ONSITE WASTE MANAGEMENT - A Case Study

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Introduction

This case study examines the history and philosophy of onsite wastewater regulation and management in Fairfax County, Virginia. The author has attempted to follow a logical presentation of facts and events. Research has indicated there are no formal vision statements and objectives for the management of onsite systems, nor are there formal plans and methods or review. However, they are implied in the literature. The Health Officer and the Sanitation Officer in Fairfax County in the early part of the twentieth century had major roles in the establishment of policies, procedures and regulation of onsite wastewater systems. It was usually at the initiative of the Health Officer, in trying to prevent the spread of disease, that sanitation ordinances were adopted. The research indicates the Health and Sanitation Officers always tried to stay ahead of the curve in the area of wastewater management. This was done by utilizing available technology. They learned from their mistakes, constantly made adjustments and always tried to stay on the cutting edge, paving a path for others to follow.

The Environment

Fairfax County is an urban suburb of the Washington, D.C. metropolitan area. The county consists of approximately 400 square miles and is adjacent to the State of Maryland along the Potomac River to the north and east and adjoins the Counties of Arlington, Prince William, Loudoun and the Cities of Alexandria and Falls Church. The City of Fairfax is incorporated within the boundaries of Fairfax County, as are the Towns of Vienna, Herndon and Clifton. Fairfax County lies in the northern parts of the Piedmont and Coastal Plain physiographic provinces. The Piedmont Upland extends northeast and southwest through the center of the county and is bounded on the west by the Piedmont Lowland, composed of Triassic sediment, and by the Coastal Plain province on the east. There is a fairly large area between the Coastal Plain and Piedmont Upland that consists of about equal parts of high-lying Coastal Plain Sediments and of Piedmont Upland materials. From west to east, the physiographic provinces are subdivided into five sections: [2]

Piedmont Lowland (or Triassic Lowland)

Piedmont Upland

Mixed Piedmont Upland and high coastal plain terraces

High Coastal Plain

Low Coastal Plain Terraces

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[1] Director of Environmental Health, Fairfax County Health Department, Va.

[2] Source: Soil Survey of Fairfax County, Virginia, May 1963, Series 1955, No. 11

The topography of the county varies. In the west (Triassic Lowlands) the relief is one of wide undulating ridges and nearly level areas with small, rolling, hilly, and steep areas near large streams. In the central portion of the county the stream divides are rather wide and undulating and rolling except in places along the lower tributaries and large streams. The smooth uplands are 350 to 450 feet above sea level. The eastern part of the county (coastal plain) consists of wide upland ridges that are rolling and undulating.

Fairfax County has a typical mid- Atlantic climate. Summers are generally hot and humid with normal average rainfall of about 40 inches per year. Winters tend to be relatively mild with occasional cold snaps.

Fairfax County for the most part is blessed with well-drained soils that are suitable for onsite waste disposal systems. Early development was focused in the central part of the county where the soils on the higher slopes have percolation rates of ten to thirty minutes per inch. The northern part of the county, called Great Falls, consist predominantly of the Glenelg and Manor soil types. Both types are deep, well-drained silt loam soils with fast percolation rates and are excellent for septic tank drain fields. The western part of the county, located in the Triassic lowlands, consists of Penn Loam soils that are shallow to rock and are variable in suitability for onsite sewage disposal systems. The eastern part of the county is generally located in the Coastal Plain province. The soils are layered and highly variable in nature.

The Occoquan Watershed and the Dulles Watershed combined encompass approximately two thirds of Fairfax County. The Occoquan Water shed drains into the Occoquan drinking water reservoir and the Dulles Watershed drains into the Potomac River, which is also a source of drinking water for all of the Washington, D.C., metropolitan area. The Virginia State Water Control Board has imposed stringent point source regulations in these watersheds. The areas adjacent to the Potomac River are protected by the Potomac Embayment Standards, which also has stringent point source regulations.

Ground water wells are abundant. The county has rare instances of low water table conditions affecting drinking water wells. Most wells are drilled to depths greater that 100 feet with yields ranging from a half to 25 gallons per minute or greater.

The county has about 26,000 onsite wastewater disposal systems. This is a best guess estimate. There is no centralized database for onsite systems. There were 6055 onsite systems installed in subdivision developments from 1952 to 1972 and about 15,000 systems were installed and approved from 1973 to the present day. This is a total of 21,055 known systems installed since 1952.

The number of dwelling units in the County grew from 26,558 in 1950 to 302,464 in 1990.

Community

Fairfax County is part of the Fairfax-Falls Church Health District, which includes the Cities of Fairfax and Falls Church and the Towns of Herndon, Vienna and Clifton. In 1920 the population of Fairfax County was 21,943. This mushroomed to 454,275 in 1970, which doubled to 818,584

in 1990. Today the County serves a population of about 1 million people[3]. The population is for the most part, middle to upper middle class, well educated with average household incomes exceeding the national average. Home values are generally high with new single family dwellings costing $250,000 or greater. Many homes in the county exceed three quarters of a million dollars to one million dollars. The population consists of high level as well as high profile government employees, elected officials, military and leaders of industry. The population is diverse in ethnicity.

Today, Northern Virginia is home to the highest concentration in the country of high tech firms. The predominant business in the county is information technology. There is no heavy manufacturing industry located in the county. The federal government, military or government contractors employ a significant portion of the workforce.

The onsite wastewater management program has historically been a function of the local health department. The local health department works in conjunction with the State health department. The County adopted local codes that are more stringent than the state regulations. The local health department also serves as the health agency for the towns and cities located in the district.

The urban county executive form of government governs the County. The chief executive officer is the county executive that is appointed by the elected board of supervisors. The board of supervisors consists of 10 elected officials representing 9 magisterial districts. The Chairman is elected at large. The County is a member of the Washington Metropolitan Council of Governments, which is made up of the jurisdictions surrounding and including Washington, D.C. This body addresses issues that are common to all localities in the region.

The Fairfax County Health Department, Division of Environmental Health has a fiscal year 2000 operating budget for the onsite water program of $1,156,675. The county recovers $338,678 in user fees and receives $535,552 in State revenue. With these adjustments the net cost to Fairfax County for the onsite water program is $291,532.

Initial Vision (1928)

" To make Virginia the first State in the country to be completely sanitated"

The Plan

In 1928 the Board of Supervisors adopted an ordinance regulating the installation of sanitary facilities. This ordinance required a permit be obtained from the Sanitary Officer to install sanitary facilities. In June of 1928, a “Health Drive” was announced. [4] This was a three-year contest to make Virginia the first state in the country to be completely ”sanitated”.[5] Sanitated refers to the State and County laws that required the owner of every house or other building used

[3] Source: Fairfax County Standards Report, 1999
[4] Source: The Fairfax Herald, Fairfax, Virginia, June 28, 1928.
[5] Appendix A

for human habitation to supply the structure with an approved sanitary closet or privy. A second article[6]published in 1931 specifically refers to the "Sanitation Campaign" [7]. The article describes handbills[8] that were printed to inform homeowners of the necessity for sanitation as a protection against the diseases carried by the fly. Enforcement of the law was expected to greatly reduce the number of deaths in Virginia. The handbill indicated that "…it now becomes the duty of the Health Department to see that this law is complied with in Fairfax County."

In August of 1932 an article titled, "Fairfax County Wins Praise of Sanitation Officials"[9], is a front-page story in the Fairfax Observer.[10] The article reports that the regional Director of Rural Sanitation for the State of Virginia announced that reports indicated that Fairfax County had achieved a 33.8 % gain in sanitation. Only one other County showed a gain, about 28%, and all other counties showed a loss. This was accomplished by adoption of a systematic method of work by the health department," which had not been in practice prior to July 1, 1932".[11]

The campaign continued into 1934 with assistance from the Federal Relief Administration. Federal funds were made available to assist homeowners who desired to have sanitary work done but were unable to pay for modernizing latrines, building septic tanks, and such. They could obtain assistance to have the work done if they paid for materials.[12] Labor was supplied by the Federal Relief Administration.[13] In 1936, the County had to change the Sanitation Program due to the tremendous increase in building activities, new subdivisions, and other construction related to development. A definite schedule of inspection activities was established to balance the Sanitation Campaign with new construction. [14]

Re-Vision (1938)

> ***In 1938, the County Health Director advised the Board of Supervisors of the necessity of adopting a new ordinance. The old ordinance had been found to be obsolete and was not enforceable in court. He stated that many new subdivisions were being laid out in the county, and that the developers of the subdivisions were using the cheapest possible type of sewers which would lead to litigation. The health department, as well as the County, is without the authority to take preventive measures.*** [15]

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6 Appendix B
7 Source: The Fairfax Herald, Fairfax, Virginia, June 19, 1931.
8 Appendix B2
9 Appendix C
10 Source: The Fairfax Herald, Fairfax Virginia, August 19, 1932.
11 Source: The Fairfax Herald, Fairfax Virginia, August 19, 1932.
12 Source: The Fairfax Herald, Fairfax Virginia, January 12, 1934.
13 Appendix D
14 Appendix E
15 Appendix F

The Plan

The Sanitation Ordinance of 1928 was repealed and replaced with a new ordinance[16] to prevent the pollution of water, to protect health, and regulate the disposal of human waste and excrements in the County of Fairfax prescribing certain types, sizes, and location of septic tanks and for controlling the construction of sewers systems and disposal plants. [17] The ordinance also required a permit to install sewage disposal systems, outlawed cesspools and prohibited straight pipe discharge of sewage to small streams, ditches and creeks. This ordinance was amended in 1946 by adding a requirement for a permit to install a pit privy.[18] The amendment also established a license requirement for contractors and operators of septic tank clean out trucks and required installation contractors to be bonded.[19]

In 1950 the ordinance was again repealed and replaced with a new ordinance. This new ordinance made the first reference to the use of percolation test in design criteria for sizing of on-site sewage disposal systems. Prior to the adoption of this ordinance percolation tests were only performed when an FHA loan was involved. The ordinance also referenced the number of bedrooms to determine the size of septic tanks. Under the provisions of this code, it appears from searching the records, that percolation test were being conducted without regard to the ground water table. Percolation test holes were prepared and tested in all seasons of the year. Many poor drainage soils would "pass" the percolation test in dry seasons but would fail in wet seasons. This was made clear to the health department in the early 50's when the county experienced failure of hundred's of systems. Health officials determined that the water table had risen into the drain field area and caused the malfunction. Around 1953 the County began a planned sewer collection and treatment system by issuing a $20 million bond fund for sanitary sewers to alleviate the failing septic tank systems.

In 1952 the Health Director suggested to the building official that applicants for building permits should clear the building office, prior to review by the Health Department. This procedure established the first tie in to the building permit application process, which is still in place today. This procedure has been instrumental in the enforcement of the onsite sewage disposal ordinances. The Health Department must review and approve building permit applications if the property is served by an onsite sewage disposal system and/or a well water supply.

In 1954 the Medical Director, in an effort to stop issuing permits for pit privies for new homes, wrote to the Commonwealth Attorney and asked the following questions:[20]

> *Can I as the Health Officer refuse an individual a permit for a pit privy in the absence of a sewer connection or an approved septic tank system?

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[16] Appendix G
[17] Source: The Fairfax Herald, Fairfax Virginia, June 17, 1938.
[18] Appendix H
[19] Source: The Fairfax Herald, Fairfax Virginia, January 18, 1946
[20] Source: Fairfax County Health Department Files, Memo Dated October 19, 1954 to MR. Hugh Marsh from Harold Kennedy, M.D.

Response: "…it is my opinion that you do not have authority to refuse to issue a permit for a pit privy when a sewer connection is not available or when the individual concerned cannot or does not desire to install a septic tank system.

*Can I as Health Officer insist that he must test his land for suitability for a septic tank system and install a septic tank rather than a pit privy if the soil is suitable?

Response:[21] "...it is my opinion that … you do not have such authority."[22]

It wasn't until September 1966, that issuance of construction permits for pit privies as the sewage disposal system for new construction were banned.

Re-Vision (1954)

"...we simply must find a way to identify these questionable soils." [23]

The Plan

The Health Department was instrumental in convincing the Board of Supervisors to fund a comprehensive soil survey for the area of the county that was undeveloped. During 1954 and 1955 while the soils survey was being conducted and mapped, environmental health officials worked closely with the Fairfax County soil scientist and made correlation studies comparing percolation rates with certain soils. They learned that one could identify water table soils by type and eliminate them from consideration for onsite sewage disposal.

Mr. T.W. Bendixen, Soil Scientist, formerly with the Robert A. Taft Environmental Engineering Center, Cincinnati, Ohio, and associated with the United States Public Health Service, stated that Fairfax County was the first in the United States to make such use of the soils survey information and to have correlated percolation tests with the soil maps in such a way to make it useful in determining the proper soils for onsite sewage disposal systems. The soil mapping was completed in 1956. [24]

In 1956, the county repealed its "Sanitation Ordinance" and replaced it with a new ordinance, "The Sanitary Inspection Ordinance" [25] that contained very specific criteria for soil percolation tests specifying a maximum percolation rate of 60 minutes per inch for septic tank drain fields. Percolation tests were required in the ordinance as a necessary component for site approval. The ordinance prescribed set minimum separation requirements between onsite waste disposal systems and wells, bodies of water, houses, basements, property lines, etc.

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[21] Source: Fairfax County Health Department Files, Memo Dated October 25, 1954 to Dr. Harold Kennedy from Barnard F. Jennings.
[22] Appendix I
[23] Source: "An Analysis of Septic Tank Survival From 1952 to 1972 in Fairfax County, Va., John W. Clayton, R.S.
[24] Appendix J
[25] Appendix K

C2 Process[26]

In the 1960's the ordinance was amended to automatically require a design for an automatic clothes washing machine.[27] Prior to this change the design for an automatic washer was optional. Ringer washers, which were the norm, used considerably less water than did automatic washers. Automatic washers were being installed to replace ringer washers without regard to the sewage disposal system capacity, leading to hydraulically overloaded systems. In addition, many homes were being built on speculation. Experience was showing that applicants for spec homes were still applying for minimum size systems, i.e., 3 bedrooms, no automatic clothes washer and no garbage disposal, to save money. With the advent of the do-it-yourself homeowner, automatic clothes washers were being added after the fact without expanding the disposal field. A subsequent amendment was added a few years later to require design for a garbage disposal for the same reasons. The county did not have a structured or formal mandatory inspection process for onsite systems after they were installed. Many problems were either self reported or reported by neighbors. However, for at least the past 35 years the County has provided, upon request, an inspection report of the on-site system to sellers, buyers, and mortgage companies. The report was provided free for many years and was initially needed to satisfy a HUD or FHA requirement for mortgage loans. The current report consists of a record review and a field inspection, including probing into the drain field, to determine the extent of saturation. Many unreported failures and potential problems have been identified and corrected as a result of these inspections. In the 70's and 80's this process was formalized and became a standard part of most real estate contracts. This inspection report is requested upon transfer of properties as well as on refinance applications. Mortgage companies wanted assurance the onsite system was functioning satisfactorily at the time the loan was granted. Homeowners also became savvier to the potential for septic problems. In the early 80's, systems installed under the 1956 code were approaching 25 years in age, the projected life expectancy for an onsite system according to the USPHS. In the 70's a fee for service was added for this inspection. The fee was initially $15 and is currently $90 for an inspection report. The current inspection report includes information on the condition of the system as well as design information. If the system is under designed the applicant is advised of the steps necessary to bring the system into compliance. This real estate report along with self-reported problems and complaints has been an effective and useful surveillance process.[28]

[26] Checking and Corrective Action
[27] Appendix L
[28] Appendix M

Re-Vision (1972)

> ***"... building in Fairfax County has reached a peak and the sanitary sewers and treatment facilities have been crowded to maximum use. The political leaders of the County were considering ways to control growth and limit construction on the sanitary sewer system as well as on individual sewage disposal systems."***[29]

The Plan

In the 70's urban sprawl was beginning to spread into the county and it was recognized that dwellings requiring onsite sewage disposal systems would increase dramatically due to limited sewer capacity and limited growth policies. The County had imposed a moratorium on new connections to the overburdened public sewer system. The County code was amended in 1973 to allow the Health Department to issue permits to repair failed onsite systems rather than force a connection to the public sewerage system.

The health department determined a need to increase system longevity and proposed two innovative approaches that were adopted by the board and included in the ordinance:

1- The resting cycle concept utilizing a flow diversion device.
2- The reservation of a suitable land area for future use for expansion or repair of the onsite sewage disposal system.

A building boom occurred in the 70's and 80's. Previously rural areas of the county were being sub-divided for single family dwellings utilizing septic tank systems resulting in Fairfax County becoming predominantly an urban suburb.

The most significant amendments since the repeal of the Sanitation Ordinance and the adoption of the " Sanitary Inspection Ordinance" in 1956 were accomplished in 1973.[30] These amendments included emerging, state of the art and somewhat controversial technology for the time. The significant amendments required all newly permitted systems to be designed utilizing a flow diversion device and inclusion of an area of suitable soil equal to 50% of the square footage of the initial designed onsite sewage disposal system be set aside for future repair or expansion.

Alternating Drain Fields

The flow diversion device was installed in the effluent line between the septic tank and the distribution system for the sub surface disposal system. The device is typically a three port device with an inlet and two outlets. This requirement necessitated the drain field to be divided into two equal portions each served by a separate distribution box. The valve was set to either the #1 or #2 position that corresponded to the odd or even number of the year in which it was

[29] Source: "An Analysis of Septic Tank Survival From 1952 to 1972 in Fairfax County, Va., John W. Clayton, R.S.
[30] Appendix N

installed. The valve is to be turned by the homeowner once a year to the opposite setting. In theory, alternating between halves of the drain field yearly would allow the half that had been in use for a year to rest and dry out. The biomat that typically forms at the soil gravel interface due to the filtration, by the soil pores, of suspended solids would dry out and crack open, eliminating the clogging typical of the biomat and would allow the field in use to rest and theoretically rejuvenate itself resulting in an indefinite life expectancy.

The installation of the flow diversion device necessitated a method to ensure the device was alternated each year to the opposite field. A post card [31] requesting the homeowner or occupant to alternate the device is sent to the property address on the anniversary date of the approval of the septic system. The card also contains advice on use and maintenance of the system and advises that pumping the tank every five years is required by the county code.

Reserve Area

The amendments require all new lots subdivided after the effective date of the amendments to establish a reserve area, containing suitable soil, equal to 50% of the square footage of the initial drain field. The reserve area was specifically set aside for future expansion of the system should bedrooms be added to the dwelling, increasing the potential occupancy. The area could be used for repair if necessary. Although, the area in between the parallel drain field trenches was identified as a suitable replacement area. Experience has since shown that the area between the trenches is not desirable for a replacement field due to installation difficulties and soil clogging. In 1992 the code was amended to require the reserve area to be used only for repair of a failed system. This change was made to address mandates contained in the Commonwealth of Virginia ***Chesapeake Bay Preservation Act*****,** which is discussed later in this study. If an expansion of the system is required to accommodate additional bedrooms the reserve area must also be expanded.

C2 Process

The county requires a repair permit for all repairs to a septic system no matter how minor. With the information gained from the repair process we learned of weaknesses in the design criteria and continually amended our ordinances and policies to ensure a proper design would eliminate a future occurrence of problems.

The 1973 ordinance remained in affect without major revision until 1984.[32] When the code was amended to be more in line with the Commonwealth of Virginia Sewage Handling and Disposal Regulations which were adopted in 1982 by the State. This was the first comprehensive and sweeping Virginia State regulations concerning onsite sewage disposal. As a result, acceptable percolation rates were expanded from maximum acceptable rate of 60 minutes per inch to 120 minutes per inch. The estimated water consumption per person per day was reduced from 100

[31] Appendix O
[32] Appendix Q

gallons to 75. This latter change effectively reduced the size of a drain field by 25% as compared to Fairfax County requirements.

These changes presented new challenges. Owners of previously rejected lots with percolation rates exceeding 60 minutes per inch were resubmitting applications for lot approval.

Re-Vision (1976)

The health department wanted to improve pump system design and remove the unfavorable stigma of pumped systems. Existing pump stations were experiencing mechanical and electrical problems. It was desirable to design a pump station that would provide long term service, would be home owner friendly, would be low maintenance, would alert the homeowner if there was a pump failure and would have a back up system to ensure the waste disposal system was functional until the failed pump was repaired.

The Plan

During the period of heavy development utilizing on site waste disposal systems, serious flaws in the design of effluent lift stations emerged. The health department staff had very little knowledge in the mechanical and electrical design for pump stations. Pump stations were not being used extensively at that time. However, due to high land values, developers were seeking ways to increase the yield of developable lots in their subdivisions. Since gravity systems were not always possible, effluent pump stations became the system of choice for developers to increase the yield of developable lots in sub-divided property. A considerable percentage of on-site permits issued in the late 70's and the 80's were designed with effluent pump stations.

Existing pump stations were experiencing mechanical and electrical problems. There were no specific requirements in the codes and regulations to prescribe a design and functionality for a pump station. The early codes required a spare pump be available on the premises in the event that a pump failed. This would insure an available pump for immediate replacement. The code also required a high water alarm.

It was desirable to design a pump station that would provide long term service, would be homeowner friendly, would be low maintenance, would alert the homeowner if there was a pump failure and would have a back up system to ensure the waste disposal system was functional until the failed pump was repaired.

The septic tank installation contractor essentially designed early pump stations in the field. The pump chamber was typically an inverted concrete well casing with the lid used as the bottom. Pumps and alarms were plugged into a standard receptacle placed inside the pump chamber. Although electrical permits were required for pump installations, there were generally no detailed inspections of the components in the pump chamber by the electrical department. The early electrical inspections focused on the main panel box connection and the control apparatus installed in the house. The electrical inspections did not consider whether the system worked as designed, only that the electrical components were installed according to code. The inspection of the proper functioning of the system is now the responsibility of the health department. The

atmosphere inside a pump chamber receiving sewage is highly corrosive. Metal components, including stainless steel clamps, deteriorated in a few months resulting in many failures.

There was inconsistency in chamber design and construction. Nothing was predictable except that problems were likely. The life span of an effluent pump was about 5 years. Pumped systems were considered very high maintenance, expensive, not adequately reliable, and not popular with homeowners.

The health department wanted to improve pump system design and remove the unfavorable stigma of pumped systems. Initially, as flaws were identified, informal steps were taken to fix the problem and prevent a reoccurrence. When it was realized that the design flaws were numerous and major, an action plan was developed.

The Health Department was fortunate to obtain the volunteer services of an engineer and jointly proceeded to design a standardized pump system that met all of the vision criteria. The initial standardized system utilized a 36 inch reinforced casing placed on a 6-inch thick concrete pad. The casing extended 1 foot above the ground surface, and was fitted with an overlapping tight fitting lid. The electrical components were required to meet the requirements of the National Electrical Code. Dual pumps were required with an automatic device to alternate between the pumps on each pumping cycle. The alternating device was also equipped with an override device that would sound an alarm in the event of pump failure and automatically activate the opposite pump. A manufactured control box that housed the pump controls, alternating device, override device, and circuit breakers was also specified. The control box was designed with fail safe features such as separate circuits for the pump and the alarm. Should both pump circuits fail due to overload the alarm would still be functional.

The standard design was committed to paper with a schematic drawing of the pumps, float controls, electrical components and piping. The system could now be designed by simply filing in the blanks. Typically an engineer who could properly specify the correct pump for the distance and height (total dynamic head) would complete the schematic drawing.[33]

This design was eventually expanded to replace the 36-inch casing with a manufactured chamber (septic tank) that allowed for additional storage in the event of catastrophic failure. This design was the basis of the design now included in the Commonwealth of Virginia, sewage handling and Disposal Regulations and is still successfully utilized today.

Pumped systems are no longer feared. Although they do require more maintenance and are more expensive than conventional gravity systems, they are now very reliable.

C 2 Process

In 1989, the Northern Virginia Planning District Commission (NVPDC) undertook studies of the onsite wastewater disposal systems in the Occoquan and Dulles watersheds. The researchers determined that there were records of approximately 5,008 onsite systems in the Occoquan [34]Watershed and 10,383 installed in the Dulles Watershed. The results of an analysis of failure

[33] Appendix R

[34] Source: Occoquan Watershed Septic System Assessment, Final Report by: Northern Virginia Planning District Commission, November, 1990

rates indicated there was a 1.75% failure rate in the Occoquan Watershed and a 2.5% failure rate in the Dulles Watershed[35]. This is an average failure rate of only 2.1% for 15,401 systems studied.

The overall rate of significant failures in the Dulles Watershed is very low. The pollutant load is contributed by failing septic systems is negligible, even when cumulative effects are considered. Septic systems treat approximately 1.5 million gallons of wastewater per day in the Dulles Watershed. NVPDC staff estimates that only 0.2 % of that load may be improperly treated and released into the Environment by systems that are not working correctly, using conservative assumptions.

Re-Vision (1992)

The State of Virginia adopted the Chesapeake Bay Prevention Act. This Act requires all counties that are located in the Chesapeake Bay tide waters to adopt local codes that affect onsite sewage disposal systems. Specifically, septic tanks were required to be pumped out once every five years in specified areas. Protection of the Bay, in part, was dependent on septic systems functioning satisfactorily.

The Plan

The Health Department again significantly amended the County Ordinance in 1992.[36] Included in the amendments was a requirement that all septic tanks in the county are to be pumped once every 5 years. Responsibility for the owners of onsite systems to perform necessary and periodic maintenance is included as a code requirement. To facilitate the pump out process all new systems are required to have an access port to the septic holding tank installed at or above the ground surface. This eliminates considerable time and labor involved in locating and exposing access ports to the septic tank and helps keep the cost of the pump out reasonable and prevents destruction of expensive landscaping.

The 1992 amendments also banned the use of seepage pits[37] for new lots created after the date of the code adoption. Experience had shown that seepage pits were averaging a life span of only 12 to 20 years, even with the flow diversion device. Pits were generally 5 feet by 10 feet by 10 to 25+ feet deep. Deep pits were not uncommon posing an adverse affect on the ground water. Pit design utilized a 30 inch concrete well casing with holes in the sides at every junction of casing. There was typically 18 inches of gravel at the bottom of the pit and gravel surrounded the casing up to a point about 36 inches below the ground surface. Effluent entered the casing, from the distribution system, near the top and dropped to the bottom of the pit and entered the gravel. When the gravel clogged due to formation of the bio-mat, effluent would rise inside the casing

[35] Source: Septic System Impacts in Northern Virginia, An Assessment of Two Study Areas, Final Report by : Northern Virginia Planning District Commission, May 1992
[36] Appendix S
[37] Appendix T

and flow out the holes installed at each casing junction. The system would malfunction when these holes became clogged.

C2 Process

A pump out manifest[38] was designed and distributed to licensed sewage haulers. The manifest records the location of the tank, the amount of sewage pumped and the disposal site. By requirement of the ordinance, the sewage hauler is required to provide one copy of the manifest to the health department and 2 copies to the system owner for every septic tank that is pumped. The owner is also required to provide one copy of the manifest to the health department. This redundancy in manifest submission is designed to insure the health department is notified each time a tank is pumped out. This information is logged into a database and a letter is generated on the fifth anniversary of the pump out to the property owner as a reminder to pump out the holding tank. A field investigation is conducted when patterns of frequent pump outs of the same onsite system are identified. Failed systems are identified and the necessary steps are initiated to repair or replace the failed system.

New Challenges

The development of large tracts of land utilizing onsite sewerage disposal systems has dramatically decreased in Fairfax County. Most applications for subdivision of property utilizing onsite sewage disposal are for 10 to 20 lots with an occasional application for more than 30 lots. These subdivisions for the most part utilize a conventional onsite sewage disposal system consisting of a drain field installed in permeable soils.

Lots that were rejected in the past because of unsatisfactory percolation rates or that were never tested because the soil maps indicated marginal to poor soils for a conventional system are being resurrected. The owners and prospective owners of these lots are submitting a significant number of applications to utilize alternative onsite sewage disposal systems. These lots in general are problematic. The soils tend to be shallow to rock or to seasonal water table (less than 24 inches) with slow percolation rates. Technologies such as drip irrigation coupled with a recirculating sand filter or a host of other shallow disposal systems with increased treatment prior to disposal are being proposed for the problematic. The value of a lot will rise significantly if a construction permit can be obtained to install an alternative technology system to serve a single-family dwelling.

Current regulations require alternative systems to have a service contract with a firm to monitor the system effectiveness and to maintain the system components. The number and complexity of alternative systems are increasing and will continue to increase in the next decade. The County is now faced with a new challenge. The historical methods of managing onsite sewage disposal systems have been very effective in Fairfax County. However, these old methods which were basically prescriptive regulation of existing and new systems have reached their peak and are no longer adequate to address alternative technology. The alternative disposal systems are, by their very name, not the typical conventional sewage disposal system with a flush and forget it

[38] Appendix U

concept. The newer systems require considerable degree of care and maintenance to ensure they are functioning properly and are not contaminating the environment.

A major problem we face today is the lack of an educated consumer (in the art of onsite sewage disposal and system maintenance). The typical county resident is an "urbanite" with little to no knowledge of onsite sewage disposal systems. There are frequently cultural and language issues concerning onsite sewage disposal that must be addressed. Many property owners get their first lesson when they literally step into a problem.

The question," Who is looking?", needs to be answered for all onsite sewage disposal systems.

The 21st Century Vision (1999)

To explore the concept of Onsite Management Systems and Onsite Management Districts as described by the National Onsite Demonstration Project and the United States Environmental Protection Agency.

The Plan

The concept of onsite waste management districts to ensure proper operation and maintenance of all onsite systems is being introduced to the County via the Health Department's, Division of Environmental Health. The subject is being researched. The times are right to continue discussions in this direction. Stay tuned.

Conclusion

Did Fairfax County begin the wastewater management program with the "end in mind" in 1938? The answer is yes and no. If the end was defined as improved sanitation for the time, then the answer is yes. If the end is the complex system in place today then the answer is no. It would not have been possible to predict in 1938 the tremendous growth the County would experience over the next 60 years. The record indicates the County began to experience a building boom in 1936, which has continued at a steady pace to this present day. A significant increase in building occurred in the late 70's and there were some slow downs because of economic concerns in the early 80's and again in the early 90's.

It is apparent from several studies that the survival rates for onsite sewage disposal systems in Fairfax County are excellent. There have been relative few failures that could not be repaired, replaced onsite, or eliminated by connection to public sewer. Experience is showing that many systems, thought to have out lived their life expectancy, are still functioning satisfactorily. This is directly attributable to adequate and proper design and installation in good permeable soils not influenced by water table conditions.

In the 70's the health department began to actively seek ways to communicate with the property owners about maintenance of their onsite sewage disposal system. With the advent of the flow diversion device, the homeowner began to receive a yearly post card from the health department advising to turn the valve so the system can rest. The card also contains information about the

need to pump the tank and who to call for help should problems be encountered with the system. The health department later developed brochures[39] and a video concerning the care and maintenance of the onsite waste water disposal system. The video is aired frequently through out the year over the county's cable television channel as a public service. Real estate agents were also a targeted group for training. The better educated they are the more accurately they can represent properties utilizing onsite sewage disposal systems to potential buyers.

Fairfax County has historically done, and continues to do, an outstanding job in onsite wastewater management. The county received praise for their efforts in 1932 and that praise is still well deserved today.

[39] Appendix P

APPENDICIES

A- *"Special 'Health Drive'",* Herndon Observer, June 26, 1928.

B- *"Sanitation Campaign",* Fairfax Herald Article, June 19, 1931.

C- *"Fairfax County Wins Praise of Sanitation Official",* Fairfax Herald Article, August 19, 1932.

D- *"Property Owners Can Have Sanitation Work Done at Moderate Cost"*, Fairfax Herald, January 12, 1934.

E- *"Sanitation Schedule",* Fairfax Herald, July 17, 1936.

F- Minutes of 1938 Board of Supervisors Meeting.

G- *"Notice of Adoption of an Ordinance by the Board of Supervisors of Fairfax County, Virginia*", Fairfax Herald, June 17, 1938.

H- *" Notice of Proposed Adoption of Amendments to an Ordinance ...Known as the Sanitation Ordinance",* Fairfax Herald, January 18, 1946.

I- Memo's dated October 19, 1954 and October 25, 1954.

J- Excerpts from 1954 Soil Survey.

K- *"Sanitation Inspection Ordinance",* June 6, 1956.

L- *"Sanitary Inspection Ordinance",* June 1, 1960.

M- Application for Evaluation, Evaluation Report, Information Sheet.

N- Presentation to the Fairfax County Board of Supervisors on May 13, 1973.
Memorandum to the Fairfax Board of Supervisors dated February 27, 1973.
"Sanitary Inspection Ordinance", 1973 Ordinance.

O- Flow Diversion Valve Reminder Card.

P- Brochure, *"Septic Tank Systems".*

Q- *"Individual Sewage Disposal Facilities",* June 18, 1984.

R- Sewage Effluent Pump Policy and Design Information.

S- *"Individual Sewage Disposal Facilities",* January 1, 1992.

T- Seepage Pit Construction Schematic.

U- Septic Tank Pump-Out Manifest.
Notice Concerning Regular Maintenance

V- Guidelines for On-Site Sewage Disposal and Well Water Supplies.
Permit Application.