

**ANALISIS KEBERADAAN DAN KARAKTERISTIK MIKROPLASTIK DALAM
FRAKSI *TOTAL SUSPENDED PARTICULATE* (TSP) PADA UDARA AMBIEN
TEMPAT PEMROSESAN AKHIR (TPA) AIR DINGIN**

TUGAS AKHIR

Sebagai salah satu persyaratan untuk menyelesaikan

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ABSTRAK

Tempat Pemrosesan Akhir (TPA) Air Dingin Kota Padang berpotensi menjadi sumber emisi mikroplastik akibat aktivitas pengelolaan sampah yang berlangsung secara berkelanjutan. Penelitian ini bertujuan menganalisis konsentrasi Total Suspended Particulate (TSP), mengidentifikasi dan mengarakterisasi mikroplastik, serta menganalisis hubungan konsentrasi TSP dan kondisi meteorologi terhadap kelimpahan mikroplastik di udara ambien sekitar TPA Air Dingin. Pengambilan sampel dilakukan menggunakan Ambient Nano Sampler pada empat titik, yaitu Pos Jaga (area keluar-masuk kendaraan), Zona B (landfill tidak aktif), Zona D (landfill aktif), dan Rumah Warga (permukiman terdekat). Identifikasi bentuk, warna, ukuran, dan jumlah mikroplastik dilakukan menggunakan mikroskop endoscope 1600X dan mikroskop stereo Zeiss Stemi 5, sedangkan identifikasi polimer menggunakan Raman Spectroscopy. Pengukuran dilakukan selama 24 jam di Zona B dan D, 10 jam di Pos Jaga, dan 12 jam di Rumah Warga. Durasi pengukuran dipilih untuk merepresentasikan potensi paparan mikroplastik terhadap masyarakat di sekitar TPA. Hasil menunjukkan konsentrasi TSP berkisar 105,73–581,53 $\mu\text{g}/\text{m}^3$, yaitu Pos Jaga 385,35–408,58 $\mu\text{g}/\text{m}^3$, Zona B 291,35–392,14 $\mu\text{g}/\text{m}^3$, Zona D 561,49–581,53 $\mu\text{g}/\text{m}^3$, dan Rumah Warga 105,73–121,53 $\mu\text{g}/\text{m}^3$. Kelimpahan mikroplastik berkisar 6,63–12,80 partikel/ m^3 , tertinggi di Zona D dan terendah di Rumah Warga. Mikroplastik didominasi fragmen (59,72%), diikuti fiber (34,42%) dan film (5,86%), memiliki tujuh variasi warna, berukuran 5,324–3933,849 μm , serta terdiri atas polimer polyethylene (PE), polypropylene (PP), polyester, dan polystyrene (PS). Konsentrasi TSP menunjukkan hubungan positif yang kuat terhadap kelimpahan mikroplastik, sedangkan temperatur udara, tekanan atmosfer, dan kelembapan udara juga menunjukkan hubungan positif. Hasil penelitian mengindikasikan bahwa aktivitas pengelolaan sampah di TPA Air Dingin berpotensi menjadi sumber pencemaran mikroplastik di udara ambien.

Kata kunci: kondisi meteorologi, mikroplastik, Total Suspended Particulate (TSP), TPA Air Dingin, udara ambien.

ABSTRACT

The Air Dingin Landfill (TPA Air Dingin) in Padang City has the potential to become a source of airborne microplastic emissions due to continuous waste management activities. This study aimed to analyze Total Suspended Particulate (TSP) concentrations, identify and characterize airborne microplastics, and evaluate the relationship between TSP concentration, meteorological conditions, and airborne microplastic abundance around the landfill. Air samples were collected using an Ambient Nano Sampler at four locations: the Security Post (vehicle entrance and exit area), Zone B (inactive landfill), Zone D (active landfill), and a nearby residential area. The shape, color, size, and abundance of microplastics were identified using a 1600× endoscope microscope and a Zeiss Stemi 5 stereo microscope, while polymer types were determined using Raman spectroscopy. Sampling was conducted for 24 h in Zones B and D, 10 h at the Security Post, and 12 h in the residential area. The sampling durations were selected to represent the potential exposure of nearby communities to airborne microplastics. TSP concentrations ranged from 105.73 to 581.53 $\mu\text{g}/\text{m}^3$, while airborne microplastic abundance ranged from 6.63 to 12.80 particles/ m^3 , with the highest abundance observed in Zone D and the lowest in the residential area. Fragments were the dominant microplastic shape (59.72%), followed by fibers (34.42%) and films (5.86%). Seven color variations, particle sizes ranging from 5.324 to 3933.849 μm , and four polymer types, namely polyethylene (PE), polypropylene (PP), polyester, and polystyrene (PS), were identified. TSP concentration showed a strong positive relationship with airborne microplastic abundance, whereas air temperature, atmospheric pressure, and relative humidity also exhibited positive relationships. These findings indicate that waste management activities at the Air Dingin Landfill are a potential source of airborne microplastic pollution.

Keywords: *Air Dingin Landfill, ambient air, meteorological conditions, microplastics, Total Suspended Particulate (TSP).*