



Konya Aslim Wild Storage Field Rehabilitation and gains

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ABSTRACT

Domestic solid waste is one of the main problems of cities. Until recently, people have disposed of these wastes with the wild storage method. It still continues in undeveloped or financially limited regions. Developing technology and emerging consumption habits have diversified the character of domestic waste over the years. Along with the diversified waste character, the dangerousness of these wastes has also advanced. From the beginning of the 1970s until 1999, wild storage was carried out on the Aslim locality in Konya. After this date, the rehabilitation and landfill works planned and the first stage rehabilitation have been completed. The work planned in 1999 started in 2000 and was completed in 2004. Within the scope of this work, an area of approximately 7 m height and an area of 35 hectares was rehabilitated, minimizing the negative effects on the environment and public health in the solid waste storage area, surrounded by wire fences and afforestation, creating a green belt around the site. The gas collection systems, leachate collection line and pool, intermediate cover and final cover sections on the site, which were used from 2004 to 2017, were completed and closed for waste acceptance.

Introduction

It was not possible to talk about landfill activities in Turkey until the 1990s. Wild storage continued until recently in many provinces except Burda-Demirtaş, Ankara-Beltaş and Istanbul-Istaç, which are the first examples, and still continues in low-population settlements [1-2]. Environmental disasters in this area have repeatedly shown the importance of the issue. The most well-known Ümraniye landfill explosion, which resulted in the death of 39 people, is a clear example of how the event could result if it was done haphazardly. The increasing population also increases the amount of consumption, which directly affects the amount of waste generated after consumption. For these and similar reasons, waste management of cities is gaining importance day by day. Many directives have been created within the framework of the 2016-2023 national waste management action plan and EU harmonization laws [3]. Aslim wild landfill rehabilitation and Konya Integrated Regular Solid Waste Landfill Project were also continued with EU support in this context [4]. Today, due to the developing financial instruments and economic opportunities, landfills are started in many provinces and districts or access to the landfill is provided (transfer station). According to the report prepared within the framework of the 2016-2023 National Waste Management Action Plan, the irregular casting which was 54% in 2008 decreased to 30% in 2014 [5-6]. Domestic solid wastes pose many environmental risks if they are operated in wild landfills. Considering the aboveground and underground pollution potential, wild storage is a method that should not be applied. Many damages such as pollution of groundwater, transport of garbage by wind, disease-causing factors, damage caused by human and animal contact are only the most well-known ones [7].

Konya Aslım Rehabilitations Field

Due to the environmental problems caused by the irregular landfill, which was used from 1970s to 2000, it was decided to rehabilitate it and a rehabilitation project was prepared in 1999. Solid waste landfill rehabilitation started in February 2000 and continued in parts and was completed in March 2004 [8]. After the first stage work, which was completed in this state, the garbage continued to be stored semi-regularly and this area was used until 2017. With the operation of Kaşınhanı integrated solid waste storage area, this area was closed in 2017 and gas extraction and electricity generation activities continue. Within the scope of the first stage, an area of approximately 7 m height and 35 hectares was rehabilitated, minimizing the negative effects on the environment and public health in the solid waste storage area, surrounded by wire fences and afforestation, creating a green belt around the site. Although the work done here seems insufficient when considering today's conditions, it is a self-sacrificing practice made with environmental sensitivity in terms of the financial conditions of the period. Observations Regarding the Pre-Reclamation Site: The pre-reclamation site was generally scattered and contaminated with the environment. There was no gas and leachate collection system at the site. Aslım landfill is clayey as a ground and is at a suitable level according to the results of the sieve analysis. There were stray animals, unconscious livestock raising people and foragers in the field all the time. Small-scale fires were observed in areas with increased methane concentration from place to place.

Material and Method

Within the scope of this rehabilitation; Approximately 3 million m³ of dispersed garbage was transported to the main garbage mass and arrangement works were carried out on the body of the site. 32 gas discharge chimneys have been created in the field [8]. The entrance-exit road to the field was maintained, the materials causing visual and environmental pollution around the field were collected by the Municipal Environmental Cleaning Teams, and the field was visually reshaped. The project characteristics and rehabilitation outlines used for the rehabilitation project planned in 1999, which is mentioned based on the general condition of the site, are given below. For the rehabilitation project, 3 million m³ of garbage in the main body has been created. The damage to the environment has been minimized in the work carried out on an area of approximately 35 Ha. The unsuitable slope situation in the garbage body was completed by filling in places and arranged in the desired 1/3 ratio. The leachate discharge line and gas drains were placed as planned and made ready for the electricity generation facility infrastructure. Within the scope of rehabilitation, respectively; 1-Natural Clay Floor. The site was closed by applying 2-Gas Drainage Line, 3-Household Solid Waste, 4-Equalization Soil, 5-Geosynthetic Clay Cover, 6-Synthetic Drainage Mat, 7-Vegetable Covering Soil.

The field was closed by applying the Cover Soil: Slope Arrangement: As a result of the slope arrangement made in the field, a more stable structure was revealed. After the collection of scattered garbage piles, the desired slope was obtained as a result of the filling and excavations made on the main body. 490,000 m³ of cover soil was used to cover the main body and slopes. With the slope arrangement, a concrete trapezoidal channel was built at 0 elevation of the field, and a trapezoidal channel was opened on the fill for each upper layer. Wall Formation: It has been designed in a way to completely surround the primary garbage mass in the rehabilitation carried out. The embankment has been projected at an average of 1D:3Y inclination, at a height of 7m, both inside and outside. A surface water drainage channel, which will provide surface water drainage of the waste mass and also the entire site, has been constructed on the outside of the embankment. The upper part of the field, which was partially rehabilitated between 2004-2017, was narrowed and 2 more layers were formed and finally closed in 2017. In these areas, the slope slopes are designed at the same rate (1/3).

Leachate Drainage: 20-30% of the precipitation falling on the wild waste landfills turns into leachate. Here, the geosynthetic membrane layer applied before the top cover was made to prevent leakage. Except for partial leaks, there is no garbage leachate caused by precipitation in the area, only the water contained in the garbage is taken to the collection pools with ø400 main collection pipes and from there with the help of vacuum trucks. Since the field ground is close to the clay soil standard used in impermeable ground applications, the collection of leachates is healthier. Surface Water Drainage: After the final closure of the Aslım rehabilitation area, after the geotextile layer and top cover soil application on the site, a trapezoidal concrete rainwater collection channel was built at the 0 elevation of the site and discharged to Keçili Stream. This channel surrounds the entire site and collects all the water from the rain flow. As of the geological situation of Konya, there is no danger of flooding or raids from the outside, but these trapezoidal channels will be able to function in order to eliminate a similar risk that may occur.

Drainage: With the 1st stage project of the rehabilitation area, gas drainage pipes were placed and 32 gas chimneys were put into operation. For 35 Ha, 200 mm diameter 25400 meters perforated gas drainage pipe was used. Gas taken from the field with a 400 mm main collection line was brought to the combustion plant. As of 2021, it continues to operate with a production capacity of approximately 1 MW. It is envisaged that the facility will be operated until the end of 2022, with a production capacity of 0.6 MW in this period. Final Cover Formation: As a result of the rehabilitation work carried out, gas production continues actively in the field. After the activities in

the field are completely finished, it is planned to plant vegetation in standards that will not damage the top cover. The rehabilitation area is shown in Figure 1.



Figure 1. Rehabilitation area.

Results and Discussion

The risks have been minimized by rehabilitating the field. Leakage water, harmful gas emissions, interaction with the environment and disease-causing factors that can be carried to the city on a macro scale have been eliminated. Leakage waters are monitored with observation wells, and electrical energy production continues with the gas collection and burning system, which is still active. In the literature studies on this subject, it is predicted that there may be methane gas output in the landfills for up to 15 years. Currently, the gas output that can sustain the electricity production in the rehabilitation area and the following landfill continues. As a result of the interview with the operator, it has been seen that the gas output that can perform efficient combustion will continue until the end of 2022 and this gas meets the standards in terms of electricity generation.

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