

David Venhuizen, P.E.

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EDUCATION:

- B.S. Aeronautical & Astronautical Engineering, and
- B.S. Liberal Arts & Sciences--Biology Major
from University of Illinois at Urbana-Champaign, 1970
- M.S. Civil Engineering from University of Texas at Austin, 1975

REGISTRATION:

- Registered Professional Engineer: State of Texas, 1980
State of Wisconsin, 1987
- Licensed Irrigator, State of Texas, 1987

SELECTED PROFESSIONAL EXPERIENCE RELATED TO WATER RESOURCES conducted by sole proprietorship consultancy, David Venhuizen, P.E.:

Bluff, Utah, wastewater facility plan: (2006-present) In this project, David Venhuizen generated and analyzed options for decentralized concept wastewater management systems to serve Bluff, a small community currently served by individual on-lot systems only. The community includes several businesses that serve a tourist economy and experience large seasonal fluctuations in wastewater flow. The decentralized options that were reviewed include:

- Centrally managed on-lot systems plus clusters for the commercial generators and lots on which a code-compliant on-lot system could not be sited, routing wastewater from those lots to collective dispersal systems. Options with low-pressure-dosed dispersal fields for septic tank effluent and with high quality pretreatment prior to drip irrigation dispersal were considered. Due to concerns about protecting the shallow aquifer from nitrate pollution, only the latter strategy was considered further.
- A “small-scale” cluster system collectivizing all properties into several treatment centers spaced around the community, with high quality pretreatment prior to drip irrigation dispersal, optionally locating the drip dispersal fields to serve an irrigation reuse function on public greenspace and/or private property.
- A “large-scale” collective system routing wastewater from all properties to two treatment centers, one on each side a major wash that bisects the community. These systems would provide high quality pretreatment, and would route effluent to stream discharge or to drip dispersal systems, which may optionally be located to serve an irrigation reuse function on public greenspace and/or private property.

The project was conducted with a partner firm that generated and analyzed more “conventional” management options. The community chose the decentralized concept options as the most favored strategies, and the facility plan was completed on that basis. The project is currently about to enter the design phase. The treatment technology favored for use in the decentralized concept options is a variant of

the packed bed filter (high performance biofiltration concept). All wastewater collection would use effluent gravity sewers.

Flora Vista (New Mexico) Preliminary Engineering Report: (2006-2007) David Venhuizen generated and analyzed options for decentralized concept wastewater management options for the exurban area between Farmington and Aztec. The area is presently served by individual on-lot systems. In some areas, a number of system failures have occurred, and there is concern about the quality of wastewater management as the area develops further. The Flora Vista Water Users Association obtained a grant to fund a preliminary investigation. A partner firm generated and analyzed centralized options. Venhuizen analyzed three options: (1) continue existing arrangements, with an enhanced function by the state regulatory authority to proactively address system failures, including the specification of improved on-lot system technologies; (2) create an on-lot management district that would specify improved on-lot system technologies and assist owners with permitting and financing and would provide organized on-going oversight of on-lot facilities; (3) provide collective management with small-scale “cluster” systems under an appropriate management entity, using effluent sewerage for collection, packed bed filter systems for treatment and drip irrigation for dispersal, located as much as practical to serve irrigation demands.

CARE El Salvador: (2000-2003) This project commenced with a seminar presented by David Venhuizen in San Salvador to a group of interested engineers, government officials and aid agency workers on the decentralized concept as a way to provide more affordable wastewater management in El Salvador, and on the high performance biofiltration concept as the treatment method that would be most cost efficient and readily manageable in that concept. This was part of an effort funded by a U.S. AID grant. The intention was to implement a small demonstration-scale project, perhaps serving 10 houses. However, an alliance was formed with CARE-El Salvador to leverage this grant with other funds provided to CARE to implement a wastewater system in a village on the Guatemalan border. While it was planned to provide service to this village with a conventional collection system and a lagoon treatment system, an isolated neighborhood in a separate drainage area was selected for a larger scale demonstration of a decentralized concept system. This portion of the village had 80 homes in place, with the potential for up to 120 at full buildout. David Venhuizen instructed CARE personnel in the design of effluent sewers and treatment systems, provided design details for the collection and treatment systems, directed the system layout, advised on system construction, and was a hands-on participant in the completion and commission of the system. The collection system consists of septic tanks receiving flow from the houses, with effluent from these tanks fed to the treatment center through a small-diameter effluent sewer system. The treatment system is composed of both a high performance biofiltration unit, using non-woven polypropylene geotextile fabric media, and a subsurface flow wetland unit, so that both concepts could be demonstrated. Effluent is routed to reuse projects that produce income for the residents.

TxDOT interstate highway rest stop wastewater system: (1999-2001) David Venhuizen designed a high performance biofiltration (recirculating gravel filter) treatment system and drip irrigation effluent dispersal system for two rest stops on Interstate Highway 37 between San Antonio and Corpus Christi, one serving northbound lanes and one serving southbound lanes. These are the most highly used rest stops in Texas. A significant design challenge was to assure that the system could respond to highly variable flows generated by the variable pattern of rest stop usage. The treatment system incorporated tanks used in the pre-existing wastewater system, adding only the filter bed containment tanks and a reclaimed water holding tank. The subsurface drip irrigation system was integrated into the landscaping plan, composing the irrigation system for the portion of the “island” between the truck parking area and the auto parking area from the entry end of the rest area to the restroom building, which lay about halfway between the entry and the exit ramps. The other half of the “island” is irrigated through a surface spray system, also designed by Venhuizen, which is fed by the potable water system. The two irrigation systems mesh seamlessly, using a unified control system. The drip field feed system provides capability to add makeup

water to provide irrigation in excess of what is produced by the wastewater flow in the peak irrigation season.

Hidalgo County (Texas) Colonias wastewater management study: (1997-1999) David Venhuizen analyzed options for wastewater management for over 125 colonias in Hidalgo County, including intensive analysis of 4 specific colonias. Options analyzed were improved on-site systems, small-scale collective systems using soil dispersal or treatment and discharge, and colonia-wide collective systems using soil dispersal or treatment and discharge. For the treatment and discharge options, sand filters and constructed wetlands were evaluated. Effluent sewerage systems were presumed for the collective system options. Results indicated that these types of decentralized management strategies would be much less costly than conventional regional sewer systems under the conditions prevailing in Hidalgo County. This led to preparing facility plans for 30 of these colonias using these decentralized management concepts. Cost estimates generated in these facility plans indicate that high quality wastewater service can be provided to Hidalgo County colonias for about 40% of the cost per house, including all “soft” costs, that would be incurred for conventional management plans. In conjunction with a local project sponsor, a detailed management plan for these decentralized facilities was formulated.

Barton Creek Arts Center: (1997-1999) David Venhuizen designed and oversaw installation of a wastewater management system for this multi-use living arts community located in an environmentally sensitive watershed. High quality treatment is provided by a denitrifying sand filter system. Environmentally benign dispersal is provided by beneficially reusing the effluent in a subsurface drip irrigation system. A permit for this system was obtained from the Texas Natural Resource Conservation Commission (former name of the current Texas Commission on Environmental Quality). Venhuizen was a hands-on participant in the drip irrigation field installation.

Environmental Defense Fund maquiladoras wastewater project: (1996) David Venhuizen conducted an analysis of options for cost efficient wastewater treatment and reuse for an industrial park in Reynosa, Mexico, and generated alternative management strategies and presented the general advantages and disadvantages of each. He presented treatment schemes for each management strategy and completed cost estimates for each approach. The aim of study was to produce a demonstration project for addressing wastewater management needs in maquiladoras on the Texas-Mexican border.

Town of Washington (Wisconsin): (1990-1995) David Venhuizen was called in to offer ideas on how to provide cost efficient, high quality wastewater service in on-site or small-scale collective systems. This was posed as an alternative to a holding tank/pump-and-haul system being proposed for Washington Island. Of particular concern was nitrate pollution of groundwater from conventional on-site systems, so a denitrifying sand filter concept Venhuizen had formulated was considered. The Town decided to pursue the decentralized strategy, using the denitrifying sand filter concept. Venhuizen prepared a facility plan, which included planning, designing and executing a demonstration project required by the State of Wisconsin to determine the degree of nitrogen removal which can be expected, and analyzing the cost effectiveness of the decentralized option relative to the pump-and-haul option. Designs for the installation and evaluation of demonstration on-site systems were completed and these systems were installed. Venhuizen was a hands-on participant in the installation of these systems and in trouble-shooting and performance analysis during the demonstration project. Evaluation of system performance and generation of a management plan for town-wide use of these systems was executed. Two larger collective systems were also designed, but not installed under this project. The facility plan was reviewed and accepted by the state regulatory agencies, and the Town implemented a form of the decentralized management strategy. The Wisconsin state agency which regulates on-site systems has since approved systems employing the design concepts generated in the Washington Island project, and has promulgated a design manual for this concept, for which Venhuizen wrote the original draft.

Colonia de Quemado (Texas) wastewater facility plan: (1992-1993) David Venhuizen generated several options for innovative wastewater management systems to serve Quemado, a small community dominated by residential wastewater sources. The options included on-site sand filter/drip irrigation and constructed wetland systems, small-scale collective systems using these technologies, and STEG/STEP sewer systems with centralized sand filter and constructed wetland treatment systems. A cost effectiveness analysis of these options vs. more conventional wastewater systems was presented. The end product was a facility plan for development of a wastewater infrastructure in Quemado, including a management plan. The cost effective option was a STEG/STEP sewer system with a centralized sand filter treatment system. This project was selected by Texas Water Development Board for funding of system design and construction under an EPA innovative projects grant program, but legal issues in the county government derailed the project.

Gloucester, Massachusetts, Facility Plan: (1991-1992) David Venhuizen consulted with the engineering firm hired to conduct a facility plan update, the specific intent of which was to evaluate a decentralized wastewater management system for North Gloucester. He assisted with generation of management scenarios and delineation of hardware options, produced a report detailing environmental impacts of on-site systems and how "alternative" management methods can reduce or circumvent those impacts, and participated in workshops to inform the public about the project.

Barton Springs/Edwards Aquifer Conservation District water conservation study: (1989-1990) David Venhuizen conducted a water conservation study for users of this aquifer. He surveyed water uses and explored options for reducing per capita demands in the residential, commercial and industrial/institutional usage sectors. He also conducted detailed fiscal analyses which highlighted the cost efficiency of leak repair, showerhead replacement and toilet replacement. This study received a "Project Planning Award" from the Texas Chapter of the American Planning Association.

Southwest Texas State University: (1989-1990) David Venhuizen conducted a preliminary study of opportunities for water conservation through wastewater reuse and efficiency enhancements. The findings indicated a high savings potential and led to Venhuizen executing more detailed investigations of building scale greywater reuse and flush water recycling systems. He generated design concepts for a greywater treatment system and a flushwater treatment and reuse system. The project indicated that on-campus reuse may be an appropriate strategy for reducing demand upon the Edwards Aquifer and reducing the overall costs of water supply and wastewater management. Venhuizen also produced, as part of this project, a detailed in-depth review of effluent quality standards appropriate to various modes of reuse.

Bastrop County W.C.I.D. No. 2: (1988-1990) David Venhuizen conducted feasibility studies of implementing an innovative decentralized concept wastewater management system within the jurisdiction of the Water Control & Improvement District No. 2, a rugged area with poor soils, to replace individual on-lot systems which experienced a high incidence of failures. These studies indicated that the proposed system would be far more cost efficient and environmentally benign than conventional management strategies, and would also make reuse of the effluent for landscape irrigation fiscally reasonable. Venhuizen conducted a preliminary engineering study and prepared a permit application for the first phase of this decentralized wastewater management system.

Design of on-site wastewater systems: (1987-present) David Venhuizen has completed designs for and has overseen installation of many "improved" on-site wastewater systems. These include both low-pressure-dosed systems and recirculating gravel filter/drip irrigation systems for individual homes, for RV and mobile home parks, and for commercial developments, and a flush water recycling system for a convenience store. Recirculating gravel filter/drip irrigation systems were designed for use on sites with

very shallow depth of soil to limiting conditions. The system concept includes nitrogen removal. Standard designs have been generated, using standard tanks produced by local manufacturers and using custom-fabricated tanks. Venhuizen produced a design manual for this treatment system concept for the State of Wisconsin. He produced an O & M manual for this system, provided to each system owner, and produced a standard maintenance contract for jurisdictions which require third-party O & M. Such system designs have been completed, either solely by Venhuizen or in concert with local partners, in Texas, New Mexico, Idaho, North Carolina, Tennessee, Missouri, and Wisconsin.

Lowman Ranch: (1984-1986) This project was a 920-acre commercial/industrial/residential development near San Marcos, Texas. David Venhuizen conducted negotiations with City of San Marcos regarding water service and wastewater system development, and he generated a utility service plan, including an innovative “decentralized concept” wastewater management system and a preliminary design for the treatment facilities. He obtained a permit for the first phase of this system from the Texas Water Commission (former name of the current Texas Commission on Environmental Quality).

EMPLOYMENT PRIOR TO FORMING SOLE PROPRIETORSHIP CONSULTANCY:

Cunningham-Graves, Inc. – 1984. Worked on commercial and residential development planning, focusing on stormwater and wastewater system plans.

City of San Marcos – 1982-1984. Organized and staffed city’s engineering department, oversaw work of 5 staff, prepared designs for street improvements, drainage facilities, water lines, wastewater lines and traffic signals, implemented and administered city’s new drainage and erosion control ordinance, participated in planning water supply and wastewater treatment facilities.

Independent Research Project – 1981-1982. David Venhuizen conducted a federally-funded research under sponsorship of City of San Marcos, Texas, as an independent contractor prior to his employment as City Engineer by San Marcos. This project investigated wastewater treatment in water hyacinth ponds covered by greenhouses, explored the effects of various flow regimes and physical parameters on treatment efficiency and the thermal performance of two greenhouse designs, and also evaluated cascade aeration concepts and wind power as driving source for wastewater aeration.

URS/Forrest & Cotton, Inc. – 1977-1981. Worked on area-wide wastewater plan, regional water supply system planning and design, street and drainage designs, commercial project layout and stormwater control, airport master plans and runway pavement design.

Texas Association of School Boards – 1976-1977. Prepared programs and provided data analysis of the impact of various legislative proposals for school finance funding on each school district in Texas.

Alamo Area Council of Governments – 1975-1976. Planned transit systems for San Antonio and for rural transit in surrounding counties.

PUBLIC PRESENTATION/INFORMATIONAL SEMINAR EXPERIENCE

David Venhuizen has made numerous formal and informal presentations at conferences, as well as to clients and interested citizens in the course of executing projects. Formal presentations have been made at the invitation of sponsoring organizations, as outlined below:

Environmental Defense Fund: Presentation made to Texas regulatory agency personnel, outlining potential benefits of decentralized wastewater management. Detailed technologies appropriate for decentralized deployment and environmental impacts and advantages of their use. Provided example of decentralized system planning using a Texas *colonia*. Also detailed design issues for constructed wetland treatment systems.

Massachusetts Bays Consortium: Part of a team which made presentations in Hyannis and Swansea, Massachusetts. Covered environmental impacts of on-site systems, and detailed methods for providing more environmentally sound on-site wastewater management, with emphasis on nitrogen reduction, which is a major concern on Cape Cod.

Conserv 90: Gave audio/visual presentation on decentralized wastewater management concept, using Bastrop County W.C.I.D. No. 2 project as an example. Gave workshop presentation on Barton Springs/Edwards Aquifer Conservation District water conservation plan. Participated in panel presentation/discussion on greywater reuse. Presented poster session on small-scale wastewater management methods, detailing treatment using sand filters, anaerobic upflow filters and gravel marshes, and dispersal in low-pressure dosed drainfields and subsurface drip irrigation fields.

University of Wisconsin-Green Bay Graduate Studies Seminar: Presentation made to faculty and students detailing the course of investigation in the Washington Island project. Detailed the technologies being employed, practical design issues, and results of system monitoring. Discussed politics of pursuing innovative wastewater management strategies in Wisconsin.

Texas Water Commission, Clean Water Task Force: Presentation made to Alternative Treatment Committee on decentralized wastewater management. Detailed fiscal, environmental and societal advantages, and reviewed technologies appropriate to decentralized deployment.

National Environmental Training Center: Generated curriculum on technology options for wastewater management by small communities and made presentation on technologies in a pilot workshop in Oklahoma. This overall effort has culminated in a training curriculum for local decision makers to provide them with the range of information they will need to make an informed decision on the best wastewater management options for their communities. Served as trainer in a workshop using this curriculum in Austin, Texas.

Lady Bird Johnson Wildflower Center Conservation Development Symposium: Presented discussion of decentralized wastewater and stormwater management practices with emphasis on how they augment and/or work with the conservation development ideal.

WEFTEC Training Workshop on Integrating Decentralized Wastewater Management into a Watershed Agenda: Presented a review of how an example development could employ a decentralized concept wastewater system focused on beneficial reuse of the effluent and a dispersed stormwater management strategy to advance the local watershed agenda, including a review of how this strategy would be globally more cost efficient than conventional practices.

OTHER EXPERIENCE OF PARTICULAR NOTE:

Organized a club lacrosse team at the University of Illinois, 1971-1972. From an administrative standpoint, was totally responsible for the team coming into being. Obtained funding, recruited

coach and players, organized training and practices, obtained equipment and fields, scheduled games with other college/university club and varsity teams, and arranged for officiating.