping albeit for a shorter time period. The construction period will be reduced from five years to 18 months, but the groundwater pumping rate during construction will be higher than projected previously and could cause more drawdown. One reason for the increased pumping is that there will be three temporary construction water ponds filled with 4.4 million gallons of water and three 20,000-gallon water tanks (DSEIR, p B-7).

Kleinfelder Response
Filling of the indicated construction ponds and tanks will take approximately six days at the rate proposed for the aquifer pumping test (500 gpm) and to the indicated volume (i.e., 4.4 milliion gallons). This is a relatively short span of time, and the impact from this relatively minor water use is unlikely to have a significant effect on the overall drawdown caused by project pumping.

COMMENT p. 3

The upper zone is subdivided into two or three zones, from 90 to 170 ft bgs and from 180 to 400 ft bgs. This is a classic alluvial aquifer with highly heterogeneous zones with variable transmissivity separated by layers of low-transmissivity clay. Geologia (2010b) indicated that many wells had been drilled to 600 ft but only screened to from 200 to 400 ft bgs because the deeper layers were low-yielding silt. This description also indicates that most of the wells and groundwater flow would behave as if in a confined aquifer.

Kleinfelder Response
Confining conditions in an aquifer occur when a zone of low permeability overlies a zone/unit of high permeability. This condition is not present at this site where the lower permeability silt lies below the more permeable alluvial aquifer. The interbedded nature of alluvial systems may result in localized areas with leaky or semi-confined conditions (refer, for example, to Freeze

and Cherry, 1979); one reason for an extended (72-hour test) is to identify conditions that may affect long term well performance.

COMMENT p. 3/4

Two deeper wells (well #s 10 and 25) have water levels more than 150 ft bgs which means that the deeper aquifer has lower groundwater level and that there probably is downward flow (recharge) from the upper to lower layer.

Kleinfelder Response

What this indicates is that there is a vertical hydraulic gradient (i.e., groundwater head potential), but it does not indicate that there is flow. Groundwater flow is dependent on the hydraulic gradient as well as the hydraulic conductivity. Flow through a zone of low hydraulic conductivity will be very slow. Generally, the larger the head difference between two zones, the less flow is likely occurring, because if a significant amount of groundwater flow was occurring between two vertically separated zones they would likely have a more similar water level.

COMMENT p. 4

The records however do not show much of a drop during the 1986 through 1994 drought or the extreme drought of 1976-77. This may reflect that the current drought is deeper than in 1986-1994 and longer than 1976-77.

Kleinfelder Response

1992-1993 was an el Niño winter, so should not be included in a drought period. The current drought is relatively severe from a historical perspective, so groundwater level declines would be expected. Note that historical groundwater level data from 2004 to the present for over 40 wells are available. These data indicate that over the past 10 years groundwater levels have declined at some wells and have increased at others despite the drought. The average change in groundwater level for 43 wells during this period is a decrease of just 1.6 feet. The mitigation measures to be implemented, including the pumping test and groundwater monitoring program, will enhance our ability to predict changes to groundwater levels within the basin and to quickly react to and mitigate unexpected changes in water levels.

COMMENT p. 5

The groundwater level map in 2014 is highly irregular, regardless of how it was drawn in Matthews and Haizlip (2014b) (Figure 3). The contours show a water table sloping from west to east across the project site, with a steeper slope to the west. There are adjacent wells with more than 150 ft of difference. For example, wells 5 and 25, in the middle at the top, have 1206 and 1046 ft amsl water levels even though the 1060 contour is far to the east. One other well has water surface elevation 10591 but it is surrounded by several wells with elevation in excess of 1120 ft. The curve in the 1260 contour just accommodates a well with 1157 ft elevation while being surrounded by many other wells with water levels much higher than 1200 ft. Some of these differences may be explainable by the wells being completed in different levels of the aquifer. If there is a significant difference in water levels among aquifer layers, a contour map should be drawn for different levels to show areas with vertical gradients.

KLEINFELDER 3880 Lemon Street, 3rd Floor Riverside, CA 92501 **p** | 951.801.3681 **f** | 951.682.0192

Kleinfelder Response
Geologica's contouring has been conducted using standard contouring approaches and depicts a flow regime that is reasonable to expect within a valley such as this, and changing gradients are often seen where, for example, hydraulic conductivity of the geologic material changes and/or between recharge and downgradient areas. As described by the commenter, well #25 is a deep well, screened in a deeper aquifer, and it is clear that deeper wells were not used to develop the interpreted potentiometric surface contours on the figure. Because there are just a few deeper wells, it would be difficult to develop a deeper interpreted groundwater surface. However, areas of vertical gradients are readily apparent on Geologica's map simply by comparing the indicated groundwater elevation differences at adjacent wells.

COMMENT p. 5/6

The recharge estimate used for this project, one inch/year over the project site, is extremely high, based on my experience in Nevada, Arizona, and California. Some researchers have set estimates of average recharge precipitation less than 8 in/y as equal to zero (Avon and Durbin 1994, Anderson et al 1992, Maxey and Eakin 1949), although most analyses indicate that even in very dry areas there will be some recharge during some years, usually due to the recharge of runoff from stream beds (Stonestrom et al 2007, Flint et al 2002). In Panoche Valley, annual rainfall varies from 10-12 inches on the west edge to as little as 5-6 inches on the north and east, with an average at the Panoche Valley weather station equal to 9.69 in/y (Geologica 2010b). During some years, the annual precipitation was less than 6 in/y. Most of the recharge in dry areas, such as Panoche Valley, occurs at the base of a mountain or in fractures in the mountains (Wilson and Guan 2004). This suggests that whatever the average total recharge is for the area, it is not homogeneous across the area, as simulated by Matthews and Haizlip (2014a and b). CA Groundwater Bulletin 118 does not estimate recharge for Panoche Valley.

Kleinfelder Response
Recharge can be highly variable, both temporally and spatially, in arid to semi-arid areas. However, the value used by Geologica is not unreasonable for similar areas. For example, Scanlon et al. (2006)[1] found that "Average recharge rates estimated over large areas (40–374 000 km2) range from 0.2 to 35 mm year^{-1} [0.008 to 1.4 inches], representing 0.1–5% of long-term average annual precipitation." In addition, while recharge will vary spatially, as indicated by the commenter, this is not especially relevant to the analysis performed by Geologica, which provides a water balance for the entire basin.

COMMENT p. 8

The citation, Young and Wallender (2002), is completely inappropriate for this area. Based on its abstract[2] it considers irrigated areas throughout the San Joaquin Valley; finding that 2/3rds of precipitation infiltrates an irrigated area is irrelevant for a natural, unirrigated, grassland. The recharge calculated by the water balance specified by the article includes infiltrating applied water[3], which means that recharge includes artificial recharge from irrigation. The note about

---

[1] Scanlon, B.R., K.E. Keese, A.L. Flint, L.E. Flint, C.B. Gaye, W.M. Edmunds, and I. Simmers, 2006. Global synthesis of groundwater recharge in semiarid and arid regions. Hydrol. Process. 20, 3335–3370.

being "consistent with findings … around the world" does not appear linked to the article, based on the abstract[4].

Kleinfelder Response

The commenter included the abstract of the referenced paper (Young and Wallender, 2002) in a footnote. Review of the abstract in the footnote does not support the position presented in the comment that the study was limited to "irrigated areas throughout the San Joaquin Valley," when it specifically refers to a single water district on the west side of the valley and does not specify only "irrigated areas." Further clarification of a correlation between the cited paper and the comment is required to understand the intent of the comment.

<u>COMMENT p. 8/9</u>

The DSEIR studies incorrectly subtract groundwater pumping from the balance to estimate recharge because groundwater that is pumped had to recharge before it was pumped. Only in a steady state situation, in which the pumping has been occurring for a long time and the system has returned to steady state, should the pumping outflow be used to estimate natural recharge. Natural recharge is water that enters the ground whether it discharges to natural discharge points or to a well.

Kleinfelder Response

The water balance was prepared using a standard accepted approach, which includes appropriate inputs and outputs to the system. Groundwater pumping is a component of the water output just as recharge is a component of the input. As stated, discharge from the system may occur by different mechanisms, but understanding these mechanisms individually is important whether the system is in equilibrium or in transition due to a new stress (e.g., pumping). Understanding all components of the budget is especially important in a transient model because of changes in storage that occur from pumping.

<u>COMMENT p. 9</u>

…the specific location of the CHB is not described or shown in a figure nor are the hydraulic parameters of the boundary described.

Kleinfelder Response

The assigned constant head value of the boundary is provided on page 8 in Section 5.1 as 925 feet and indicated as being "…on the eastern edge of the model grid." The hydraulic characteristics of this boundary would be those of the model cells it occupies.

<u>COMMENT p. 10</u>

In practice, steady state conditions become reestablished when drawdown ceases to increase; in reality, steady state is never reached because drawdown continues to draw from further in the model domain or from the boundaries.

KLEINFELDER 3880 Lemon Street, 3rd Floor Riverside, CA 92501 **p** | 951.801.3681 **f** | 951.682.0192

Kleinfelder Response
A natural system can attain steady-state conditions under many varying sets of conditions and in response to a wide variety of stresses such as changes to recharge conditions following flooding or increase in groundwater extraction. Models attempt to capture the key attributes of groundwater systems, but they are always simulations and may not capture all aspects and details; however, models can attain steady-state conditions as can natural systems. As was done for the Geologica model, the additional modeling to be performed following the pumping test will incorporate inputs and outputs that are appropriate to the conditions that are anticipated to occur as a result of groundwater extraction for the proposed project construction.

COMMENT p. 10

The Well package for MODFLOW assumes that pumped water is drawn from the entire model cell, so that pumping drawdown is spread over the model cell. A cell is much larger than the well area, so the predicted drawdown is always much less than actually occurs at the well. Usually, a model is developed with model cells that become smaller, or telescope down in size, around a well so that the simulated drawdown is more realistic. This was not done here, so the very small predicted drawdowns at the pumped well, 3 and 5 ft, respectively, for two different storage coefficients, are grossly too small.

Kleinfelder Response
This is an incorrect understanding of the numerical solutions in MODFLOW and the Well Package that is associated with MODFLOW. The solution does not "care" about the size of the cell. The well drawdown function is solved at the cell node, which in MODFLOW is the center of the cell, no matter what size the cell is, so the solution will not be affected by the cell size. If MODFLOW operated in this fashion, it would be very difficult to use. Thus, the calculated drawdown will be as accurate in a large model cell as in a small model cell.

COMMENT p. 11

Another problem with the estimate is that the model assumes the target wells, wells 14, 16 and 27, are screened in the same aquifer layer. The model has just one layer, so the model implicitly pumps all water from an aquifer thickness equal to the layer thickness. The model report (Matthews and Haizlip 2010a) did not specify the thickness but simulated the entire domain with a single transmissivity. By using just one layer for the model, the simulation assumes that the entire aquifer thickness provides water to the well when the reality is that only aquifer layers screened by the well provides water. This causes the model to underestimate the drawdown at the well. If one of the wells being monitored is screened over sections of the aquifer from which more of the pumped water is drawn from, the drawdown could be much higher than predicted. This discussion assumed that during well construction, the driller located the more productive layers rather than screening the entire aquifer thickness. If the wells are screened in different layers, there may be less effect. The DSEIR simply does not adequately describe the hydrogeology of the wells to be pumped for the project or the wells that could be affected by the project.

Kleinfelder Response
The assumption implicit in using a one-layer model is that the various conductive lithologies within the aquifer system are actually hydraulically connected throughout the basin. This is

likely an accurate assumption for the “shallower” wells; there are a few wells that appear to be screened within a deeper, hydraulically separated, aquifer in the basin. Because the transmissivity values used were calculated from a pumping test, they already implicitly incorporate the natural condition of the aquifer rather than the suggested concept of isolated intervals exhibiting more or less drawdown. This varying drawdown may occur in the very short term due to local vertical hydraulic conductivity differences, but will not be significant after longer pumping times. Although the heterogeneity of the materials is not accounted for in the model, the model is likely to simulate the system with sufficient accuracy that drawdown can be predicted. Further aquifer testing and ongoing groundwater monitoring throughout the basin, as required by MM WR-1.1, will provide additional data on aquifer conditions and the actual effects of long-term pumping for the project. The groundwater-level data will be used in real time to monitor the effects of extraction, which can be adjusted as needed.

COMMENT p. 11

Recharge is the closest source for replenishing water that is pumped, which means that the simulated pumpage will pull recharge in and near the model cell containing the well boundary first.

Kleinfelder Response

It is not clear what is meant by this comment, but recharge in the numerical model is applied equally to the entire domain, and potential short-term hydraulic effects will not be apparent in the modeling results for the long-term pumping. In addition, baseflow within the simulated aquifer will be the primary source of recharge to the pumped cell.

COMMENT p. 11/12

The project will impact 15 known vernal pools, or 0.26 acres either permanently or temporarily (DSEIR, p C6-25). Despite their obvious influence on hydrology, including recharge and surface water storage, the water resources chapter of the DSEIR does not even mention vernal pools. Vernal pools fill with water seasonally and drain by percolating into the ground. Most of this percolation becomes groundwater recharge. The project will cause this recharge to be lost, but the DSEIR does not disclose this impact or attempt to mitigate it.

Kleinfelder Response

The indicated area, 0.26 acre, is a very small area within the overall project area of several thousand acres, and is not likely to have a significant effect on the water budget.

COMMENT p. 16

The DSEIR has not considered the pumping from any wells in basin other than the project site, as part of its groundwater modeling, as discussed above. Failure to consider the pumping of other wells is a failure to consider the overall impacts of this project on the site. Additional pumping in a basin such as Panoche Valley could result in threshold effects, meaning that overlap of drawdown among wells could cause cumulative drawdown that exceeds the sum of the individual wells because of boundary conditions. In other words, individually the wells pump as if the aquifer domain has an infinite extent, one of the assumptions of standard well *hydraulics equations. If several wells are pumped at the same time and if the aquifer can still be considered infinite, the cumulative effects are simply the sum of the drawdown from the several wells. However, if the overlapping drawdown causes drawdown to reach a no flow boundary, the infinite-aquifer assumption breaks down and the cumulative pumping causes more drawdown than the sum of the individual wells. The DSEIR has not considered cumulative pumping, which for 18 months will be more than doubled due to about 384 af being pumped for the proposed project while the current pumping is 120 af/y.*

Kleinfelder Response

Several existing wells within the basin currently extract small volumes of water from the aquifer system. The addition of extraction by the construction project will add to the overall groundwater extraction within the basin. While the new temporary extraction may be larger than the other individual existing extractions, it will not cause more drawdown than is predicted by the hydraulic characteristics of the aquifer system. Note that Geologica's model already shows the effect of project pumping reaching the basin boundaries, which they discuss, and shows the additional drawdown that will be caused by this pumping. Also note that wells do not pump "as if the aquifer domain has an infinite extent," although pumping test solutions often make this assumption, and pumping from just one well can create a cone of depression that reaches a hydraulic boundary; more than one well is not required for this. It is correctly stated that a hydraulic barrier can magnify drawdown, and this is numerically accommodated in models by use of "image" wells. Following additional aquifer testing, further modeling will be performed to update aquifer parameters and incorporate known conditions within the basin.

<u>COMMENT p. 17</u>

The water level in a well depends on the pressure in the aquifer spanned by the well screen or open interval. If the well spans more than one lithological layer, meaning layers of different type such as gravel, sand, or sandstone, with different pressures, the well water level will be a weighted average of pressures in the layers; it will be an average dependent on the pressure and the transmissivity of each layer at the point it intersects the well.

Kleinfelder Response

The initial statement is correct. However, the water level measured in a well will generally more closely represent the zone with the highest head value, not a weighted average of just the pressure in zones penetrated by the well. In addition, any difference from this higher head value, which is likely to be small, will be a function of the hydraulic conductivity of the layers, as added in the final phrase. However, it is not clear if the commenter is suggesting that different head values will be due solely to differences in the aquifer material, which would not be correct.

<u>COMMENT p. 17</u>

A downward vertical gradient indicates groundwater is flowing vertically downward…

Kleinfelder Response

A downward vertical gradient simply indicates the potential for downward flow, not that flow is actually occurring. A very steep vertical gradient may be present across a confining layer of low hydraulic conductivity but flow will be limited because of the low conductivity.

KLEINFELDER 3880 Lemon Street, 3rd Floor Riverside, CA 92501 **p** | 951.801.3681 **f** | 951.682.0192

COMMENT p. 17

An upward vertical gradient may indicate a layer with artesian pressure.

Kleinfelder Response
An artesian condition simply means that the potentiometric head value of an aquifer is above the ground surface elevation. It is possible that the commenter means "under confining pressure" rather than artesian.

COMMENT p. 17

To provide guidance on whether there is a vertical gradient being established, a monitoring well should be open to no more than 20 ft of aquifer at any one location. Monitoring wells should have multiple openings where necessary to monitoring different layers and to determine vertical gradients.

Kleinfelder Response
The length of a screen interval can be more than 20 feet and still accurately represent the hydraulic head within an aquifer. We assume that the commenter means that, to establish differences in hydraulic head between layers, multiple *hydraulically separated* openings would be required in one well. Separate wells screened in different layers can also be used to evaluate vertical gradients.

COMMENT p. 17/18

For the reasons specified in the previous paragraph that make a monitoring well an adequate well, existing pumping wells should not be considered part of the monitoring regime. Because they are the wells that should be protected, they should be monitored. Thus, it is necessary to monitor the existing wells for impacts due to the proposed project, but it is not sufficient.

Kleinfelder Response
Any well with known construction details can be useful for the monitoring of water levels, including existing pumping wells, which can still provide useful data.

COMMENT p. 18

a. It is not possible to establish any kind of trend representative of pre-project conditions by submitting a monitoring plan 60 days before the commencement of pumping. In general, the minimum time for a pre-project trend would be a year to get seasonal changes.

Kleinfelder Response
In their December 2014 memorandum, Geologica includes historical groundwater levels for over 40 wells within the basin, thus providing information on pre-project conditions and trends starting in 2004. They indicated a general downward trend in water levels during the recent drought, although groundwater levels in some wells increased during this period. Therefore, pre-project conditions have already been established and disclosed.

KLEINFELDER 3880 Lemon Street, 3rd Floor Riverside, CA 92501 **p** | 951.801.3681 **f** | 951.682.0192

<u>COMMENT p. 18</u>

b. The DSEIR implies that "post-construction … trends" can be determined before pumping begins since that would be only trend that can be compared "against observed and calculated trends".

Kleinfelder Response
There are 10 years of groundwater monitoring data for over 40 wells against which post-pumping conditions can be compared. In addition, monitoring for the program mandated by MM WR-1.1 will commence prior to project pumping and will include analysis of trends in water levels.

<u>COMMENT p. 18</u>

c. The DSEIR does not specify what a "calculated trend" might be; in general that would likely be an analytical or numerical model of project pumping with calibrated aquifer parameters, but there is no requirement that, that be provided. The calculated trend would have to be estimated prior to pumping to be able to compare against it.

Kleinfelder Response
As indicated above, at least 10 years of groundwater level data already exist for over 40 wells within the basin. A method such as the Mann-Kendall would be used to analyze available data and calculate a statistically based trend. New data collected during project activities will be combined with historical data, where available, to calculate long-term trends.

<u>COMMENT p. 18</u>

d. Comparing against a calculated trend would only be comparing whether the estimate was correct, not whether it was causing an impact.

Kleinfelder Response
See above responses to items a, b, and c.

<u>COMMENT p. 18</u>

e. A calculated trend would result from an adequate model based on calibration against the established pre-pumping trend. That has not been done for the DSEIR, as it should have been, nor is it proposed for the monitoring.

Kleinfelder Response
See above responses to items a, b, and c. The proposed monitoring and reporting program includes evaluation of groundwater levels and comparison to historical levels within the basin.

KLEINFELDER 3880 Lemon Street, 3rd Floor Riverside, CA 92501 **p** | 951.801.3681 **f** | 951.682.0192

COMMENT p. 18

Seventy two hours may be insufficient to cause sufficient stress at nearby private wells to adequately parameterize the aquifer.

Kleinfelder Response
Seventy-two hours is a standard and well-accepted length for a large-scale aquifer test for this type of work, and is expected to stress a sufficiently large volume of the aquifer system to obtain reliable hydraulic characteristics that can be applied to the interference analysis. The existing historical records (described above) and the proposed ongoing high-frequency groundwater monitoring will provide further information on the effects of pumping and whether adjustments are needed during project construction.

SANTA CLARA VALLEY AUDUBON SOCIETY AND THE SIERRA CLUB

COMMENT p. 12/13

According to revised estimates, water usage over the 18-month time period of the Revised Project increases approximately ten-fold, with peak daily water usage expected to go from .13 acre-feet to 1.72 acre-feet and peak annual demand from 38.57 acre-feet to 314.87 acre-feet. (SEIR, Table B-4) Given these increases and in light of recent drought conditions, the faster drawdown of water may impact onsite and offsite watercourses ant the ability of vegetation to receive adequate water, impacting local protected species that rely on this vegetation.

Additionally the primary mitigation measure appears difficult to implement in low-rainfall years, such as have been prevalent recently. MM-WR-1.1 states the basic standard that, "If…the project pumping has resulted in water level decline of 5 feet or more below the baseline trend at nearby private wells, the applicant shall be prohibited from using the well(s) as a water source for the project, or shall reduce groundwater pumping until water levels stabilize or recover." (SEIR, page C-16-9) However, earlier in this same section of the SEIR, it acknowledges that "Water level elevations in a number of wells in Panoche Valley have declined over the last 5 years by approximately 5 to 15 feet. However, water level elevations in other wells within the Panoche Valley have risen during the same period."" (SEIR C.16.1)

The SEIR must identify how a significant drawdown in local wells would be determined to be the fault of "project pumping" rather than drought. The SEIR must also identify how local sample wells will be chosen, given acknowledged inconsistencies in well elevations (SEIR C.16.1).

Kleinfelder Response
A continued drought would directly affect the amount of drawdown experienced over the long term, because the amount of recharge to the aquifer system is reduced compared to normal rainfall. This might result in greater drawdown. However, impact to local watercourses would only be apparent if the watercourses are directly fed by groundwater (e.g., gaining streams), and impact to plants would occur only to phreatophytes (i.e., plants that directly tap groundwater). Because the depth to water is typically greater than 30 feet and considering the vegetation that is generally present in the Panoche Valley, it is unlikely that any of the watercourses rely on groundwater baseflow or that phreatophytes are common. Thus, additional drawdown that might occur due to the ongoing drought is unlikely to have the suggested impact.

KLEINFELDER 3880 Lemon Street, 3rd Floor Riverside, CA 92501 **p** | 951.801.3681 **f** | 951.682.0192

Mitigation measure MM-WR-1.1 consists of a groundwater monitoring and reporting plan. Implementation of this plan is unlikely to be impacted by drought (i.e., low-water) conditions. Although shallow wells may go dry during drought conditions, most appear to be sufficiently deep that this is not expected to occur, and replacement wells will be incorporated into the program if any of the monitored wells are compromised.

A substantial database of water levels from 2004 through the present already exists for over 40 wells throughout the valley, and the recent drought is apparent in that water levels have typically declined during the past few years. Therefore, water-level trends due to the drought are already known and will continue to be monitored along with the more rapid changes that are expected from project pumping. In addition, because the monitoring program will commence prior to project pumping, pre-existing water levels and local pumping drawdown may be distinguished from project drawdown. The wells selected for monitoring include those known to be actively pumping, specifically so this effect can be monitored.

CLOSURE

Should you have any further questions please feel free to contact Jim Finegan at 951.801.3743.

Sincerely,

KLEINFELDER

Jim Finegan, PhD, PG, CHg
Principal Hydrogeologist

Randall A. Reid
Senior Project Manager

Attachment: J. Finegan resume

KLEINFELDER 3880 Lemon Street, 3rd Floor Riverside, CA 92501 **p** | 951.801.3681 **f** | 951.682.0192

KLEINFELDER
Bright People. Right Solutions.

Attachments

Total Years of Experience

25

Education

BA, Geology. Occidental College, California

PhD, Hydrogeology. University of Melbourne

Registrations

Professional Geologist (PG) CA

Certified Hydrogeologist (CHg), CA

James Finegan, PhD, PG, CHg

Principal Hydrogeologist

Dr. Finegan is a California Certified Hydrogeologist with 25 years of experience in geologic and hydrogeologic investigations and is an experienced field technician. He has a PhD in hydrogeology, specializing in groundwater flow and contaminant transport in fractured-rock aquifers. Dr. Finegan provides litigation support as an expert in hydrogeology and is experienced in data evaluation and geochemical analysis techniques, including computer-based numerical groundwater modeling and 3D conceptual site modeling. Dr. Finegan is an experienced groundwater modeler, and has been invited to speak about numerical modeling.

Relevant Project Experience

The following is a representative selection of Dr. Finegan's project experience.

Remedial Investigation/Feasibility Study, Stringfellow Hazardous Waste Superfund Site, Riverside County, California

Lead Hydrogeologist responsible for performing model runs, sensitivity analysis, and reporting on the modeling of remedial alternatives for a Feasibility Study using a 3-dimensional numerical groundwater flow and contaminant transport model for the Stringfellow Hazardous Waste Superfund Site in Riverside County, California, overseen by the California Department of Toxic Substances Control. The chemical simulated in the transport model is perchlorate, which has been transported about 5 miles down gradient of the source area. This MODFLOW model was an update of an original model developed by Dr. Finegan with a former employer. Additional contaminants assessed include TCE, p-CBSA, hexavalent chromium, and 1,4-dioxane. Dr. Finegan has also provided groundwater tracer analysis for an in-situ bioremediation pilot study. Current work involves performing a monitoring optimization of over 600 wells at the site, developing biennial and annual monitoring and remedy effectiveness evaluations of the entire site, and collaborating on isotope sampling and data analysis of perchlorate impacts.

Former Plating Facility, Soil Remediation of Hexavalent Chromium and Numerical Modeling, Los Angeles, California

Large diameter augers and in situ chemical reduction (LDA/ISCR) by injection of calcium polysulfide were employed at the site to achieve the remediation of hexavalent chromium in soil. Groundwater associated with the site, which is located within the Glendale South Operable Unit of the San Fernando Valley Superfund Site, is subject to remediation pursuant to Federal Superfund proceedings led by the USEPA. Subsequent to initiation of LDA/ISCR activities, transient hexavalent chromium concentrations, elevated above prior levels, were detected in groundwater samples collected from site monitoring wells, an off-site water-supply well and an off-site USEPA monitoring well. Dr. Finegan performed and supervised numerical flow modeling and particle tracking simulations of the saturated zone to evaluate groundwater flow and capture of transient hexavalent chromium by the water-supply well. The results indicate that the hexavalent chromium-impacted groundwater is being captured and has not migrated beyond the capture zone of the water-supply well.

TCL Landfill, Preliminary Feasibility Study for a Proposed Groundwater Recharge Gallery System, Tullamarine, Victoria, Australia

The feasibility of a recharge gallery system to assist with improving the quality of high salinity groundwater discharging from the landfill to a nearby creek was evaluated. The proposed method comprised a large trench system to be filled with fresh water that would seep into the underlying groundwater, thereby diluting salinity. Following review of site data and an existing numerical model, the Groundwater Services, Inc. (GSI), Mass Flux Toolkit "*MASS FLUX TOOLKIT To Evaluate Groundwater Impacts, Attenuation, and Remediation Alternatives Version 1.0"* was used to estimate TDS mass discharge from the landfill to the creek within the saturated zone of the Older Volcanics and Silurian bedrock layers at the boundary. The mass discharge analysis used horizontal hydraulic conductivity values, hydraulic gradients, and concentrations of groundwater TDS along the calculated transect

James Finegan, PhD, PG, CHg

Project Experience (cont.)

Naval Air Station Lemoore CTO 051, Naval Facilities Engineering Command, Lemoore, California
Dr. Finegan is hydrogeology technical lead for review and preparation of final RI/FS documents for two areas of concern at the Naval Air Station, Site 5/9 and Site 14. Current additional work includes evaluation of a metals background population and hexavalent chromium occurrence at the site. The aquifer system at the site comprises a complex layered system of aquifers and aquitards impacted by petroleum hydrocarbons (and MTBE) and chlorinated solvents. Five aquifers have been designated at the site, extending to over 100 feet bgs and with impacts detected in each, although impacts decrease with depth. Sources of impact include a gas station, underground storage tanks, wash racks, wastewater piping and disposal ponds, storm water lines, and former site activities such as aircraft maintenance and cleaning. Site investigations have included groundwater monitoring well installation and sampling, soil and soil-gas sampling, membrane interface probe studies, aquifer pumping and slug tests, and a human-health risk assessment. Groundwater contaminant plumes have changed transport direction over time due to changing hydraulic gradients, and the interaction of different chemical contaminants has increased the complexity of chemical behavior at the site. An upcoming investigation will include sampling of multiple wells for detailed metals evaluation.

Former Marine Corps Air Station, Optimization Study for the Principal Aquifer Remedial Action at IRP Site 18 and Shallow Groundwater Unit Remedial Action at IRP Site 24, El Toro, California
Dr. Finegan is hydrogeology technical lead for this remedial optimization study at the former El Toro Marine Corps Air Station. The project involves assessment of the ongoing remedy to evaluate the present status and projected performance of the remedy in meeting the current remediation goals. Recommendations will be made for optimization strategies or remedial enhancements that could be executed to maximize remedial effectiveness and cost efficiency. Dr. Finegan is leading a detailed review of hydrogeologic data and an existing numerical (MODFLOW) model. The model is being recalibrated and it will be used to evaluate remedial scenarios and optimization.

Former Pratt Oil Works, Numerical Modeling to Evaluate a Hydraulic Barrier Wall for LNAPL Control, Long Island City, New York
A numerical groundwater flow model was prepared to evaluate the effectiveness of a proposed slurry wall as a barrier to LNAPL interactions with Newtown Creek from the Former Pratt Oil Works in Long Island City, New York. Groundwater flow modeling was performed using the USGS three-dimensional, finite-difference, computer code MODFLOW-2000 and particle tracking using MODPATH, and included tidal studies that resulted in a finely time-discretized transient model to account for tidal effects on LNAPL movement near the barrier and adjacent water body. An existing steel-sheet-piling bulkhead wall along the property boundary was also incorporated into the model. The results of numerical modeling were used to evaluate barrier wall construction options.

Former Tank Farm, Confidential Client, Los Angeles County, California
Lead hydrogeologist responsible for performing detailed data evaluation and report writing with team members for this large-scale environmental assessment project that includes over 40 monitoring wells and almost 200 direct push locations including profiles for CPT, MIP and UVOST®. Work conducted at this former tank farm includes soil-vapor, soil, biological, and groundwater sampling and analysis. In addition, NAPL has been identified at over 100 feet bgs, and ongoing investigations using UVOST® and soil-confirmation sampling are being performed. Dr. Finegan has developed novel methods to integrate and evaluate the various data types to develop a comprehensive site conceptual model, including lithology assessment of the complex subsurface based on CPT penetration stress values and multi-method graphics that allow cross-comparison of data. Site data has also been compiled and used to construct a computer-based 3D conceptual model. These methods facilitate a comprehensive understanding of the conceptual model by integrating a substantial data volume of many types. Site investigations are continuing off site to evaluate the extent of soil, groundwater, and NAPL impacts.

James Finegan, PhD, PG, CHg

Project Experience (cont.)

Technical Support, 3D Conceptual and Numerical Modeling, BKK Landfill, West Covina, California
Dr. Finegan assisted in assessing the costs of different approaches to closure for the groundwater remedy at this site with two closed landfills (190-acre Class I and 160-acre Class III) and various ancillary facilities. He currently provides technical guidance and review for the DTSC, working with DTSC general counsel and the Responsible Party group to negotiate a detailed scope of work for groundwater corrective action. Attends monthly project review meetings between the DTSC and the RP group to provide input on work plan details, the interpretation of investigation data, and the development of additional investigation scope. Also observes and provides input on field work involving drilling through native and landfill materials, well installation, and aquifer testing. Dr. Finegan is supervising development of a 3D conceptual site model (CSM) using state-of-the-art software, including lithology of complex bedrock units and geologic structures, groundwater elevations, and contaminant distribution, and which has been converted to a 3D numerical groundwater model. Modeling will be used to evaluate groundwater flow and contaminant fate and transport, specifically to help refine the understanding of highly complex hydrogeologic conditions at the site. Dr. Finegan and colleagues have provided valuable high level technical guidance during meetings and in negotiations with the BKK Group regarding investigation needs, data interpretation, and regulatory requirements for protection of human health and the environment and site closure.

Former Mobil and BP service stations, 3D Modeling and Visualization, Gunnedah, NSW, Australia
The site comprised two former service station facilities with an LNAPL/dissolved phase plume that had migrated off site beneath several adjoining properties. The EPA mandated that a hydrogeologic conceptual model be developed to provide a defensible contaminant migration, exposure and risk scenario. Dr. Finegan led the effort to develop a 3D computer-based conceptual site model using the software Leapfrog Hydro™, which is specifically designed for hydrogeological projects. Lithologic, laboratory, LNAPL, and groundwater data were compiled and used to create the 3D model.

Clay Street Grade Separation Project, Aquifer Pumping Test for Dewatering Evaluation, Riverside County, California
Dr. Finegan planned and directed well installation and a 72-hour pumping test to evaluate aquifer characteristics for a proposed a railroad grade separation at the intersection of Clay Street and existing rail lines in a portion of unincorporated Riverside County, California. The proposed project will lower the profile grade of Clay Street, and a bridge will be constructed to carry railroad traffic. Groundwater has been measured at approximately 27 feet bgs, and the maximum depth of excavation in this area will be approximately 36 feet. In addition, depth to highly weathered bedrock in this area ranges from 25 to 50 feet bgs. To accomplish excavation below the groundwater table, it is proposed to dewater shallow groundwater in the excavation area and its vicinity. The results of the pumping test were used to evaluate dewatering options, estimated flow volumes, and local aquifer impacts.

Liberty Quarry, Granite Construction Company, Riverside County, California
Lead hydrogeologist in preparation of responses to comments on the Draft Environmental Impact Report for the Liberty Quarry Surface Mining Permit No. 213, Riverside County, California. Dr. Finegan prepared detailed technical responses to over 100 comments regarding hydrogeologic aspects of the proposed quarry, submitted by consultants and San Diego State University. The combined responses were prepared as part of a team addressing hydrogeologic, surface water, and geologic comments on the draft EIR.

Backwash Reclamation Ponds - Van Norman Complex, Los Angeles, California
Provided quality control and technical review of ground water models developed to simulate alternative dewatering methods to control infiltration of groundwater into sludge processing ponds within LADWP’s Van Norman Complex.

James Finegan, PhD, PG, CHg

Project Experience (cont.)

Northeast Interceptor Sewer Phase II Southern Section, Los Angeles, California
Dr. Finegan provided technical review of in-situ permeability tests (packer tests), which were used to calculate hydraulic conductivity of bedrock. The method involved using two packers to hydraulically isolate a bedrock interval, pressurizing the interval, and measuring the recovery. The recovery is evaluated to calculate the hydraulic conductivity and conditions of the tested interval.

Corrective Action System Evaluation and Optimization, Former Mobil Bulk Plant 99DPL, Dos Palos, California
This site has an existing dual-phase extraction system to mitigate groundwater and soil-vapor impacts by petroleum hydrocarbons in a shallow (~5 feet) groundwater environment. Dr. Finegan re-analyzed a previous pumping test, designed and analyzed a second pumping test, and performed analytic element modeling to evaluate optimization of the groundwater pump-and-treat system at the site. Modeling was used to propose modifications to this system to more completely capture groundwater impacts at the site. Modeling was also performed to optimize dewatering of an excavation for soil remediation.

Dewatering Evaluation, Summit Drive Drainage Improvements, Escondido, California
Dr. Finegan performed evaluation of pumping test data as part of a Dewatering Evaluation and Plan for a drainage improvement project in San Diego County, California. Step-drawdown and constant-rate (including recovery) pumping tests were performed with a pumping well and two observation wells. Hydraulic parameters calculated from the pumping test were used to develop a dewatering plan for proposed excavations. Following construction of the drainage improvements, a claim was made against the County by a neighboring resident, and Dr. Finegan is currently providing litigation support to the County as an expert in hydrogeology.

ExxonMobil Retained Liability Sites Closure Program, Oklahoma and Texas, USA
Dr. Finegan is part of a team of technical professionals developing and implementing an aggressive strategy to eliminate environmental liability at 10 Upstream retained liability sites, comprising former and active natural gas compressor, booster, and distribution plants in Oklahoma and Texas. Dr. Finegan's role is to provide assessment field support and hydrogeology expertise.

Evaluation of Corrective Action System and Seismic Reflection Investigation, Coyote Canyon Landfill, Orange County, California
Dr. Finegan performed a detailed data evaluation of the groundwater extraction system at the Coyote Canyon Landfill in Orange County, California, including a high-resolution shear-wave seismic investigation. The evaluation included a comprehensive review of site historical data, recommending and implementing additional field work to fill data gaps, and evaluate the existing and additional data to better understand the continued detection of VOCs downgradient of the groundwater extraction system. The evaluation results were used to support recommendations for overall modifications and enhancements to the corrective action approach and to the design and operation of the groundwater extraction system and landfill gas control system. In response to the evaluation, the RWQCB indicated approval of a recommended rebound test of the extraction system, where the system will be shut down and changes to groundwater flow and transport will be monitored for two years.

Former Seeligson Gas Plant, Premont, Texas
Dr. Finegan provides technical guidance on site investigations and field work as well as peer review of site reports. Environmental investigations have included groundwater monitoring reports and a Site Investigation and Supplemental Investigation Work Plan. Planned work includes additional well installation, ongoing monitoring, investigation of water-supply and oil-and-gas wells in the vicinity of the site, and investigation of other potential contaminant sources in the area.

James Finegan, PhD, PG, CHg

Project Experience (cont.)

Perchlorate and VOC Plume Investigations, Mid-Valley Sanitary Landfill and adjacent NPL site, Rialto, California

Dr. Finegan has served as technical advisor and Lead Hydrogeologist for geologic and hydrogeologic studies to characterize the nature and extent of groundwater contamination, primarily by perchlorate and trichloroethene, adjacent to the Class III Mid-Valley Sanitary Landfill and nearby industrial sites in Rialto, California. Work included design and construction of deep (>700') single- and multi-port groundwater monitoring wells, aquifer pumping tests, borehole geophysical analyses, laboratory analyses, computer-based hydrogeologic modeling, definition of the lateral extent of groundwater impacts, evaluation and design of a cost-effective remedial response, development of a Pilot Study to verify the adequacy of the proposed remedial measures (pump, treat and reinjection at the point of compliance [POC]), and full CAP implementation. Drilling in Rialto has been performed using ARCH, mud-rotary, and other methods. Because the impacted groundwater was connected to a community supply source, an aggressive schedule was employed requiring up to five drill rigs and field geologists at one time. A CAP system for one of the plumes was successfully constructed and is capable of handling 350 million gallons of water per year.

MTBE Plume Investigations, Chevron USA, San Juan Capistrano, California

Dr. Finegan was on-site Professional Geologist (PG) and expert in field services to monitor field work being performed as part of methyl tertiary-butyl ether (MTBE) plume investigations for service stations in San Juan Capistrano. Dr. Finegan also performed numerical flow and transport modeling with other team members to simulate remediation scenarios in the heterogeneous aquifer system beneath the site. Numerical modeling consisted of constructing a basin-wide groundwater flow model and refining the grid in the study area to simulate a proposed Interim Remedial Action Plan that will use a water-supply well to control the MTBE plume. In his field capacity, Dr. Finegan was responsible for assessing correct performance of field work and for making recommendations to enhance the quality of the work and the data derived from the field activities. He also performed aquifer test analyses with other team members and wrote the report for a test that included 25 observation wells. Other responsibilities included report review and writing, making recommendations for drilling and well construction specifications, and evaluating and interpreting site data.

Evaluation of Water Elevations in Oakwood Lake, Manteca, California

Dr. Finegan evaluated several existing models and performed numerical groundwater flow modeling to evaluate lake water levels in Oakwood Lake in response to changes in the operational status of this former sand and gravel quarry and to seasonal effects on the lake. The model was used to predict high water elevations, based on a 100-year rainfall event, and to make subsequent recommendations regarding the NPDES permit for the lake.

Evaluation of Ore Concentrates, Peeples Mine, Skull Valley, Arizona

Dr. Finegan managed the evaluation of the volume of ore concentrates at a mine in Arizona, using seismic tomography methods. Pits previously excavated on the site had been filled with mineral concentrates that contain various precious metals. The scope of work included review of existing aerial photographs and site assay reports followed by two-dimensional (2D) surface seismic tomography surveys to aid in identifying the bottom and sidewalls of the pits. These data were used to calculate estimated volumes of ore concentrates within each pit. These data were used by the client to estimate the value of the ore for potential sale.

Program Manager of Environmental Projects for Landfills in San Bernardino County, California

Dr. Finegan was Program Manager for all environmental monitoring and reporting programs at 26 landfills in the County of San Bernardino, California. He provided project management for ongoing monitoring and environmental programs at 26 landfills, including developing project scopes, writing and releasing RFPs, reviewing proposals and selecting both monitoring/reporting and laboratory contractors. Management also included extensive interaction with three California Regional Water Quality Control Board (RWQCB) regions and the LEA, technical oversight of all project tasks, making recommendations and implementing scope reductions and enhancements, and report editing and review. In addition to Detection Monitoring, managed all environmental assessment, engineering feasibility studies (EFSs), corrective action, and monitoring projects and programs for County landfills, including Subtitle D perimeter gas-migration, NPDES, and septage impoundments. Chemicals of concern included perchlorate, VOCs, hexavalent chromium, nitrate and others from septic disposal, and various other inorganic chemicals and metals.

James Finegan, PhD, PG, CHg

Project Experience (cont.)

Hydrogeologic Investigation for Landfill Expansion, Central Landfill, Sonoma County, California
Project hydrogeologist in support of the hydrogeologic investigation for landfill expansion at Sonoma County's Central Landfill. The project included drilling of 8 boreholes to 100 to 300 feet, which were initially cored with HQ-wireline coring equipment and the reamed for borehole geophysical logging (caliper, electrical resistivity, acoustic televiewer and heat-pulse flow) and subsequently completed as groundwater monitoring wells. Step-drawdown and 24-hour aquifer pumping tests were performed within the fractured crystalline bedrock. The pumping test data, geophysical logs, and water quality data were used to assess the characteristics of the bedrock aquifer and develop a groundwater monitoring network.

Technical Advisor for Superfund Investigation, Cajon Disposal Site, San Bernardino County, California
Dr. Finegan served as primary technical advisor to the County of San Bernardino Solid Waste Management Division regarding inclusion of the Cajon Disposal Site (CDS) in the Source Operable Unit investigation of the Newmark Superfund Site. The CDS is located near Devor, California, adjacent to Cajon Wash. Displacement associated with the San Jacinto fault system has created a complex hydrogeologic environment beneath the CDS, which is located within the up-gradient portion of the Source Operable Unit. Chlorinated aliphatic compounds (e.g., tetrachloroethene) are the chemicals of concern in the Newmark plume. Dr. Finegan reviewed and evaluated data and reports produced by the US EPA, the Army Corps of Engineers, and multiple consultants working in the Newmark Superfund Site. He also represented the County at technical and negotiation meetings with the US EPA and the US DOJ and has provided technical evaluations and responses to EPA claims regarding the CDS.

Groundwater Monitoring and Reporting Programs, Salinas Valley Solid Waste Authority, Monterey County, California
Dr. Finegan was Project Manager for groundwater monitoring and reporting programs at four landfills in the County of Monterey, including the Crazy Horse Sanitary Landfill, a NPL site with VOCs as the primary chemicals of concern. Project responsibilities included quarterly and semi-annual sampling and reporting, technical review of work by other consultants working at these landfills, and interaction with the Central Coast RWQCB. Dr. Finegan also evaluated and made recommendations regarding the corrective action system at the Crazy Horse Landfill, including initiating a one-year rebound test after system shutdown.

Hydrogeologic Investigation, Yucaipa Disposal Site, San Bernardino County, California
Dr. Finegan was the Lead Hydrogeologist responsible for supervising hydrogeologic studies associated with a VOC release from the closed Yucaipa Disposal Site located adjacent to a regional park in Yucaipa, California. Work included a geologic and hydrogeologic characterization by traditional and geophysical methods. The STING resistivity geophysical method was used to identify a complex of faults in bedrock beneath a thick alluvial section, which affect groundwater flow and contaminant transport. The STING data was used to guide the location of exploratory boring, temporary wells, and 8 permanent groundwater monitoring wells. Results of the field program (including quarterly water quality data and aquifer pumping tests) were used to assess the aquifer characteristics and the VOC plume geometry. Groundwater modeling (including MODFLOW and MODPATH) were used to simulate groundwater flow and attenuation of contaminants with distance from the site.

Geologic Investigations and Design and Installation of Detection Monitoring Network, Barstow Sanitary Landfill, San Bernardino County, California
Dr. Finegan was project manager for establishing a detection monitoring network at the Class III Barstow Sanitary Landfill in San Bernardino County, California. This landfill is a regional refuse disposal location for San Bernardino County and has been studied extensively for capacity expansion. The property includes a sanitary landfill for solid refuse and two large lined impoundments for collection and evaporation of septic and other liquid wastes. Groundwater at this site was known to be greater than 500 feet deep, so mud-rotary drilling was used to drill to over 700 feet depth and install three groundwater monitoring wells spaced around the existing landfill and proposed expansion areas.

James Finegan, PhD, PG, CHg

Project Experience (cont.)

Detection Monitoring and Evaluation Monitoring Programs, Adelanto Disposal Site, San Bernardino County, California
Dr. Finegan was project manager for establishing a detection monitoring network and a subsequent evaluation monitoring program (EMP) to assess the extent of VOC impacts at the Adelanto Disposal Site in San Bernardino County, California. The initial work included drilling and installation of three groundwater monitoring wells and three soil-pore gas monitoring probes in a complex aquifer system of alluvium and bedrock. Two phases of EMP investigations included installation of four additional groundwater monitoring wells and evaluation of groundwater flow direction and transport of groundwater contaminants. Transport evaluations included computer modeling using BIOCHLOR.

EISB Installation, Seal Beach Naval Weapons Station, Seal Beach, California
Dr. Finegan was an on-site PG for the installation of an enhanced in-situ bioremediation system and monitored-natural-attenuation network at the Seal Beach Naval Weapons Station in Seal Beach, California. Almost 250 boreholes were drilled in a complex alluvial/coastal aquifer system to depths ranging from 40 to 205 feet using rotosonic methods with continuous core, including a network of groundwater monitoring wells and the installation of source area and down-gradient biobarrier injection wells for the addition of electron donor (emulsified vegetable oil) and active microbial cultures. Several VOCs (primarily trichloroethene) are contaminants of concern in a plume that extends 4000 feet from the source area. The on-site PG was responsible for drilling, detailed lithologic logging of continuous cores, and well installation, attendance at site meetings, instruction and training of new and inexperienced personnel, and supervision and coordination of all personnel on site during drilling, well and well-head construction, and well development activities.

Residential Septic System Testing, Design, and Expert Witness, Southern California
Dr. Finegan has served as an expert for failed residential community septic systems and has directed and acted as field geologist for the drilling of over 1000 24- to 72-inch-diameter boreholes in alluvium and bedrock throughout Los Angeles, Riverside, and San Bernardino Counties. Most of these boreholes were subject to percolation testing for the design of residential septic systems. Geologic evaluation included down-hole logging of many of these boreholes to depths of up to 70 feet. Dr. Finegan also has extensive experience in testing and design of small test pits for leach-line systems.

Evaluation of Waste Classification Protocols, Forward Landfill, San Joaquin County, California
Performed coupled vadose and saturated zone modeling to evaluate proposed “designated levels” for several inorganic constituents typical of landfill leachate at the Forward Landfill in San Joaquin County, California. The designated levels are used to classify wastes that may be delivered to the site for appropriate disposal within the Class II and Class III waste management units at the Forward Landfill. Pursuant to this evaluation, dilution-attenuation factors (DAFs) were calculated for waste constituents using the US EPA’s Multimedia Exposure Assessment Model (MULTIMED). Prior to evaluating designated levels, Dr. Finegan performed leachate generation analyses for an expansion area at the Forward Landfill using the Hydrologic Evaluation of Landfill Performance (HELP) model.

Numerical Groundwater Flow and Capture Zone Model Evaluation, Orange County, California
Dr. Finegan assessed and used a large numerical groundwater flow model to simulate flow patterns and travel times near a groundwater injection barrier in the Orange County Groundwater Basin. The model was originally created by others to simulate optimal injection/barrier conditions to prevent seawater intrusion into the Basin. In addition, Dr. Finegan performed detailed evaluation of available data from wells near the injection barrier to aid in developing a conceptual model and thorough understanding of the Basin.

Spencer v. KB Homes, Carlsbad, California
Dr. Finegan was retained as an expert in hydrogeology for litigation involving a housing development in Carlsbad, California, where shallow groundwater conditions are impacting residential lots. He has evaluated historical site groundwater conditions and observed lot-specific destructive testing and installation of piezometers pursuant to developing opinions for this case. Dr. Finegan has provided expert testimony at deposition regarding hydrogeologic conditions at the site as well as opinions on proposed remedies.

James Finegan, PhD, PG, CHg

Project Experience (cont.)

Failed Community Septic System, Malibu, California
Dr. Finegan provided litigation support as an expert for a failed community septic disposal system in Malibu, California. Approximately 20 homes were connected to the system, which comprised individual septic tanks, a conveyance system, and dosing from large storage tanks to a group of seepage pits excavated in volcanic bedrock. The seepage pits failed prematurely after a few years of use, and Dr. Finegan was hired as an expert to evaluate subsurface hydrogeologic conditions as well as parts of the septic-system testing and design that may have contributed to failure of the system. The case settled prior to going to trial.

Gonzalez v. Trimark Pacific Homes, Bonita, California
Dr. Finegan was an expert witness for evaluation of groundwater conditions near a residential development in Bonita, California. The grading and construction of the housing development was alleged to have caused shallow groundwater conditions that were impacting a single-family residential property adjacent to the development. Dr. Finegan performed sample collection and data evaluation to assess groundwater conditions at the single-family residence and vicinity. This case settled prior to going to trial.

Publications and Papers
Finegan, J.M., J. Stock. "Innovative techniques for CPT operation and interpretation of LIF results." CPT'14, Las Vegas, NV*, 2014.*
Murphy, R., T. Reeder, and J.M. Finegan. "Hydrogeologic Investigation of the Yucaipa Disposal Site" in Engineering Geology Practice in Northern California. Association of Engineering Geologists , California, 2002.
Finegan, J.M., H.B. Kerfoot, and A.L. Rivera. "An Evaluation of Assisted Landfill Gas Venting at an Arid-Region Landfill in San Bernardino County, California." 24th Annual Landfill Gas Symposium – SWANA, Dallas, Texas, 2001.
Raub, M.L., D.J. Morell, E. Aronson, J.M. Finegan, R.J. Keenan, and A.L. Rivera. "Mechanisms of Landfill Gas Migration in the Vadose Zone at an Arid-Region Landfill." 3rd Annual Arid Climate Symposium - SWANA, Albuquerque, New Mexico, 2000.
Finegan, J.M., A.M. Campbell, and R.J. Keenan. "Analysis of Impacts to Groundwater and the Vadose Zone at an Arid-Region Landfill in San Bernardino County, California." 1999 ASCE/CSCE Conference on Environmental Engineering, Norfolk, Virginia, 1999.
Finegan, J.M. "Conceptual Model of Groundwater Flow in a Basaltic Aquifer System near Melbourne, Australia." Groundwater: Sustainable Solutions, Melbourne, Australia, 1998.
Finegan, J.M. "Transport, Attenuation, and Degradation of Organic Chemicals in a Basaltic Aquifer System near Melbourne, Australia." PhD thesis in contaminant hydrogeology, University of Melbourne, 577 pp (including appendices), Melbourne, Australia, 1996.
Finegan, J.M. "Groundwater Contamination in a Basalt Aquifer - Transport and Attenuation of Pollutants." Water Down Under '94, Adelaide, Australia, 1994.

Recent Presentations
Symposium on the Application of Geophysics to Engineering and Environmental Problems, Austin, TX. "Using NMR [Nuclear Magnetic Resonance] To Evaluate the Source and Distribution of a Shallow Groundwater Release." 03/22-26/2015. [includes extended abstract]
National Ground Water Association Conference on Groundwater in Fractured Rock and Sediments. Burlington, VT. "Stringfellow Superfund Site – Characterization, Remediation, and Modeling of Groundwater Impacts." 09/23-24/2013
Southern California Chinese American Environmental Protection Association, Fifth Symposium on Global Emerging Environmental Challenges and Government Responses. San Gabriel, California. "Groundwater Impacts and Fate and Transport Modeling of Perchlorate Stringfellow Superfund Site, Riverside County, CA." 8/11/2012.
Association for Environmental Health and Sciences Foundation, Inc., 22ND Annual International Conference on Soil, Water, Energy, and Air. San Diego, California. "Fate and Transport Modeling of Perchlorate Stringfellow Superfund Site, Riverside County, CA." 3/20/2012.
National Ground Water Association 2011 Ground Water Summit. Baltimore, MD. "Numerical Modeling of a Complex Aquifer System, Stringfellow Superfund Site, Riverside County, California." 05/04/2011

James Finegan, PhD, PG, CHg
Recent Presentations (cont.)

Association of Engineering and Environmental Geologists, Inland Chapter, monthly meeting. "Municipal Landfills and Groundwater Contamination." 06/20/2007.
A Continuing Education Series in Geology at UC Riverside Extension; sponsored by the Inland Geological Society and Association of Engineering and Environmental Geologists, Inland Chapter. "Numerical Groundwater Flow and Contaminant Transport Modeling." 03/10/2007.

Awards
The Claus Gloe Hydrogeological Award, 1998, International Association of Hydrogeologists, Victoria, Australia, for significantly advancing the understanding of hydrogeology in Victoria.
California Association of Mineralogical Societies Scholarship, 1988, California Association of Mineralogical Societies Student academic scholarship.
Pew Grant, 1988, Pew Foundation for undergraduate research.