ABSTRACT

Sewage sludge is the product of the processes of waste water treatment, during which the heavy metals are concentrated in the sludge.

The sludge is rich in nutrients such as phosphorus and nitrogen and also contains valuable organic substances. Because of that it can be utilized on agriculture land as fertilizer if all procedures which prevent harmful effects on soil, plants, animals and humans are implemented. The continuous monitoring of heavy metals in the sludge must be established.

The validation of three modified standard testing methods was performed. Electro thermal atomic absorption spectrometry was used for the determination of lead, cadmium, nickel and chromium. Copper and zinc were analysed with flame atomic absorption spectrometry and the cold vapour atomic absorption spectrometry was used for the determination of mercury. Comparative measurements with other analytical techniques such as ICP / MS were carried out. The criteria for validation were met and the suitability of the methods for the determination of metals in the sewage sludge was confirmed.

The revision of the legislation was made. Maximum allowed levels of metals in various regulations were compared. Some discrepancies were found for the treated sludge, which are designed for use in agriculture.

A decision tree for making an assessment of the waste sewage sludge was made.

Sewage sludge from waste water treatment plants from Primorska region were analysed and data on levels of heavy metals were collected. The evaluation of sewage sludge was performed and possible options for their disposal were suggested, regarding the current legislation, taking into account the concentrations of heavy metals. Only one sample could be classified in the first quality class and therefore could be used in agriculture. All other samples, except two, in which high levels of mercury were determined, were classified in second quality class and could be applied after the anaerobic or aerobic treatment on non-cultivated areas with respect to additional legal restrictions. All samples could be used (after dehydration) as fuel in waste incineration plants which has the environmental licence for covering such types of wastes.

Key words heavy metals, sewage sludge, sludge disposal