BCOSSA Technical Review Committee Technical Bulletin

Title: Introduction to the new SPM

Subject:

Introduces the SPM V2 (September 2007), summarizes key changes from the SPM V1 and introduces opportunities for improved Onsite system cost effectiveness based upon use of the new manual.

Relates to SPM Version: Version 2, 21st September 2007

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1. Introduction to the new SPM (Version 2)

1.1 Introduction

The BC Sewerage System Standard Practice Manual (SPM) is provided by the BC Ministry of Health to serve as a source of standard practice for authorized persons seeking to comply with "standard practice" as required under the *Health Act's* Sewerage System Regulation (SSR).

The SPM is a guideline not a legislated requirement. Rather, it provides a set of recommended standards applicable as one form of standard practice in BC, in support of the performance based SSR. It is ***highly recommended*** that those standards identified as "critical" and "linked" standards be followed and any deviation from these standards be made in accordance with the criteria laid out in the SPM.

The manual is neither intended as a design specification nor an instruction manual for untrained persons.

The SPM is a living document, with regular review cycles. Currently review is annual.

The BC OnSite Sewage Association (BCOSSA) Technical Review Committee (TRC), reviews and edits of the SPM for the Ministry of Health. As part of this review process the TRC gathers stakeholder input as well as technical information. The TRC may also provide interpretation of, and technical support to, the manual.

The BCOSSA, through its Technical Review Committee (TRC), reviews and edits (under contract) the SPM for the Ministry of Health. As part of this review process the TRC gathers stakeholder input as well as technical information. The BCOSSA TRC is also tasked with interpretation of and support to the manual, this includes the release of Technical Bulletins such as this one. Part of the technical support service includes support to the initial "roll out" of the manual, so that Authorized Persons are aware of the changes and of how best to use the manual.

This process, by which industry supports a guidance document for government provides the first outcome based non-prescriptive process for the onsite industry and is considered to be unique in North America.

1.2 Revision process

The first SPM, V1 (2005) was released June 2005 and amended September 2005.

Stakeholder input during 2006 contributed to a revision process managed by the TRC. The revised Draft was submitted to the Ministry of Health February 7th 2007. The draft was reviewed by the Ministry of Health in consultation with the TRC and with legal review, and finalized September 2007.

This first revision made major changes to the manual, in terms of content, conceptual framework and of layout. This was expected, based upon the large changes in the onsite industry and the new approach to the manual.

Future revisions will build upon the current layout and conceptual framework and are expected to be more minor.

In the interim period between revisions technical bulletins from the TRC will provide updates and interpretations/clarifications. The TRC is also intended to manage the provision of a technical support service to the manual for practitioners, answering questions and assisting with the improvement of skills in the industry.

1.3 Key changes from the first SPM

The Standards provided by the SPM are similar to those of the SPM V1, however, the layout is very different.

The layout has been reworked to make the manual more usable, so that although the manual is considerably expanded, once the AP is familiar with it they will find following the manual much easier. The manual now includes an index, and the PDF version is fully bookmarked.

Consistency of standards, and of presentation has also been improved.

1.3.1 Division to parts

Part 1

Administrative, roles and responsibilities and standard practice.

Part 2

Critical standards for onsite systems, this part includes the key design tables. The layout of the Part 2 standards follow the normal flow of a design process, and a Design Inputs Worksheet (following the same flow) is provided.

All standards of Part 2 are considered to be linked.

Departure from Part 2 critical standards should only be made by a professional, with suitable peer reviewed support and environmental performance assurance.

Part 3

Standards and guidelines for Record of Sewerage System filings and practice. Details of technologies for onsite, “Toolbox” of techniques and standards for application of those techniques.

Part 3 standards for technologies are internally linked, and where they are linked to another technology (eg dosed gravity standards are linked to pressure distribution pump chamber standards) this is clearly stated.

Departure from Part 3 can be made by any AP, but should only occur with suitable support and assurance that performance objectives will still be met.

Appendices

Provide background information; include worksheets to standardize system design and a comprehensive glossary

1.3.2 Key conceptual changes in new version

- Improved usability, layout, diagrams
- Cost control for onsite systems was a priority
- Standard Practice
  - Defined in Section 1.1.4
- Clear division of critical standards, and definition of the importance of linked standards
- Clear guidance on departures from the manual standards, with procedures for Part 2 and Part 3 standards
- More clearly performance based
- Clear guidance on where the involvement of a professional is recommended
- Solution oriented approach, less restrictive (particularly for Registered Practitioners)
- Expanded design and solution options, with basic and extended options
  - For system design, basic methods still conceptually the same, although some tables changed
  - Extended design options now available as well
  - Site constraints approach replaced by more flexible and solution oriented Site Capability Tables
- Coverage of technologies greatly expanded
  - Greater consistency of presentation of technology information
- More emphasis on maintenance and monitoring
- Standards for practice provided, including minimum standards for design documentation and plans

1.3.3 Key changes in Part 1

- Clear explanation of the role of the SPM and the application of standard practice by Authorized Persons (APs)
- Clear instructions for application of the SPM standards by the AP,

  - And instructions on how to handle departures from the manual while still using it as the source of standard practice
- Expanded repair options

1.3.4 Key Changes in Part 2

Follows the order of an Onsite design, laid out to be used with the Design Inputs Worksheet.

Key changes by section:

Section 2.2 Daily Design Flow

- Provides clear peaking factor
- New secondary DDF method for residential in section 2.2.1.2
  - Addresses luxury homes
- Updates and corrections to Facility Flows
- 50% increase in size for garburators now for treatment AND field
- Recommendation for owner acknowledgement (sign off)

Section 2.3.2 Minimum site investigation standards

- Clearly lists minimum standards for site evaluation and reports
- Minimum standard of 4 Permeability tests
- Identifies soils where more comprehensive investigation may be needed, including
  - Sands, fine sands
  - Clay textured soils
  - Sodic soils
  - Platy structured soils

Section 2.3.3.1Boundary performance

Appendix F provides guidelines for situations where performance assurance should be provided (for example, where a setback to drinking water is being reduced).

Section 2.3.3.2 Vertical Separation — VS

- Clarity of standards improved, and separated to conventional systems and sand mounds/sand lined trenches
- Reduced native soil VS for Type 3
- Clear standards for sand mounds and Sand Lined Trenches
  - Including application standards (i.e., what is a sand mound and what is not)

  - Provides sand depth standards as well as VS
- Increased total VS for shallow soil depth
- Clear definition of Seasonal High Water Table (in Glossary)
- Guidelines for increasing VS in special cases

Section 2.3.3.3 Horizontal setbacks

- Split to:
  - Critical setback standards
  - Other setback standards
- Special considerations for reduction of setback to wells, drinking water and other critical setbacks,
  - including the need for a professional with competence in the field of hydrogeology or geotechnical engineering.
  - and environmental performance monitoring
- Increased setbacks to High Pumping Rate Water Supply System wells (over 500 persons)
- Definition of seasonal fresh water
- Breakouts consolidated, and defined (Glossary)
- Setback credit for pressure distribution instead of Type 2, with reduced setback
- Setbacks from tanks considerably reduced
- Separation of non critical setbacks provides clarity and allows for more flexibility in system design by practitioners (see below for details)

Section 2.3.4 Hydraulic Loading Rate (HLR) tables

- Some Type 2 and 3 loading rates for coarse soils reduced
- Kfs values corrected, which will reduce issues with higher permeability soils
- Sand mounds and sand lined trenches clarified
  - Sand mound basal loading now from standard HLR table
  - Sand mound sand loading increased for Type 1
  - Timed dosing strongly recommended for greater than Type 1 loading to sand mounds
  - Extra sand specifications and loading rates

Section 2.3.5 Linear Loading Rates—LLR

- Entirely new single table, considerably higher LLRs

- Applied to all systems where flow is primarily horizontal, should be applied in all cases where sand mounds are used on shallow soils
- With provisions for small systems on non conforming sites
- Diagrams to assist with application

Section 2.3.6 Site Capability

- More solution oriented than site constraints
- Table to address sites that are constrained and options for possible solutions
- Table showing main site capability needed for different systems (e.g., gravity)
- Many more options for practitioners
- Flood plains issues covered

Section 2.4 Residential Sewage and Treatment Standards

- Table 2-14 entirely new, provides residential sewage and Type 1 standards,
  - Part 2 standards are linked to these performance standards
- Monitoring priorities for maintenance plans

1.3.5 Key Changes in Part 3

Section 3.3 Minimum Design, Installation, Maintenance and Monitoring Standards

This section provides clear standards for practice by the AP. The AP will be able to use this section as a checklist for:

- design documentation
- site plans
- maintenance plans and system maintenance
- monitoring design

and other critical tasks.

Technologies

These are now organized into conventional systems of increasing complexity (from trickling gravity to Subsurface Drip Dispersal), followed by Sand Mounds and sand lined trenches, and Evapotranspiration absorption (ETA/ET) beds and lagoons, and each section has consistent headings:

- Performance Standards

- Description and Principles of Operation
- Design Considerations
- Specifications and Installation Considerations
- Maintenance and Monitoring Considerations

All sections have been substantially updated. Several entirely new techniques are now included:

- Collection systems
- Dosed gravity systems (without the previous limit on size for gravity systems)
- Serial and sequential gravity systems
- Siphon systems
- At grade beds
- Pressurized Shallow Narrow Drainfields
- Subsurface Drip Dispersal
- Site drainage techniques
- Sand Lined Trenches
- Evapotranspiration/Absorption (ETA) and Evapotranspiration (ET) Beds

Other technologies have considerably expanded options and instructions, particularly:

- Sand mounds
- Lagoons
- Pressure distribution systems (with a worksheet included for design)

Key changes to the Appendices

The appendices are now clearly separate from the manual, and hold supporting information, details and explanatory information.

The comprehensive glossary will assist the AP with use of the manual.

Worksheets for design are included to assist the AP and to improve standardization of design documentation.

2. Onsite Sewage System cost effectiveness and the new SPM

2.1 Introduction

Onsite sewage systems are used to provide sewage treatment and disposal to residential and small commercial users in all areas of BC. The Onsite system should be designed, installed and operated to protect public health. However, the system should also be cost effective and efficient in its use of resources. The Onsite system should also be as simple as possible (given the site conditions) to improve long term reliability and reduce maintenance costs.

In the development of the SPM V2 the BCOSSA Technical Review Committee (TRC) has had a view to all three of these objectives.

This part of the Technical Bulletin will summarize the new or modified provisions of the SPM which improve Onsite system cost effectiveness and efficiency. It will also provide explanations for changes which may be thought to increase system cost.

These improvements have been made through the provision of guidelines and standards for technologies that were not previously covered, through clarification of standards for technologies and through expansion of options for Registered Onsite Wastewater Practitioners (ROWPs).

2.2 Increased flexibility for system selection

The previous SPM utilized a system of "constraint classification" to drive selection of the type of system that could be installed on a site.

The SPM V2 still considers site constraints, through "Site Capability" tables and through a section with guidance on solutions to common site conditions. However, the range of system choices and the flexibility of options available in this more solution oriented approach will permit the selection of considerably more economic solutions to common constraints.

This will also assist (in combination with the wider range of available techniques) in addressing marginal lots which have been considered too costly to service with onsite.

For example, a gravity system (normally lower cost than a pressure system) can now be installed on steeper slopes. A dosed gravity system is no longer restricted to a certain size.

Or, a sand mound can be installed on shallow soils without use of tertiary pre-treatment.

Or, a sand lined trench system may be used to address very high permeability soils that would otherwise need an expensive pre-treatment system.

Or, where vertical separation is over 72" simple gravity systems may be now be used to address severe constraints which previously needed expensive solutions.

2.3 Increased options for ROWPs

The former SPM highly recommended that expensive and complex systems, and that Professional services for system design be obtained where faced with several types of site constraints, The new SPM recognizes that these site constraints can now be addressed (through options provided in the Site Capability tables) by a ROWP, in many cases utilizing simple technology.

2.4 Worksheets for key planning tasks

The inclusion in the appendices of the SPM V2 of comprehensive worksheets for system design, pressure distribution system design and sand mound design will not only provide useful, time efficient tools for AP s (reducing design costs and improving quality) but will also standardize designs across the Province, helping to reduce overbuilding.

2.5 Improvements to the critical standards for systems

2.5.1 New selection methods for system Daily Design Flow (DDF)

Daily Design flow calculations can be a major contributor to system cost. The SPM V2 provides two methods for choosing DDF. This allows flexibility and provides a method to deal with special or complex system design ..

2.5.2 Improved Vertical Separation (VS) tables

The old SPM utilized tables for soil depth and vertical separation which lead, at times, to use of high levels of treatment where a sand mound or sand lined trench system would have been appropriate (at lower cost).

The SPM V2 provides clear guidance for use of sand mounds/sand lined trenches to address VS constraints (as well as to address poor soil conditions). This will, as stated above, lead to considerable cost savings (both for system installation and for system maintenance).

In addition, considerably more credit (reduced horizontal setbacks and vertical separation) for use of Type 3 (advanced treatment with disinfection) is given, allowing simpler application of Onsite systems on very difficult sites—an important contribution to cost effectiveness.

Gravity systems are restricted to sites where native soil VS is 36", this clarifies a situation in the old manual which gave a 24" figure for native soil VS and 36" total required. This led to

confusion, as gravity distribution should not be used where a raised system is used. Where soil depth is 24" the use of an at grade pressure system (either trench or bed—see below for at grade bed advantages) is more economical and also addresses technical concerns over breakout and poor treatment with raised gravity systems.

2.5.3 Improved Horizontal Setback (HS) tables

Due to confusing standards for HS in the old manual many systems were constrained by HS and this led to increased cost.

The SPM V2 uses improved and simplified HS tables, and reduces setbacks for tanks considerably.

In addition, the new tables provide a clear HS "credit" for use of pressure distribution, which improves the economics of pressure system use (while removing the credit for Type 2 treatment systems—which are more expensive to install and maintain). Savings for a typical small residential system that had previously needed Type 2 treatment will be minimum $5000 initially, with ongoing maintenance costs also reduced).

Additionally, by separation of the critical and other HS the new manual gives considerably greater flexibility to ROWPs and other AP s in system design, which will reduce costs and will reduce the need for Type 3 systems (which have high initial and ongoing costs). ROWPs are now given a clear indication of which HS standards can be varied by them, and professionals are given clear guidance on how to address variance of critical HS standards.

> As an example, reduction of the HS to a property line (where this will not impact health or the environment) is available to all APs, this flexibility may allow a simpler or better system on a severely constrained lot which otherwise does not have enough available length for the system.

Some increases to HS have been made in the area of large community wells, however these were considered to be necessary for health protection and options for reduction of setbacks by a professional are still available.

2.5.4 Sand mound and sand lined trench systems

Clear guidelines and standards were needed in order to encourage application of these systems in cases where Type 2 or Type 3 treatment were previously used. The SPM V2 makes provisions for these technologies which will allow ROWPs to use them to address such situations as:

- Low permeability soils
- High permeability soils (e.g. gravelly sands)
- Shallow soils or high water table

This will provide considerable cost savings, as well as reducing system complexity and long term maintenance costs.

Clear and comprehensive standards for sand depth, options for more than one type of sand (to address cost and availability), options for installation and specification and provision of a worksheet for design will all improve the application of these techniques.

2.5.5 Linear Loading Rates (LLR)

LLR are used as part of system design to establish the length of the system along a contour.

In order to provide more flexibility in system design, and less conservative separation standards, the SPM V2 now strongly recommends the use of LLR in design.

However, it also recognizes that certain lots were created in the past where fitting the system on the lot is a problem—and so provides for relaxation of standards in those cases for normal residential systems, this is a provision intended to address cost control.

2.6 Part 3 of the SPM, improvements to technologies

Part 3 of the SPM provides detailed standards and guidelines for the various techniques used in BC for Onsite systems. In this section rewriting and expansion of the manual took place with the importance of cost effectiveness always in mind. This is in some cases by new standards and in others by opening up new technologies for use by ROWPs.

Some key examples of improvements are:

- Section 3.5 provides for greater flexibility in choice of pipe types and addresses the design and installation of advanced collection systems by ROWPs
- 3.7.3 Trenches:
  - Permits use of shallow layer of C33 fill under gravity systems as part of the native soil VS standard.
  - Clarification of options for shallow or at grade trench systems. Permits use of gravity trenches at grade.
  - Provisions for use of lower cost trench breathable barrier layer and Geotextile specifications to clarify use of low cost geotextile where this is the choice.
  - Aggregate depth was returned to previous standard, nine inches however cost impact will be small and most ROWPs were still using the old standard depth
  - More options for non aggregate trenches and optional distribution techniques
- 3.7.4 Gravity distribution:
  - Provisions for continued use of gravity distribution for larger systems in a repair will provide considerable cost savings in these cases.
  - Splitter tees permitted.
  - In order to address health and environmental impacts, gravity systems are restricted to a narrower range of soil types, however, the impact of this is reduced by the provision for use of gravity systems where there is adequate (over 72”)

Vertical Separation and in the provision of low cost sand lined trench options for pressure distribution to highly permeable soils.

- 3.7.5 Dosed gravity distribution:
  - This method was not covered in the old SPM and provision of clear standards will encourage its use. In many cases it will provide ROWPs with an alternative to use of pressure distribution at lower cost.
  - The size restriction for gravity systems is not applied to dosed systems, allowing this low cost approach to be used for larger systems
  - Permits use of serial and sequential distribution systems, which are lower in cost for sloping sites and also allow use of gravity distribution on much steeper sites. Maintenance costs for serial systems are also lower.
- 3.7.6 Zones, distributing valves and alternating fields:
  - Again not covered in the past, zoning options will reduce cost for pump and transport line if used.
  - Alternating fields will, in certain cases, increase system longevity and so cost effectiveness.
- 3.7.7 Pressure distribution:
  - Improvements to guidelines for distribution design will reduce cost
  - Provision of a worksheet for design and more flexibility in component sizing will provide more cost effective designs
  - Improvements to and simplified method for pump chamber design will allow more efficient pump chamber sizing
  - New coverage of siphon systems will assist with cost effectiveness where power access is an issue.
- 3.7.10 At grade and raised beds:
  - New in the SPM, these systems provide a very cost effective solution for at grade dispersal.
  - Reduced costs for fill material, permission to use of low cost fill (not c-33 sand) for cover, greatly reduced site impact.
  - In some cases the space saving nature of these systems will permit installation with Type 1 effluent quality, where previously Type 2 would have been needed.
- 3.7.11 Shallow Narrow trenches (PSND):
  - New guidelines allow for design of these specialized systems by trained ROWPs.
  - These systems provide a cost effective solution to difficult sites, particularly where slopes are steep or site impact should be minimized.
- 3.7.12 Subsurface Drip Dispersal (SDD):
  - New in the SPM, these systems can be a very cost effective solution to certain sites, as well as addressing site impact concerns, the new guidelines allows for design of these specialized systems by trained ROWPs..
- 3.7.13 Site drainage:

  - Not previously covered by the SPM, site drainage may make the difference between a very low cost system and a Type 3 system, in some cases saving tens of thousands of dollars.
  - Use of site drainage may permit use of a site not otherwise usable.
  - The provision of standards and guidelines for site drainage will improve application by ROWPs.
- 3.8 Sand mounds and sand lined trenches:
  - As discussed above, this section includes a new, integrated design approach, linked to the new VS standards for these technologies in Part 2.
  - Provisions for use of different types of sand to address cost of the mound sand in parts of the Province.
- 3.9 Evapotranspiration/Absorption (ETA) and Evapotranspiration (ET) beds:
  - New to the SPM, this technology has been used in parts of BC in the past. The new standards and guidelines provide a simplified design approach and expand the potential for use of these systems to a much wider range of sites.
  - These simple systems use gravity distribution and are adaptable to very constrained sites.
  - These can provide a very low cost solution for sites which would otherwise be unusable or require expensive treatment, sand mounds etc.
- 3.10 Lagoons
  - These low cost systems are widely used in BC, the previous SPM presented a narrow range of options.
  - The new SPM provides a range of size and shape options to suit different areas of the Province, and this will considerably reduce the cost of systems in some areas.
  - Other improvements to the guidelines will lead to reduced cost for system components.