

To: Members & Affiliates, Biosolids Management Committee

ACTION REQUESTED

From: National Office

Date: June 6, 2006

Subject: WERF REPORT ON REACTIVATION AND REGROWTH OF FECAL COLIFORMS

Reference: RA 06-03

On June 5, 2006, the Water Environment Research Foundation (WERF) published a report entitled, *Examination of Reactivation and Regrowth of Fecal Coliforms in Centrifuge Dewatered, Anaerobically Digested Sludges* (Project 03-CTS-13T), detailing the results from the first phase of a research effort undertaken in response to reports of increases in fecal coliform counts in dewatered sludge at a handful of wastewater treatment plants. Electronic copies of the final study report (<http://www.nacwa.org/getfile.cfm?fn=2006-06-CTS.pdf>) and associated fact sheet (<http://www.nacwa.org/getfile.cfm?fn=2006-06-02React-fs.pdf>) are available on the NACWA website. WERF conducted the study in coordination with the District of Columbia Water & Sewer Authority (DC WASA), a NACWA member, and other agencies that were evaluating process changes in order to produce higher quality biosolids. Though the study is limited in its scope and additional research is needed to further understand the issue, the researchers did find elevated levels of fecal coliform bacteria in centrifuge cake samples at four of the seven facilities, all of which were sampled multiple times as part of the WERF study.

The WERF researchers attributed the increased coliform counts at the four facilities to a combination of regrowth and reactivation. NACWA is recommending that its members review the study carefully and consider undertaking additional testing to determine whether this phenomenon is occurring at their facilities. Members can examine the potential for regrowth/reactivation by measuring fecal coliforms after digestion and again in cake samples after dewatering. Before conducting any sampling, NACWA members are encouraged to thoroughly evaluate the need for such sampling and how any data collected will be used. As outlined below, several communities have already successfully implemented mitigation strategies when further pathogen reduction was necessary.

At some of the study facilities, levels of fecal coliforms did exceed regulatory targets. NACWA members are encouraged to review the Part 503 requirements for pathogen reduction and what steps must be taken to ensure compliance with the Clean Water Act [a brief summary of these steps is included in this *Alert*]. The Chairs of NACWA's Biosolids Management Committee are playing an integral role in reviewing the report for the Association and will be involved in future discussions on this issue. In the coming weeks, NACWA will be working with WERF and the Water Environment Federation (WEF) to provide you with additional information and resources on the issue. The information below contains additional detail on the WERF study, the Part 503 requirements for pathogen reduction, and some recommended actions for NACWA members. Please contact Chris Hornback, NACWA's Director of Regulatory Affairs, at 202/833-9106 or chornback@nacwa.org, if you have any questions.

Additional WERF Study Details

All seven of the facilities selected for the study used high solids centrifuges for dewatering. Three of the facilities employed mesophilic digestion, two facilities used thermophilic digestion, and two facilities used temperature phased anaerobic digestion (TPAD). Four of the seven facilities (two with mesophilic digestion, one with thermophilic digestion, and one with TPAD) had fecal coliform bacteria counts in centrifuge cake samples that were higher than counts in the centrifuge feed samples, based on standard culturing methods. In some cases, the fecal coliform values were several orders of magnitude greater than the feed samples. Three facilities (one meso, one thermo and one TPAD) did not show this trend.

The WERF researchers used several standard culturing methods to estimate coliforms, including *E. coli*. These standard methods showed an increase in coliforms only after dewatering. When researchers used another measurement method, quantitative polymerase chain reaction (PCR), they found that the coliforms were present before dewatering. The PCR method measures DNA copies, with the assumption that each DNA copy corresponds to a viable bacteria cell (though PCR's ability to distinguish between viable and nonviable has been questioned). The researchers hypothesized that some of the *E. Coli* measured by the PCR method were in a viable, but not culturable state, and that these viable coliforms became culturable or reactivated only after dewatering. The PCR method is not an approved analytical method for biosolids and is not relied upon to make public health decisions. However, it does suggest in these cases that this reactivation phenomenon may be occurring.

The WERF researchers attributed the increased coliform counts at the four facilities to a combination of regrowth and reactivation. Although the exact cause(s) for reactivation are currently unknown, they appear to be site-specific, given that the phenomenon was not observed at other facilities using the same combination of digestion processes and centrifugation. WERF has already begun work on additional research to gain a better understanding of this phenomenon.

Recommended Actions for Utilities

Since the regrowth/reactivation phenomenon reported by WERF appears to be highly site-specific, NACWA member agencies should consider undertaking additional testing to determine whether this phenomenon is occurring at their facilities. Utilities can examine the potential for regrowth/reactivation by measuring fecal coliform after digestion and again in cake samples after dewatering. Any analytical methods used should be consistent with those specified in the Part 503 rules. Again, NACWA members are encouraged to thoroughly evaluate the need for such sampling and how any data collected will be used before testing.

Future WERF research and work by WEF will further explore the various operational or process changes that are available to control regrowth/reactivation. NACWA will remain engaged in these efforts as appropriate and keep the membership updated. In the interim, the WERF report does discuss some potential approaches for reducing fecal coliform levels (if reduction is deemed necessary). In addition, several of the study communities have identified and successfully implemented mitigation strategies to reduce fecal coliform levels, including:

- Longer term storage, if utilities have sufficient capacity, and/or partial drying;
- Maintain thermophilic conditions in sludge through centrifugation and cake storage;
- Partially dry the biosolids with an ash amendment;
- Low dose lime additions;
- Incorporate with soil; and/or
- Modifying digester reactor hydraulics (e.g., operate thermophilic reactors in series).

Ensuring Compliance with Part 503 Requirements

As you know, the Part 503 regulations (Subpart D) provide three options or alternatives for facilities to demonstrate compliance with Class B pathogen reduction requirements:

Alternative 1: Test for fecal coliform density as an indicator for all pathogens to demonstrate the biosolids meet the regulatory limits.

Alternative 2: Treat the biosolids in one of the Processes to Significantly Reduce Pathogens (PSRP)

Alternative 3: Treat the biosolids in a process equivalent to one of the PSRPs, as determined by the permitting authority.

Monitoring after treatment is not required if Alternative 2 is selected and the biosolids are considered in compliance with the regulations if the solids are treated according to the specifications in Appendix B of Part 503. Regardless of the Class B option chosen, the Part 503 regulations also include mandatory site restrictions that prevent crop harvesting, animal grazing, and public access for a certain period of time.

Subpart D of the Part 503 regulations also provides six different options for facilities to demonstrate compliance with the Class A pathogen reduction requirements. Regardless of the option chosen, the applicable requirements must be met at the time the sewage sludge is used or disposed; at the time the sewage sludge is prepared for sale or give-away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements for exceptional quality biosolids.

Additional information on the options available for ensuring compliance with the Part 503 regulations is available on EPA's website (<http://www.epa.gov/owm/mtb/biosolids/503pe/index.htm>).

EPA Issues Statement on Report, Affirms Part 503 Regulations Protect Public Health

Also on June 5, EPA released a fact sheet on the WERF report discussing the results of the study and its potential implications. EPA's fact sheet is available on NACWA's website (http://www.nacwa.org/getfile.cfm?fn=2006-06_WERF_Reactiv.pdf). Significantly, EPA noted that the Agency continues to believe that the pathogen requirements and operational standards in Subpart D of the Part 503 regulations are "protective of public health."

Next Steps and Additional Information

NACWA will continue to track WERF's ongoing work on this issue and alert the membership to any additional information. If Association members need information on the study, both the final study report (<http://www.nacwa.org/getfile.cfm?fn=2006-06-CTS.pdf>) and associated fact sheet (<http://www.nacwa.org/getfile.cfm?fn=2006-06-02React-fs.pdf>), provide a substantial amount of information on the issue. NACWA understands that WERF will be making the researchers for this project available on an upcoming conference call to answer additional questions. In addition, WEF is developing background information and "Q&As" to help utilities respond to inquiries from the media or the public regarding the study. WEF is also assembling a task force that will evaluate the implications of the study and related operational and process options. The findings of this task force will be published by WEF in August 2006 as a Technical Practice Update.

NACWA will be working with both WERF and WEF on these continuing efforts and will work to ensure that any national press coverage of the issue is factual and includes the municipal perspective. NACWA is also encouraging its members to contact the National Office for additional information before conducting any

Regulatory Alert 06-03

June 6, 2006

Page 4

sampling and asks that members update the Association on any actions they take relating to this report. NACWA's Biosolids Management Committee will also be discussing this study at its next meeting on July 18, during NACWA's Summer Conference in Seattle, Washington.

Please contact Chris Hornback, NACWA's Director of Regulatory Affairs, at 202/833-9106 or chornback@nacwa.org, if you have any questions.