

TPA Jatibarang berdiri dan beroperasi sejak tahun 1993, berlokasi di Kelurahan Kedungpane, Kecamatan Mijen, Kota Semarang. TPA Jatibarang menampung sampah dari seluruh wilayah Kota Semarang, hingga saat ini terdapat 5 zona sampah yang terdiri dari 3 zona sampah tidak aktif dan 2 zona sampah aktif. Masalah yang sering timbul dari penimbunan sampah adalah air lindi yang beresiko mencemari air tanah, sementara pertumbuhan jumlah penduduk terus meningkat diikuti peningkatan volume timbunan sampah. Di sekitar TPA Jatibarang terdapat area pemukiman dan aliran Sungai Kreo. Penelitian ini dilakukan untuk mengetahui kondisi hidrogeologi di TPA Jatibarang, kadar Klorida, logam berat (Kadmium, Tembaga, Timbal, Seng, dan Mangan), dan *organic carbon (TOC)*, dan pola pergerakan *plume* Klorida, logam berat, dan TOC pada saat ini serta prediksinya pada 10 tahun mendatang. Metode yang digunakan meliputi pengamatan geologi, analisis sampel batuan, analisis sampel air lindi, air tanah, dan air sungai, pengukuran air permukaan, serta pengumpulan data sekunder. Data-data tersebut diolah menjadi suatu model konseptual yang merupakan penyederhanaan dari kondisi *natural system* daerah penelitian. Hasil penelitian menunjukkan kondisi hidrogeologi di TPA Jatibarang dan sekitarnya tersusun dari hidrostratigrafi unit batupasir tufan dan breksi vulkanik sebagai akuifer bebas dengan kedalaman muka air tanah antara 1 – 56 m, nilai konduktivitas hidrolika akuifer 0,00202m/detik – 0,00486m/detik, ketebalan akuifer 12m – 76m, nilai gradien hidrolika 0,026 – 0,037, dan arah aliran air tanah dari arah barat laut menuju tenggara yang berakhir di sungai Kreo. Hasil simulasi pemodelan pergerakan *plume* dalam airtanah menunjukkan arah penyebaran *plume* kontaminan Klorida ke arah tenggara dan selatan dengan konsentrasi tertinggi 2.400mg/l dan pada 10 tahun mendatang konsentrasi tertinggi mencapai 3.000mg/l, arah penyebaran *plume* logam berat ke arah tenggara dengan konsentrasi tertinggi 0,4mg/l dan pada tahun 2032 konsentrasi tertinggi mencapai 0,5mg/l, arah penyebaran *plume* TOC ke arah tenggara dengan konsentrasi tertinggi 300mg/l dan pada 10 tahun mendatang konsentrasi tertinggi mencapai 464mg/l.

Kata kunci: air lindi, pemodelan aliran airtanah, pemodelan pergerakan *plume* dalam airtanah

ABSTRACT

TPA Jatibarang was established and operated since 1993, accommodating garbage from all areas of Semarang City. Located in Kedungpane Village, Mijen District, Semarang City, Until now, there are 5 waste zones consisting of 3 inactive waste zones and 2 active waste zones. The problem that often arises from landfilling is leachate which is at risk of polluting groundwater, meanwhile, population growth is followed by an increase in the volume of waste generation. Around the Jatibarang landfill there are residential areas and the Kreo River. This research was conducted to determine the hydrogeological conditions in the Jatibarang landfill and its surroundings, levels of Chloride, heavy metals (Cadmium, Copper, Lead, Zinc, and Manganese), and organic carbon (TOC), current movement patterns of Chloride, heavy metal, and TOC plumes and its predictions for the next 10 years. The methods used include geological observations, analysis of rock samples, Analysis of leachate, groundwater, and river water samples, surface water measurement, and secondary data collection. The data is processed into a conceptual model which is a simplification of the natural system conditions of the research area. The results showed that hydrogeological conditions in the Jatibarang landfill and its surroundings consisted of hydrostratigraphy of tuffaceous sandstone and volcanic breccia as unconfined aquifers, with depth of groundwater table between 1m – 56m, aquifer hydraulic conductivity between 0.00202m/sec – 0.00486m/sec, aquifer thickness between 12m – 76m, hydraulics gradient between 0.026 – 0.037, with the direction of groundwater flow from northwest to southeast ending in the Kreo river. The simulation results of plume movement modeling in groundwater show that the direction of plume distribution of chloride contaminants is in a southeasterly and southerly direction with the highest concentration of 2,400mg/l and in the next 10 years the highest concentration reaches 3,000mg/l, The direction of distribution of heavy metal plumes towards the southeast with the highest concentration of 0.4mg/l and in 2032 the highest concentration reaches 0.5mg/l, the direction of spread of the TOC plume towards the southeast with the highest concentration of 300mg/l and in the next 10 years the highest concentration reaches 464mg/l.

Keywords: leachate, groundwater flow modeling, plume movement modeling in groundwater