

# **Sustainable Technology for Beneficial Reuse of Municipal Solid Waste Incineration Residues**

SHIMAOKA, Takayuki., HAKAYAMA, Hirofumi., TAKAHASHI, Fumitake

*Department of Urban and Environmental Engineering,  
Faculty of Engineering, Kyushu University, Japan*

## **Abstract:**

About 52 million tons of municipal solid waste is generated and 40 million tons of municipal solid waste are incinerated every year in Japan. And 6.6 million tons of municipal solid waste incineration residues (MSWIR) are generated by the incineration and most of MSWIR are landfilled in waste disposal sites. The amount of disposal of MSWIR reaches about 80% of the amount of all disposals in waste disposal sites. From such background, effective utilization of MSWIR is important for not only prolonging life of a landfill site but also formation of a Sound Material-Cycle Society.

To develop an innovative dechlorination system of MSWIR, which is named Recyclable Landfill System (RLS), to reuse as a resource of cement, pilot plant experiment to confirm effectiveness of organic materials as additives for the dechlorination of MSWIR was conducted by using large scale lysimeters. The MSWIR contains about 0.6% soluble chlorine and 0.4% insoluble chlorine. In the case of no addition of organic materials to MSWIR, the soluble chlorine could be removed but the insoluble chlorine was remained. On the other hand, in the case of addition of garbage compost as an organic additive, both soluble and insoluble chlorine contents were effectively removed. The removal of the insoluble chlorine was due to the decomposition of the insoluble chlorine because of the lowering of pH by the decomposition of the organic substance and the generations of organic and inorganic acid derived the decomposition of garbage compost. As a result the total chlorine content of MSWIR could be decreased to 0.1% in about one year.

Life-cycle cost (LCC) and life-cycle CO<sub>2</sub> (LCCO<sub>2</sub>) of the RLS were calculated and compared with a conventional landfill system (CLS). LCC and LCCO<sub>2</sub> of the RLS were 0.64 times and 0.68 times of the CLS respectively. From the results of the life cycle assessment, the beneficial reuse of dechlorinated MSWIR as cement resource could contribute to the establishment of a Sound Material-Cycle Society.

## **Keywords:**

Sound Material-Cycle Society, municipal solid waste incineration residues, dechlorination, cement resource