Ralph B. Kalfayan, SBN133464
David B. Zlotnick, SBN 195607
KRAUSE, KALFAYAN, BENINK
& SLAVENS LLP
625 Broadway, Suite 635
San Diego, CA 92101
Tel: (619) 232-0331
Fax: (619) 232-4019

Attorneys for Plaintiff and the Class

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

ANTELOPE VALLEY GROUNDWATER CASES	RELATED CASE TO JUDICIAL COUNCIL COORDINATION PROCEEDING NO. 4408
This Pleading Relates to Included Action: REBECCA LEE WILLIS, on behalf of herself and all others similarly situated, Plaintiff, vs. LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 40; CITY OF LANCASTER; CITY OF LOS ANGELES; CITY OF PALMDALE; PALMDALE WATER DISTRICT; LITTLEROCK CREEK IRRIGATION DISTRICT; PALM RANCH IRRIGATION DISTRICT; QUARTZ HILL WATER DISTRICT; ANTELOPE VALLEY WATER CO.; ROSAMOND COMMUNITY SERVICE DISTRICT; MOJAVE PUBLIC UTILITY DISTRICT; and DOES 1 through 1,000; Defendants.	The Honorable Jack Komar Coordination Trial Judge REBECCA WILLIS' AND THE CLASS'MEMORANDUM OF POINTS AND AUTHORITIES IN SUPPORT OF MOTION FOR APPOINTMENT OF EXPERT WITNESS DATE: August 17, 2009 TIME: 9:00 a.m. PLACE: Dept. 1 JUDGE: Hon. Jack Komar

INTRODUCTION

The Willis Class respectfully submits this Memorandum of Points and Authorities in support of its Motion for a Court Appointed Expert Witness. Given the various concerns

previously expressed by the Court and parties, Willis requests that the Court appoint its own expert to assist it in accurately determining the Basin's yield, the cost of which should be borne by the Public Water Suppliers. That is appropriate for the following reasons:

(1) The yield determination is a critical aspect of this trial, which will affect the rights of numerous parties and Class members who cannot meaningfully obtain expert advice.

(2) The yield determination is highly technical and involves a massive amount of scientific evidence. The Court should use its authority to get appropriate expert assistance in making this critical determination as accurately as possible.

(3) The primary experts who are expected to testify as to the Basin's yield are both highly qualified persons, but they have reached dramatically varying opinions. This shows the need for an impartial expert.

(4) The Court has a fiduciary duty to protect the interests of the classes as well as a duty to the public to protect the Basin. Further, the appointment of an independent expert will increase public perception that the yield decision has been fairly and carefully reached.

(5) The incremental costs to the Public Water Suppliers will be modest.

Finally, we suggest that the Court appoint Professor Thomas Harter as its expert.[1] He has indicated an interest in serving in that capacity and has formed no opinions regarding the matters at issue.

ARGUMENT

1. The Yield Determination Is a Critical Aspect of This Trial, Which Will Affect the Rights of Numerous Parties and Class Members Who Otherwise Cannot Participate in that Determination.

The importance of the yield determination cannot be overestimated. In many respects, this is the fundamental issue in this case. That determination will significantly affect the interests of the parties for years to come as well as the future of the Antelope Valley Basin. It is no exaggeration to say that the livelihood and future of thousands of persons may depend on this

[1] Professor Harter's declaration and c.v. are attached hereto as Exhibit A.

finding. Moreover, as plaintiff Willis has previously explained, there is no practical way for the Class(es) to retain experts to protect their interests in this determination. Not only should Class counsel not be required to front the significant costs of such an expert, they cannot even recover those costs under Section 1021.5 of the Code of Civil Procedure, pursuant to which plaintiffs' counsel expect to be compensated. See *Olson v. Automobile Club of Southern California*, (2008) 42 Cal. 4th 1142. Hence, it is impractical for the Class to obtain expert opinion on this crucial matter.

This critical issue should not be decided solely based on expert testimony propounded by the Public Water Suppliers ("PWS") and large agricultural interests. Rather, the Court should appoint its own expert to review the findings and opinions of the parties' experts and counsel the Court with respect thereto.

2. The yield determination is highly technical and involves a large amount of technical scientific evidence. The Court should use its authority to get appropriate expert assistance in making this critical determination accurately.

It is incontrovertible that the yield determination is highly technical and will involve review of a massive amount of scientific evidence. This is precisely the type of situation where a trial court should exercise its authority to appoint an expert to assist it in its determination. *Manual for Complex Litigation*Section 11.51 (4th ed. 2006). *See Federal Trade Comm. v. Enforma Natural Prods., Inc.* 362 F.3d 1204, 1213 (9th Cir. 2004); *Mercury Cas. Co. v. Superior Court* (1986) 179 Cal. App. 3d 1027, 1032-33. Notably, the appointment of such experts is not uncommon in condemnation cases, where, as here, government entities are asserting property claims against private persons. *See Contra Costa County Flood Dist. v. Armstrong* (1961) 193 Cal. App. 2d 206, 210.

Of course, the Court must ultimately decide this highly technical issue based on the evidence presented to it. But given the critical nature of this issue and the complexity and voluminous nature of the evidence, the Court should have the guidance of a truly independent expert.

3. The primary experts who are expected to testify as to the Basin's yield are both highly qualified persons, but they have reached dramatically varying opinions,

which shows the need for an impartial expert.

It is noteworthy that Messrs. Scalmanini and Sheehan – the primary experts expected to testify as to yield -- are both highly qualified, but have come to widely differing opinions as to the Basin's yield. Both of these experts have studied the Basin at great detail, but they have come to widely varying conclusions about its yield. The widely disparate nature of their opinions is another reason why the Court should take advantage of its authority to obtain independent expert assistance.

We anticipate that the PWS' expert, Joseph Scalmanini, will likely opine that the Basin's native recharge is approximately 60,000 AFY and that return flows from agricultural use and imported water are approximately 50,000 AFY, resulting in a Total Sustainable Yield of approximately 110,000 AFY. By contrast, we anticipate that Bolthouse Farms' expert, Thomas Sheehan, will opine that the Basin's native recharge is approximately 100,000 AFY and that return flows from agricultural use and imported water are approximately 75,000 AFY, resulting in a Total Sustainable Yield of approximately 175,000 AFY. In short, his estimate of the Basin's yield is approximately 60% greater than that of Mr. Scalmanini.

These are significantly varying numbers, the determination of which will have a major impact on the future course of these proceedings as well as the economic and other interests of the parties and Class members. Based on historical rates of pumping, **if Mr. Scalmanini's estimates are correct, the Court will likely find that the Basin is and has been in a state of overdraft. By contrast, if Mr. Sheehan's estimates are correct, the Court will likely not find overdraft.** Equally important, their varying analyses are based on a number of technical factors, each of which they have studied extensively. Because of the importance of this decision, the highly technical nature of the evidence, and the widely disparate views of well regarded experts, the Court should avail itself of the guidance of an independent expert.

4. **The Court has a fiduciary duty to protect the interests of the classes as well as a duty to the public to protect the Basin. Further, the appointment of an independent expert will increase public perception that the yield decision has been fairly and carefully reached.**

As the Court is aware, it has a fiduciary duty to protect the interests of the Willis and

Wood Classes that militates for the appointment of an independent expert. *See Kullar v. Foot Locker Retail, Inc.* (2008) 168 Cal. App. 4th 116, 129. As to other litigants, the Court need merely be impartial. But as to the Classes, the Court has the responsibility to make sure that the process fairly protects the members' interests. Given the vital importance of the yield determination and the fact that the Class has no practical means to obtain expert assistance, the Court should appoint its own independent expert to review and guide its findings.

Notably, the Willis Class has no interest in maximizing or minimizing the Basin's yield. Rather, the Class' interest is in protecting the viability of the Basin without inappropriately encroaching on the parties' ability to use the Basin's groundwater. Thus, the Class' interests are coextensive with the Court's interest in making a just and appropriate finding. Unless the Court appoints an expert, the Classes will be powerless to defend against the PWS' claim that the Basin is in overdraft. By appointing an expert, the Court will enhance its ability to reach an appropriate result on this critical issue and fulfill its fiduciary obligation to protect the Class.

Although the PWS question the Court's authority to appoint an independent expert for the benefit of the Class, it is clear that the Court may appoint such an expert to assist it in making its determinations. Evidence Code 730 provides:

> When it appears to the court, at any time before or during the trial of an action, that expert evidence is or may be required by the court or by any party to the action, the court on its own motion or on motion of any party may appoint one or more experts to investigate, to render a report as may be ordered by the court, and to testify as an expert at the trial of the action relative to the fact or matter as to which the expert evidence is or may be required. The court may fix the compensation for these services, if any, rendered by any person appointed under this section, in addition to any service as a witness, at the amount as seems reasonable to the court.

Finally, the appointment of an independent expert will increase public perception that the critical yield decision has been made in a careful, just, and fair manner. That alone justifies such an expert.

5. <u>Professor Harter Is an Appropriate Independent Expert.</u>

It cannot be disputed that Professor Harter is a qualified expert to assist the

Court, and we suggest that the Court appoint him to assist its determination of the basin's yield. Professor Harter has a PhD in Hydrology and holds the Robert M. Hagan Endowed Chair in Water Management and Policy at the University of California, Davis. As his c.v. shows, he has extensive experience analyzing large groundwater basins.

Although Willis Class counsel has had some preliminary conversations with Professor Harter, we have not had any substantive communications with him regarding his proposed work; nor has he expressed any opinions on the Basin's yield. He is an unbiased and well-qualified academic who can ably assist the Court in reaching a fair and just determination of this vital issue.

6. The Incremental Costs to the Public Water Suppliers Will Be Modest.

It is appropriate for the Court to require the Public Water Suppliers to bear the costs of the Court's expert, at least in the first instance, since the Class' position in this litigation is essentially defensive in nature and the Public Water Suppliers benefit from the Class' presence in achieving a comprehensive adjudication. Moreover, the incremental cost to the PWS will be modest.

Professor Harter has estimated that he can analyze the existing experts' reports and opinions, including reviewing relevant underlying data, and provide his opinions with respect thereto for some $85,000. While not insignificant, that amount is less than 10% of the amount that we estimate the PWS have collectively incurred for their experts -- an amount that cannot and has not been matched by any of the other parties. Under these circumstances, it is appropriate to impose the costs of an independent expert, such as Professor Harter, on the PWS.

The Public Water Suppliers' argument that there are already sufficient experts in this case misses the mark. The PWS are large governmental entities who have hired many experts to assist in presenting their case. Given the vital interests at stake and the greatly disparate expert opinions, the parties and the Court need the services of a truly impartial expert to ensure that justice is done.

///

CONCLUSION

For the reasons stated above, the Court should exercise its authority under Section 730 of the Evidence Code and appoint an independent expert to assist the Court in determining the Basin's yield.

Dated: July 23, 2009

KRAUSE KALFAYAN BENINK & SLAVENS LLP

/s/ Ralph B. Kalfayan
Ralph B. Kalfayan, Esq.
David B. Zlotnick, Esq.
Attorneys for Plaintiff and the Class

EXHIBIT A

Ralph B. Kalfayan, SBN133464
David B. Zlotnick, SBN 195607
KRAUSE, KALFAYAN, BENINK
& SLAVENS LLP
625 Broadway, Suite 635
San Diego, CA 92101
Tel: (619) 232-0331
Fax: (619) 232-4019

Attorneys for Plaintiff and the Class

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

ANTELOPE VALLEY GROUNDWATER CASES This Pleading Relates to Included Action: REBECCA LEE WILLIS, on behalf of herself and all others similarly situated, Plaintiff, vs. LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 40; CITY OF LANCASTER; CITY OF LOS ANGELES; CITY OF PALMDALE; PALMDALE WATER DISTRICT; LITTLEROCK CREEK IRRIGATION DISTRICT; PALM RANCH IRRIGATION DISTRICT; QUARTZ HILL WATER DISTRICT; ANTELOPE VALLEY WATER CO.; ROSAMOND COMMUNITY SERVICE DISTRICT; MOJAVE PUBLIC UTILITY DISTRICT; and DOES 1 through 1,000; Defendants.	RELATED CASE TO JUDICIAL COUNCIL COORDINATION PROCEEDING NO. 4408 The Honorable Jack Komar Coordination Trial Judge DECLARATION OF THOMAS HARTER IN SUPPORT OF MOTION FOR EXPERT WITNESS FEES Date: TBD Time: TBD Dept: LASC-1

///

///

///

I, Thomas Harter, declare:

1. I am a hydrologist at UC Davis. Attached to my declaration is a true and correct copy of my curriculum vitae. I make this declaration in support of a motion to be appointed as an expert witness in this case. I have personal knowledge of the facts contained in this declaration and am willing to testify to the facts herein.

2. I have agreed to provide the law firm of Krause, Kalfayan, Benink & Slavens (KKBS) with expert hydrology/geology work in connection with the Antelope Valley groundwater adjudication. The work shall primarily include review, analysis, and opinion regarding the work of other experts retained by various parties in this litigation. Generally, I shall opine regarding the Safe Yield.

3. The gross budget for the work, fees, and costs, is estimated to be approximately $85,000. I shall bill for professional services plus actual expenses only after the court approves the scope of work and the budget. The 2009 billing rates for staff are as follow:

Thomas Harter Research.....$300/hour
Thomas Harter Testimony.....$600/hour
Research Associates.....$60/hour to $150/hour

I declare under penalty of perjury under the laws of California and the United States that the foregoing is true and correct. Executed on 28 day of February, 2009, in Davis, California.

Thomas Harter

Thomas Harter, Ph.D.

Robert M. Hagan Endowed Chair in Water Management and Policy

Department of Land, Air, and Water Resources
University of California, Davis
One Shields Ave.
Davis, CA 95616
w/530-752-2709 f/530-752-5262
thharter@ucdavis.edu
http://groundwater.ucdavis.edu

Education and Other Qualifications

PhD, Hydrology, University of Arizona, 1994
MS(Diplom), Phys. Geography/Hydrology, Universität Freiburg & Universität Stuttgart, Germany, 1989
BS (Vordiplom), Physical Geography/Hydrology, Universität Freiburg, 1985

Honors, Fellowships, Awards

2007-current, Robert M. Hagan Endowed Chair, Water Management and Policy
2008, Western Extension Directors' Award of Excellence
2007, Kevin J. Neese Award, Groundwater Resources Association of California
1991/92, Harshbarger Fellow, University of Arizona
1985/86, Fulbright Scholar, University of Arizona
1983/89, Fellow of the Studienstiftung des Deutschen Volkes, Bonn, Germany

Society Memberships

American Geophysical Union
European Geosciences Union
National Ground Water Association
Interantional Association of Hydrologic Sciences

Editorial and Professional Responsibilities

Associate Editor, Water Resources Research
Associate Editor, Vadose Zone Journal
Board of Directors, Groundwater Resources Association

Representative Project Experience

Deep Vadose Zone Characterization and Flow/Contaminant Transport Modeling, Principal investigator on several studies to investigate deep groundwater recharge and nitrate/pesticide transport in thick, heterogeneous, alluvial vadose zones; including field characterization, laboratory measurements, and advanced computer modeling.

Groundwater Modeling Research Projects; Principal investigator on projects involving the development of basin groundwater- and surface water models, e.g., for the development of a conjunctive use management strategy in a 1,500 sq. mile watershed, eastern Tulare Lake Basin, California, and for protecting base-flow conditions in the Scott River, Klamath Basin, California; development of a regional stochastic groundwater model for the assessment of deep groundwater contamination from shallow saline water in a 550 square mile watershed in the Western San Joaquin Valley, California. Modeling projects involve model conceptualization, data compilation, data processing, integration of geostatistical, GIS, database, and groundwater modeling software (GSLIB, ArcGIS, MS Access, MODFLOW, MT3D, RWHET), programming (Fortran, Matlab, Comsol), model calibration, application, and research.

Contaminant Emission and Subsurface Transport in (Animal) Agriculture; Principal Investigator and Co-Investigator on a suite of research and extension projects dealing with groundwater contamination from dairies and other confined animal facilities, and from other agricultural landuses; long-term pollution; field reconnaissance, monitoring, groundwater modeling (flow, transport, quality); development of monitoring networks and best management practices; environmental fate and transport of salts, nitrate, pathogens (*Cryptosporidium*, *E. Coli 117 O157*, *Salmonella*, *Campylobacter*), antibiotics and other pharmaceuticals, steroid hormones, groundwater forensics related to animal farming; mathematical/computational methods for fate and transport modeling, upscaling across bench-, plot-, field-, farm-, to regional scale.

Scientific and Technical Advising, Public Service, Extensive technical reviews of various groundwater development projects and participation on technical panels, review committees, and technical advisory committees (Kaweah River Rock Gravel Mine, Tulare County; Calaveras Mining project, Fresno County; Canada del Oro Recharge Study, Pima County; Calfed Water Use Efficiency - Water Measurement Panel; USDA-NRCS P-Index Technical Committee; USDA-NRCS Comprehensive Nutrient Management Planning Technical Committee; US EPA Bank Filtration Technical Advisory Committee; Monterey County Nitrate Technical Advisory Committee; Scott Valley Water Committee; Tulare County Water Commission; California Dairy Quality Assurance Program, and others)

Short Courses and Workshops Developed and Taught

"Principles of Groundwater Flow and Transport Modeling." 3-day short course.

"Introduction to Vadose Zone Modeling." 3-day short course.

"Groundwater, Wells, and Pumps: A Workshop for Growers." 1-day workshop.

"The Groundwater Workshop." 1-day workshop.

"Applied Groundwater Hydrology: Principles, Measurements, and Interpretation." 2-day short course.

"Drinking Water Source Assessment in Groundwater and Surface Water." 2-day short course.

"Introduction to Groundwater and Watershed Hydrology: Monitoring, Assessment and Protection." 2-day short course.

"Practice of Groundwater Flow & Transport Modeling." Upper level course, UC Davis

Publications (* indicates peer-reviewed):

* Watanabe, N., T. Harter, and B. A. Bergamaschi, 2008. Environmental occurrence and shallow groundwater detection of the antibiotic Monensin from dairy farms. J. Environ. Qual. 37:S-78–S-85. doi:10.2134/jeq2007.0371.

* Harter, T. and L. Rollins (eds.), 2008. Watersheds, Groundwater, and Drinking Water - A Practical Guide. University of California Agriculture and Natural Resources Publication 3497. 274pp.

* Rains, M.C., R. A. Dahlgren, G. E. Fogg, T. Harter, and R. J. Williamson, 2008. Geological control of physical and chemical hydrology in California vernal pools. Wetlands 28(2):347-362. (pdf file for personal use only)

* Chomycia, J.C., P.J. Hernes, T. Harter, and B.A. Bergamaschi, 2008. Land management impacts on dairy-derived dissolved organic carbon in ground water. J. Env. Qual. 37(2), 333-343. doi:10.2134/jeq2007.0183.

* Harter, T., E. R. Atwill, L. L. Hou, B. M. Karle, and K. W. Tate, 2008. Developing risk models of *Cryptosporidium* transport in soils from vegetated, tilted soilbox experiments. J. Environ. Qual 37: 245-258.

* Vereecken, H., T. Kamai, T. Harter, R. Kasteel, J. Hopmans, and J. Vanderborght, 2007. Explaining soil moisture variability as a function of mean soil moisture: A stochastic unsaturated flow perspective, Geophys. Res. Lett., 34, L22402, doi:10.1029/2007GL031813.

* Singleton, M. J., B. K. Esser, J. E. Moran, G. B. Hudson, W. W. McNab, and T. Harter, 2007. Saturated zone denitrification: Potential for natural attenuation of nitrate contamination in shallow groundwater under dairy operations. Env. Sci. & Technol. 41 (3), 759-765.

* Cortis, A., T. Harter, L. L. Hou, E. R. Atwill, A. I. Packman, P. G. Green, 2007. Transport of *Cryptosporidium parvum* in porous media: Long-term elution experiments and continuous time random walk filtration modeling. Water Resour. Res. 42(12), W12S13, doi:10.1029/2006WR004897.

* Vereecken, H., R. Kasteel, J. Vanderborght, and T. Harter. 2007. Upscaling hydraulic propertes and soil water flow processes in heterogeneous soils: a review. Vadose Zone Journal 6(1), 1-28.

* Zhang, H., T. Harter, and B. Sivakumar, 2006. Nonpoint source solute transport normal to aquifer bedding in heterogeneous, Markov chain random fields, Water Resour. Res., Vol. 42, No. 6, W06403, 10.1029/2004WR003808.

* Marques, G. F., J. R. Lund, M. R. Leu, M. Jenkins, R. Howitt, T. Harter, S. Hatchett, N. Ruud, and S. Burke, 2006. Economically driven simulation of regional water systems: Friant-Kern, California. J. of Water Resour. Mgmt. and Planning 132 (6): 468-479.

* Cable-Rains, M., G. E. Fogg, T. Harter, R. A. Dahlgren, and R. J. Williamson, 2006. The role of perched aquifers in hydrological connectivity and biogeochemical processes in vernal pool landscapes, Central Valley, California. Hydrol. Process. 20, 1157–1175.

* Searcy, K.E., A. I. Packman, E. R. Atwill, and T. Harter, 2006. Deposition of Cryptosporidium oocysts in streambeds. Applied and Environmental Microbiology, 72(3):1810-1816.

* Chang, A., T. Harter, J. Letey, D. Meyer, R. D. Meyer, M. Campbell-Mathews, F. Mitloehner, S. Pettygrove, P. Robinson, R. Zhang, 2006. Managing Dairy Manure in the Central Valley of California; University of California Committee of Experts on Dairy Manure Management. University of California Agriculture and Natural Resources Publication 9004, http://anrcatalog.ucdavis.edu; 178 pp.

* Harter, T., 2005, Finite-size scaling analysis of percolation in three-dimensional correlated binary Markov chain random fields, Physical Review E 72(2), 26120 (8 pages), DOI: 10.1103/PhysRevE.72.026120.

* Harter, T., Y. S. Onsoy, K. Heeren, M. Denton, G. Weissmann, J. W. Hopmans, W. R. Horwath, 2005. Deep vadose zone hydrology demonstrates fate of nitrate in eastern San Joaquin Valley, *California Agriculture 59*(2):124-132.

* Searcy, K. E., A. Packman, E. R. Atwill, and T. Harter, 2005. Association of Cryptosporidium parvum with Suspended Particles: Impact on Oocyst Sedimentation, *Applied and Environmental Microbiology 71*(2):1072-1078.

* Sivakumar, B., T. Harter, and H. Zhang, 2005. Solute transport in a heterogeneous aquifer: A search for nonlinar deterministic dynamics, *Nonlinear Processes in Geophysics 12*(2):211-218.

* Sivakumar, B., T. Harter, H. Zhang, 2005. A fractal investigation of solute travel time in a

heterogeneous aquifer: Transition probability/Markov chain representation, *Ecological Modelling 182*:355-370.

* Onsoy, Y. S., T. Harter, T. R. Ginn, W. R. Horwath, 2005. Spatial variability and transport of nitrate in a deep alluvial vadose zone. *Vadose Zone J. 4*:41-55.

Harter, T. and J. Menke, 2005. Cow numbers and water quality - is there a magic number? A groundwater perspective. (revised from: Harter T., 2004, *Proceedings, National Alfalfa Symposium*, San Diego, December 13-15, 2004. 13 pages).

* Harter, T. and S. Talozi, 2004. A simple, inexpensive dialysis sampler for small diameter monitoring wells, *Ground Water Monitoring & Remediation, Fall 2004*, 97-105.

* Harter, T., C. Knudby, 2004. Effective conductivity of periodic media with cuboid inclusions. *Advances in Water Resources 27*(10):1017-1032.

* Harter, T. and J. W. Hopmans, 2004. Role of Vadose Zone Flow Processes in Regional Scale Hydrology: Review, Opportunities and Challenges. In: Feddes,R.A., G.H. de Rooij and J.C. van Dam, *Unsaturated Zone Modeling: Progress, Applications, and Challenges*, (Kluwer, 2004), p. 179-208.

* Kolodziej, E. P., T. Harter, D. L. Sedlak, 2004. Dairy wastewater, aquaculture, and spawning fish as sources of steroid hormones in the aquatic environment, *Env. Science and Technol. 38*, p.6377-6384.

* Ruud, N. C., T. Harter, and A. W. Naugle, 2004. Estimation of groundwater pumping as closure to the water balance of a semi-arid irrigated agricultural basin. *J. of Hydrology 297*:51-73.

* Nakamura, K., T. Harter, Y. Hirono, H. Horino, and T. Mitsuno, 2004. Assessment of root zone nitrogen leaching as affected by irrigation and nutrient management practices. *Vadose Zone J.* 3:1353–1366.

*Vrugt, J. A., G. H. Schoups, J. W. Hopmans, C. Young, W. W. Wallender, T. Harter, W. Bouten. 2004. Inverse modeling of large-scale spatially-distributed vadose zone properties using global optimization, *Water Resour. Res. 40*(6), W06503 10.1029/2003WR002706.

*Minasny, B., J. W. Hopmans, T. Harter, S. O. Eching, A. Tuli, M. A. Denton, 2004. Neural networks prediction of soil hydraulic functions for alluvial soils using multistep outflow data, *Soil Science Soc. Of Am. Journal 68*:417–429.

*Harter, T., 2004. Aquifers / Specific yield storage equation / Vulnerability mapping of groundwater resources / Animal farming operations: groundwater quality issues. *Wiley Encyplopedia of Water*, accepted.

*Harter T., Water rights and water quality protection in California, *in*: Harter, T. (ed.), *Watersheds and Groundwater: A Practical Guide:* University of California, DANR Publications, 14 p., *accepted*

*Harter T., Principles of hydrogeology, University of California, *in*: Harter, T. (ed.), *Watersheds and Groundwater: A Practical Guide;* DANR Publications, 18 p., *accepted*

*Harter T., Introduction to groundwater sampling and monitoring, *in*: Harter, T. (ed.), *Watersheds and Groundwater: A Practical Guide;* University of California, DANR Publications, 17 p., *accepted*

*Harter T., Delineation of wellhead protection areas, *in*: Harter, T. (ed.), *Watersheds and Groundwater: A Practical Guide;* University of California, DANR Publications, 27 p., *accepted*

*Harter T., Vulnerability assessment of groundwater resources, *in*: Harter, T. (ed.), *Watersheds and Groundwater: A Practical Guide;* University of California, DANR Publications, 13 p., *accepted*

*Jones, Alison, Mary Bianchi, John Harper, and Thomas Harter, Water Pollution Control Legislation, Farm Water Quality Program Fact Sheet, *University of California, DANR Publication 8088*, 5 p., 2003.

*Harter, T., Basic Concepts of Groundwater Hydrology, Farm Water Quality Program Fact Sheet, *University of California, DANR Publication 8083*, 5 p., 2003

*Harter T., Groundwater Quality and Groundwater Pollution, Farm Water Quality Program Fact Sheet, *University of California, DANR Publication 8084*, 5 p., 2003.

*Harter, T., Groundwater Sampling and Monitoring, Farm Water Quality Program Fact Sheet, *University of California, DANR Publication 8085*, 7 p., 2003.

*Harter, T., Water Well Design and Construction, Farm Water Quality Program Fact Sheet, *University of California, DANR Publication 8086*, 6 p., 2003.

*Prather, T., T. Harter, M. Bianchi, and J. Fallon, Developing Nonpoint Source Pollution Evaluation Programs, Farm Water Quality Program Fact Sheet, *University of California, DANR Publication 8087*, 4 p., 2003.

*Bianchi, M. and T. Harter, Nonpoint Sources of Pollution in Irrigated Agriculture, Farm Water Quality Program Fact Sheet *University of California, DANR Publication 8055*, 8 p., 2003.

*Wang, Z., L. Wu, T. Harter, J. Lu, W. A. Jury, A field study of preferential flow during soil water redistribution, Water Resour. Res. Vol. 39 No. 4, 10.1029/2001WR000903, 01 April 2003.

*Ruud, N. C., T. Harter, A. W. Naugle, A conjunctive use groundwater-surface water flow model for the Tule River groundwater basin in the eastern-central San Joaquin Valley, California; in: Marino, M. A. & S. P. Simonovic, Integrated Water Resources Management, IAHS Publication No. 272, p. 167-174.

*Harter, T., R. D. Meyer, M. C. Mathews. Nonpoint source pollution from animal farming in semi-arid regions: Spatio-tmporal variability and groundwater monitotin strategies, Post-Conference Proceedings, Future Groundwater Resources at Risk, Lisbon, Portugal, 25-27 June 2001; Lisbon, 2002.

Ruud, N. C., T. Harter, A. W. Naugle, 2002. A conjunctive use model for the Tule groundwater sub-basin area in the Southern-Eastern San Joaquin Valley, California, Final Report to the U.S. Bureau of Reclamation, November 2002, 196 pages.

*Atwill, E. R., L. Hou, B. M. Karle, T. Harter, K. W. Tate, R. A. Dahlgren, 2002. Transport of Cryptosporidium parvum oocysts through vegetated buffer strips and estimated filtration efficiency, Applied and Environmental Microbiology 68(11), pp. 5517-5527.

*Harter, T., H. Davis, M. C. Mathews, R. D. Meyer. Shallow groundwater quality on dairy farms with irrigated forage crops, J. of Contam. Hydrology 55, 287-315, 2002.

*Wang, Z., J. Lu, L. Wu, T. Harter, W. A. Jury, Visualizing preferential flow paths using ammonium carbonate and a pH-Indicator, Soil Sci. Soc. Of America J, .Vol. 66:347-351, 2002.

Mathews, M. C., E. Swenson, T. Harter, R. D. Meyer. Matching dairy lagoon nutrient application to crop nitrogen uptake using a flow meter and control valve. Paper Number 01-2105, 2001 ASAE Annual International Meeting, Sacramento, CA, July 30-August 1, 2001; 2001.

Campbell M. C., C. Frate, T. Harter, S. Sather, Lagoon water composition, sampling, and field analysis, Proceedings 2001. California Soil and Plant Conference, Fresno, February 7-8, 2001, pp. 43-51, 2001.

Harter, T., M. C. Mathews, R D. Meyer. Effects of dairy manure nutrient management on shallow groundwater nitrate: a case study. ASAE Meeting Presentation, Paper Number 01-2192, 2001 ASAE Annual International Meeting, Sacramento, CA, July 30-August 1, 2001; 2001.

Meyer, R. D., M. C. Mathews, J. Deng, T. Harter, Dairy lagoon water versus anhydrous ammonia for corn silage production and soil nitrogen management, Western Nutrient Management Conference Proceedings Vol. 4, Salt Lake City, March 8-9, 2001, pp. 65-73, 2001.

Harter, T., H. Davis, M. C. Mathews, R. D. Meyer. Monitoring shallow groundwater nitrogen loading from dairy facilities with irrigated forage crops. ASAE Meeting Presentation, Paper Number 01-2103, 2001 ASAE Annual International Meeting, Sacramento, CA, July 30-August 1, 2001; 2001.

*Harter, T., S. Wagner, E. R. Atwill, Colloid transport and filtration of *Cryptosporidium parvum* in sandy soils and aquifer sediments, *Env. Science and Technology, 34(1)*, 62-70, 2000.

*Harter, T., Application of stochastic theory in groundwater contamination risk analysis: Suggestions for the consulting geologist/engineer, *Theory, Modeling and Field Investigation in Hydrogeology: A special volume in honor of S. P. Neuman's 60th Birthday*, Special Book Series, Geological Society of America, in print, 1999.

Ruud, N. C., A. W. Naugle, T. Harter, A GIS-linked conjunctive use groundwater-surface water flow model for the Tule River basin, southeastern San Joaqin Valley, California, *Proceedings, International Conference on Calibration and Reliability in Groundwater Modeling*, Zuerich, Switzerland, 20-23 Sept. 1999, 739-744, 1999.

*Ruud, N. C., T. Harter, Conditional geostatistical model of alluvial hydrofacies for risk analysis of deep groundwater quality deterioration from shallow salinity, *Proceedings, International Conference on Calibration and Reliability in Groundwater Modeling, Zuerich*, Switzerland, 20-23 Sept. 1999, 443-448, 1999.

Harter T., R. D. Meyer, M. Campbell-Mathews, Shallow groundwater quality under dairies in Merced and Stanislaus County, *Proceedings, 1999 California Plant and Soil Conference*, 122-127, California Chapter of American Society of Agronomy, 1999.

Campbell-Mathews, M., R D. Meyer, T. Harter., Using dairy lagoon water to replace commercial fertilizer, *Proceedings, 1999 California Plant and Soil Conference*, 133-138, California Chapter of American Society of Agronomy, 1999.

*Harter T., Stochastic analysis of reactive transport in heterogeneous porous media, in: Govindaraju, R. S. (ed.), *Stochastic Methods in Subsurface Contaminant Hydrology*, American Society of Civil Engineers, 2002.

*Harter, T., and D. Zhang, Water flow and solute spreading in heterogeneous soils with spatially variable water content, *Water Resour. Res. 35*(2), 415-426, 1999.

*Harter, T., T.C.J. Yeh, Flow in unsaturated random porous media, nonlinear numerical analysis, and comparison to analytic stochastic models, *Adv. in Water Resour. 22*(3), 257-272, 1998.

Harter, T., K. Heeren, G. Weissmann, W.R. Horwath, J. Hopmans, Field Scale Characterization of a Heterogeneous, Moderately Deep Vadose Zone: The Kearney Research Site, *Proceedings, Characterization and Measurement of the Hydraulic Properties of Unsaturated Porous Media*, United States Salinity Laboratory, Riverside, California, 621-630, 1999.

Harter, T., K. Heeren, G. Weissmann, W.R. Horwath, J. Hopmans, Non-point Source Contamination in a Heterogeneous, Moderately Deep Vadose Zone: The Kearney Research Site, *Proceedings,*

Groundwater Quality: Remediation and Protection 1998, IAHS Publication No. 250, 257-263, 1998.

Harter, T., S. Wagner, E.R. Atwill, Groundwater protection: The fate of Cryptosporidium parvum in porous media, *Proceedings, Groundwater Quality: Remediation and Protection 1998*, IAHS Publication No. 250, 75-77, 1998.

Harter, T., Uncertainty and risk analysis of contaminant transport, Proceedings, *California Biennial Groundwater Conference*, Sacramento, September 14-15, 1997, University of California Water Resources Center Report No. 95, 97-107, 1998.

Harter T., 1996, On the usefulness of analytical stochastic models for solute transport in heterogeneous, variably saturated soils, *1996 ASAE Annual International Meeting*, Phoenix, Arizona, July 1996, ASAE, St. Joseph, Michigan 49085

*Harter T., A.L. Gutjahr, T.-C.J. Yeh, 1996, Linearized co-simulation of hydraulic conductivity, pressure head, and flux in saturated and unsaturated, heterogeneous porous media, *J. of Hydrology, 183*, 169-190

*Harter, T., T.C.J. Yeh, 1996, Stochastic analysis of solute transport in heterogeneous, variably saturated porous media, *Water Resour. Res.,20*, 1585-1595

*Harter, T., T.C.J. Yeh, 1996, Conditional stochastic analysis of solute transport in heterogeneous, variably saturated soils, *Water Resour. Res., 20*, 1597 - 1609

*Harter, T., D. Zhang, Conditional prediction of transport in unsaturated, heterogeneous porous media: Monte Carlo simulation versus Eulerian-Lagrangian theory, in: Wagner, B.J., T.H. Illangasekare, K.H. Jensen (eds.), *Models for assessing and monitoring groundwater quality*, IAHS Publiation No. 227, 193-201, 1995

Harter T., 1994. *Unconditional and conditional simulation of flow and transport in heterogeneous, variably saturated porous media*, PhD dissertation, University of Arizona, Tucson, Arizona

*Harter T., T.C.J. Yeh. 1993. An Efficient Method for Simulating Steady Unsaturated Flow in Random Porous Media: Using an Analytical Perturbation Solution as Initial Guess to a Numerical Model. *Water Resources Research 29*(12):4139-4149.

*Yeh T.C.J., R. Srivastava, A. Guzman, Th. Harter. 1993. A Numerical Model for Water Flow and Chemical Transport in Variably Saturated Porous Media. *Groundwater 31*(4):634-644.

Harter T., G. Teutsch. 1990. Pesticide Transport Models: Comparison and Validation with Soil Column Leaching Experiments. in: Weigman D.L.. 1990. "Pesticides in the Next Decade: The Challenge Ahead", *Proceedings of the Third National Research Conference on Pesticides*, November 8-9, 1990, Virginia Water Resources Research Center. pp.725-750.