ALKALINE STABILIZATION AND SCREENING OF SEPTAGE

PHASES 1 & 2

Prepared for the Ontario Ministry of the Environment

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EXECUTIVE SUMMARY

Due to concern over pathogens, debris and odour in septage and their potential impact on source waters, the Ontario Government is phasing-out land application of untreated septage. However, septage which had been treated to reduce pathogens, debris and odour to acceptable levels will be allowed for land application. One method to reduce pathogens is through the alkaline stabilization process. Debris in septage generally includes but is not limited to hair, rags, plastics, sanitary napkins, bottle caps, etc. This study examines lime stabilization and screening as a treatment option for the Ontario septage industry.

Alkaline stabilization and screening of septage is currently not carried out within Ontario and, therefore, a study was required to demonstrate this process to the MOE, as well as to hauler and land applicators of septage in Ontario. The MOE has retained The Ontario Rural Wastewater Centre (ORWC) and XCG Consultants Ltd. (XCG) to demonstrate and train Ontario septage haulers on cost-effective approaches to alkaline stabilize and screen septage prior to land application.

The study comprises 3 phases:

- Phase 1 – consists of a compilation of information on regulatory and field operating experience with lime stabilization and screen of septage prior to land application in selected U.S. States.
- Phase Two – evaluation and demonstration (field trials) of the lime stabilization and screening of septage at two Ontario sites.
- Phase Three – development and pilot delivery of a training manual and workshop on lime stabilization and screening of septage.

This report contains the findings and observations made in Phase 1 and Phase 2. The training manual is published as a separate document. The results from Phase 1 and Phase 2 are published here as a single document, although they are stand-alone reports. This summary covers both Phases.

Phase 1 Summary

XCG undertook an initial review of selected U.S. states to identify those suitable for further review. XCG, ORWC, two Ontario haulers (Mike Cowie and Giles Ardiel) and the MOE (collectively known as the Project Team) then selected two of these U.S. states for a full review. The Project Team conducted site visits to haulers at one of the two selected U.S. states to gain practical experience of alkaline stabilization and screening of septage. XCG also contacted a further two U.S. states to obtain specific information on alkaline stabilization and screening that were highlighted as being of interest during the initial review process.

Practices and legislation in all 11 states examined vary with regard to both screening and stabilization. Of the 11 states that were active with alkaline stabilization, 3 also have legislation requiring screening. Screening requirements do no usually specify the screen size. Septage haulers in the U.S. generally use hydrated lime that they make up in slurry form before adding to the septage. Some (generally Wisconsin) use powdered lime and add it to the septage while drawing the septage into the truck to ensure adequate mixing. Few haulers use proprietary alkaline products due to the additional cost over the powdered lime.

Of all those contacted, very few haulers use commercially made systems for screening and lime addition – although they do exist on the market. Screens and methodologies for lime addition generally were designed and made by individual haulers. Mixing of the lime and septage occurred either in the collection/application truck or in a permanent storage tank at the works yard of the individual hauler. Screening most commonly occurred at the time of application, during transfer to another truck, or when put into the storage tank.

Phase 2 Summary

Eight field trials were conducted at two sites in Ontario using three types of waste: domestic septic tank waste, domestic holding tank waste, and portable toilet waste. Both slurry and dry lime addition were used. Various mixing and screening methods were tested to determine what worked best in different situations and to help identify potential problems.

Lime stabilization requires that the pH of the limed septage remain above 12 for at least 30 minutes. Samples were collected directly after lime addition and 30 minutes later in order to ensure this condition was met. A conventional pH meter was used to make the measurements. Samples were also collected for analysis of parameters including alkalinity, *E. coli*, biochemical oxygen demand (BOD), total suspended solids (TSS), total Kjeldahl nitrogen (TKN), nitrate (NO_3^-), ammonia (NH_3), and total phosphorus (TP). Results showed that all parameters were within the expected range for each of the given waste types.

Soil samples were collected from the fields before limed septage application and one month later. These samples were analyzed for pH, sodium bicarbonate extractable phosphorus and ammonium acetate extractable potassium. Results showed that the parameters did not change notably with the application of lime-stabilized septage. Although some leaf burn was noted in the short-term in one run after application of a portable toilet waste which had received a fairly high lime dosage to the surface of the crop, no long-term effects on the crops were evident.

Screening at the truck during land application and screening whilst transferring from the truck to a storage tank were tested. All the screens used in the field trials were able to prevent debris from being spread onto the field. However, it was observed that bar screens were easier to clean than sieve screens. It was also found that, due to the presence of more debris, portable toilet waste should be pre-screened instead of during land application.

The results from the field demonstrations showed that additional time required for lime stabilization and screening ranged from 20 to 35 minutes. Additional equipment requirements included a 170 litre (45 imperial gallon) barrel and a mechanical mixer / sump pump for preparing lime slurry, a pH meter and rinse water or pH indicating paper, a sampling container, a means of transporting lime in slurry or powdered form, and a screen.

The results from the filed demonstrations suggest that lime stabilization and screening is a feasible treatment option for the Ontario septage industry. This treatment method can be implemented without great inconvenience to septage haulers.