Opazovanje konsolidacije komunalnih odpadkov z matematično korelirano uporabo metode DPPM in laserskega skaniranja

ID 01

Integrated monitoring of waste consolidation using laser scanning and DPPM method with mathematical correlation of both methods

DUŠAN SETNIKAR[1], BRANKO BELINGAR[2], SLAVC JANEŽIČ[3]
DOC.DR. JOŽE KORTNIK[4]

[1] *Primorje Geotehnika d.o.o., Laže 30, 6224 SENOŽEČE*
dusan.setnikar@primorje.si
[2] *DMS d.o.o.,* Golnik *3, 4204 GOLNIK*
dms.golnik@siol.net
[3] *CeROD d.o.o., Kettejev drevored 3, 8000 NOVO MESTO*
slavc.janezic@cerod.org
[4] *UNIVERZA V LJUBLJANI, Naravoslovnotehniška fakulteta*
Oddelek za geotehnologijo in rudarstvo, Aškerčeva cesta 12, 1000 LJUBLJANA
joze.kortnik@ntf.uni-lj.si

Povzetek

Glavna ekonomska karakteristika je razpoložljivi volumen in njegova efektivna izkoriščenost. Dolgoročno posedanje površine odlagališča ima vpliv na razpoložljive možnosti rabe prostora po zaprtju odlagališča. Za ugotavljanje sprememb na površini se danes uporablja lasersko skaniranje, za geometrične spremembe znotraj deponijskega telesa pa je bila razvita metoda DPPM (tlačna profilna in statična meritev pomikov), ki bo v članku podrobneje predstavljena. Na podlagi profilnih meritev lahko pridobimo podatki glede stopnje konsolidacije znotraj deponijskega telesa. V kombinaciji s površinskimi meritvami se lahko izdela dolgoročna ocena geometrijskih sprememb odlagališča med in po aktivnem obratovalnem obdobju odlagališča.

Ključne besede: konsolidacija komunalnih odpadkov, terestrično lasersko skaniranje, odlagališče, metoda DPPM, sesedki, posedki.

Abstract

The main economic characteristic of MSW landfill is available volume for waste disposal and its effective exploitation is significant due to NIMBY effect. Expected surface settlements have significant effect on available options for post-closure land use. Available volume is primarily affected by MSW quantity and composition, disposal method and by gradual MSW consolidation due gravitational collapse and biological decomposition. Due to MSW composition the use of classic geophysical methods is obstructed, therefore we had to find some other approach to collect on geometrical changes in the interior of a landfill. Besides short description of volumetric changes monitoring this article describes also an approach to the survey of consolidation process on the new MSW landfill with use of profile measurements in durable flexible pipe built in disposed MSW and regular surface measurements by meaning of terrestrial laser scanning. New pipe will be laid every time on

the identical ground plan location on the landfill operating surface once or twice a year and at the same time laser scanned to achieve 3D data for positions of the pipe correlated with current landfill surface. Waste beneath the pipe will settle in time due MSW subsiding and additional waste disposed over it. Continuous real time static measurements will be performed on the pipe bottom and profile measurement at regular periods and digital data will be available for further treatment. On the base of profile measurements settlement rates throughout the landfill body will be anticipated with additional mathematic model. In the expecting 25 years landfill operational period a set of 3D data will be obtained. All measurements (point, profile, surface) will be performed within 2cm accuracy range. Method is applicable and useful on both landfills with highly heterogeneous composition as well as on those with less heterogeneous content.

Additional knowledge about MSW consolidation mechanisms and their values will contribute to more accurate estimation of available volume in landfill operational time and to proper planning of land use after landfill closure.

Key words: MSW consolidation, terrestrial laser scanner, MSW landfill.