

ON-SITE SEWERAGE FACILITIES – WHAT IS EXPECTED OF NEW REGULATIONS

Peter D. Beavers
Department of Natural Resources, Queensland

Abstract

Queensland has revised its regulations covering on-site sewage treatment and land application of the effluent. It is proposed in this paper to critically look at these new regulations and compare them to the revised Australian Standard AS/NZS 1547. The new performance based regulations are completely different from the previous prescriptive based regulations. However, what is driving performance-based regulations and are they useful to the regulator? It is doubtful that a regulatory body has gone back and critically considered these two important questions. As all State regulatory bodies in Australia are introducing new regulations, it is timely that we review the aims and goals of the regulations and whether the anticipated outcomes can be achieved. It is probably a good time to ask if much thought was ever given to the expected outcomes. What is really required is a mechanism that allows the regulatory authority to be able to measure the success of new regulations. The need for prescriptive-based guidelines to accompany performance-based regulations is discussed. The information contained in this paper is based on the experiences encountered with the introduction of new regulations to Queensland.

Keywords

on-site, performance, performance standards, prescriptive standards, regulations, sewage

1 Introduction

During the 1980's and 1990's there was a dramatic increase in the use of on-site sewerage facilities to serve domestic dwellings in outer urban fringes. Residential development in the outer fringes consists mainly of low density housing on allotments ranging from 0.5 ha up to 10 ha. However, in Queensland there are a number of historical subdivisions in unsewered areas where allotment areas can be as small as 600m². Whilst this form of development has proceeded at a rapid rate, regulations governing on-site sewerage facilities has not changed since the 1950's.

A variety of on-site sewage treatment, disposal and reuse options are now available to the owner of a single domestic dwelling in an unsewered area. The effective use of many of the innovative systems is hampered by inadequate programs to regulate their use. The septic tank system has been the conventional method used for on-site treatment of sewage and all past regulations have revolved around this system. These prescriptive regulations centred on the "percolation test" and local practices and experiences. They were not based on scientific principles, but primarily on empirical relationships and folklore (Otis and Anderson, 1994).

In Queensland the Standard Sewerage Law (Queensland, 1949), prior to its revision in April 1998, is a very good example of a regulation not adequate to meet the demands for environmental protection. Like all codes or regulations developed in the 1950's, the most common assumptions were:

- design of the absorption trench can be based on a clean water "percolation test" and the complex interrelationships between soil characteristics and conditions, quality of the wastewater, biological mechanisms and climate ignored;
- a prescribed design can be used for all sites meeting certain minimum requirements;
- operation and maintenance of the system can be performed by an uninformed owner; and
- compliance with public health objectives will meet environmental protection requirements.

The publication AS 1546 “Small Septic Tanks” (Standards Australia, 1990) and AS 1547 “Disposal Systems for Effluent from Domestic Premises” (Standards Australia, 1994) attempted to provide a rational basis for the design and installation of septic tank systems. However, many of the above basic assumptions were still implicitly implied in these Australian Standards. It must be recognised that these Standards provided a vast improvement on earlier Standards and Codes that were available, but there was still scope for improvement. A major failing of the Australian Standards and the Standard Sewerage Law (Queensland, 1949) is; they are prescriptive documents that emphasise hydraulic performance rather than treatment, and do not provide adequate provisions to assess the benefits of alternative technologies.

Regulatory authorities in Australia, New Zealand and the United States are now embracing the performance-based approach to environmental management. Standards Australia has directed that all new and revised Standards are prepared as performance-based documents (Maffucci, 1995). The shift to performance-based standards is well intentioned but unless there is on going compliance monitoring and enforcement, improvements in on-site sewerage facilities will not be evident.

This paper gives a critical review of new regulations and compares them with the revision of AS 1547 (Standards Australia, 1994). The factors that have moved regulators to adopt performance-based standards and their usefulness to the regulatory bodies are discussed. As all State regulatory bodies in Australia are introducing new or revised regulations, it is timely that we review the aims and goals of the regulations and whether the anticipated outcomes can be achieved.

2 Performance Based Standards

Prescriptive standards become a “snapshot of time” and do not allow for changes in technology nor do they explain why things are done in a particular way (Gunn & Beavers, 1998). Implicit in prescriptive standards or codes such as the Standard Sewerage Law (Queensland, 1949) is performance requirements that are based solely on public health protection. These performance requirements were based on an assumption that by keeping wastewater below the ground surface, distant from water supply wells and surface water, public health will be protected. These standards were suitable for scattered homes on large rural holdings but are inadequate for on-site sewerage facilities located in the higher density rural residential subdivisions.

On the other hand “performance standards define the acceptable environmental impacts of on-site wastewater treatment systems by specifying measurable performance requirements” (Otis and Anderson, 1994). They do not require that site characteristics or treatment methods be specified.

For example, a site with a permeable soil overlying fractured basalt and having a shallow water table would not be suitable for a conventional septic tank system under a modern prescriptive standard. Contamination of the groundwater by pathogenic microorganisms and nutrients would be the major reason for refusal. However, under a performance-based standard, an on-site sewerage facility that can demonstrate reliable and consistent pathogen removal and nutrient reduction to measurable performance levels may be acceptable to the regulatory body.

Under performance-based standards each site, the difficult site being the most challenging, is addressed according to its individual characteristics to achieve the established performance objective for treatment and disposal. The specific proposal may be “engineered” by the designer, and approval is granted when the regulator is satisfied that performance objectives are met. No particular system design is prescribed by the regulatory code.

A performance-based code allows the application of any number of innovative and alternative approaches to difficult or unusual sites, provided that performance standards can be met. Once in place, performance-based codes establish a framework for the continuing integration of new technologies and new ideas, new problems and new solutions.

3 Regulatory Concerns

A regulator's viewpoint was put forward by Smithson, (1995) who noted that performance based requirements, in general terms, were becoming the "golden boy" of the on-site wastewater intellectual community. Smithson expressed concern about the practical reality and user friendliness of the performance-based approach and argued that performance codes can only be acceptable if backed up by improved and standardised prescriptive guidelines.

In many respects, the Author shares his concerns. The performance-based approach increases the responsibility upon all parties involved i.e. regulators, site evaluators, designers, installers, service providers and homeowners. However, the real responsibility will still continue to fall on the regulator.

The performance approach is still in its infancy in Australia and the majority of the above-involved parties are, at this point in time, not equipped to handle the change. We must be mindful that many local government officers, who are charged with the responsibility of regulating on-site sewerage facilities, would also have responsibilities in several other program areas. More often than not, they are overwhelmed and under supported, pressured by tradition, and operate in a political and economic environment that just cannot be ignored.

Those charged with the responsibility of preparing the performance-based codes, and this includes the author, must be cognisant of these very real concerns. The development of user friendly prescriptive guidelines which support the performance code is, the Author believes, a necessity. The review team for AS 1547 (Standards Australia, 1994) has taken these concerns on board and is incorporating prescriptive appendices in the final document. However, State and local governments may have to go one step further with more user friendly guidelines that can be used by the homeowner.

In many respects, the homeowner has been forgotten in the whole process. At the end of the day it is the homeowner who pays for the system that is installed. The homeowner requires assurance that the system installed is the most appropriate for the site conditions. The new performance standards will impose increased costs for the homeowner. The requirements for site evaluation increase the cost of the system. On-going maintenance, service provision and local government charges will add to cost burden of the homeowner.

4 An Effective Management Program

The homeowner, who is being burdened with local government charges after installation, will want to see evidence that the money is being well spent. Further, regulatory complacency with system performance after installation cannot continue if the goals of the new regulatory regime are to be met. A lack of regulatory control is seldom recognised as the problem with poorly performed on-site sewerage facilities. In recent years, most effort has been directed towards finding alternatives for the septic tank systems. It must be said that many of the alternatives are performing no better than the humble septic tank system.

This being the case, then it must be concluded that the fault lies elsewhere in the program. Failures of on-site sewerage facilities to perform are not due to inherent flaws in system concepts, but to their inappropriate application or operation. Regulatory agencies in the past have expected on-site sewerage facilities to be designed for neglect, be simple enough for a semi-skilled person to design and install without training, foolproof so that any unskilled person can operate and be inexpensive. If on-site sewerage facilities are to be effective, a strong regulatory management program is necessary.

The objective of any regulatory program should be to ensure that practices meet expectations. Functions of an on-site sewerage facility regulatory program may include:

- establishment of rules;
- verification of rule compliance;
- enforcement; and
- record keeping.

4.1 Establishment of Rules

In Queensland, the rules are established by the State Government and then administered by local government. In other States, it has been somewhat different in that the State Government established and administered the rules. Change is in progress and several States are devolving the administration of the rules to local government. The rules differ slightly from State to State but the health and environmental outcomes are the same.

The rules that are established can be either prescriptive or performance-based. More importantly, they must include a description of the standards that are expected to be met, and the necessary procedures to be followed to gain regulatory approval.

The revision of AS 1547 (Standards Australia, 1994) will provide for most situations the Standards that are expected to be met. The most notable exception is separation distance of the on-site sewerage facility from a stream, groundwater, property boundary dwelling etc. This has been left to each State regulatory body to address.

4.2 Verification of Rule Compliance

Verification of rule compliance is probably one of the most important aspects of any management program but is usually the most neglected. In the past it has been totally ignored in management of on-site sewerage facilities. However, unless mechanisms to verify compliance with rules are established there is no possible way of knowing whether the desired health and environmental outcomes are being achieved.

Typical mechanisms will include reviews, audits, inspections and reporting. The rules provide procedures for local government to give approval to the installation of an on-site sewerage facility. In some instances, “conditions” may be placed on the approval to install the facility e.g. a “condition” being that the facility be serviced on a quarterly basis in accordance with the requirements of the manufacturer’s approval. However, what is generally missing is the mechanism to verify that the “condition” is actually implemented to the satisfaction of all parties.

Therefore, when new or revised regulations are introduced, local government should first review all their internal procedures to ensure they comply. A quality assurance program should be set in place to make sure that the new procedures will deliver the expected outcomes. This program should have built into it an annual review that allows the local government to assess the procedures.

It is notable that new regulations coming into force are putting a strong emphasis on performance monitoring. A well developed performance monitoring program is essential in ensuring that on-site sewerage facilities are operating properly and meeting the required performance standard. Review and follow-up of monitoring reports must occur to maintain operation effectiveness.

4.3 Enforcement

Without effective enforcement mechanisms, compliance with the rules will be lax (Otis and Anderson, 1994). This statement is very true, but most local governments would agree that taking enforcement action is cumbersome and may not always be successful.

A degree of enforcement can be achieved through the permit system that is currently in place. A permit or approval to install an on-site sewerage facility must be obtained by the owner. Some local governments are also considering the introduction of an operating permit that may be issued for a limited term, and renewed if proof of compliance with performance standards is shown.

Licensing of service operators is another mechanism of ensuring control and, indirectly, achieving compliance. The licensed operator is required to provide services and the licence may be suspended or revoked if the services are shown not to conform to established standards.

5 New or Revised Regulations Being Introduced

When AS 1547 (Australian Standards, 1994) was published in 1994 it was acknowledged that it had some deficiencies. Most notable was the lack of attention to site evaluation. Also it is a prescriptive standard with the main emphasis being on the conventional septic tank and absorption trench.

It is easy to be critical of AS 1547 (Australian Standards, 1994), however one cannot blame this standard for the high failure rate of on-site sewerage facilities. It was only published in 1994, and the Author is not aware of any performance evaluation of facilities designed to this document being undertaken by any regulatory authority. The high failure rate of on-site sewerage facilities can be attributed to the design rules established back in the 1950's, not to AS 1547 (Australian Standards, 1994).

As well as including site evaluation in the review of AS 1547 (Australian Standards, 1994) the Standards Committee was also of the opinion that other aspects causing high failure rate of on-site sewerage facilities also required consideration. It was further agreed that the approach to revising AS 1547 (Australian Standards, 1994) was to centre around the "performance" of the implementation processes that achieve on-site wastewater servicing, and the "performance" of those persons who have responsibility for carrying out those implementation processes (Gunn and Beavers, 1998). The approach had to be flexible enough to provide for different administrative structures and to take into account variations in design, regulatory approval procedures, geographic and topographic characteristics and land development pressures and methodologies.

At about the same time, Queensland began a review of the Standard Sewerage Law (Queensland, 1949), the subordinate legislation to the Sewerage and Water Supply Act (1949). The main purpose, at that time, was to replace the prescriptive technical provisions of the Standard Sewerage law with the National Plumbing and Drainage Code (Standards Australia, 1996). Action was also taken to replace the prescriptive technical provisions relating to on-site sewage treatment and disposal by other Australian Standards and a Departmental Code of Practice for on-site sewerage facilities.

Due to delays in publication of the revised AS/NZS 1547, it became necessary for the State Government to prepare an Interim Code of Practice for On-site Sewerage facilities to ensure some regulation is available in the period until AS/NZS 1547 is published. This Interim Code of Practice draws heavily on the current drafts of the Australian Standards.

In both cases it was clear to the Review Committee, State and Local Government and industry, that the respective standards and laws were deficient and did not conform to demands for environmental protection. The question that must be addressed is "How in the future will we measure the performance of the revised AS/NZS 1547 and other laws and regulations that are now being introduced?" An Australian Standard has a five-year term before it must be reviewed. The Review Committee may decide no changes are necessary or alternatively make a number of revisions. But, on what basis will the Review Committee make these decisions?

To evaluate the performance of the revised AS/NZS 1547, or any other regulatory standard or code, it will be necessary to look at its performance objectives. For example, the performance objectives of the revised AS/NZS 1547 include:

- protection of public health;
- maintaining and enhancing environmental quality;
- maintaining and enhancing community amenity;
- minimising use of the water resource; and
- utilising residual water and nutrient material.

Mechanisms should be set in place that will allow evaluation of a standard or code against the performance objectives. Clearly, if it can be demonstrated that the failure rate of on-site sewerage facilities installed after the introduction of new standards is reduced, then that is a positive. Other factors must also be considered. Questions on improvement of environmental quality need also to be

addressed. Successful implementation is dependent upon all persons involved carrying out their responsibilities in a diligent and informed manner so that their contribution to achieving performance requirements is to an appropriate standard.

Within the implementation responsibilities, benchmarks could be established that would allow future reviews of the standard a means of determining its relevant success. Improvements in service delivery, fewer complaints to local government regarding service providers, more informed owners are a few benchmarks that may determine whether the implementation responsibilities are being achieved and as a result improving community amenity, public health and the environment.

Government and Standards Australia Committees must be put more effort and thought into evaluating the performance of regulatory standards. The Committee that prepared the revision of AS 1547 (Standards Australia, 1994) should be considering the development of a number of performance indicators. Regulatory authorities could also develop some performance indicators and future national forums of regulators should include this on the agenda.

6 Conclusions

Regulatory authorities in Australia and New Zealand are now embracing the performance-based approach to environmental management. However, this approach is going to increase the responsibility upon all parties involved, more particularly on the regulator. If on-site sewerage facilities are to be effective, a strong regulatory management program will be essential. Once set in place, it will not be good enough for the regulator or other parties to sit back and expect the program to function by itself. Continual review of the program will be essential. The regulatory standards will require review, at least on a five-yearly basis. Performance indicators to evaluate the standard must be established to ensure future reviews are based on sound documented knowledge.

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