Scientific Peer Review of Technical Issues Contained in the Draft Regulations for Onsite Wastewater Treatment Systems

By

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General Observations/ Comments

1. The proposed regulations for OWTS appear to be comprehensive and should be generally protective of groundwater and onsite drinking water wells. However, OWTS are widely known to be major sources of groundwater pollution. Hence, in areas, and especially on properties, that have unregulated onsite domestic wells, OWTS regulations to protect human health should error on the conservative side. The draft OWTS regulations missed or perhaps avoided a strategic chance to regulate domestic water wells on properties with OWTS. The state-of-the-art and guidance on siting of OWTS has improved dramatically since the early work on transport and fate of chemicals from septic tank effluents in 1960's by the USEPA Robert S. Kerr Environmental Research Laboratories in Ada, Oklahoma. However, it is questionable if the proposed regulations require sufficient monitoring of domestic wells to protect human health in rural communities.

2. The proposed regulations do not specifically address communities sewered by OWTS, e.g. rural trailer parks, retirement communities, etc. Should community OWTS be addressed?

3. Water quality monitoring/analysis is regulated and must be done by certified laboratories. Similar certification is not required for facilities used for testing, evaluation, and certification of supplemental treatment technology/units This issue is addressed specifically under response to scientific issue # 9 and deserves further consideration.

4. References cited to support scientific judgments/decisions in the regulations are heavily weighted to articles in conference proceeding that frequently/generally are not peer reviewed. Where possible, original peer reviewed articles published in well-known scientific/engineering journals should be cited as the basis for scientific judgments. Official USEPA publications are peer reviewed but many reports submitted to federal and state government by contractors are not. These should be avoided as authoritative publications where possible. Also, state and local government publications that do not reference original literature should be avoided as the authoritative basis for new regulations.

5. Many of the references given in Enclosure 2 are incorrectly cited (see responses to scientific issues #'s 1 – 4). It would have been helpful in "References for Enclosure 2" if

a list of full references had been provided. Placing author(s) name on and marking specific sections referenced would save reviewer time.

Responses to Scientific Issues

1. **The regulations (§24901(c)(1 and 2)) would require that no person operate a new OWTS or increase the average pollutant loading to an existing OWTS with a design capacity to treat over 5,000 gallons-per-day without first notifying the Regional Water Board.**

Requirement seems reasonable. Literature reference is adequate for factual basis. However, reference should be (Plews and DeWalle 1985) not (Plews et al. 1985). The paper was written by Plews and De Walle. The study was done by five individuals, including Plews and DeWalle.

2. **These regulations (§24901(c)(3)) specify that, if the waste type of the wastewater entering the OWTS is changed or if biochemical oxygen demand (BOD) or total suspended solids (TSS) concentrations exceed 150 mg/L in the septic tank effluent and prior to discharge to the dispersal system, the OWTS owner must notify the Regional Water Board.**

Requirement seems reasonable based on references cited. Is the correct reference Crites and Tchobanoglous 1998?

3. **The proposed regulations (§24910(t)) require all new septic tanks to restrict solid particles in excess of 1/8 inch in diameter from passing through to the dispersal field.**

Requirement seems reasonable based on references cited. Not clear from reference about the benefit-cost relationship between size of particles omitted eg. 1/8, 1/4. However, size criteria could have large impacts on frequency/cost of filter maintenance.

The references should be Byers et al. 2001 and Kahn et al. 2000.

4. **The proposed regulations (24910(u and v)) would require owners of existing OWTS with a domestic well on their property to sample groundwater from a monitoring well downgradient and within 100 feet of the OWTS dispersal system every five years, and within 30 days of a new OWTS installation. Alternatively, the OWTS owner can elect to sample the onsite domestic well. The water sample would be analyzed for total coliforms and other constituents as specified in the Section and the results of the analysis reported electronically to the State Water Board.**

Requirement does not seem reasonable or adequate based on supporting literature. Use of a monitoring well to determine if an onsite domestic well is contaminated with OWTS effluent does not seem advisable or reasonable. Your rationale for this requirement explains the reason – "The direction of groundwater flow, and thus the direction of the OWTS discharge plume, is generally not known". Since 50% of housing

units with OWTS rely on a domestic well for drinking water and the direction of ground water flow is known to shift, at times dramatically with season and rainfall, it does not seem adequately protective of human health to rely on monitoring wells as surrogates for drinking water wells. I recommend that monitoring of onsite domestic wells be required at intervals less than 5 years. "The USEPA recommends that domestic wells be tested annually (USEPA 2002)."

5. **A provision in proposed regulations (§24910 (x)) "recommends" that water softener regeneration brine not be discharged to groundwater or OWTS.**

Recommendation is questionable. Other parts of this proposed OWTS regulation correctly stress the importance of practices that enhance the useful life of OWTS. The known effects of sodicity on hydraulic conductivity are counter to this philosophy.

6. **The proposed regulations (§24912) specify a protocol to determine the seasonal high groundwater level for purposes of OWTS siting (to establish the maximum depth of soil that remains continuously unsaturated in the proposed dispersal area).**

Requirement/methodology seems reasonable based on references cited.

7. **Where a Regional Water Board requires OWTS to include disinfection to protect surface water or groundwater quality, the proposed regulations (§24913(c)) specify that OWTS supplemental treatment components must be designed to reduce total coliforms in the effluent.**

Requirement seems appropriate based on existing technology, current understanding of pathogen reduction in unsaturated subsurface dispersal systems, and references cited.

8. **Where a Regional Water Board requires OWTS to remove nitrogen in order to protect surface water or groundwater quality, the proposed regulations (§24913(d)) specify that OWTS supplemental treatment components must be designed to reduce total nitrogen in the effluent to 10 mg/l.**

Requirement is appropriate and supported by cited references and a large body of other literature. This requirement is especially important when onsite drinking water wells are present.

QA/QC for certification of supplemental treatment technologies is equally important.

9. **The regulations (§24913(e)) specify a protocol for certifying supplemental treatment technology by third parties.**

Requirement is subject to the vagaries of the test and certification process and to abuse. State and Regional Water Boards require the use of certified laboratories for water analysis - for good reason and based on long experience. QA/QC for certification of supplemental treatment technologies is equally important.

The important/operative wording in this discussion of the requirement includes the phrases "qualified professional" and "independent third party certification." The protocol for testing and evaluation of supplemental treatment technologies appears appropriate in all respects but independent third party laboratories are not all equal and some are incompetent.

This requirement and its implementation should receive more thought.

10. **The proposed regulations (§24913(h)) require weekly operation inspections of disinfection supplemental treatment units.**

Requirement is appropriate and strongly supported by references cited.

11. **The proposed regulations (§24914(b)) require that all dispersal systems except seepage pits be sized using bottom area as the infiltrative surface.**

Requirement strongly supported by subsurface science and references cited.

12. **The proposed regulations specify maximum design application rates for sizing the dispersal systems in Figure 1 and Table 2.**

Proposed wastewater application rates are within EPA guidelines and appropriate for OWTS in California.

13. **The proposed regulations (Figure 2, §24914(c) and 24914(d)) would require additional unsaturated soil depth where excessive rock fragments exist in the dispersal system.**

Requirement and analysis of tradeoffs are appropriate, straight forward, and supported by literature cited.

14. **The proposed regulations contain a requirement (§24914(c)) for a minimum of 3 feet of unsaturated soil in the dispersal system to treat septic tank effluent in order to reduce pathogens.**

Requirement/guidelines probably appropriate for most bacterial pathogens but are questionable for viruses. See Azadpour-Keeley, A and C. H. Ward. 2005. Transport and

Survival of Viruses in the subsurface-Processes, Experiments, and Simulations Models Remediation 15(3): 23 – 49.

15. The proposed regulations contain a provision (§24914(d)) that allows using third-party certified wastewater treatment processes (supplemental treatment) as a surrogate for one foot of soil treatment (i.e. the regulations allow a minimum of 2 feet of unsaturated soil for OWTS with supplemental treatment rather than 3 feet of unsaturated soil required for conventional OWTS), provided that those processes meet performance requirements (§24913 (b), (c)) prior to discharge.

Requirement/guidelines are probably appropriate but may not be sufficiently conservative. See responses to discussion of requirement #'s 9 and 14.

16. The proposed regulations (§24914(e)) would allow up to one equivalent foot (1.5 feet) of engineered sand fill (material specifications in Table 2) as a substitute for the lack of suitable native unsaturated soil below the OWTS.

Requirement/guidelines are based on acceptable literature cited. Why is engineered fill (sand or crushed glass) specified instead of onsite or earthen materials (native soil) from the area that would generally have higher sorptive capacity? Use of local native soil could assure that the regulation would be both achievable and conservative.

17. The proposed regulations (§24914(g)) would allow design of gravel-less dispersal systems with a reduction (adjustment multiplier of 0.7) of the minimum required dispersal system area for effluent application.

Requirement/guidance supported by literature cited. Excellent reference.

18. The proposed regulations (§24914(h)) would require a minimum of six inches of soil over shallow subsurface dispersal systems.

Requirement/guideline probably satisfactory but may not be sufficiently conservative. What about protection of shallow drip dispersal systems from compaction from weight of heavy vehicles, including farm equipment? During wet weather the butane delivery truck has sunk more that 6 inches in the yard of my farm in Arkansas.

19. The proposed regulations contain conditions for the use and placement of seepage pits specified in §24914(i)(1 through 3).

Requirement/guidelines appear to be consistent with supporting references. What fraction of total OWTS consist of seepage pits? Seepage pits should be the last option and the least used. Wording in proposed regulation could be stronger.

20. The proposed regulations (§24914(j)) require that evapotranspiration beds be designed to remove, without spilling over, all the expected wastewater generated at the site plus rainfall that is expected to have a return frequency of once every 25 years on annual, monthly, and seasonal basis.

Requirement/guidance appropriate based on State Water Resources Control Board guidelines. See response to discussion of requirement # 18, which is also applicable to protection of evapotranspiration beds from compaction and loss of mechanical integrity.

21. The proposed regulations in Article 4 (§24940) would require owners of OWTS within 600 lateral feet of an impaired water body, listed as impaired pursuant to §303(d) of the Federal Clean Water Act, to take specified actions where OWTS (in general) were identified as contributing to the impairment of the water body by the Regional Water Board. For purposes of this Section, impairment is limited to nitrate or bacterial contamination.

Requirement/guidelines supported by reference to California Department of Health Services document that contains no references to original literature. This should be corrected. The draft regulation states that Article 4 (2940) applies to any water body that has been designated impaired under the CWA "but only where a TMDL has been approved that includes determination that OWTS contribute to the impairment of the water body." What about areas/water bodies not covered by TMDL determinations?

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