Assured Biosolids Limited (ABL) Biosolids Assurance Scheme (BAS) Position Statement on the Use of *E. coli* as an Indicator Organism for Faecal Contamination – September 2016

Background

The recycling of biosolids to agricultural land improves soil quality and fertility by supplying stable organic matter and two major crop available nutrients - nitrogen and phosphorus (plus sulphur, potassium, magnesium and trace elements etc.). The sustainable use of biosolids in agricultural systems is essential to complete natural nutrient and carbon cycles. Biosolids are also a potential source of microbial pathogens and applications to agricultural land in the UK are controlled to ensure the highest possible standards for food safety. Under the provisions of the Safe Sludge Matrix (ADAS, 2001), only biosolids products that have been treated (either by conventional or enhanced methods) to reduce the potential pathogen loading can be applied to agricultural land. The Safe Sludge Matrix states that for conventional treatment 99% of pathogens must be destroyed (2-log reduction) and for enhanced treatment 99.9999% (6-log reduction) pathogen destruction is required, along with the absence of *Salmonella*. Currently, the effectiveness of the treatment is monitored by the reduction in *Escherichia coli* (*E. coli*) present in biosolids.

E. coli as an indicator organisms

E. coli are coliform bacteria which are considered the most appropriate group of coliforms to indicate faecal (bacterial) contamination from warm-blooded animals. *E. coli* are found in the large intestine of mammals and birds and generally do not survive well outside the intestinal tract, and their presence indicates recent faecal contamination. *E. coli* are abundant in untreated biosolids and there is a strong correlation between the presence/absence of the indicator and other faecally derived pathogens.

Indicator organisms are typically used to demonstrate the potential presence or absence of groups of pathogens. *E. coli* are considered to be a good indicator of microbial contamination as they are usually present at high concentrations, have similar sensitivities to sludge treatments as a range of pathogens, and can be identified quickly and economically using measurement methods that are well established.

Testing for all of the pathogens potentially present in sludge is not practical due to the specificity of the tests and the range of pathogens that might potentially be present. Some of the difficulties associated with using alternative methods for assessing faecal contamination include:

- Many tests for pathogens have been developed for clinical material where the pathogen is likely to be present in large numbers relative to other organisms, but the converse applies to biosolids products.
- Most clinical requirements are only for 'presence or absence' of a pathogen and to modify these tests for enumeration (e.g. most probable number tests) is not practical for routine testing.
- 'Most probable number' techniques do not provide the appropriate levels of detection and sensitivity.
- Most genera of bacteria require specific media, and most virus types require specific cell lines.
- Some pathogens cannot be readily enumerated.
- The recovery of ova of helminths and cysts of protozoa is inefficient and viability cannot be readily determined.

Conclusions

The UK Water Industry will continue to use *E. coli* as an appropriate indicator organism for potential pathogenic risks from land applied biosolids.

This position will be reviewed as methods of detection for other bacteria and virus types become more reliable and further evidence becomes available which may indicate that alternative or additional indicators of faecal contamination may be appropriate in the future.

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