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Memo: Well setback provisions in the *Sewerage System Regulation*, recommendations for policy and response to Ministry of Health Rationale document.

1 Introduction

In mid-February we received a document "Rationale for Sewerage System Setbacks", 1st November 2010, prepared by the Ministry of Health and providing background information, with references, on the new well setback provisions in Section 3.1 of the *Sewerage System Regulation* (SSR). This document also includes a policy statement on differing setbacks to holding tanks and septic tanks.

We have reviewed this document and the supporting references provided, relating them to other research in the field. We have also received comment from stakeholders on the new provisions and, particularly, on the policy with respect to tank setbacks.

This memo is intended to comment upon the setback provisions and rationale, and to recommend a change to policy on application of the provisions to tank setbacks.

2 Main conclusions

- Specific setback distances should be contained in the SPM, not in the *Sewerage System Regulation*
- Considering all information and arguments regarding setback distances, we conclude that 15 metres is a reasonable "standard" setback distance from a septic tank to a well. Considering the other precautions in the Regulation and the SPM, we find no need to increase this setback distance to 30 metres.
- Research is needed to determine the impact and potential impact of onsite systems on ground and surface waters in BC, and the outcome of these studies be used to support risk management and site capability decisions at provincial and local levels
- **We conclude that effective maintenance, inspection and repair of sewerage systems (including tanks and dispersal systems) is the most effective risk management strategy available for reducing potential onsite system impact.** This is particularly the case as it addresses the large number of older systems already in place (which did not benefit from current risk mitigation provisions).

See **Section 6** for detailed recommendations.

3 Review of reports

3.1 Documents cited in the rationale document

Our interpretation of the documents referenced, and other reports by the authors of these papers, is that the general recommendation of the authors may be summarized as follows:

- Safe horizontal separation is not readily defined, and is related to a number of factors. Safe horizontal separation is specific to a site, site climate and to an application rate and should be assessed on a site and project specific basis.
- Safe horizontal separation may be included in land use planning through the use of statistical tools and site evaluation specific to the area under consideration. This may be related to the establishment of land capability for development where onsite systems are to be used, and to the preferred density of development. This is a process of risk management.
- Sewerage systems contaminating wells with pathogens are doing so because they are malfunctioning, either due to design or lack of maintenance.
- Setback provisions have been demonstrated to not be adequate to protect groundwater in the absence of proper onsite system design/installation/maintenance/repair.
- Maintenance of sewerage systems is critical to the protection of health and the environment.
- Risk management for septic tanks is best approached by ensuring tanks are watertight, and that tanks remain watertight over their life.

A broader review of literature indicates a lack of consistency in correlation between onsite systems (even where poorly functioning) and negative health impact. This further supports the conclusion that prescriptive horizontal setbacks are unlikely to find conclusive scientific support, particularly on a province wide basis, and that horizontal separation is only one of the factors to be considered in performance based onsite system design—on a site and project specific basis.

3.2 Pathogen removal by soil treatment in onsite systems

We have, in the past, made review of the capacity for sewerage system dispersal areas to remove pathogens through soil treatment of effluent. Research indicates that a properly designed sewerage system dispersal area, which is operated properly, will remove pathogens (bacteria and viruses) prior to effluent from the system reaching the groundwater table.

Modern risk management strategies for onsite systems typically include performance-based consideration of this capacity instead of prescriptive setback provisions; this approach is followed by the US EPA, for example.

3.3 Setback provisions of other jurisdictions

We have reviewed the horizontal setback provisions in regulation of other Canadian provinces and US states, together with the recommendations of US Federal authorities.

In general the setbacks vary from 15m to 30m for domestic wells from domestic onsite systems. This variation does not appear to be related to differing climate, soils or geology. Traditionally setbacks to

cess pools, privies were established at 30m and setbacks were reduced as more steps were taken to reduce risk of contamination.

Many jurisdictions provide differing setbacks to tanks versus dispersal areas. Where this is the case, setback to tanks is normally 15m. Most jurisdictions requiring setbacks of 30m to onsite systems reduce setback to 15m for tanks. The overall result is that the large majority of jurisdictions provide for setbacks of 15m or less between tanks and wells.

Those jurisdictions where onsite systems regulations have been developed with considerable technical involvement (example Maine, Rhode Island, Washington State, Alberta, Nova Scotia, BC prior to recent SSR amendment) show either 15m setback to wells from onsite systems as a whole, or reduced setbacks to tanks.

In many cases there are provisions for variation, both upward and downward, of setbacks.

We did not find any jurisdictions where setback to holding tanks or vaults was less than that for other tanks.

Many jurisdictions have requirements for system inspections, either regularly or for property transfers and a number have maintenance and inspection programs.

We did not find any research which demonstrated any difference in well water quality between jurisdictions with differing setback provisions.

3.4 Setbacks from tanks related to well water contamination

There is little information available to determine any relationship between the setback distance from a septic tank to a well, and the frequency of well water contamination by sewage contaminants. In other words, it is difficult to find documented support for any particular setback distance.

3.5 Rationale document

The Ministry rationale document sets out arguments for a setback of 30m to dispersal components and septic tanks.

These arguments are largely based upon:

- Potential for virus travel to wells from septic system dispersal areas.
- The term “septic tank system” or “septic tank” used in older reports.
- Reports showing pathogen travel from failing onsite systems to wells.
- Reports of leaking tanks from older installed systems.
- An opinion with respect to risk and holding tank systems.

4 Discussion

4.1.1 Safe horizontal setbacks

Based on the research cited in the rationale document, and other reports by the same researchers, and regulations of other jurisdictions there is no support for a 30m setback to a residential sewerage system, including the dispersal area, to domestic wells, for modern systems.

There is support for large setbacks for older systems.

There is strong support for mandated maintenance for all onsite systems.

There is strong support for mandated repairs and upgrades for existing onsite systems.

There is support for proper land use planning, with consideration of onsite systems.

There is support for site and project specific assessment and performance-based design to ensure groundwater is protected; this includes development of safe setback as part of design.

The research cited does not generally include systems designed to modern standards and properly operated and maintained. Many of the systems were leaching pits or cess pools and others were malfunctioning older septic systems. This is the case for other research into watershed level impacts of onsite systems.

We note that some more modern research by the authors of cited papers was not included in the Ministry rationale document.

4.1.1.1 RISKS ASSOCIATED WITH PRESCRIPTIVE STANDARDS

The one example of a modern system found in one of the cited papers is one where the design should have addressed the site and project specific performance requirements to protect groundwater—and it is likely that, had the system been designed under a performance-based code this would have been done. The example therefore demonstrates the weakness of prescriptive regulation.

The demonstrated contamination of wells and surface water, where it is truly due to onsite systems, has occurred despite regulated setback provisions—the 30-meter setback provision to cess pools and dispersal areas had been the norm for 100 years even at the time of the research.

We therefore consider that the research cited, rather than supporting setback provisions in regulation rather supports the need for performance-based regulation and proper system design/installation/maintenance/repair. Prescriptive regulation may, indeed, be higher risk due to the false sense of security it creates.

In BC further risk is caused by lack of consideration of site capability for onsite systems during land use planning due to the resultant inconsistency between prescriptive zoning (density and use) regulation and site capability.

It is due to this situation that modern risk management for onsite systems centers on other factors, including:

- Site and project specific design.
- Design and installation by trained persons.
- Design of systems to performance at defined boundaries.
- Design of systems to attain pathogen removal prior to effluent reaching groundwater.
- Watertight tank systems.
- Maintenance of systems by trained persons.
- Land use planning to address onsite system density in relation to site capability.

It is no coincidence that the US EPA does not utilize horizontal setbacks as a key risk management strategy for onsite systems.

4.1.2 Safe horizontal setbacks to septic tanks

The available research and standard practice in the industry does not provide support for a 30-meter setback to septic tanks.

As noted, the majority of jurisdictions provide a 15m setback for tanks, and there is no evidence of health impact in those jurisdictions compared to those using 30-meter setbacks.

It is clear that septic tanks can leak, and that a large horizontal setback to a leaking tank provides some additional protection. However, there does not seem to be any significant advantage to a 30-meter setback versus 15m, and the key factor in protection of health is to have the leaking tank repaired promptly.

It is our estimation that the interpretation of research cited in the Ministry rationale document is flawed by a misreading of the term “septic tank system” or “septic tank”. In older manuals and research these terms are frequently used to refer to the entire sewerage system, and where seepage is referred to this is in relation to the seepage of effluent into the dispersal area. This use of the term arises from the differentiation of these systems from cess pool systems.

The research cited strongly supports proper installation and watertight testing for septic tanks.

The research cited supports maintenance of tank systems, including checks on developing leaks.

4.1.3 Setback to holding tanks

There is no support in the cited literature or in other regulations for differing setbacks to holding tanks in relation to other tanks.

We have discussed the provided rationale for smaller setbacks to holding tanks, and have the following comments:

- We are of the opinion that holding tanks are as likely as septic tanks to leak, and considerably more likely to overflow.
- The SSR applies only to systems with filings and maintenance plans, and the SSR requires the owner to maintain the onsite system. The argument that holding tanks will be inspected and septic tanks may not relies on owners not adhering to the SSR, which is an enforcement issue, not an argument for reduced setbacks to holding tanks.

- Since holding tanks are only used where onsite dispersal systems cannot be safely constructed there will be sites where the risk of groundwater contamination is high in the case of a leaking tank or overflow. This would support either increased setbacks or other risk mitigating features. The third and fourth arguments presented in the rationale document, we think, support this conclusion rather than the conclusion arrived at in the document.
- We note that the high cost of pump out is an inducement to owners to allow sewage to overflow to the ground, rather than pumping it out.
- Holding tank pump out does not require inspection of the tank by a trained Authorized Person, and is typically undertaken by an untrained pumper truck operator.

Overall, we consider the risk to groundwater from holding tanks may be higher in many cases than that from septic tanks.

5 Risk management and onsite systems

In response to concerns about impact on health and groundwater by onsite systems, based upon research of the type cited in the rationale document, BC has developed a risk management approach to onsite system design, installation and maintenance.

5.1 Overall risk management steps

Key risk management steps taken include:

- Adoption of a performance-based regulation, with design, installation and maintenance of systems supported with a Standard Practice Manual (SPM) and with system design expected to be site and project specific.
- Standards in the SSR and SPM aimed at pathogen removal in soil prior to effluent reaching the groundwater, examples of provisions include:
  - Comprehensive soil and site evaluation prior to design
  - Lowered hydraulic loading rates
  - Provision of linear hydraulic loading rates
  - Vertical separation based on soil type and dispersal method
  - Pre-treatment needed to Type 3 level for certain conditions
  - Site capability assessment to address high risk sites
  - Encouragement of pressure distribution systems, and of low hydraulic application rate timed dosing for high risk situations
  - System maintenance standards.
- SSR required training of Authorized Persons, and oversight by professional bodies registering these persons.
- The SSR requires design by a professional for large flow systems
- Requirement in the SSR for owners to maintain systems and for maintenance to be undertaken (or supervised) by trained Authorized Persons.

5.2 Risk management for tanks

With respect to septic tanks and other treatment tanks some key risk management strategies implemented include:

- SPM standard for horizontal setbacks to tanks, with specific provisions for any reduction in these critical setbacks (including requirement for a professional)
- Tanks to meet CSA standards (which include provisions for structural integrity)
- Tank inlet and outlets use rubber couplings or sealing gaskets
- Tanks with sealed lids (for tanks with separate lids)
- Tanks to be installed to SPM standards by trained Authorized Person, SPM includes provisions for:
  - Proper tank footings
  - Proper support of inlet and outlet piping
  - Sealing of all penetrations.
  - Watertight testing of tanks.
- Tanks with sealed risers and riser lids
- Risers and lids to be kept accessible for maintenance access
- Maintenance mandated by the SSR, maintenance to be undertaken (or supervised) by an Authorized Person trained in maintenance, SPM provisions for maintenance include check on tank integrity.

We consider that these risk management steps meet and exceed the recommendations of reports on issues with leaking tanks (example Ball's report as cited in the rationale document).

5.3 Risk management and cost benefit

It has been the direction of the people of BC, as interpreted by the government, that risk management for onsite systems must be balanced with cost.

Although no clear statement of level of acceptable risk has been made, it is clear that the people do not wish onsite systems to be excessively costly.

It is our opinion that multiplication of risk management strategies will lead to unacceptable levels of system cost, and, as we have discussed above, may not lead to a level of risk reduction that justifies increased cost.

As an example, adding a regulatory 30-meter setback to wells from septic tanks does little to reduce risk, but can lead to considerable increase in system cost when added to the already comprehensive risk management strategy in place for septic tank design, installation and maintenance. This is particularly the case as land use planning to date has been undertaken based on the lower setback distance.

5.4 Risk management and "what if" scenarios

Where there is lack of clear information on risk, lack of clear assessment of risk and lack of a defined acceptable level of risk it is the tendency to resort to "what if" scenarios when trying to come up with

risk mitigation strategies. This is the situation with horizontal separation to wells from sewerage systems, when considered on a province or state wide basis.

These "what if" scenarios are not usually productive, and this is particularly the case where there is a lack of awareness of the strategies already in place to manage risk.

6 Recommendations

6.1 General

It is our opinion that the inclusion of prescriptive setbacks in the SSR has compromised the performance nature of the regulation, potentially increasing risk to health and the environment, and we recommend that the Ministry consider removing these prescriptive standards in a future amendment of the regulation.

We also recommend that the Ministry develop a clearly stated document providing acceptable levels of risk for onsite system impact.

6.2 Maintenance and repair

We applaud the steps the Ministry and Province have taken to mandate maintenance of systems under the SSR. We recognize, however, that enforcement will continue to be an issue.

We recommend that the Ministry prioritize maintenance for all onsite systems in BC.

We recommend that the Ministry and the Province pressure local governments to mandate maintenance, inspection and repair of onsite systems.

We believe that this is the most effective risk management strategy available for reducing potential onsite system impact, particularly as it addresses the large number of older systems already in place and which did not benefit from current risk mitigation provisions.

We hope that as this develops, stakeholder involvement will be used to ensure mandated inspection, maintenance and repair processes are both appropriate and cost effective.

6.3 Land use planning

A common cause of problems, with older and newer systems, is building lots that are simply too small to comfortably accommodate both a drinking water well and an onsite sewage system. This historical situation is currently addressed by triggering the involvement of a professional (example the SPM setback standards to wells which cause professional involvement due to a need to address setbacks), however, this is treating the symptoms and fails to recognize that some areas may suit high density development with onsite and others may not.

We recommend that the Ministry and the Province address, both at a provincial and at a local government level, development of site capability assessment for land use planning in order to integrate onsite system density planning with the creation of future developments.

6.4 Research and development

We recommend that the Province support the collection and analysis of monitoring data and studies to determine the impact and potential impact of onsite systems on ground and surface waters in BC, and that the outcome of these studies be used to support risk management and site capability decisions at provincial and local levels.

This research should be targeted to answer specific questions in order to improve onsite system practice, these questions include what factors best predict well water contamination from onsite systems (example system age, state of maintenance, horizontal and vertical offsets, soil types, etc.).

It is fair to say there is a lack of specific information about the frequency of wells being polluted by leaking septic tanks and, therefore, it is difficult to state conclusively if there is a problem with the traditional 15-metre setback. Therefore, we encourage the BC government, and other entities, to research this further.

6.5 Septic tank and other tank setbacks

We understand that the setback provision in the SSR is likely to remain in the short term.

We recommend that the Ministry alter its policy with respect to setbacks to septic tanks to include septic tanks, lift stations and other sewerage system tanks in the 15m minimum setback.

Rationale for this may be based upon consideration of the risk management strategies already in place, and could, for example, include provision that the larger, (30m), setback would apply for tanks not watertight tested after installation.

6.6 Holding tanks

We recommend the Ministry develop a policy document for Health Authorities to apply when reviewing applications for holding tank permits.

This document should include a requirement for site assessment and for the provision of double tank systems with alarm where risk to groundwater is considered to be high.

We recommend that permitted holding tanks be inspected on a regular basis by the Health Authority or by a trained Authorized Person with report to the Health Authority required under permit.

Should the Ministry of Health wish, we would be happy to discuss or clarify these recommendations or support the development of strategies for onsite system risk management. We are also available to support other stakeholders in their discussions of this issue.

COTRA