



April 14, 2011

Borrego Water District
Attention: Board of Directors
806 Palm Canyon Drive
Borrego Springs, CA 92004-3101

Subject: Update of the Groundwater Management Plan and Anza Borrego Desert Integrated Regional Water Management Plan

Members of the Board:

Pursuant to Director Lyle Brecht's request, Wildermuth Environmental, Inc. (WEI) analyzed the *2009 Anza Borrego Desert Integrated Regional Water Management Plan* (ABD IRWMP) developed by Bill Mills and the *2002 Groundwater Management Plan* (GMP) and subsequently prepared a process description and cost estimate to update and synchronize those plans. Our observations regarding the *current situation on the ground* and past management plan efforts are listed below:

- The groundwater basin is in a serious state of overdraft, and the adverse economic consequences of overdraft are imminent. This is evident in the review of groundwater level and chemistry data and corroborated in the ongoing USGS studies in the basin where the hydrogeologic impacts of future pumping scenarios are being evaluated. It is highly unlikely that the overdraft and its attendant economic consequences will be self-correcting over time. What will be required is the active management of the basin to achieve an economically least-cost future for the Valley.
- The upper aquifer of the basin is deeper in the northern portion of the basin where agricultural production occurs and shallower in the southern portion of the basin where the District's production occurs. It is likely that the District's wells will go out of production long before any agricultural wells are threatened.
- In addition to these production problems, the District will most likely be required to treat groundwater, at great cost, prior to use as water quality deterioration is likely to be exacerbated as overdraft continues and the water levels of the upper aquifer drop towards the middle and lower aquifers. This requirement for advanced water treatment is common when withdrawals occur in older geologic sediments, which will occur in the basin as the water table in the upper aquifer drops further and withdrawals commence from the middle and lower aquifers.
- The Bureau of Reclamation is in the process of evaluating the importation of water into the ABD area; this work will be completed in the near future. The USGS investigation will also be completed in the near future. The implications of these two investigations will require updates to the GMP and the ABD IRWMP.

That said, the District and other Valley stakeholders will need to develop and implement a GMP now to ensure sustainable water use both for the purposes of using the basin for water banking and if importation is not economically feasible at this time.

- The 2002 GMP produced recommendations that would limit groundwater production to a yield that would be sustainable over time.
- The 2009 ABD IRWMP produced recommendations to augment local supplies with imported water and did not incorporate the recommendations of the 2002 GMP; at present, the two plans are neither consistent nor synchronized.
- These two plans need to be updated and synchronized to enable the District to be eligible for state grants under Proposition 84—the 2012 state water bond, should it be approved by the voters—and other future state grant programs.

We have observed and/or participated in the development of GMPs and IRWMPs, and based on our experience in these processes, we respectfully recommend that the District and the Valley's other stakeholders commence with the actions described below in a deliberate and expedited manner.

Develop an Implementable Groundwater Management Plan and ABDIRWMP with the Clear Objective of Establishing a Managed Borrego Valley Groundwater Basin

Scope. The tasks required to develop an implementable groundwater management plan and an ABDIRWMP that are mutually supportive of the objective to establish a managed Borrego Valley Groundwater Basin include the following:

1. Establish a stakeholder group that will be administered by the District.
2. Clearly articulate the objectives of the GMP and ABD IRWMP.
3. Clearly articulate current and planned water use in the Borrego Valley Groundwater Basin.
4. Clearly describe the state of the Basin based on existing and new data collected as part of the development of the GMP.
5. Develop two management plan alternatives: one based on no importing of supplemental water and the other based on importing supplemental water.
6. Develop preliminary implementation plans and costs for each groundwater management plan alternative. The implementation plans must include schedules and milestones to achieving sustainable groundwater production.
7. Develop financing alternatives for each groundwater management plan alternative.
8. Complete CEQA/NEPA processes for the GMP and ABD IRWMP.
9. Conduct a public process consistent with IRWMP and CEQA scoping requirements.
10. Revise the GMP to comport with the CEQA/NEPA process.

Cost and Time Required to Complete this Work. The estimated cost to complete these plans is about \$300,000 to \$400,000, exclusive of CEQA/NEPA process. This cost assumes that the Bureau and the USGS's ongoing work will be available for use in the GMP and ABD IRWMP. The cost of the CEQA/NEPA process will be largely driven by the imported water alternative; thus, its cost is difficult

to estimate. For planning purposes, the District should budget \$100,000 for the CEQ/NEPA effort. It is estimated that it will take about two years to complete this work.

Development of the Governance Structure and Rules to Implement the Groundwater Management Plan for the Borrego Valley Groundwater Basin Portion of the ABDIRWMP that Establishes a Managed Basin

The scope of this effort will be determined more precisely during the development of groundwater management implementation and the ABDIRWMP. Based on our experience in the Beaumont and Chino Basins, it could cost between \$1 million to \$4 million and take two to four years to develop and implement a governance structure for establishing a managed Borrego Valley Groundwater Basin. There may be additional costs borne by the other pumpers in the basin, and these costs may also be considerable.

Please call me if you have any questions regarding the above or need further assistance in scoping and developing these plans.

Very truly yours,

Wildermuth Environmental, Inc.

Mark Wildermuth, PE
President



Assignment

President

Education

*M.S., Systems
Engineering, University of
California, Los Angeles,
1976*

*B.S., Engineering,
University of California,
Los Angeles, 1975*

Registrations

*Professional Civil
Engineer, California
C32331*

Mr. Wildermuth has 35 years of experience in water resources engineering and planning, including surface and groundwater hydrology and hydraulics, water resources planning, surface water and groundwater computer simulation modeling, water rights, surface water and groundwater quality, flood plain management, municipal recycled water discharge impacts in receiving waters, and water supply and flood control facility design. Mr. Wildermuth has extensive expertise in the development of water resource management plans for groundwater basins and watersheds in Southern California, and he has provided expert witness testimonials and opinions for litigation support and mediation in several important cases.

Prior to starting his own company, Mr. Wildermuth held responsible positions at major environmental consulting firms, including James M. Montgomery, Consulting Engineers, Inc., where he was a principal engineer from 1987 to 1990; and Camp Dresser and McKee, Inc. from 1980 to 1987. In 1990, Mr. Wildermuth started his own company to focus specifically on water resources management studies and the application of state-of-the-art technology to water resources projects. The company was incorporated as Wildermuth Environmental, Inc. in 1998 and now employs over 20 professionals.

Mr. Wildermuth received a B.S. in Engineering from the University of California at Los Angeles in 1975 and an M.S. in Water Resources Engineering from the University of California at Los Angeles in 1976. He is a member of the National Ground Water Association, the American Water Resources Association, and the Groundwater Resources Association of California. Mr. Wildermuth is a registered professional civil engineer in the State of California.

Selected Project Experience

Wildermuth Environmental, Inc. – 1990 to Present

2010 Recharge Master Plan Update, Chino Basin Watermaster

Mr. Wildermuth served as the project manager, facilitator, and lead technical analyst for the development of the 2010 Recharge Master Plan Update. This investigation was ordered by the Court and had a Court imposed deadline for completion. Mr. Wildermuth designed the investigation and the report, which were approved by stakeholders and submitted to the Court for approval. The Court subsequently approved Mr. Wildermuth's investigation plan and scope. Mr. Wildermuth managed the overall execution of the investigation, which included three other consultants. Mr. Wildermuth lead nine workshops over a 15-month period and completed the final report one month prior to the Court appointed deadline. The product of this work has been highly praised for its completeness, technical sophistication, and the transparent process in which the work was conducted. Draft sections of the report were posted on the project website, which was developed and maintained by WEI. State-of-the-art surface water models were used to estimate stormwater recharge in spreading basins and in localized recharge facilities that will be constructed to comply with the 2010 MS4 permits. The investigation also determined the existing recharge capacity for imported and recycled waters and the future recharge capacity requirements. The report included conclusions and recommendations for future recharge projects and future supplemental water supply sources, including non-Metropolitan imported water supplies. Currently, Watermaster and the stakeholders are preparing to implement the recommendations of the 2010 Recharge Master Plan Update.

2009 Production Optimization and Evaluation of the Peace II Project Description, Chino Basin Watermaster

In 2007, WEI conducted the Peace II Agreement engineering work for the Watermaster. This work considered future groundwater production projections

through 2060, the effective period of the Peace Agreement. This work concluded that the projected groundwater production patterns of the stakeholders coupled with the existing recharge assets available to Watermaster would lead to unacceptable groundwater depressions in the Chino Basin. Part of the reason for these depressions is the uncoordinated siting and pumping of wells by the stakeholders. WEI examined the projected groundwater production patterns and associated recharge plans to determine if changes could be made in the siting of future wells and if production could be redistributed among wells to reduce the magnitude of changes in groundwater levels. WEI investigated the use of different groundwater recharge schemes to balance groundwater production and recharge in the basin. WEI applied state-of-the-art groundwater models (developed by WEI for Watermaster in 2007) iteratively to optimize groundwater production and recharge patterns in the basin. These revised groundwater production and recharge patterns were then incorporated into an analysis of modifications to the Optimum Basin Management Program, which are required to expand the desalter production facilities and to meet other requirements of the OBMP. Under Mr. Wildermuth's direction, WEI staff used a series of groundwater models to estimate future groundwater elevations across the basin, groundwater elevation time histories at every municipal and many private wells, subsidence potential, impacts on riparian vegetation, impacts to stream flow, and the impact on the transport of several contaminant plumes. The resulting work was accepted by Watermaster and the Inland Empire Utilities Agency and was subsequently incorporated into the *2010 Peace II Subsequent Environmental Impact Report*.

Optimum Basin Management Plan (OBMP), Chino Basin Watermaster

Mr. Wildermuth serves as the project manager and lead technical analyst, providing as-needed engineering services to the Chino Basin Watermaster. Activities include the review of water rights applications, storage losses from over-year groundwater storage accounts, and groundwater monitoring; estimating salt offset credits and the replenishment volumes required for proposed groundwater treatment project(s); coordinating with the San Bernardino County Flood Control District and Conservation District regarding recharge and with the Metropolitan Water District regarding water rates and seasonal storage service.

As the project manager, Mr. Wildermuth architected and implemented the scope of work for the Chino Basin OBMP, which was court-ordered by the San Bernardino Superior Court. Specifically, Mr. Wildermuth developed the process used in developing the OBMP scope of work and authored the engineering and institutional scopes of work. WEI, under the direction of Mr. Wildermuth, completed engineering studies and developed the resulting management plan. The engineering scope of work included the problem definition, the development of goals, developing and analyzing management components, the integration of management components, financial analysis, and the development of an implementation strategy.

Optimum Basin Management Plan Implementation, Chino Basin Watermaster

Mr. Wildermuth is the project manager for WEI's involvement in the implementation of the OBMP. WEI's efforts include large-scale surface water discharge and water quality (20 stations), groundwater level and water quality (600 wells), groundwater recharge, InSAR, and extensometer monitoring programs. WEI also provides oversight on well siting and related impact analyses for new desalter wells.

Chino Basin Dry-Year Yield Program, Chino Basin Watermaster

Mr. Wildermuth serves as the project manager for WEI's involvement in the development of the Chino Basin Dry-Year Yield (DYY) Program. WEI assisted the Watermaster and the Inland Empire Utilities Agency in the development of the 100,000 acre-ft DYY program. WEI completed a thorough reassessment of the hydrogeologic conditions of the Chino Basin and assisted other consultants with facility planning, including well siting, water quality evaluations, and specialized

mapping. WEI developed and applied a sophisticated set of surface and ground water models to evaluate the DYY's impacts on groundwater levels, contaminant plume movement, and surface and ground water interaction in the southern part of the basin. Currently, WEI is expanding this analysis to investigate groundwater storage programs of up to 500,000 acre-ft.

Groundwater Quality Monitoring Program, Chino Basin Watermaster

Mr. Wildermuth conducted a groundwater quality monitoring program for the Chino Basin Watermaster, which involved the collection of about 70 water samples in the field and about 200 samples from cooperating agencies. This project started in 1990 and continued through 1996. Subsequently, WEI expanded this program to about 600 wells as part of the Chino Basin OBMP

Preparation of Problem Statement and Estimate of Recharge, Antelope Valley Groundwater Adjudication Process, Lagerlof and Senecal

Mr. Wildermuth participated with a panel of experts to estimate the natural recharge in the Antelope Valley adjudication area. Mr. Wildermuth's responsibilities were to estimate the change in groundwater storage during the base period and use the change in storage estimates with production estimates and artificial recharge estimates to compute natural recharge. Mr. Wildermuth and WEI staff exhaustively analyzed groundwater level records and well completion reports to develop a comprehensive groundwater storage change model. Mr. Wildermuth's work was reviewed and approved by the panel of experts and included in their report.

Recharge Master Plan, Chino Basin Water Conservation District, Chino Basin Watermaster, and the San Bernardino County Flood Control District

Mr. Wildermuth was the project manager and lead technical analyst for the recharge master plan of the Chino Basin. The objectives of the master plan were to develop a plan of recharge to meet future groundwater replenishment requirements—utilizing storm water, recycled water, and imported water—and to evaluate the change in groundwater recharge caused by the construction of San Sevaine Creek and East Etiwanda Creek flood control improvements. This study utilized a daily runoff model to estimate the magnitude and temporal distribution of storm water recharge.

Under the master plan, recycled water and imported water are recharged during periods that ensure minimum conflict with storm water recharge. New facilities and modifications to existing facilities were recommended. A second phase of the recharge master plan was completed as part of the Chino Basin OBMP, in which WEI collaborated with the Black and Veatch Corporation. Upon completion, the Chino Basin Watermaster, the Inland Empire Utilities Agency, the Chino Basin Water Conservation District began converting 19 flood retention basins to spreading basins and began building two new recharge facilities. The total cost of the recharge improvements was about \$45 million.

Analyses of Recharge and Recharge Facilities, Chino Basin Water Conservation District

Mr. Wildermuth conducted studies to determine the annual average recharge at the Chino Basin Water Conservation District's storm water recharge facilities. Daily flow simulation models were developed and applied for a 41-year period. The results of this study are being used to improve operations and maintenance schedules at existing facilities. Mr. Wildermuth also developed a monitoring program to determine changes in percolation rates and subsequent maintenance practices to restore maximum percolation rates. A key component of the monitoring program was the installation of digital water level sensors with integral data loggers to measure basin water levels every ten minutes. WEI developed the analytical methods and software to convert these observations into estimates of basin inflow, outlet discharge, evaporation losses, and basin recharge.

Nitrogen / Total Dissolved Solids (N/TDS) Task Force, Santa Ana Watershed Project Authority

Mr. Wildermuth was the architect and co-project leader for a multiphase comprehensive evaluation of the fate of nitrogen and TDS in the Santa Ana Watershed. In this investigation, the Basin Plan objectives for TDS and nitrogen were reset—based on the best available data and scientific methods—and new procedures were developed to assess the availability of assimilative capacity. Phase one involved the development of procedures for evaluating TDS and nitrogen impacts from recycling projects in the Santa Ana Watershed, a massive data collection and validation effort, watershed characterization, and an initial assessment of TDS and nitrogen loads to surface water and groundwater from municipal recycled water treatment plants and non-point sources.

Phase 2A involved delineating new basin/management zone boundaries, developing groundwater storage estimates for each management unit, estimating TDS and nitrogen statistics at wells, computing volume-weighted TDS and nitrate concentrations for the new basin/management zones, and completing a new wasteload allocation analysis for the Santa Ana River and selected tributaries.

Phase 2B involved the development and implementation of a sophisticated modeling system to evaluate the then current TDS and total inorganic nitrogen (TIN) wasteload allocations for municipal recycled water plants that discharge to the Santa Ana River and its tributaries. A daily stream flow simulation model was used to estimate TDS and TIN concentrations in the Santa Ana River and its tributaries in response to recycled water discharges, storm water runoff, non-tributary discharges, and groundwater interaction.

San Timoteo Watershed Management Program, San Timoteo Watershed Management Authority

Mr. Wildermuth was the project manager and lead technical analyst in the development of a watershed management program for the San Timoteo Watershed. This effort involved designing the investigation; conducting a stakeholder process; a baseline water resource inventory and characterization; establishing the issues, needs, and wants of the stakeholders; articulating the program goals and impediments to those goals; the development of “program elements” for a watershed-scale management program to remove impediments to those goals; and the development of an implementation plan and cost estimates.

The resulting water resources management plan contained a program to expand the water supply from its current level of about 32,000 acre-ft/yr to 99,000 acre-ft/yr. WEI is currently assisting the STWMA in implementing the second phase of the program.

Beaumont Basin Adjudication, San Timoteo Watershed Management Authority:

Mr. Wildermuth provided engineering and hydrogeologic support services to the Cities of Banning and Beaumont, the Beaumont Cherry Valley Water District, the South Mesa Water Company, the Yucaipa Valley Water District, and other groundwater pumpers in the Beaumont Basin adjudication. Mr. Wildermuth developed the groundwater management concepts that were incorporated into the physical solution.

Hot Creek Fish Hatchery Spring Flow, Mammoth Community Water District

Mr. Wildermuth was the project manager and lead technical analyst for an investigation of groundwater pumping impacts on Hot Creek Fish Hatchery spring flow. This investigation, which was completed in 1995, showed that existing groundwater production had negligible impacts on spring discharge. Subsequently, WEI reviewed newly obtained data for the 1995 through 2001 period,

verifying its 1995 findings and paving the way for increased groundwater production to support new development.

This work was revisited in 2003 due to concerns that increased groundwater production might impact springs in the Valentine reserve. Subsequent analyses by WEI demonstrated that no impacts would occur as a result of production.

Groundwater Management Plan, Eastern Municipal Water District

Mr. Wildermuth developed a groundwater management plan for the West San Jacinto Basin, consistent with the long-term water resource management goals of the Eastern Municipal Water District and agricultural water users. The plan was developed under California enacted groundwater management statutes (AB 3030) and was recently implemented. This plan received the Edmund G. Brown award from the State of California in 1995.

Menifee Basin Desalter, Eastern Municipal Water District

Mr. Wildermuth completed the design of a 3-mgd well field for the Menifee Basin Desalter, providing groundwater management consulting to the Eastern Municipal Water District.

Groundwater Modeling, Montgomery Watson (for the Santa Ana Watershed Project Authority)

Mr. Wildermuth provided hydrologic and groundwater-modeling services for the design of two 8-mgd well fields and a 12-mgd well field in the Chino Basin. These well fields were intended to feed the desalting facilities owned by the Santa Ana Watershed Project Authority. Mr. Wildermuth assisted the Chino Basin Watermaster in the development of replenishment sources for the Chino desalting facilities and in the determination of salt extraction credits for agricultural interests in the basin.

Various Projects, Montgomery Watson

Mr. Wildermuth, as a consultant to Montgomery Watson, provided water resources consulting and modeling services in the Chino, Colton, and Riverside Basins. In addition, Mr. Wildermuth directed and participated in the development of the most sophisticated groundwater model ever developed in the upper Santa Ana Basin.

Groundwater Contamination Superfund Site, Confidential Client

WEI conducted a study to determine the potential source(s) of a groundwater plume that contains volatile organic compounds (VOCs), primarily trichloroethene (TCE) and tetrachloroethene (PCE). Mr. Wildermuth was responsible for the development of groundwater flow and transport models to determine the source(s) of these contaminants and the approximate period of loading.

Surface and Groundwater Studies from Discharge of Recycled Water, City of San Bernardino Municipal Water Department

Mr. Wildermuth conducted numerous studies to evaluate receiving water impacts in surface water and groundwater from the City of San Bernardino's recycled water discharge to the Santa Ana River. These studies involved surface and ground water modeling to determine the nitrogen and TDS impacts of various recycled water discharge alternatives on surface water and the groundwater basins that are recharged by those surface waters.

Surface Water Modeling Studies, City of San Bernardino Municipal Water Department

Mr. Wildermuth conducted surface water modeling studies to estimate the discharge, TDS, and nitrogen impacts of various recycled water marketing alternatives proposed by the City of San Bernardino.

Water Use Audit and Water Resources Development, Rancho Mission Viejo

Mr. Wildermuth conducted a water use audit of Rancho Mission Viejo and developed a phased plan of study for the development of water resources for the Ranch as land is converted from agricultural to urban uses.

Preparation of Application to Divert Water, Rancho Mission Viejo

Mr. Wildermuth prepared an application to divert water by appropriation and the supporting environmental documentation. Impacts to downstream water users were evaluated and mitigation plans are being developed. Mr. Wildermuth is also involved in negotiating the sale of diverted water to local agencies.

Evaluation of Proposals, URS Consultants (for the Santa Ana Watershed Project Authority)

Mr. Wildermuth evaluated the impacts of various waste discharge proposals for the Western Riverside Regional recycled water plant on surface and groundwater resources in the upper Santa Ana Basin.

Saline Plume Management Alternatives, Kaiser Steel Resources

Mr. Wildermuth developed saline plume management alternatives in the Chino Basin for Kaiser Steel Resources. This work involved groundwater modeling and water quality sampling. Solutions included pump and treat alternatives and a salt-offset alternative.

In addition to developing the salt-offset alternative, Mr. Wildermuth assisted Kaiser in moving this solution through the regulatory process, saving Kaiser over \$40 million.

Conjunctive Use Plan Study, Western Municipal Water District, San Bernardino Municipal Water District, City of San Bernardino, and Orange County Water District

Mr. Wildermuth is conducting a study to develop conjunctive use plans for the management of local, imported, and recycled water above Riverside Narrows.

Montgomery Watson (aka James M. Montgomery, Consulting Engineers [JMM]) – 1987 to 1990

Mr. Wildermuth served as the manager of Water Resources studies at JMM's Irvine office. Mr. Wildermuth was also the manager and lead-modeling specialist for the *TDS and Nitrogen Studies, Upper Santa Ana Watershed*. Responsibilities included the development of a comprehensive work plan and the modification, calibration, and use of the Santa Ana Basin Planning models to evaluate future TDS and nitrogen management plans. Mr. Wildermuth developed a series of models to simulate the fate of agricultural leachates in the vadose zone and the saturated zone for the 1900 through 2015 period and a software link between the river quality model (QUAL2E) and the Basin Planning models. Mr. Wildermuth participated in the development and evaluation of eight management plans.

Water Quality Management Plan, Western Municipal Water District, San Bernardino Municipal Water District, City of San Bernardino, and Orange County Water District

Mr. Wildermuth was the project manager for the development of a water quality management plan for the Colton and Riverside Groundwater Basins. Mr. Wildermuth developed a detailed work plan that focused on moving various water management entities towards consensus on a basin management plan. The study involved the use of groundwater flow and quality models and public participation.

Groundwater Mining Studies, Southern Nevada Water Management Study

Mr. Wildermuth was the lead-modeling specialist in the evaluation of the groundwater mining studies of the Rail Road Valley and California Wash Basins in Nevada.

Integration of Surface and Groundwater Models, Wyoming Attorney General

Mr. Wildermuth was the lead-modeling specialist for the integration of surface and ground water models of the North Platte River. The purpose of this project was to evaluate the effects of river depletions due to agriculture and to evaluate reservoir management plans.

Conjunctive use Study, City of Santa Barbara

Mr. Wildermuth was project manager and lead-modeling specialist for a conjunctive use study for the City of Santa Barbara. Mr. Wildermuth developed conjunctive use alternatives that involved recharging surface water from the Santa Ynez River (by injection and spreading), the injection of recycled water, and in-lieu recharge concepts. Mr. Wildermuth used groundwater models to evaluate the impacts of conjunctive use operations on groundwater.

Phase IV Groundwater Investigation, Kaiser Steel Resources

Mr. Wildermuth was the project manager of the Phase IV Groundwater Investigation at the Kaiser Steel Facility in Fontana, California. Mr. Wildermuth's role in this study was to develop remediation plans for two large plumes of degraded groundwater emanating from Kaiser. Mr. Wildermuth directed the study team's efforts, which included water quality sampling, drilling monitoring wells, and groundwater modeling and engineering studies.

QUAL2E Modeling Studies, Santa Ana River Dischargers Association

Mr. Wildermuth was involved in the review of the QUAL2E modeling studies performed by the Santa Ana Regional Water Quality Control Board. Mr. Wildermuth's responsibility in this study was to provide an independent review on behalf of the Santa Ana River Dischargers Association.

The key issue of this study was a determination of QUAL2E model reliability for establishing waste load allocations for point discharges with an emphasis on nitrogen species.

Camp Dresser & McKee, Inc. – 1980 to 1987

Metropolitan Water District of Southern California

Mr. Wildermuth was the project manager and lead analyst for the Chino Basin Groundwater Storage Program. Mr. Wildermuth's responsibilities included the development and implementation of state-of-the-art models for non-point source groundwater contamination and regional vadose zone modeling. The goal of this study was to estimate the long-term groundwater quality impacts of large-scale conjunctive use management programs.

TCE/DBCP investigation, Santa Ana Watershed Project Authority

Mr. Wildermuth was the project manager and lead analyst for a TCE/DBCP investigation in the Redlands area. Field studies were designed and implemented to estimate the then current TCE and DBCP conditions in the area, and a three-dimensional model was developed to predict the fate of TCE and DBCP under various management alternatives. Alternative mitigation measures were developed and evaluated.

Safe Yield and Groundwater Management Study, Cucamonga County Water District

Mr. Wildermuth was the project manager and lead analyst for a safe yield and groundwater management study for the Cucamonga Groundwater Basin. Mr. Wildermuth developed and calibrated a three-dimensional groundwater model to evaluate the impacts of artificial recharge, in-lieu recharge, and drought management programs. Mr. Wildermuth developed a detailed monthly hydrology of the Cucamonga Basin for use in safe yield estimates, groundwater model calibration, and water supply management.

Chino Basin Storage Program Feasibility Study, Department of Water Resources

Mr. Wildermuth was a project engineer for the Chino Basin Storage Program feasibility study. Responsibilities included an evaluation of the availability of surplus State Project water for conjunctive use and an evaluation of the correlation between local flood flows and surplus state project water.

Groundwater Modeling Study, Regional Water Quality Control Board

Mr. Wildermuth was a project engineer for the Santa Ana Regional Board groundwater modeling study of the 400,000-acre Upper Santa Ana Groundwater Basin. Responsibilities included a complete rewrite and calibration of the groundwater hydraulic and water quality codes. These models were used to investigate revisions to the Upper Santa Ana Basin Plan.

Water Flow and Demand Projection Study, City of Scottsdale

Mr. Wildermuth was a project engineer for a water demand and recycled water flow projection study for the City of Scottsdale. Various potential land use scenarios were analyzed to develop ultimate water demands and recycled water flows. Potential supplies included Central Arizona Project water, groundwater, and recycled water. Mr. Wildermuth developed a comprehensive and fully interactive computer model to conduct the analysis. The unit factors for indoor and outdoor water demand and the parameters defining waste flow were estimated by calibrating the computer model in a selected area of Scottsdale.

Groundwater Study, Occidental Chemical

Mr. Wildermuth was a project engineer for a detailed groundwater study of a toxic spill site near Lathrop, California for Occidental Chemical. This study involved the use of a two-dimensional, multi-layer groundwater model to predict pollutant movement with and without mitigation plans.

Shallow Groundwater Management Program, The Irvine Company

Mr. Wildermuth was the project manager for a study to develop a shallow groundwater management program for the Irvine Subbasin. This study resulted in a recommendation to control and/or mitigate shallow groundwater in an urbanized area.

Phase II Irvine Subbasin Study, The Irvine Company

Mr. Wildermuth was the project manager for the Phase II Irvine Subbasin study. This study focused on the development and analysis of water use plans for the Irvine Subbasin.

Flood Control Study, The Irvine Company

Mr. Wildermuth was the project manager and lead analyst for a flood control study of San Diego Creek in the City of Irvine. This study analyzed flood plain development and channel improvement alternatives.

Flood Control Planning Study, Army Corps of Engineers

Mr. Wildermuth was a project engineer for the flood control planning studies in support of the Central Arizona Water Control Study. Mr. Wildermuth performed the hydraulic design and cost estimates for reservoir flood outlets and levee systems on the Salt River and selected bridges on the Salt River. The impacts of sand and gravel operations within the Salt River were also evaluated.

Mr. Wildermuth also conducted numerous river-engineering studies in Southern California for the Army Corps of Engineers.

TetraTech – 1976 to 1980

HEC-1, HEC-2, & TR-20, Florida and Texas

Mr. Wildermuth was the project engineer for numerous flood insurance studies in Florida and Texas, specializing in the use of HEC-1, HEC-2, and TR-20. And, Mr. Wildermuth applied special-purpose dam flood wave routing models and the HEC-6 model for the hydrologic evaluation of flood safety for a nuclear power plant.

Los Angeles County Flood Control Department – 1974 to 1976

Studies for the Storm Drain System of the Laguna Regulating Basin

Mr. Wildermuth conducted design hydrology and hydraulic studies for a storm drain system and collaborated in a PMF spillway adequacy study for the Laguna Regulating Basin. This study included the development of runoff model parameters and the conceptual development of a serial reservoir flood routing computer model. Mr. Wildermuth also developed a semi-self-calibrating watershed model.

This conceptual model was used by the Hydraulic and Hydrology section for spillway studies in the late 1970s and early 1980s.

Affiliations / Organizations

American Water Resources Association

National Groundwater Association

Groundwater Resources Association

Vistage (formerly The Executive Committee)