A. Appendix

Six Case Studies

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Thurston County

A progressive Board of Health begins onsite management in the 1970s

Location and Name

Thurston County Operational Certificate Program
Thurston County Environmental Health
County Courthouse, Bldg 1
2000 Lakeridge Dr SW
Olympia, WA 98502

Contacts

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Background and Setting

Until recently, onsite regulations in Washington State followed from 1974 minimum criteria concerning siting and design. Not that different from many state revisions occurring around the time, the regulations stipulated requirements for maintenance and proper use, but had little provision for assuring that this was done.

Because Washington's constitution is structured so as to leave considerable authority with local governments, implementation of programs was (and still is) left to local health entities at county or municipal levels. One such entity is the Thurston County Board of Health and its supporting Health Department. Thurston County, wherein lies Olympia, the state capital, contains an estimated 40,000 septic systems for which the Health Department is responsible. This number increases by about 1100 every year. The county lies at the southern end of the 80-mile-long Puget Sound with its necklace of estuaries, bays, and waterways. The county, itself, has over 100 miles of shoreline, and contains some of the most productive shellfish beds in the state.[1]

The Problem

Several trends converged to outmode the state's 1974 law, although it was a law that, in many states, even today would be regarded as progressive. One was that in the Puget Sound Basin, where most of the state's population lives and works, there were already an estimated 500,000 septic systems, a number which, because of development pressure, was growing by 25,000 yearly. Another was that large numbers of seasonal vacation homes were being sold to year-round users.[1]

Still another was the discovery by the county Health Department that several public wells in Thurston County had nitrogen levels that were increasing year by year. Finally, one after another, commercial shellfish beds within the sound had to be closed, sometimes, but not always, because of septic system problems. By 1990, over 32,000 acres had been closed or downrated.[2] These problems were aggravated by the county's soils, which vary from highly permeable sands and gravels to very tight shallow soils that overlay impermeable basaltic bedrock.

The Solution and Its Development

Thus in the mid-1970s the Thurston County Board of Health, not waiting for tighter provisions in state law, nor for the creation of the Puget Sound Water Quality Authority (which was under discussion, but not yet established), took its own action. Under the leadership of Patrick Vosse (County Director of Environmental Health at the time), the county initiated its own modest permit-based inspection program. Onsite policy continued to evolve through the 1980s under the leadership of Donald Leaf. By 1990 all new, repaired, or newly owned (title transfer) systems required operational permits.

As it happened, by 1985 the Puget Sound Water Quality Authority (PSWQA) was established (Chap 90.70 RCW), and by 1987 it had developed a comprehensive water quality management plan that encompasses all 12 counties surrounding the sound, including Thurston. The plan called on the state legislature to bring onsite systems under proactive management.[3]

Later still, in 1989, state law governing septic systems was revised, and was ultimately activated in 1994 with the release of new onsite regulations (Chapter 246-272, Washington Administrative Code, effective Jan 1, 1995). The new law specifies that local health jurisdictions throughout the state are to establish programs for "compliance monitoring," defined as "actions taken or coordinated by a local health jurisdiction to assure that owners of onsite systems are properly operating and maintaining them." By the year 2000 all systems are to have come under some form of monitoring. Moreover, systems located in "areas of special concern" (which the jurisdictions identify under several state environmental and resource protection mandates) were to come under immediate management, and require inspection no less often than every three years by persons certified by the local Health Department.[4]

The new state law adopted a public–private partnership approach. Jurisdictions would tailor their programs within very broad state guidelines, the most important being that property holders would continue to own systems, and to maintain them through public or private means; and that local health authorities would assure that compliance occurred.

Of course the Thurston County program was to be affected by those latter developments, but not as much as some counties—because the onsite provisions of both the Puget Sound comprehensive plan, as well as the new state sanitary code, had been based in part on the experiences of Thurston County. The county was to be a bellwether

in another way as well: for a time lawsuits (ultimately resolved in Thurston County's favor) would impede the program.

When it began the Thurston County program was well ahead of its time both in Washington and elsewhere. Policies adopted by the Board of Health acknowledged these general principles:[1]

- Onsite policy would be based on comprehensive planning.
- Water quality monitoring would be imperative.
- ISDS technologies would be site- and area-specific.
- ISDS system construction would be for the long term.
- Operating permits, carrying variable maintenance and inspection requirements, would be employed.
- Eventually all systems would require operating permits.
- Owners would bear the cost of the onsite program.
- Private sector participation in the program would be encouraged.

Program Structure and Activities

The Thurston County program is presently involved in design review, inspection, professional training and certification, public education, and water quality monitoring. It systematically tests both public and private water supplies, and conducts additional monitoring with grant funds targeted at particular goals or kinds of information. It has developed plans for a more regular and systematic receiving-waters monitoring program, directly linked to onsite performance. These plans are currently on hold because of an unsettled lawsuit challenging the legality of a water quality monitoring fee assessed for this purpose.[1]

The program was phased starting with:

- New, large, or alternative systems;
- Systems serving restaurants;
- Systems undergoing transfer of ownership;
- Systems located in areas of special concern.

In Thurston County, areas of special concern as well as areas that are "geologically sensitive" are recommended by the Health Department. The Planning Department may also recommend critical areas based on planning criteria such as water frontage, unstable slopes, or areas susceptible to flooding. Both sets of recommendations tend to have been made in conjunction with several types of countywide planning and resource protection efforts mandated by state law, including land-use and groundwater-protection plans. After receiving recommendations, the three County Commissioners officially designate such critical areas by using the same process (public meetings and hearings) used for the development or revision of other regulations. In Thurston County, as it happens, the County Commissioners are one and the same as the Board of Health. These officials are elected and salaried full-time.

In 1990 the county decided that ultimately (as its response to 246-272 WAC) all systems in the jurisdiction would come under an "operational permit." At present about 40% of the 40,000 systems operate under a permit and monitoring scheme.

The permits carry 1- to 4-year terms depending on the type, size, and use of the system. Conventional residential systems are to be inspected every 4 years. Inspection includes an examination of the state and condition of the system, volume of water use (deemed a crucial variable in marginal situations), and various particulars that depend on the type of system involved. Conditions attached to the permit depend on the site sensitivity and the complexity of the technology. Corresponding inspection, operation, and maintenance requirements are stipulated. Although there is no formal risk assessment protocol, inspection frequency is dependent on the history, state, type, and complexity of the system. Alternative systems are commonly employed, and pressure distribution is more common than gravity flow from tank to drainfield.[4]

The county is presently considering a point-based methodology to make site-specific determinations of inspection frequency and maintenance requirements. For example, systems on shorelines near shellfish growing areas, or those in areas of very high ground water, could be rated higher and might be inspected or monitored more carefully or frequently. Other criteria would concern distances from bodies of water and other setback distances, whether shellfish beds were nearby, type of drainfield, soil conditions, type and complexity of system, flow volume, and use of the building. The more points that accrue, the more frequent would be the inspections.

Alternative systems must be approved by the state Board of Health (and its permanently standing Technical Review Committee), which does ongoing research on new system performance, and develops guidelines for each new system concerning their design, siting, installation, and operation and maintenance requirements. These guidelines may include specific performance criteria. Performance criteria are also stipulated for systems that can not meet minimum conventional horizontal and vertical setbacks. Treatment standards in these circumstances stiffen as the vertical and horizontal dimensions diminish.

Most systems remain privately owned, with operating and maintenance responsibilities falling to the owner. Owners are provided with instructions for the operation and maintenance of their systems, and, if the system is new, with a copy of the as-built plans. An exception is any communal system constructed in an identified city sewer service area. These systems must be designed with sewer integration in mind, and are owned and operated by the jurisdictional sewer service entity.

Health Department staff reviews and approves plans for new, expanded, or upgraded systems; keep records; issue notifications; and perform construction inspections, as well as an initial inspection at the time of issuing a permit. Originally it was planned that Health Department staff would also perform renewal inspections. Instead, homeowners are notified of the need to renew their permit. It is the homeowner's

responsibility to then secure the services of a pumper, licensed by the county, who inspects the system, does any required pumping, makes minor repairs, or identifies the need for them. Service providers report back to both the homeowner and the department. The integrity of these procedures is assured through licensing programs for the several classes of septic system contractors, administrative procedures for taking disciplinary actions, and spot checks on work reported. A failing system or one that needs major repairs, such as the replacement of a tank or drainfield, triggers a Health Department design review, permitting, tracking, and inspection procedure. If timelines are not met, the situation becomes an enforcement case. Low-interest loans are available for repairs and upgrades.

Health Department inspections are described as intensive.[1] Those conducted during sanitary surveys are the most stringent in the state. Critical areas in the county have been prioritized and are successively targeted for sanitary surveys. During the late 1980s the surveys began using dye-tracing techniques when it became apparent that less intensive techniques were not always detecting water quality problems or protecting shellfish beds. The technique exposes failures that otherwise go undetected; and it has revealed an average failure rate of about 15%, with little correlation between failure and either the type or age of the system.[1] In the targeted area homes are systematically surveyed and owners are educated through workshops, brochures, and videos.

The Health Department maintains a computer database containing information on ownership, system type, and repair and inspection history. It was developed in-house, originally in R-Base. Finally, the county runs a testing and certification program for designers, installers, and pumpers, and is in the process of developing similar procedures for persons who will perform system inspections and maintenance.

One staffer handles enforcement actions that may arise from complaints (of, for example, surface discharges) or from noncompliance with code or permit conditions. Owners are typically given 30 days to submit a corrective design and 60 days to effect it. Inspections at change of ownership are effectively self-enforcing insofar as loan institutions will not provide mortgages without certification of the system. Enforcement may also be effected though administrative hearings, civil infractions, civil penalties, and actions through Superior Court.

Size and Cost of Program

There are currently about 17,000 systems in the program. It has a budget of approximately $260,000, totally supported by fees, and employs about 3.5 full time equivalents. The fee schedule includes an initial $40 administrative fee, and a $145 initial inspection fee; an annual $30 water quality monitoring fee, and a $15 periodic permit renewal fee. For new construction there are additional fees for design review and inspection, and construction permits, although discounted "packages" are offered for new construction.[3] At the present time water quality monitoring fees are being held in trust because of the lawsuit.

Monitoring and Reporting Program

At the time the Thurston County program began, it was more stringent than any state requirements, and "oversight" of the State Board of Health was largely a matter of curious interest. Under the current regimen, and as part of the state's Chapter 246-272, the state Board of Health must approve the monitoring programs that all counties are now required to develop in order to assure that local regulations are at least as stringent as state requirements. Such oversight is relatively routine, however, because of the strongly autonomous nature of the county governments. It is doubtful that the state would intervene in any onsite matter unless reports of malfeasance were brought to its attention. It does, however, plan ongoing assistance to enhance the effectiveness of local programs, and intends to work on ways to evaluate the effectiveness of local approaches.

Moreover, many related activities are supported with state help. For example, the county's door-to-door surveys with dye tests for neighborhoods at high risk are part of the watershed management plan initiated by PSWQA (now called the Puget Sound Water Quality Action Team). These were funded in part through the state's Centennial Clean Water Fund, whose revenues derive from a tax on cigarettes.[5] In addition, the county's low-interest loans to low- and middle-income homeowners needing system repairs or replacement are funded by a loan from the state's SRF.

Level of Success and Lessons Learned

Thurston County took some chances in opting to be first in the state to operate an onsite monitoring and maintenance program, and may have made some painful discoveries that other counties can avoid. The benefits of the program are obvious enough. Proper sewage treatment is better assured through inspection and maintenance, while costly sewers are avoided and public resources better protected. Thurston County's program had been set up to prevent the closure of more of its shellfish beds. Eventually, it hopes for the reopening or upgrading of some the beds that are closed. (Within the larger Puget Sound area, while additional beds continue to be closed, over 7000 acres have been upgraded since 1989, three areas as a direct result of the repair of failing onsite systems.[2]) The program has been driven by diligent concern for drinking water quality and shellfish protection, as well as by a forward-looking, proactive, seriously motivated Board of Health.

However, the program had been hampered by two lawsuits.[4, 6] One suit contended that the phased implementation of the program was inequitable. The other raised constitutional issues, contending that the water quality monitoring fee was an illegally imposed tax. While those suits were in progress in the courts, the renewal phase of the permitting program was discontinued, renewal permit fees were not collected, and thus compliance efforts were hampered. Water quality monitoring fees continued to be collected, but were held in a trust fund pending the outcome of that lawsuit.

In both cases, Superior Court ruled on behalf of the county in summary judgment. The renewal permit program is again operational, albeit in weaker form. The plaintiff in

the second case appealed to the Washington State Court of Appeals, which also ruled in favor of Thurston County. The case was then appealed to the Washington State Supreme Court which denied review, affirming the Appeals Court decision.[7] Thus, the way has been cleared to release the funds and commence the water quality monitoring program.

The lessons appear to be that if implementation is phased, the scientific, environmental, and hydrological justification for the phasing must be explicit and impeccable. Also, in this case, the complexity of the fee structure, and the sheer number of itemized fees, have been both visible and controversial. A simpler fee schedule sufficient to cover all aspects of the management program might have been more palatable to owners. More public participation, promotion, and education might have helped. It has been reported that owners did not really understand the renewable nature of their operating permits, or the need for all the different fees.[1]

Problems aside, the county (and now the state) regards onsite treatment as the method of choice in many suburban and rural areas—provided that comprehensive planning is employed, and that a monitoring program is established to assure that systems are properly operated and maintained.

Sources

While any errors or misinterpretations in this account are wholly those of the author, the persons listed above as contacts, as well as the persons whose names follow, have been helpful sources of information:

Dave Lenning, Alternatives Northwest, 2210 Lakemoor Dr SW, Olympia, WA 98512, tel 360-352-1163.
Krag Unsoeld, Environmental Planner, Puget Sound Water Quality Action Team, P.O. Box 40900, Olympia, WA 98504, tel 360-407-7300.

References

[1] Puget Sound Water Quality Authority, 1994. *Summary Proceedings of "Clearing the Waters," [a conference on] Improving the Use and Management of On-site Sewage Systems in Puget Sound*. (PSWQAT, Abbot Raphael Hall, Box 40900, Olympia, WA 98504.)

[2] Washington State Department of Health, Office of Shellfish Programs. *1996 Annual Inventory of Commercial and Recreational Shellfish Areas in Puget Sound*. (Building 4, Airdustrial Center, Box 47824, Olympia, WA 98504.)

[3] Puget Sound Water Quality Authority (prepared by Apogee Research, Inc., Seattle, Washington), 1993. *Local Government Water Quality Finance Guidebook*. (PSWQAT, Abbot Raphael Hall, Box 40900, Olympia, WA 98504.)

[4] Washington State Department of Health, Community Environmental Health Programs, 1996. *Guidance Handbook for On-site Sewage Monitoring Programs in Washington State*. (Box 47826, Olympia, WA 98504.)

[5] Gover, Nancy, 1996. Thurston County surveys failing septic systems. In: *Small Flows*, 10(1):5, 10.

[6] Leaf, C. D., 1997. Unpublished memo: *Brief Case Summary, Thurston County Rental Owners Ass'n. versus Thurston County*.

[7] *Thurston County Rental Owners Ass'n. v. Thurston County*, 85 Wn. App. 171, *review denied*, 132 Wn. 2d--. No. 65232-5, July 8, 1997 (1997).

Guysborough, Nova Scotia

A small district, authorized under provincial law, that publicly owns and operates onsite systems located on private property

Location and Name

Guysborough Waste Water Management District
c/o Environmental Services Committee
Municipality of the District of Guysborough
P.O. Box 79
Guysborough, Nova Scotia B0H 1N0
Canada

Contact

Mr. Shirley Nixon, Municipal Clerk Treasurer, Tel 902-533-3705

Background and Setting

A 1982 amendment to the (provincial) Nova Scotia Municipal and Town Act allows Nova Scotia towns and municipalities to create Wastewater Management Districts.[1] The idea is to provide a mechanism for uniform "flush and forget" public service to building owners, regardless of the mix of technologies and regardless of who owns the systems. Such districts are thought to be especially applicable to small rural villages, particularly where circumstances have resulted in low population densities, undersized lots, inadequate systems, bad topography, or thin soils.

Essentially the authorization enables the district, when created, to enter private property for the purpose of inspecting, repairing, upgrading, or replacing ISDS components, or components of communal systems. The powers of such a district are not that different from those of a sewer district, although in one sense they are broader, for the district may operate package plants or other small community systems as well as manage individual systems. The administrative unit is either a public works or sewer committee of the Municipal Council vested with all the necessary authorities and duties. It can own or lease land, make contracts, and fix and collect charges. It is held responsible for overall planning; upgrades; and design, construction, inspection, operation, and maintenance of any type of system. The district is essentially granted a permit to discharge.

Boundaries of the district need not coincide with the existing town boundaries, and would typically be smaller; there may be several districts created within one town. Or a district may even be "noncontiguous," comprising individual properties or groups of properties that require special management for environmental or health reasons.

Approval by voters (prospective ratepayers) in the district is required. The option must be presented to them as a complete plan that has considered sites, boundaries, servicing options, preliminary designs, and cost estimates. All property owners in the district are obliged to participate in the funding, paying an annual charge that covers capital recovery as well as operation and maintenance costs.

The Problem

Guysborough is a small fishing village on the eastern Nova Scotia coast containing about 700 residents and 250 homes, a very small mixed residential and commercial "downtown," and a harbor.[2] Many of Guysborough's existing systems were completely inadequate. Some of them were cesspools; others were poorly designed or constructed. Drainage fields saturated the ground in some areas. It was apparent that other systems drained into ditches or other water courses that led directly to the harbor. Sufficient complaints accumulated with the Environmental Services Committee that in 1986 the town applied to the Nova Scotia Department of Municipal Affairs for 100% funding of a "Pollution Control Study." Funding obtained, the study was contracted out. It confirmed that fewer than 10% of Guysborough's systems were adequate.

The Solution and Its Development

Thus it was that Guysborough came to establish a wastewater district in 1989. The district does not encompass the entirety of the town, but it built and operates a small conventional treatment plant (a Rotating Biological Contactor) for the core area of the town, which handles about 130 buildings; and an aerated lagoon system for an outlying area, which handles about 90 buildings. For a third section of town, it brought some 25 individual systems under management, and upgraded or replaced them. The district oversight agency in the case of Guysborough is the Council on Wastewater Management Systems, which answers to the Environmental Services Committee of the Municipal Council.

Under Nova Scotian law, the next phase of the Pollution Control Study is very similar to the U.S. EPA's protocol for comprehensive planning. Having documented the problem and need, successive phases of the planning process are to:

- Define boundaries of the problem area(s) and district;
- Explore treatment and management options;
- Make preliminary designs;
- Estimate costs.[1]

With the help of the consulting engineer, the Municipal Council decided on a package that would put the densest area of the town, as well as fringe areas that had poor soils (heavy clay, "Category III"), under a single district.[2] At the same time the areas to be served by the proposed package plant, by the aerated lagoon, and by the managed ISDSs were established. The idea was that in order to hold costs down, no area would

receive more treatment than required to effect an adequate outcome, but that with a single, broad district the total costs could be more broadly, thus equitably, distributed.

After the steps outlined above are completed, the protocol then calls for:

- Presenting the package to ratepayers at public hearings;
- Putting the package, or a revised package, to vote;
- Providing detailed, final design;
- Preparing the bylaws, creating the management structure, and
- Commencing operations.

The bylaw must clearly articulate the boundaries of the district, identify the locations and types of systems, spell out the full extent of municipal responsibilities, and specify an equitable method of levying fees.[1]

A long series of public meetings then commenced in Guysborough.[2] Some residents on the fringe area that would not be connected to the sewer were opposed, having, for example, recently paid for new systems; and, in any event, felt that they were being denied the "benefit" of either central system. To equitably levy fees, the consultant proposed that fees be based on "equivalent units," with the fundamental unit being the 200-imperial-gallon flow estimated for one household. This would mean, for example, that if a business were thought to generate a 600-gallon flow, it would be charged for three equivalent units. Again, however good the scheme sounded, there were objections. Owners of a tourist complex, for example, argued (to no avail) that equivalent units should be prorated on months of use.

Despite the disgruntlement, when it was put to a plebiscite (a secret ballot vote of ratepayers only), the measure passed. The district commenced operations in 1989, and became fully operational in 1993.

Program Structure and Activities

A licensed engineering contractor handled design and construction of the aerated lagoon and the package plant. A single town employee tends to their operation and maintenance, although the Nova Scotia Department of Environment also continually monitors their performance.

Likewise, an engineering contractor was engaged to initially pump and inspect ISDSs, make required repairs, and design or install upgrades consistent with the latest municipal standards (which flow from minimum criteria set by the province under the "Nova Scotia Regulation Respecting On-Site Sewage Disposal Systems"). While there was a great deal of resistance in some cases, the last such system was upgraded in 1992.

Alternative or innovative systems can be used when permitted by Nova Scotia regulations. In particular, mound systems can be employed for undersized lots or poor soils. As was the case immediately before formation of the district, system design has to be approved by the Guysborough District Board of Health. The town periodically tenders

bids for routine pumping and maintenance of systems. ISDSs typically are inspected and pumped on a five-year cycle.

The decisions on requirements for repair and replacements of ISDSs, as well as on maintenance requirements, rest with the municipality in consultation with its contractors. No owner pays for these activities directly, as they are covered in the operating budget of the district.

Size and Cost Of Program

Guysborough was able to obtain 50% of the capital and startup costs from the province.[2] The municipality agreed to fund another 25% from its own capital reserves, and so structured the proposed bylaw. This left ratepayers to fund 25%, which came to a $2495 (Canadian) one-time Capital Connection Charge (CCC) per "equivalent unit." Residents could finance the CCC over ten years paying one tenth each year, and 15% interest on outstanding principle. At present, any new connections or systems are charged a one-time CCC of $3500 (regardless of actual cost) for either a connection to one of the central facilities; or for design, construction, and installation of their ISDSs.

A staff of two runs the program with help from contractors. The "Annual Operating Levy" is presently set at $125 per equivalent unit. Billing is itemized on the annual tax bill, with the same penalties (ultimately property seizure) for failure to pay. The bylaw also provides for prosecution and fines of up to $1000 or prison terms of up to 90 days for violation of any provision of the bylaw.

Monitoring and Reporting Program

Guysborough is a very small town, and the district operation is quite modest. The district keeps its own paper records on systems, their status, and the activities of contractors. But it does not report to the province. It does, however, rely on the province's Department of Environment for monitoring of the central systems, as well as for any water resources monitoring, research, training, and certification that the province may establish or demand.

Level of Success and Lessons Learned

Most Guysborough residents and its Municipal Council are satisfied with their program, as is the Province of Nova Scotia. Failing systems have been eliminated, harbor waters are cleaner, and the costs have certainly been lower than that of hooking every building to a central plant.[3]

However, these districts have often been voted down in Nova Scotia.[4] Only three towns have adopted such districts, even though enabling legislation has been on the books since 1982. Of sixteen others that considered it, decentralized management was actually the recommended course to take in fourteen of them, but it hasn't happened.

The Nova Scotian public apparently often regards central sewering as more desirable and less interfering. Mound and similar systems are regarded as unsightly. Moreover, equity of either service or cost has been an issue in towns considering a mixed technology approach such as that of Guysborough.[3] Indeed, not every resident of the Guysborough district feels fairly treated in being outvoted.

In a provincial review of these programs,[4] establishing a basis for equity has been described as a "major stumbling block" to voter approval. In fact, the document recommends amending the enabling legislation so that voter approval is not required for a municipality to establish such a district, although so far no legislative changes have been made.

Furthermore, aside from questions of equity, voters have not always perceived that a problem really existed, or that a Wastewater Management District was the entity to fix it. In fact, as a new kind of public utility, it has seemed to some unfamiliar, strange, and possibly unworkable. Perhaps the answer here lies in better public preparation.

Sources

While any errors or misinterpretations in this account are wholly those of the author, the person listed above as a contact, as well as the person listed below, have been helpful sources of information:

David A. Pask, 1995, Technical Services Coordinator, National Drinking Water Clearinghouse, West Virginia Univ., Box 6064, Morgantown, WV 26506.

References

[1] Nova Scotia Dept. of Municipal Affairs, 1983. *Wastewater management districts: an alternative for sewage disposal in small communities.* (No further information available.)

[2] Nixon, Shirley, 1995. Presentation: Managing Wastewater Systems [in Guysborough, N.S.]. In: *Conference Summary: Managing Small-scale, Alternative and On-site Wastewater Systems,* Assumption College, Worcester, MA. (Marine Studies Consortium, 400 Heath St, Chestnut Hill, MA 02167.)

[3] Mooers, Jordan D. and Donald H. Waller, 1994. Wastewater Management Districts: the Nova Scotia Experience. In: E.C. Jowett, 1994, *Wastewater Nutrient Removal Technologies and Onsite Management Districts*; Conference Proceedings. (Waterloo Centre for Groundwater Research, Univ. Waterloo, Waterloo, Ontario.)

[4] Paton, Andrew, 1995. *Review [of the] Merits of Wastewater Management Districts—Municipal infrastructure Action Plan, Activity #15.* (Community

Planning Division, Provincial Planning Section, P.O. Box 216, Halifax, NS B3J 2M4.)

Nine Counties in North Carolina

A public management entity makes land developable through the use of alternative systems

Location and Name

Public Management Entity
District Health Department
(Pasquotank-Perquimans-Camden-Chowan)
P.O. Box 189
Elizabeth City, NC 27907

Contacts

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Background and Setting

North Carolina has one of the largest rural non-farm populations in the country. More than half its residents are served by onsite systems despite the fact that conditions are often less than ideal. Poorly-drained, clayey soils; shallow rock ledges; or swamps and marshes whose margins have high water tables characterize many areas of the state. Moreover, many sites suitable for conventional septic systems have already been developed; thus, increasingly, new development must rely on alternative systems that compensate for poor site conditions. In fact, alternative systems have been in use for a long time in North Carolina, in part because of an active research and extension program at the College of Agriculture and Life Sciences at North Carolina State University (NCSU).[1, 2]

For these reasons, North Carolina was one of the first states to recognize that proper management was required for onsite systems, and during the 1980s the state passed a number of laws tightening requirements for their use. However, in 1988, a survey conducted by NCSU on behalf of the legislature revealed that alternative systems were failing at twice the rate of conventional systems, mostly because they weren't being adequately maintained.

Thus, in the early 1990s North Carolina completely overhauled and consolidated its wastewater laws and regulations (Chapter 90A, Article 3 of the General Statutes, and North Carolina Administrative Code, Title 10, Subchapter 10A, Section .1900) to require mandatory surveillance (at the least by an owner) of all onsite systems, along with mandatory surveillance and maintenance by a "management entity" for the more risky of them. Systems are classified into 6 types, depending on their complexity, design, and

size; each type subject to corresponding rules concerning operation, operator certification, inspection, maintenance, and reporting requirements. Alternative systems, including those designated as innovative or experimental, are permitted, but require the tightest management. Owners of systems requiring oversight must establish an inspection and maintenance contract with an approved management entity, or, in the absence of an entity, with an independent Certified Subsurface System Operator. The new law (effective July, 1992) also provides for a Certified Subsurface System Operator Certification Program, which is conducted jointly by the state and NCSU.[3]

There are at least 12 management entities acceptable to the state. These include cities and counties through their own departments; city and county water, sewer, or sanitary districts or authorities; intergovernmental agreements to establish joint districts or authorities; public utilities; and private certified operators.[4]

Onsite wastewater regulations are written, enforced, and revised by the Department of Environment, Health and Natural Resources (DEHNR), which (unlike the case in many states, including Massachusetts) combines public health and environmental management functions in one agency. Within the department there is a formal memorandum of agreement[5] between the Division of Water Quality, DWQ (which contains a Section for Groundwater Protection), and the Division of Environmental Health, DEH (which contains a Section for Onsite Wastewater Management).

The agreement sets out how the divisions (that is, the sections within the divisions) divide and coordinate their activities so that both groundwater resources and public health will be protected. The Groundwater Protection Program is administered directly by the DWQ, while local health departments (municipal, county, or district) administer onsite regulations by acting as delegated agents of the DEH.

Any local health department may promulgate regulations more restrictive than those of the state. Also, any local health department may act as the designated "management entity" for systems that require oversight. Such is the case in a northeastern coastal area of the state, where initially four counties (the number now having grown to nine) established a management entity in 1993 through the preexisting, multi-county ("PPCC") District Health Department.

The Problem

The counties of Pasquotank, Perquimans, Camden, and Chowan are located on long peninsulas, separated by estuaries that drain from the north into Albemarle Sound, an "inland sea" of sorts. To the east, the sound is blocked from direct tidal flushing by North Carolina's Outer Banks, a large section of which constitutes the Cape Hatteras National Seashore. The EPA and the DEHNR had declared much of this area “nutrient sensitive”. Thus, new point-source discharges of nutrients into receiving waters were restricted, severely limiting centralized wastewater treatment options.

But the geomorphology of the lower coastal plain puts severe constraints on land-based sewage disposal as well. The soils of the very low (10 feet elevation and less), flat interfleuves often contain a clayey, poorly permeable upper horizon; the sandy horizon underneath is often saturated, especially in winter and spring. By some estimates, more than 90% of the area is unsuitable for conventional septic systems. The situation was and is additionally aggravated by growing development pressure for both seasonal and year-round units.

In response to these pressures, during the 1980s the PPCC District Health Department (originally formed in the 1940s) began stipulating fairly extensive use of sand-lined trench leaching systems (SLTs), or combined trench and mound systems. These trenches cut through the clayey horizon to the sandy horizon underneath, and are then backfilled with sand and gravel to form the bed for leaching pipe and (often) pressure dosing. Frequently it is also necessary to establish perimeter drainage for the sandy horizon in order to lower the water table. The secondary drainage system might be designed for a whole subdivision. Initially, no maintenance for such systems was stipulated.

As a result of concerns expressed by the DEHNR, the College of Agriculture at NCSU obtained funds to conduct a series of studies in 1991 to assess the performance of the SLTs. It found that, even by simple visual inspection, more than a quarter of these systems was failing. And it concluded that although SLTs could be effective, their success depended on specific site conditions and corresponding design (including that of the secondary drainage), the quality of the backfill, and trench depth (many were too deep). A more systematic approach to site-specific design was recommended, with more attention paid to perimeter drainage and water-shedding landscape design. Finally, the NCSU study recommended that these systems be regularly inspected and maintained to assure their continuing effectiveness.[6]

The Solution and Its Development

Given the region's particular problems, and with the NCSU study in hand, it is easy to see how the PPCC District Health Department's Management Entity was one of the first in the state to get organized under North Carolina's 1992 enabling legislation. Efforts to form the entity began immediately after results from the NCSU study were in. Essentially it is charged with the oversight of any alternative systems, such as the SLTs, as well as any conventional system that also depends on perimeter drainage. Currently, there are about 1000 systems in the management program.

Program Structure and Activities

Any individual owner whose site is unsuitable for a conventional system (a determination made by the PPCC Health Department, not the management entity), and who wants to construct an alternative system, must make a contract ("Inspection and Maintenance Agreement") with the District Management Entity prior to being issued an Operation Permit.[7] The contract is filed with the register of deeds and indicates that the

property is subject to the terms of the agreement, and that it runs with the land as a restrictive covenant. The agreement also contains the following provisions:

- The owner retains ownership of the system.
- The owner manages and maintains the system in accordance with conditions attached to the Operation Permit issued by the District.
- The District inspects the system at least annually.
- The owner agrees to provide easements and access to system components.
- The District notifies the owner within 48 hours of any inspection that indicates a need for system pumping, repair, or maintenance outside the scope of routine inspection.
- Owners are provided with a Repair Permit that spells out the nature of the repairs to be conducted, and the time frame in which they must be done (typically 30 days).
- Owners must obtain (at their expense) any necessary repairs from a District-approved contractor, and prove that they have been effected.
- In the event the owner fails to comply, the District effects the repairs, charging the owner for the service.

There are additional provisions for subdivisions, which must obtain Health District approval. The proposing developer must file an application that includes a map showing property boundaries, and pay a soil evaluation fee set by the District. A District Environmental Health Specialist then meets the developer to walk the property and take soil samples. The District analyzes samples and a report is sent to the developer within 30 days.

If the property is found suitable, or provisionally suitable, for conventional ISDSs, the District will specify minimum lot size, dependent on conditions. The developer then follows Planning Board requirements for obtaining final plat approval.

If the property is not suitable for conventional systems, the subdivider may develop, with a registered surveyor or engineer, a wastewater and groundwater drainage plan for the plot that must be approved by the District. After the plan is approved, but prior to the District's issuing any individual Operation Permits, the developer must then:

- Form a Property Owners Association in which membership is required of all individual owners (if 10 lots or more are involved, the Association must be a corporation);
- Draw up a Declaration of Restrictive Covenants that runs with the parcels;
- Corporately make a contract with the District Management Entity that contains provisions similar to those outlined above for individuals, except that the Property Owners Association is the responsible party.

Typical restrictive covenants have provisions for compliance and payments, assessments made by the Association for the purposes of operation and maintenance, setback lines, and easements for groundwater drainage and maintenance. Both the covenants and the required actions of the subdivider vary depending on the size of the subdivision and the type of onsite system employed.

PPCC District staff consider topography; surface drainage; vegetative cover; soil texture, structure, and wetness; mineralogy; depth to water table; and the existence of restrictive horizons in making stipulations for acceptable wastewater systems and groundwater drainage plans. Stipulations concerning maintenance and inspection frequency are those outlined in the new state code. Staff will provide technical advice and construction supervision on request.

Inspections of communal systems consider and report on:

- Collection system (leaks or blockage);
- Tanks (grease trap condition, riser accessibility, surface water diversion, structural soundness, watertightness, functionality of sanitary tees, state of tank, and pumping frequency);
- Pump and dosing systems (are they operating correctly,; are there high-water alarms; pumps, floats, pipes, and valves in working order);
- Ground absorption fields (surfacing effluent, ponding in subsurface trenches, surface water diversion, vegetation, destructive or impermissible uses);
- Inspection of groundwater drainage networks to assure their proper functioning.

Size and Cost of Program

North Carolina's management entities are supported wholly by fees (and penalties) which the entities set. Presently, the PPCC district's initial application fee for individuals is $150, and the annual renewal and inspection fee is $50, regardless of inspection frequency. In 1996, operational costs for the program, which oversees about 1000 systems, were approximately $50,000. Staff amounts to about two full-time equivalents.

If assessments, fees, or bills for actions taken by the District because of homeowner noncompliance are not paid, then together with accruing interest they become a continuing lien on the property. The District may also bring an action at law against the owner and/or an action to foreclose on the property, with compensation to include administrative and legal costs.

Monitoring and Reporting Program

Activities and actions taken by the District (or any approved "management entity") are reported to, and reviewed by, the local Board of Health. Management entities are not specifically charged with environmental monitoring—only with the monitoring and performance of the systems for which they are responsible, although an entity may require near-site monitoring by owner/operators through conditions attached to an Operation Permit. Within the PPCC district limited water quality monitoring is being conducted by NCSU in connection with ongoing studies of the effectiveness of the onsite management program.

State supervision of either local Boards of Health, or the management entities that answer to them, is mainly by directive rather than by oversight. However, local health

departments report violations to the state's DEH, which can levy administrative penalties for violation of the code against system owners who fail to comply. These penalties may be up to $50 per day for small systems, and $300 per day for systems with flows over 480 gpd. If those are ignored, the state can revoke operating permits, file misdemeanor criminal action charges, or seek injunctive relief to condemn a building or a dwelling.

As spelled out in the Memorandum of Agreement between the DWQ and the DEH,[5] local Boards of Health, acting as agents of the DEH, as well as the DEH itself cooperate with the DWQ in the execution of the state's water quality and groundwater protection programs. Some provisions of this agreement follow:

- Permit applications for all systems requiring state approval (those with discharges exceeding 3000 gpd, as well as certain types of alternative and innovative systems) are received by the DEH, but reviewed by both the DEH and the DWQ. The DWQ may recommend denial of any permit upon finding that groundwater standards would be violated.
- Local health departments (LHDs) alert the DWQ to any applications for permit renewal or amendment where a groundwater monitoring network is established or planned, requesting recommendations for any groundwater or effluent monitoring requirements that should be attached to the permit.
- The DWQ also may locate monitoring well sites of its own based on such information.

LHDs inform the DEH, and the DEH informs the DWQ, of compliance and enforcement activities undertaken by LHDs.

Level of Success and Lessons Learned

In 1996 NCSU returned to the region to determine whether alternative systems there were functioning better.[8] NCSU attempted to parallel the 1991 study as far as possible. Using similar criteria, the failure rate had diminished from about 25% to about 5%. However, not all of the decrease could be attributed to the recent management measures taken. For example, 1996 was a drier year, and the average age of the systems inspected was younger. Nevertheless, the improvement was attributed in part to the proactive activities of the management entity, including regular inspections (and repairs) and the adoption of more systematic design and siting criteria.

The study uncovered some potential problems. Subsurface ponding in trenches (not specifically looked for in the 1991 survey) was observed in over 10% of the systems surveyed. Drainage maintenance in some cases appeared lax. Poor landscaping was the problem area most often observed—although most owners confessed that they had been advised to correct the problem, and in some cases corrections were underway.

There are political problems as well. The PPCC Health Department has no reserve fund to initiate any repairs not made by homeowners. And it has had trouble with fee collection. County Commissioners have not always been sympathetic, some regarding any attempt to improve wastewater management as mischief-making by "people in

Raleigh" who (purportedly) would like to see development halted in the northeast region of the state.

Sources

While any errors or misinterpretations in this account are wholly those of the author, the persons listed above as contacts, as well as the person listed below have been helpful sources of information:

Mike Hoover, Ph.D., Soil Science Dept, North Carolina State University, Box 7619, Raleigh, NC 27695, tel 919-515-7305.

References

[1] Hoover, Michael, 1988. NCSU's on-site management program is cooperative effort. In: *Small Flows*, June (1988):8-9.

[2] Rubin, A.R., 1988. North Carolinians match treatment systems to soil, site conditions. In *Small Flows*, June (1988):10-11.

[3] Eddy, Natalie, 1993. NC provides training for onsite system operators. In: *Small Flows*, 7(3):1, 6-7.

[4] North Carolina Cooperative Extension Service, 1991. Management of single family and small community wastewater treatment and disposal systems. In: *Soilfacts* (an occasional series), 12/91-4M-TWK-220011, AG-439-11: 6 pp. (North Carolina Cooperative Extension, College of Agriculture and Life Sciences, NCSU.)

[5] *Memorandum of Agreement* [between the Division of Environmental Management (now the Division of Water Quality), and the Division of Environmental Health]. (Photocopy obtained from PPCC District office, further information not available.)

[6] Hoover, M.T., R. O. Evans, T.H. Hinson, and R.C. Heath, 1993. *Performance of sand lined trench septic systems on wet, clayey soils in northeastern North Carolina*. Final Project Report for Division of Environmental Management, North Carolina DEHNR. (College of Agriculture and Life Sciences, NCSU, Raleigh, N.C.)

[7] PPCC Health Department, 1995. "Management Entity Outline", and other internal documents. (See address above.)

[8] Lindbo, D.L., T.M. Campbell, N. Deal, R. Hollowell, (in press). Performance of sand lined trench and conventional systems within a management entity. To

appear in: *Proceedings of the Eighth National Symposium on Individual and Small Community Sewage Systems*, March 1998, Orlando, Florida.

Georgetown Divide

A full-fledged, cradle-to-grave management program

Location and Name

Auburn Lake Trails Wastewater Management Zone
Georgetown Divide Public Utility District of El Dorado County
P.O. Box 4240
Georgetown, CA 95634

Contact

Marie E. Davis, General Manager, tel 916-333-4356

Background and Setting

While the concept of onsite management dates back to the mid-1950s, the Georgetown Divide Public Utility District is often credited with establishing, in 1971, the first fully comprehensive ("cradle-to-grave") management program. There is direct public agency involvement in site testing, system design, construction management, operation, maintenance, and environmental monitoring. Only construction and ownership are left to others; however, the district closely supervises construction, and owners as a condition for receiving an operating permit grant an easement for district access. [1]

The program applies to Auburn Lake Trails, a subdivision near Georgetown, California. Georgetown is situated on the western slope of the Sierra Nevada mountain range, in El Dorado County. The subdivision lies in the American River watershed—the river which flows through Sacramento, the state capital, and which is a pristine, regional, and intrastate source of water.

The Problem

While the Auburn Lake Trails subdivision plan called for the eventual construction of a treatment plant, there was a problem in that the subdivision would begin with only a few hundred units, primarily of second, or vacation, homes. However, a treatment plant designed for buildup (at some 2500 proposed units) would initially have insufficient flow to function properly, thus the subdivider proposed installing onsite systems as an interim measure. The El Dorado County Division of Environmental Health, and other planning bodies, were concerned about geological conditions that were thought to be basically unsuitable for onsite disposal. These included thin, poor soils and steep topography. Moreover, protecting the watershed was of great concern, particularly in light of the density and size of the proposed subdivision.

The Solution and Its Development

To allay these concerns, J.T. Winneberger, a consultant for the developer (and long a proponent of onsite management) proposed to the Georgetown Divide Public Utility District, which had already been established to manage Georgetown's water supply, the idea of public management. The district agreed to accept the responsibility for Auburn Lake Trails onsite systems provided that the County's Health Division, as well as the Central Valley Regional Water Quality Control Board (CVRWQCB), concurred. This concurrence was obtained because of the recognition by all parties that the rate of buildout was going to be slow; and, more importantly, because the Georgetown Divide PUD was willing to establish (and did establish) an assessment district, when and if the need arose to proceed with a central plant. At its inception all that the district assessed was a one-time fee of $50 from each new owner to help defray the costs of a central plant feasibility study at some future time. Nevertheless, a mechanism was in place to build a plant when it was required, clearing the way for the interagency agreements and an agreement with the subdivider, which were then struck. The program was born in 1971.

Georgetown Divide's program was not the only California program initiated in the early 1970s. Many of them stretched the legal limits of county authority. However, in 1976 in recognition of a need, the Governor's Office of Appropriate Technology was created in cooperation with the State Water Resources Control Board (which oversees the activity of the regional, watershed-based boards). The Office commissioned a widely cited 1977 study entitled "Rural Wastewater Disposal Alternatives," and helped push through Senate Bill 430,[2] the "onsite wastewater disposal zone law," which went into effect in January 1978. The law specifically states that central treatment plants will no longer be approved where existing onsite systems can be rehabilitated, or where less expensive alternatives to central plants exist. It modified the powers of 17 types of institution already authorized to establish central treatment programs, enabling them to alternatively establish special districts, called "zones," for onsite management programs. The agencies that manage these zones do so as wholly accountable public utilities operating under a permit or authority parallel to that of a point-of-discharge NPDES permit. The permit stipulates monitoring and reporting requirements, which can be tightened or loosened.

While all this was happening at state level, Auburn Lake Trails was not without continuing problems and growing pains. Septic systems (many of them innovative) were failing despite the management program. Moreover, residents had come to oppose building a central plant for fear of the development pressure it would bring. The Homeowners Association was in the middle of a lawsuit with the developer on several scores. And the CVRWQCB had imposed a moratorium on more development until the problems were solved. In 1978 the District hired, at the developer's expense, a soil scientist to analyze and pinpoint the causes, magnitude, and correctability of the failures. Using those studies and previously acquired data going back to the program's inception in 1971, the District, the homeowners, and the developer reviewed both central plant and onsite options. In 1985 they agreed to abandon the idea of future sewering, reduce the subdivision to 1100 units at buildout, take advantage of the new law's provisions for

establishing a permanent wastewater management zone, and reorganize under the new enabling legislation.

The program that exists today is the product of the trials and errors of 25 years. Moreover, although the program was initially established for a completely new subdivision, subsequent difficulties with systems resulted in the need for rehabilitation and replacement. Thus the Georgetown Divide case is, in some ways, applicable to that of older communities as well.

Program Structure and Activities

At the height of development activity the Zone was managed with a staff of four. At present it operates with a staff of about two-and-a-half people: one program coordinator and professional designer, and one-and-a-half field inspectors. The low staffing requirement is possible because the computer system includes system design aids, inspection results, water quality data, soil data, report generating, schedules and other "tickler" functions. The database was developed in-house using commercially available database software. The district has completely mapped the hydrology and soil geology of the subdivision, identifying 10 geological and soil types; these are reducible to 5 management units that vary in design and monitoring requirements. Each of the units is matched to a set of possible system types. Today these system types number 8, down from 15 originally. Staff is responsible for:

- Site evaluation and testing;
- System design, including post-backfill landscape design and erosion control;
- Construction management and oversight;
- System maintenance and monitoring;
- Environmental monitoring of ground- and surface waters;
- Performance monitoring of alternative systems; and
- Alternative systems research.

All these activities are performed very thoroughly. Every individual system has twinned leach fields, alternated with a diverter valve; every site also contains a reserve leach field area. Factors considered in design include depth to groundwater, drainage pattern, soil permeability and restorative capacity, and slope direction and vegetation as they affect soil dryness and evaporation.

All systems contain inspection risers and sampling ports. Depending on their type, systems are inspected at intervals ranging from 4 to 18 months. If tanks need pumping, it is the homeowner's responsibility to see that it gets done; compliance is signaled by pumper reports to the district. The cost of repairs is also borne by the homeowner. The ultimate enforcement device of the district is its easement. If necessary, the district will pump or repair, putting a lien on the property until the service is paid for, although this is rarely required.

Size and Cost of Program

In 1996 the program was responsible for the management of approximately 750 individual systems (200 conventional, the rest specially designed), and one communal system that presently services about 100 houses. The 1997 budget is approximately $165,000, or about $195 per unit per year. User charges[3] are apportioned according to the "level of benefit received," and are as follows:

- $540 for ISDS design and construction oversight, or
- $1825 for design, construction oversight, and connection fees for the
- communal system; in addition to
- $150 per year management charge for ISDSs, or
- $275 per year for the communal system.

There are also smaller annual charges on vacant lots. (The cost of pumping a system, which homeowners bear, is about $250; and the cost of installing a system, which also falls to the homeowner, ranges from about $4000 to $15,000 depending on requirements. Generally, lot prices reflect the anticipated cost of system installation.)

Monitoring and Reporting Program

Monitoring and reporting requirements are stipulated by the County and the Central Valley Regional Water Quality Control Board.[4] Following the reorganization in 1985, reports were submitted quarterly; at present the zone submits an annual report. Reporting requirements are tailor-made for each zone. In the case of the Georgetown Divide zone, the report includes a location map, systems inventory and activity, environmental monitoring data, mound-system monitoring data, and communal system monitoring data. Reports are submitted in both tabular and summary form, meant to "clearly indicate compliance with waste discharge requirements." The discharger (district) must also "discuss the compliance record and the corrective actions taken or planned." At present, personal contact with the CVRWQCB is not frequent, as the Board has been satisfied with the program's progress and reports.

Mound system leachfield discharges, groundwater beneath them, and surface water at seven streams are regularly sampled and tested for fecal and total coliform, chloride, nitrate, electrical conductivity, temperature, and pH. Groundwater hydrology (depth to water table, flow rate, etc.) is also routinely monitored.[4]

Level of Success and Lessons Learned

The Georgetown program got off to a shaky start without much in the way of a comprehensive needs assessment and monitoring plan—in part because in the early days it was still thought that eventually a central plant would need to be built. Too much emphasis was initially placed on systems and systems maintenance, and too little on what was happening in the ground. The key to its successful risk management today lies in the complete understanding of small-scale soil and hydrologic variability, in addition to very specifically tailored siting and design. Great attention is paid to hydraulic conductivity at

the site and where discharges will actually flow. As individual site conditions worsen, system requirements are correspondingly tightened or site-tailored in terms of leachfield and dosing layout.

Today both administrators and regulators regard the Georgetown zone as highly successful. Hard proof of the success lies in the demonstration of water quality in the streams flowing out of the development that is satisfactory to the RWQCB's standards. Moreover, the program is carried 100% by a very reasonable fee structure. Nevertheless, it should be borne in mind that initial costs, subsequent needs analysis, soil studies, and so on were borne by the developer, who was able to bear them because of the sheer size of the development and the developer's capital resources.

Sources

While any errors or misinterpretations in this account are wholly those of the author, the contact listed above, as well the individual listed below, have been helpful sources of information:

Charles F. Gierau, General Manager of the Georgetown Divide PUD (retired), P.O. Box 348, Georgetown, CA 95634, tel. 916-333-4537.

References

[1] Prince, R.N., and M.E. Davis, 1988. On-site system management [in the Georgetown Divide PUD]. Presented at the National Environmental Health Association's Third Annual Midyear Conference, *Onsite Wastewater Management and Groundwater Protection*, Mobile, AL. (The document is available from the National Small Flows Clearinghouse, P.O. Box 6064, Morgantown, WV 26506.)

[2] California State Water Resources Control Board, 1978. *Public Management of On-site Wastewater Systems: An Explanation of Senate Bill 430.* (Available from National Small Flows Clearinghouse, Box 6064, Morgantown, WV 26506.)

[3] Georgetown Divide PUD, 1996. *[Notice to Auburn Lake Trails Property Owners.]*

[4] Georgetown Divide PUD, 1996. *Auburn Lake Trails On-site Wastewater Disposal Zone Monitoring and Reporting Program [report] 84-126*, September 17, 1996.

Stinson Beach

Another early, publicly-managed California program

Location and Name

Stinson Beach Onsite Wastewater Management Program
Stinson Beach County Water District
3785 Shoreline Highway
P.O. Box 245
Stinson Beach, CA 94970

Contacts

Bonnie M. Jones, Program Manager, tel 415-868-1333
Richard Dinges, General Manager, tel 415-868-1333

Background and Setting

Stinson Beach is another early, California, example of onsite districts whose origins predate California's Senate Bill 430, the "onsite wastewater disposal zone law,"[1] and thus exemplifies the process by which management districts can be formed in the absence of their general authorization at state level. (State-level California legislation is discussed more fully in the Georgetown Divide case study.) Interestingly, however, by the time the Stinson Beach program was operational, California *had* passed Senate Bill 430. The Bill borrowed heavily from provisions of 1976 legislation, Senate Bill 1902, the one which specially authorized the Stinson Beach district.

The Problem

The situation confronting Stinson Beach was difficult but not atypical.[2, 3] Stinson Beach is a small community (population around 1500, with about 700 onsite systems today) in Marin County, located about 20 miles north of San Francisco. Part of Stinson Beach is a park that can draw 20,000 visitors on a weekend.

As is the usual case for a coastal community, siting conditions at Stinson Beach are less than ideal. Soils are sandy, depth to groundwater slight; the western uplands are steep and prone to erosion, the streams fast and plunging. The main stream, Easkoot Creek, feeds Bolinas Lagoon. In 1961 a Marin County Department of Environmental Health survey formally concluded that surface and groundwaters were being polluted. Bacterial counts in Easkoot Creek indicated an imminent public health hazard.

Most of the existing systems, many of them cesspools, were antiquated, or their construction had been poorly regulated or supervised. Indeed, after the program's startup,

more than 200 of the original 555 systems were deemed to have failed because of one or more of the following:[2]

- The system was simply a cesspool (thus failing by definition);
- The system was improperly designed or installed;
- The system had deteriorated;
- The system was undersized;
- There were expressions of surface effluent.

The Solution and Its Development

In response to the threat, Marin County tasked the Stinson Beach County Water District with solving the problem by designing and operating a central wastewater facility.[2, 3] The district is governed by a five-member elected Board of Directors.

Between 1961 and 1973, nine separate studies and proposals for central treatment were presented by the district, each in turn rejected by voters. Thirteen years had passed with no action. There was strong evidence of surface water pollution from failing systems, and in 1973 the Bay Area Regional Water Quality Control Board (RWQCB) intervened, putting Stinson Beach on notice—a building moratorium would go into effect forthwith, and all onsite systems would be eliminated by 1977. In spite of the RWQCB's strong action, which it could execute without so much as a hearing if a public health hazard was in evidence, a *tenth* central sewer proposal was rejected. The reasons for persistent rejection of these plans by voters included:

- High homeowner costs,
- Fear that sewering would hasten development,
- Skepticism about the purportedly low impact that an ocean outfall would
- have offshore, and
- Skepticism about whether alternatives had been sufficiently considered.

An eleventh study was specifically undertaken to examine alternatives to central sewering. Both engineering and environmental consultants were hired with a planning grant funded through the federal Clean Water Act. This study discovered that pollution attributable to septic systems was less than alleged, and quite localized. It also concluded that onsite remediation and management was the most cost-effective and environmentally benign.

The question then was whether regulators would agree. Concurrence was sought from the Bay Area RWQCB as well as the State Water Resources Control Board. The process was not easy, but was pushed persistently by Stinson Beach water district board members citing the evidence in the last study done. Even then, regulators only reluctantly agreed to permit the district—only as a trial, and with very strict reporting requirements.

Once approval was obtained, local politicians ushered the proposal through the California legislature relatively quickly, and in 1976 the state enacted special legislation (consistent with California Water Code provisions) empowering the Stinson Beach

County Water District to establish the Stinson Beach Onsite Wastewater Management Program. The program would ensure that the quality of the water in the community would be maintained through the effective control and management of onsite systems. It would answer directly to the Bay Area RWQCB, rather than to the Marin County Environmental Health Department.

After much negotiation on administrative and regulatory details, the district's rules and regulations were approved by the RWQCB on a 3-year trial basis.[4] The program went into effect with passage of a series of town ordinances, and commenced operations in January 1978. Since then, rules, regulations, and ordinances have evolved as problems were encountered, there being few precedents to go on.[3, 4, 8]

Program Structure and Activities

The program was structured to govern the permitting, construction, inspection, repair, and maintenance of existing systems.[2, 3] All such systems were to be inspected and documented with respect to their location, type, size, age, condition, and flow requirements of the house. The qualifications of all participants in such work, public or private, were left to state rules and certification procedures (which licenses or certifies engineers, environmental health specialists, and installers).

Later, the program would also regulate newly constructed alternative systems (in California referred to as "special systems"); and later still all new construction. New construction now requires district approval of system design prior to the issuing of a building permit, as well as inspection of the construction, and the filing of as-built plans with the district.

Ownership of the systems, and the responsibility for installation, repair, or upgrades, rests with owners and their contractors. It is also the homeowner's responsibility to provide access ports at the inlet and outlet of the tank. These and other rules are outlined in a pamphlet entitled "Homeowners' and Users' Guide for Onsite Wastewater Disposal Systems,"[5] which has been adopted by other California programs as well.

However, it is program staff that provides design oversight and performs inspections. If the system is unsatisfactory, a Failed System Citation is issued that lists violations and provides a timetable and reporting mechanism to assure that remediation is effected. (At start-up, an initial house-to-house survey was used to identify the most critical failures or substandard systems from which came interim—and conditional—permits to operate.)

Otherwise, the inspection results in a 1- or 2-year permit to discharge. If systems are alternative or marginal, special monitoring requirements can be attached to the permit. At present, every system is inspected at least once every three years and upon any change in ownership. Advanced systems (which are now required for some areas) can be inspected every quarter. Finally, the permit to discharge is conditional on the

homeowners' authorizing the district to enter their property for purposes of inspection and, if need be, repair.

The regulations provide penalties for noncompliance of up to a $500 fine or 60 days imprisonment, with each day of noncompliance considered another count. There are, of course, appeal provisions. Nuisance abatement proceedings begin when an owner fails to effect a required repair within the time frame stipulated in the Citation. The district also has the power to effect its own repairs and put a lien on the property until repaid. However, it has rarely had to take these measures because the district is also empowered to cut off the water supply of a non-complier, something it has had to do occasionally. It may also (through the county) order the revocation of an occupancy permit.

A major revision, Ordinance No. 1994-01 of the Stinson Beach County Water District (required by the RWQCB to tighten management), more clearly spells out the purposes and conditions required of and for variances (in the case of new construction), waivers (for older parcels), and appeals, all of which are subject to filing with and/or approval by the Bay Area RWQCB. Commercial systems, defined as any system with a design flow of more than 600 gpd, and any permissible nonstandard system (called special systems, which have their own design and siting criteria) require variances, which in the granting have conditions attached to the operating permits.

Size and Cost of Program

From the beginning, the cost of installation, or that of effecting replacements, repairs, or upgrades, has fallen to the homeowner. (Excluding engineering and permitting fees, the cost of a new system to the homeowner runs from about $15,000 to $40,000.) There is, however, a low-cost, revolving loan fund (capitalized by the state) for low-income households requiring replacements.

Start-up costs for the management and inspection program itself were funded by EPA grants in lieu of what would have been a construction grant for a central facility. At present the jobs are handled by the full-time equivalent of about two staffers, inspection accounting for about half of the tasking; engineering and administration divide the other half about equally. An outside contractor does lab work.

The operational budget is met mostly (90%) through bimonthly discharge permit fees. The remaining program costs are covered by special inspection and monitoring fees (3%), variance and waiver design review fees or construction permit fees (7%). In fiscal year 1996-97, the total program expenses were about $215,000. Prior to the 1994 reorganization, operating permit fees were $13.00 per month. However, under reorganization, the fees rose to $53 bimonthly, or $318 per year.

Monitoring and Reporting Program

Aside from systems inspections, an important key to the Stinson Beach program was an aggressive surface- and groundwater monitoring program. Initially samples were

taken from seven surface-water and six groundwater stations, and analyzed for coliform, organic nitrogen, and MBAS (methylene blue active substances). The state and regional boards set standards for these constituents. As understanding of systems, their hydraulics, and local hydrology has grown, the monitoring program has been modified and in some ways relaxed.

Also key to the program has been watchful oversight by the Bay Area RWQCB, which (in approving the district) asked (and continues to ask) for quarterly (previously monthly) and annual self-monitoring reports containing text, graphical and tabular data, and a record of compliance actions and results. The purpose of the reporting is clearly spelled out. It is to:

- Document compliance and progress;
- Facilitate district self-policing;
- Refine regulatory criteria, standards, limitations, and prohibitions; and
- Compile complete water and wastewater inventories.

Aside from reports, RWQCB staff meets in person with program staff about once a year to uncover any incipient problems, or to offer advice and recommendations. For example, at the last such meeting it was recommended that the program regularly distribute a newsletter reminding residents of all essentials and any changes in the program. It appears that public education must be an ongoing concern, especially where there is a relatively high turnover of ownership, and many rentals. In general, the RWQCB is satisfied with the program, and is encouraging the establishment of other zones in its jurisdiction.

Level of Success and Lessons Learned

In the first three years of the program 236 systems were repaired or replaced. By 1988 the last failing system had been corrected. Monitoring has shown clearly that water quality has improved, and that threats to it from septic systems (if not all other sources) have been eliminated.

But the Stinson Beach program was not without problems, which are only to be expected of a new and innovative program starting from scratch. The problems encountered early on mostly had to do with delays and procedural uncertainties. Institutionally, there were few precedents; procedures had to be defined from scratch and often revised. It took almost three years to perfect the record-keeping system. Plan reviews were not timely or efficient. The revolving loan program was four years in the making. Correction of failed systems was slowed by homeowners who didn't initially take compliance seriously, as well as by a shortage of contractors, engineers, and system components brought on by the sudden demand.

One completely unanticipated problem was that access ports, required of system owners at both inlet and outlet, were leading to a serious mosquito problem; redesign of the ports resulted.[3]

During these delays and setbacks the Bay Area RWQCB came to question the very viability of the program. Later satisfied, they suggested that the district involve itself in "preliminary engineering," effectively designating performance standards by area which would act to limit acceptable engineering options, saving homeowners time, frustration, and engineering costs. After several years most of these problems were matters of history; but others arose.[6]

In January of 1987, a district analysis of groundwater and hydraulic data showed that one section of the district (a sand spit and low-lying area around Bolinas Lagoon) could not safely sustain buildout using conventional systems. In consequence the Bay Area RWQCB instituted another building moratorium until a solution was found—namely, the use of sandfilter systems, which are now required and inspected quarterly for that area. The moratorium was lifted in May of the same year. Such ongoing problem solving might be part of any district's history.

Then, in early 1992, the Bay Area RWQCB received complaints from board members of the water district that the onsite system monitoring program was not being fully implemented or adequately executed. It emerged that uncertified staff was approving plans that didn't fall within the guidelines, that there was inadequate tracking and follow-up of compliance, and that systems requiring review by the RWQCB were being installed without its knowledge. In part this was the result of the assumption of new duties by the district (oversight of new systems, for example) with an increasingly inadequate staff, budget, and fee structure. In consequence, the RWQCB again imposed a moratorium on new systems pending reevaluation of the program; revised (and tighter) technical, approval, and tracking procedures; and the development of a more adequate staffing and fee structure. New ordinances that addressed these requirements were passed in 1994 (and fine-tuned again in 1996).

Whatever the growing pains, water quality has satisfied the RWQCB, and the program is a source of pride in the community, even if the occasional homeowner is disgruntled by an order to replace a system. The program has dealt with setbacks and problems successively and successfully, providing a well-documented history worthy of study.

Sources

While any errors or misinterpretations in this account are wholly those of the author, the persons listed above as contacts as well as the persons listed below have been helpful sources of information:

Andrea G. di Marco, Past President and Board Member, Stinson Beach County Water District, (present address:) Box 443, Stinson Beach, CA 94970; tel 415-868-2442.

Richard Condit, Bay Area Regional Water Quality Control Board, 2101 Webster, Suite 500, Oakland, CA 94612; tel 510-286-0456.

References

[1] California State Water Resources Control Board, 1978. *Public Management of On-site Wastewater Systems: An Explanation of Senate Bill 430*. (Available from National Small Flows Clearinghouse, Box 6064, Morgantown, WV 26506.)

[2] Richardson, Mark S., 1989. Public Management, Operation and Maintenance of On-site Sewage Systems. In: *Proc. 6th Northwest On-site Wastewater Treatment Short Course*, Sept 18-19, 1989; R.W. Seabloom and D. Lenning, eds. (Univ. Washington, Seattle, WA.)

[3] Stinson Beach County Water District, 1982. *Report on the Stinson Beach Onsite Wastewater Management District for the period January 17, 1978 through December 31, 1981*. (SBCWD, Box 245, Stinson Beach, CA 94970.)

[4] Stinson Beach County Water District, 19??. *Wastewater Management Program Rules and Regulations*; and [*Revisions of 1994*] (SBCWD Ordinance 1994-01). (SBCWD, Box 245, Stinson Beach, CA 94970.)

[5] Stinson Beach County Water District, 1978 (reprinted 1979 by the State Water Resources Control Board), *Homeowners' and Users Guide for Onsite Wastewater Disposal Systems*. (SBCWD, Box 245, Stinson Beach, CA 94970.)

[6] Stinson Beach County Water District, 1992. *Fifteenth Annual Report of the Onsite Wastewater Management Program; January 1, 1992 - December 31, 1992; including data summary of Jan 1, 1986 - Dec 31, 1991*. (SBCWD, Box 245, Stinson Beach, CA 94970.)

Keuka Lake

Driven by a venerable and active watershed association, Lake Keuka communities strike an intermunicipal agreement

Location and Name

Keuka Watershed Improvement Cooperative (KWIC)
110 Court Street
Penn Yan, NY 14527

Contact

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Background and Setting

Lake Keuka lies in upper New York State's Finger Lakes Region.[1] The Lake and its watershed provide water for more than 20,000 people, over 10,000 of whom live on the lake's shores. This lake borders 8 municipalities and two counties. The region is very rural, with agriculture and tourism providing the main sources of revenue. The area offers excellent opportunities for boating, fishing, and swimming; the economic value of such activities is of the order of $50 million annually. The market value of shoreline property is estimated to be nearly $1 billion, constituting by far the largest share of the municipalities' tax base.

The Problem

Overall, water quality in the lake is good, but several studies have shown occasionally elevated levels of sediment, nutrients, and pathogens close to shore.[1] Also, it was recognized that many septic systems had been poorly designed, or were failing because of inadequate or inappropriate maintenance. Many sites around the lake had been developed on small lots, or in other ways made adherence to revised state code impossible. The problems were aggravated by heavy weekend occupancy in many of the dwellings. In any event, New York's sanitary code only applies to new construction, and oversight of town or county adherence to the code was weak.

Pollution, and its potential impact on health, recreation, property values, and the associated tourism industry, led local townspeople to identify water quality as a leading concern. A civic group, the Keuka Lake Association (KLA) uncovered the magnitude of this concern, in a survey of its membership. More than 30 years old, the association comprised 1700 members already imbued with a strong sense of community and already well-aware where their drinking water came from. In response, the association's nonprofit

Keuka Lake Foundation then acquired $180,000 in grants and other revenues for study and planning purposes.

The Solution and Its Development

In 1991, the Association formally established the Keuka Lake Watershed Project, whose specific purpose would be to campaign for uniform, coordinated, cooperative watershed management for the region.[1] There were three prongs to the Project's effort:

- Establish details of current conditions;
- Educate the public to the need for action; and
- Foster interinstitutional and intertown cooperation.

KLA volunteers, some of whom worked nearly full time on the project, mailed out more than 30,000 brochures to area residents. They established liaison with Soil and Water Conservation Districts, the N.Y. Department of Environmental Conservation, and the New York Water Resources Institute. They understood that the way to build grassroots support for their efforts was to develop proposed policy by consensus in participatory processes open to all interest groups, including those who were initially hostile to "more regulation." To this end, they encouraged the formation of individual "Town Watershed Advisory Committees" (TWACs) that would provide local public forums to address water quality issues. In these forums, every question raised was to be answered factually and reasonably without disparaging the question or the questioner.

An early suggestion of the TWACs was to form a single oversight committee, consisting of elected officials from each municipality. This supercommittee was named the Keuka Watershed Improvement Cooperative (KWIC), which began meeting monthly in May of 1992. Like the TWACs, which grew out of Association activity, KWIC had no official status. But that would change.

The stated purpose of the Cooperative (KWIC) was to develop a model watershed law, and then identify who should administer it. As envisioned, the law would address the design and construction of onsite facilities (excluding facilities so large that they were regulated directly by the state), facility inspection, easement for purposes of inspection, and enforcement. No formal needs assessment was undertaken, but it was generally understood that the water quality was imperiled unless septic systems were better managed. In its effort the KWIC Board hired a professional watershed project director to develop technical information and options, and relied on a technical advisory support group as well. There was also help from New York state personnel. Provisions of the law were developed at length in the continuing public forums.

When it came to administration, the Cooperative examined and rejected forming a regulatory commission through the state's enabling procedures—the argument being that there was no reason to involve the state with all that would entail. It also examined and rejected county-based ("county-small") watershed districts—the lake fronted two counties, not one, and some portions of each county could not be expected to have as great an interest in the lake. Instead, it opted to draw up an intermunicipal agreement

(IMA) under the state's Home Rule provisions, which allow municipalities to do anything together (by agreement) that they could have done separately. The IMA was selected for its inherent flexibility and ease of creation. The draft itself was only eight pages long. When voted on and signed, it would legally formalize the Cooperative, and could be executed by vote of the municipal boards.

At numerous public meetings residents were presented with a package comprising the agreement; the proposed watershed protection law; and recommended policy, regulations, and procedures (including those for dispute resolution). First the uniform wastewater law, and later the IMA agreement that formalized KWIC and its role, were nearly unanimously approved by every municipality's town or village boards. KWIC commenced operations in July, 1994.

Program Structure and Activities

KWIC's chartered purposes include uniform implementation of the new wastewater ordinance, provision of comprehensive planning for wastewater management, and the development or recommendation of other water quality initiatives in order to "protect and improve the purity of water in the Keuka Lake watershed."[2] The agreement provides for a KWIC Board of Directors consisting of one elected official from each municipality and for a professional watershed management staff. The Board has the authority to make policy for the program, develop a budget, and oversee the watershed staff, who is employed directly by KWIC. The watershed manager is responsible for performing site evaluations, issuing permits, and doing some system design (although he may require a homeowner to hire an engineer as well). The manager also is responsible for developing and revising standards, conducting an information and education program, and reporting to KWIC's Board.

Each town directly hires its own watershed (and septic system) inspector (typically part-time). The inspectors are, however, subject to training and supervision by KWIC's manager to assure consistent application of law and regulations. Inspection reports are filed with the town, and with KWIC, and are copied to the homeowner. If the system "passes," the homeowner's copy constitutes a revocable "Permit to Operate."

Regulations govern permitting, design standards, permitted technologies, inspection, and enforcement. A KWIC-issued permit is required for any new construction or modification. Separate design and inspection standards control residential, commercial, and critical sites or alternative systems. On previously developed sites, a system that functions, even if it doesn't meet current standards, does not "fail by definition," although corrective action may be required. However, a previously built system that is failing must be brought up to minimum state standards, or, when that is not possible, the watershed manager may require a design incorporating "Best Available Technology" which can include alternative systems not covered in N.Y. state code. The development of design standards and the selection of alternative technologies have involved a cooperative effort among the watershed manager, a representative from the district office of the state health department, and a consulting engineer. A grant from the

Keuka Lake Foundation was used to study practices and technologies used elsewhere when conditions were poor or otherwise limited.

All sites in "Zone One" (the land within 200 feet of the lake or its tributaries) require a KWIC-conducted inspection at least once every five years. Holding tanks are inspected annually. Aerobic and other alternative systems must be inspected annually, at which time the owner must show evidence of an extant maintenance contract. KWIC-conducted inspections are also made during construction, and on receipt of complaints.

For preexisting systems, homeowners are notified of upcoming inspections and must uncover the tank. In initial inspections the fate of all waste sources is identified, to assure, for example, that showers or washing machines don't drain into barrels or ditches. Basic information on the system and the residence is obtained as well. Then the condition of the system and the leachfield is assessed. There is no fixed pumping schedule, but the tank must be pumped at the time of inspection unless the inspector has sufficient information to waive the requirement.

Failures are cited in a Notice of Violation; any required upgrades, as well as the time frame to complete them (typically 6 months unless there is an imminent public health threat), are stipulated. Re-inspection of corrective actions is required. Enforcement provisions in the law define violations, and specify the timetables for compliance. In the case of noncompliance, the law provides for fines (up to $250) or imprisonment (up to 15 days), with each week of violation constituting a new count. Costs for enforcement may be imposed on the violator as well. It is the individual municipalities that issue citations to appear in town or village court. Since the program's inception no enforcement actions have been needed or taken.

Size and Cost of Program

Approximately 3000 systems are in Zone One, and subject to ongoing inspections (about 600 Zone inspections per year). In a typical year there are also about 175 title-transfer inspections, 100 construction permits and inspections, and 100 tank replacements. Staff presently includes a full-time watershed manager and administrative assistant (employed by KWIC) as well as the part-time inspectors employed by the towns. The annual KWIC budget is approximately $70,000.[2] KWIC is financed by septic system construction permit fees ($100), grants as available and equal assessments from each member municipality. KWIC inspections, including those for construction and Zone One are made at no charge. Municipalities collect inspection fees at title transfer, and currently charge $50. There is no betterment program or financial assistance except in rare instances where owners may qualify more generally for state financial assistance.

Monitoring and Reporting Program

The Cooperative coordinates its activities with state and county agencies so that matters of jurisdiction, responsibility, and resource allocation can be intelligently assigned. There are links with two district offices of the state health department, but

reporting to the state is a brief annual formality because the program is more stringent than any state requirement.

Independently of KWIC, the Keuka Lake Association operates a very complete lake monitoring program with complete limnological profiles and extensive fecal coliform testing.

KWIC has developed a computerized database and GIS system to inventory systems and track work and inspections. The system is also used in research (funded by a water quality grant) to study various treatment measures and their success at difficult sites. Groundwater surrounding the systems will be monitored so as to evaluate and develop consensus on the treatment technologies used. The study is expected to result in a decision-making protocol for riparian and lacustrine sites throughout the Finger Lakes area of New York.

Finally, KWIC retains a standing Technical Review Committee to help with policy and regulatory modifications. It is composed of experienced watershed inspectors and sanitarians, consulting engineers, state health department officials, Cornell cooperative extension agents, and others.

Level of Success and Lessons Learned

The Keuka Lake effort is more preventative than remedial, at least in terms of the lake, which has never had serious water quality problems.[3] That is the way residents want to keep it, and why they are pleased; government officials, satisfied; and watershed staff, enthusiastic. The scientific demonstration of the program's success lies in the future, the question being whether the program can continue to preserve the lake's high quality.

The demonstrable success so far is organizational. The program does not try to "do everything," but is meeting its goals. Outreach efforts and consensus building from the beginning were what resulted in the ready establishment of this program, and in its full support by real estate interests. Regulations are made and enforced at the most local level, where citizens are more inclined to support and cooperate with the initiatives. The ongoing and thoroughly public process builds good will, provides mechanisms to quell or settle disputes, and forestalls the threat of lawsuits or political rancor.

The Keuka Lake experience suggests that a modest technical program and a stable legal framework with plenty of public opportunity to revise or modify policy may be the best way to commence onsite management.

References

Any errors or misinterpretations in this account are wholly those of the author. In addition to the person listed above as a contact, the following documents are the most important sources of information for this report.

[1] Landre, Peter, 1995. The creation of Keuka Lake's Cooperative Watershed Program. *Clearwaters*, summer 1995.

[2] Smith, James C., 1995. Protecting and Improving the Waters of Keuka Lake. *Clearwaters*, summer, 1995.

[3] Smith, J.C., 1995. Presentation on Keuka Watershed Improvement Cooperative. Summarized in: *Conference Summary: Managing Small-scale, Alternative and On-site Wastewater Systems*, Assumption College, Worcester, MA. (Marine Studies Consortium, 400 Heath St, Chestnut Hill, MA 02167.)