

Environmental Impact of Municipal Solid Waste Landfill in North of Iraq



Huseyin Gökçekuş, Youssef Kassem, Muhammad Khidre Musa

Abstract: solid wastage yielding in a landfill badly influenced the encompassing condition and people habitat nearer to landfill destinations. Landfill is the most established and the most widely recognized type of evacuation and transfer of waste, comprising the last discarding technique for solid waste in the city. It is outstanding that the effect of MSW landfills leads to contamination of every single natural segment. The negative natural effect of landfills diminished by employing preservation advancements and proper solid waste administration techniques. The nowadays investigation attempted observing of the city wastage landfill effect on the circumference. The spatial attributes of the region affected by the waste dumping and the conceivable effect of leachate utilizing phytotoxicity tests were done. The landfill is built, with base liner and leachate and landfill gas gathering and remedy and curing framework. The transition of leachate and gas from the corpus of landfill into the encompassing condition present a genuine natural concern, which mingle to groundwater squalor, air contamination with sway on atmosphere through methane outflow and potential wellbeing risks. This paper shows an influenced of solid waste land fill in environment. Populaces, particularly those living nearer to the landfill area contamination sources are in danger of both short and long haul impacts of natural, physical and chemical contaminants, including water and food borne sicknesses, substantial metals poisonings and other possibly dangerous components and mixes present noticeable all around, water, soil, particularly in north of Iraq. By and large, there is absence of vital strategies, guidelines and rules in all divisions and at all levels in connection to sheltered and ecological neighborly tasks in agribusiness, industry, vitality, and open administrations.

Key Words: solid waste, landfill,, contamin, silica fume, slag

I INTRODUCTION

Landfilling is the significant technique for municipal solid was (MSW) transfer on the world since it is the most economical waste administration system as of now

accessible that emission a huge measure of methane and Carbon dioxide are created from the debasement procedure of saved wastage in landfills [1]. Landfill activity and producing leachate is the source of tainting of underground and surface water (for the most part if the landfill needs satisfactory liners),

sharp odor ,loud upsetting commotion from landfill apraties such as Shovel, compactor, truck...etc, and bioaerosol discharges fugacious organic composite [2].

The capacity of leachate in uncovered tidal ponds can impact the degrees of smells experienced in a landfill site. Inhabitant or workers living near landfill terminus have filling to worry because of a few dangerous contaminations emanate from landfill activities [3]. Some different contaminations related with testimony of garble on landfills involve dust, rubbish, overabundance rodents, startling landfill fires, and so forth [4]. The components that impacts the side-effect or emanations from landfills includes the sort and amount of wastage kept, the length of life of the landfill, and the weather states of the landfill locales. intricate substance and microbiological responses inside the landfill frequently cause to the development of a few vaporous contaminations, persevering natural toxins, (for example, dioxins, polycyclic sweet-smelling hydrocarbons), hefty metals and particulate issue and fills are a chief participant to the world's anthropogenic greenhouse gas (GHG) liberation because an massive quantity of Carbon dioxide and methane are produced from the decadence operation of deposited. Landfills create different sorts of follow poisonous components which incorporate carbon monoxide,hydrogen sulfide, xylene, dioxin, and so on. Harmful natural smaller scale poisons additionally incorporate polychlorinated dibenzofurans and polychlorinated dibenzo-para-dioxins which are altogether called dioxins and polycyclic fragrant hydrocarbons (PAHs). Dioxin can be framed from the nearness of chlorine-comprising materials in the landfill and from landfill fire which is unsafe to homo wellbeing [4]. Dioxin has been connected with increment in death rate brought about by ischemic coronary illness, when engulfed by people [5]. PAHs are contemplate causing cancer since it osculation with humans which could rapid a the lungs cancer growth, skin malignancy and insufficiencies on different pieces of the body [6]. At the point when people breathe in particulate issue, thinks about have demonstrated that it prompts lining

aggravation, fundamental incendiary alters and blood clotting which can extra prompt obstacle of veins, sore throat and myocardial infarction [7]. An examination led in a landfill of Turkish, on the wellbeing hazard appraisal of BTEX (Xylene ,Toluene , Ethylbenzene and Benzene) outflows on landfill laborers in the zone demonestrate that BTEX didn't represent a wellbeing danger to the landfill laborers, in light of the fact that the mean grouping of BTEX estimated in the landfill was not sucient and was less than the United States Environmental Protection Agency for the most part satisfactory abundance upper-bound lifetime malignancy danger of one out of 10,000. Nonetheless, the creator noticed that landfill effects on people straightforwardly relied upon the sort of contaminations and the term of presentation to the individuals [8].

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Hydrogen sulfide is a dreary and profoundly combustible gas. It has a smell of spoiled egg and chip in enormously to the scent discharges experienced from landfill destinations.

It is framed when large quantity sulfate comprising mixes (like plasterboard and gypsum) are blended in with the decomposable wastage in the landfill position. At the point when people are presented to significant amount of Hydrogen sulfide it could prompt breakdown of the central sensory system and respiratory loss of movement [9]. waste administration is a civilizational issue [10] and landfills have been generally applied because of various points of interest, including effortlessness, low speculation, huge taking care of limit and low operating cost. Several investigations represented that practically 95 percent of MSW was discarded via landfilling around the world; in the European Union (EU), the vast majority of the part states discard over half of their loss in landfills [11]. As of late, a several researchers published some papers about the impact of landfill destinations on the groundwater. For example, in 2015 both researchers Abu-Zuid and El-Salam broke down the ecological effects related with city waste landfilling, leachate and groundwater quality close to the landfills in Egypt [12]. In 2012 Nagarajan with some other researchers considered the conceivable effect of leachate permeation on the characteristic of groundwater [13]. Another investigation, gave by Koda et al (2017) surveyed the groundwater quality in a landfill and a waste administration site, with exceptional respect to the degrees of natural contamination [14]. There have been examines in the writing announcing all the more by and large the impact of landfill destinations on closest encompassing. For instance, Gworek with other investigator in (2015) concentrated on surveying the impact of a MSW landfill with the age 35 years on the natural mercury contamination in the dirt description, groundwater, and the vegetables [15]. The nature of landfill leachate depends on the landfill lifetime, water condensation content, kinds of city waste being buried, PH, climatic alteration and year season, hydrology specification of the field, the phase of disintegration in the landfill, and biodegradability ratio and it could be classified as young, intermediate, and mature [16]. With expanding utilization of MSW landfills as the most broadly used system of solid waste administration, the potential adulteration from city landfills has become a major issue. Along these lines, it is critical to investigate the poisonous impacts of working or potentially shut landfills on plants, mammals and people. Landfills can be a wellspring of natural contamination for the most part through landfill leachate, which is wastewater profoundly soaked with different mixes filtering out of decaying MSW [17].

II. UNIVERSALE PRODUCTIONS SOLD WASTE

According to statically the waste production in 2020 will reach to 2.2 billion ton since it anticipate the waste production will rise to 3.4 thousand million tons by 2050 (the rate of increasing 70 %). Nearly 23% of all world waste producing by East Asia and Pacific district. In 2016, the world produced 242 million tons of plastic waste, or 12% of all city wastage.

In view of the volume of waste produced, its component, and how the waste is being overseen, it is

assessed that 1.6 billion tons of CO₂-equal were produced from the treatment and transfer of waste in 2016 – illustrate to around 5 percent of worldwide emanations. During last 19 years the World Bank has submitted over \$4.7 billion to in excess of 340 solid waste administration programs in nations over the globe. [18]. Fig.1

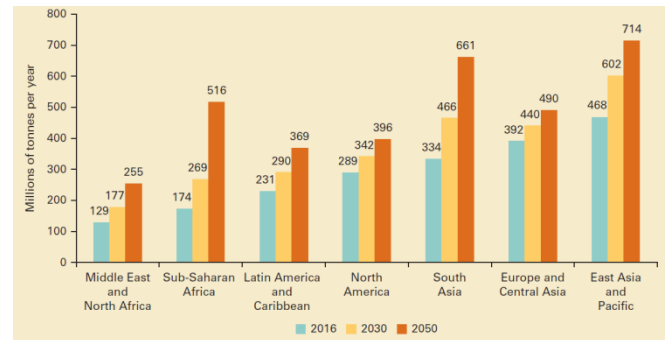


Figure 1. Wastage Production by zones [19]

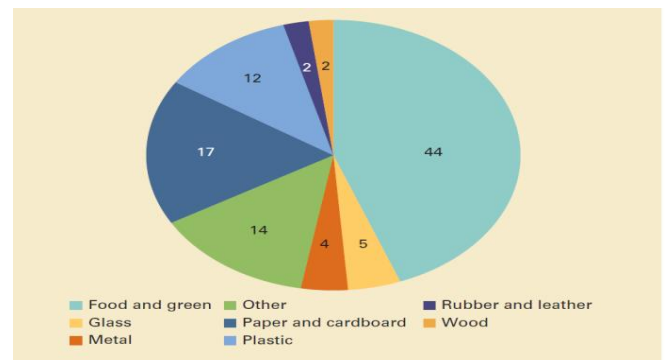


Figure 2. Universally Waste compound [19]

III. CONTROL OF SOLID WASTE POLLUTION

A. Disposal

It is done most normally via sanitary landfill or via incineration. Landfills-an advanced sanitary landfill is a downturn in an impermeable soil layer that is cover with an watertight film. In it solid waste is put in an appropriately chosen and arranged landfill site in a recommended way [20].

B. Incineration

it is the way toward burning city solid waste in an appropriately structured heater under reasonable temperature and working status. It diminishes the solid waste by about 90% and 75% by weight

C. Fertilize or Composting

bacterial deterioration of organic composition of the city wate bring about the development of humus or fertilizer and the procedure is known as composting. It helps in transfer of solid waste, transfer of night soil, and creation of significant compost for crops, it is additionally named as biodegradation [21]

D. Reusing

It implies reusing a few parts of the waste that may have some monetary worth. Reusing rations resources, reduce the vitality utilized during make and furthermore lessen contamination.

E. Source recuperation (pyrolysis)

it is a sort of damaging distillate where the solid waste are warmed in pyrolysis reactor at 650-1000 °C in oxygen exhausted condition. during this procedure ,the chemical ingredient and energy of some organic .waste are compensate. The organic component split up into vaporous fluid and vaporous parts like CO₂ , CO , tar, methane, scorch carbon and so on [22].

F. Source diminution

it is one of the essential methods to lessen squander. This should be possible by utilizing less material when creating a production, reusing items, planning production bundling to decrease their amount. Exclusively one can decrease the utilization of superfluous things which causes strong waste

IV. STUDY AREA AND COLLECTION DATA

The North of Iraq comprises of four governorates, Hawler Sulaymaniyah, Dohuk, and Halabja, and to other administration (Garmean and Raparen) has a population nearly 6 million, As per the Ministry of Health in the Iraq, And in north of Iraq three different zone are elected that graphically is introduced in . and for ta collection dta three different city in north of Iraq are chosen. Figure 3 shows the study area.



Figure 3. Study area, North of Iraq

V. RESULT AND DISCUSSION

A. Hawler

Hawler land fill site is arranged close Kani-Qrzhalah zone (in Erbil province, Iraq. It is around 15 km a long way from downtown area of Erbil City Fig.1. The complete landfill site region is 148 Dunam, however just a section is presently operational in accepting in excess of 8906 tons of strong waste every day. Vigorous and anaerobic deterioration of the natural materials brings about both fluid (leachate) and vaporous final results. Shaped landfill

leachate could contain huge amounts of contaminations estimated as chemical oxygen demand (COD), 5 days biochemical oxygen request BOD₅, alkali nitrogen NH₃-N, suspended solids, hefty metals, phenols, and phosphorus. Fig 4. shows the Erbil land fill and Table 1 . demonstrated general specification of landfill leachate.

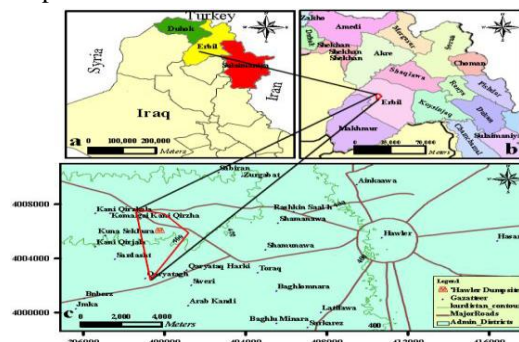


Figure 4. Maps show: a- Iraq, location of Erbil Province is indicated, (Red line)[20]

Table1: Typical landfill leachate characteristics[20].

Parameter	Unit	Leachate land fill catgory		
		Youn less than 5 years)	Intermediate (5-10years)	Stabilized (greater than 10 years)
pH		<6.5	6.5-7.5	>7.5
COD	mg/L	>10000	4000-10000	<4000
BOD ₅ /COD		0.5-1.0	0.1-0.5	<0.1
Organic compound		80% VFA ^a	5-30% VFA ^a + HFA ^b	HFA ^b
NH ₃ -N	mg/L	<400	NA ^c	>400
TOC/COD		<0.3	0.3-0.5	>0.5
Kjeldahl nitrogen	g/L	0.1-0.2	NA ^c	NA ^c
Heavy metals	mg/L	small to medium	small	small
Biodegradability		significant	Medium	small

a = fugacious fatty acids, b =Humic and fulvic acids, and c = Not available

For the most part, leachate portrayal changes with the climatic areas moreover the landfill utilizable practices. The biodegradable portion of natural contaminants in leachate decline as a result of the anaerobic decay happening in by expanding the time of land fill . Hence, develop or stabilized leachate include significantly more obstinate organics than youthful leachate.

In view of the time of HLS, landfill leachate at HLS could be considered as develop (balanced out) leachate; Characteristics of delivered leachate from ELS are appeared In Erbil City both surface and groundwater are utilized by customers for drinking and other every day employments. See Table 2 .

Table 2: specifications of Landfill leachate at HLS in (mg/L).[21].

Parameter	Value
pH	> 7.5
NH ₃ -N	> 400
COD	<4000
BOD ₅	100-3500
BOD ₅ /COD	< 0.1
TOC	50-2200
TOC/COD	> 0.5
NO ₂ ⁻ N	0.1-1.5
TDS	1100-6400

In the event that crude leachate is inclined to the natural circumference without remedy, it could turn into a principle wellspring of water contamination since it can permeate through soils, leading to extra pollution of the getting water. To diminish the harmful impact of released crude leachate on the regular habitat, a some techniques for water and wastewater remedy have been utilized. The procedures for the treatment of landfill leachate could be named biological ,physical and chemical [22].Generating landfill leachate from ELS considered as balanced out leachate (low biodegradability proportion, high amount of COD and low condensation NH₃-N) and it degrade the qualities of the encompassed water fount. physica - chemical compound treatment strategy is compelling For this kind of leachate .See Table 3. And Table 4 .shows leachate quality of didffent leachate in some counties , according to this data the Indian site in vloves larger organic substance than the other. The unknown concentration at the Indian site are a lot bigger than the liquid part convergences of different destinations in addition , in particularity, generally larger amount of Pb and less Cd were noted for the Indian site than the investigation locales. Because of the absence of data on the persuasive agents and status, it is hard to recognize the critical factors on the leachate modality

Table 3. Water Sample Analysis (mg/L)

Parameters	Sample1	WHO (2011)
Turbidity (NTU)	0.55	5
pH	7.5	8
EC (mmho/cm)	811	1530
T.D.S.	502	1000
Hardness (as mg (caco3)/l)	257	500
Ca	51	75
Mg	53	150
Na	31	200
K	0.65	3
HCO ₃	59	200
SO ₄	90	250
Cl	33	250
NO ₃	12	50

Summary

Table 4. Summarized Quality leachate of various landfills Su)(in mg per Liter, unless determine[24]

Paramete r Landfill type	Indonesi a Open dump	Philippine s Controlled dump	Taiwan Semi- sanitary	Indi a Ope dump
pH	6.8~7.5	7.9	7.3~8.4	6.9
EC (mS/cm)	-	-	7~40.6	24.5
TDS	-	-	-	27,950
COD	290~350	6904	2480	27,200
BOD5	145~218	-	26~492	19,000
As (Liq)	-	0.022	-	-
Pb (Liq)	-	0.04	0.0005~0.0 9	1.54
Cd (Liq)	-	<0.003	< 0.01	0.06
Cr (Liq)	0.04~0.05	0.11	0.12~0.52	0.29
Zn (Liq)	0.05~0.06	-	0.003~0.56	2.21

The consequences of water test examination at three unique areas show that they are inside as far as possible as per the WHO (2003). All water investigated tests are appropriate for drinking and water system employments. The depth of this district is nearly 2 m which demonstrated the effect of septic tanks to the close to subsurface layers.

Because of absence of the best possible plan of ELS, the delivered crude landfill leachate cannot be gathered and observed. It blends in with the normal surrounding circumference. Obviously, blending crude landfill leachtae from ELS with the normal environment causes menace to the environment (especially water sources). Delivered landfill leachate from ELS considered as balanced out leachate (low biodegradability proportion, high grouping of COD, and low convergence of NH₃-N) and it degrade the qualities of the encompassed water sources. For this kind of leachate, physical-chemical remedy technique is required. It is clear according to the Table 4 pH is 7. to 8 which is reasonable for methano-genic bacteria. Comparable outcomes were gotten by Tra'nkler et al.[24].which discovered that leachate samples had a marginally large pH and stayed in the scope of 7.0 to 8.0 throughout the activities which demonstrates the short acidic stage and early methanogenic stage. Then again, Bahaa-eldin et al. [25.] discovered that the normal estimation of pH was 6.7 for the city landfill leachat Hassan and Ramadan ssessed landfill leachate characteristicsu and observed the mean estimations of conductance and all out soluble solids were 41,637 µS/cm and 30,083 milligram per liter respectively. Proportion of Biochemical Oxygen Demand at 5 days per Chemical Oxygen Demand (0.69) demonstrated that the leachate had large biodegradability via anaerobic stage. Chofqi et al. [25] researched in Morocco about the leachate emanate from the Eladida landfill and perceived that the filter ate had the mean estimations of COD and BOD5 of 1000 mg/l and 60 mg/l, individually.

The proportion BOD5 to COD was 0.06. This demonstrates the leachate was stabilized and the landfill was in the methanic period of anaerobic corruption. Smaller outcomes were achieved in another investigation in one landfill in Colombia where the most extreme leachate COD worth was 4480 mg.

Table 3 shows Heavy metals condensation of leachate tests. From the consequences of geoelectrical resistivity, the contaminated zone was demonstrated by its low resistivity value whenever contrasted and encompassing zone. Area close to waste landfills destinations have more noteworthy probability of groundwater and soil pollute as a result of the potential contamination source of leachate and septic tanks release zone starting from the close by site. Such filth of groundwater resource represents a considerable hazard to neighborhood asset client and to the circumferential habitat. On the off chance that this procedure is proceeded, it might be in reach to groundwater surface lastly sully the ground water. The fundamental ecological problem, in actuality of landfills leachate on the groundwater quality. The landfills of Alexandria landfills in Egypt, utilizable since 2001, is in the underlying stabilization proceeding and the leachate had large biodegradability throughout anaerobic stage ($BOD_5/COD = 0.83$).

Although leachate was described by high substance of inorganic and organic substances just as the poisonous nature rise from hefty metals condensation, the groundwater through checking wells around the operative cells didn't have serious defilement, while certain criterions surpassed the WHO. The dirt at the investigation region was seen as unable for avoiding the relocation of contaminants, vertically as well as on a level plane from the source point. Thus, this outlines the septic tank release valley has been contaminating the dirt just as expanding its harmful not exclusively to the dirt and groundwater yet in addition proficient to affect the fauna and vegetation. The short pathway required for these contaminants before coming to groundwater was improved by intermittent water table changes and penetrating water during the stormy season. Youthful leachates are more dirtied than the stabilized ones where BOD5 may attain till 81,000 milligram per liter for youthful and 4200 mg/l for stabilized specimens [27]. BOD5/COD proportion in youthful landfill, where biological action correlate to acid stage of anaerobic depreciation, arrives at value of 0.85 [28]. Aged landfills create stabilized leachate with comparatively small COD and low mall biodegradability (BOD5:COD proportion less than 0.1). In Morocco, Chofqi et al. gathered leachate tests from ElJadida landfill and the mean outcomes indicated that the leachate had high condensation of sulfates and nitrates (1150 mg/l and 290 mg/l, individually). High quantity nitrate value demonstrates that the waste in landfill was oxidized, along these lines the sulfate decrease not happened. What's more, the leachate natural issue has not been completely biodegraded at this point and sulfur has not been liberate, for this reason the quantity of sulfate were smaller than those investigate by Chofqi et al [28]

B. Garmean

Kirkuk is situated close to the domain of the Zagros Mountains 83 km south of Erbil, about 236 km far away from the Baghdad. It is depicted by semi-completely dry

climate with surpassing sweltering and dry summer and cool precipitation a winter, with precipitation ordinary of 250-320 mm consistently. The people density of Garmean city is 1,445,556. Sanitarian landfill is the fundamental kind of great plan of solid waste organization in Iraq which get around 1000 tons of waste each day, having around 192,915 m² of region and orchestrated in Zindana town in Kirkuk city clean landfill Fig. 5 and Fig. 6.



Fig 5. Garmean landfill site and two transfer stations (TS 1 and TS 2).[29]



Fig. 6. Leachate treatment system at Kirkuk sanitary[29]

The mean estimations of trace elements in agricultural soils are likewise given in Table 5, Sites Specification for Ground water. Numerous investigations have demonstrated that the leachate from city solid waste landfills can be a source of pollutions, bringing about lower poisonous quality of leachate samples. The leachate at more significant levels of denseness vigorously reduce the plant growing. With the exception of the leachate from certain month samples, the precipitation was the biggest so the poisonous quality of leachate was lower.

Table 5. Sites Specification for Ground water Samples

Samples component (mg/l)	Average of 7 samples	WHO level
pH	8	6.5-8.5
TDS	700	1000
Ni	0.168	0.02
Cl ⁻	245	250
TSS	95.0147	-
PO4-3	.38	0.004
Mn	0.516	0.5
COD	35	-
Pb	0.001	0.01

BOD	14	3
SO ₄ ⁻²	811	250
BOD/COD	0.40	-
Cu	0.017	2
Cd	0.0025	0.003
EC	1410	1350

The outcomes got from this examination demonstrate that the checking monitorin wells are downstream coordinating the leachate remedy framework and landfill site; along these lines elevated levels of Phosphate (PO₄ - 3) Sulfate (SO₄ - 2), Phosphate,Nitrate (NO₃ -),biochemical oxygen demand and chemical oxygen are normal for checking wells showing the movement of leachate in to ground water. It is additionally anticipate that the leachate could have streamed instantly into the wells from the surface waste within raining season when the leachate lake is fullyfille .The distinction in the degrees of pollutant between the before treatment and after treatment leachate specimens demonstrates the impress of leachate treatment framework is limiting the degrees of filths and bringing down the danger of leachate pollution the ground water. As indicated by the data from Kirkuk district, soil kind of landfill site is prevailed by clay and silt, in this manner the low degrees of heavy metals in the observing wells might be ascribe to the specifications of rainfall, complexation and sorption. Numerous investigations have indicated that the leachate from city waste landfills can be a wellspring of defilements. The pollutants in the leachate were weakened by precipitation, bringing about lower lethality of samples of leachate. the contaminants in the leachate were weakened by precipitation, bringing about lower poisonous quality of leachate specimens .For the most part, the water at the landfill site isn't dangerous if it is constructed and designed according to the engineering specifications. The standard landfill itself is built, with base liner and leachate gathering pipes, landfill gas collection system and treatment framework. Along these lines, leachate can't meet a way into the subsurface circumference and move. The landfill has no immediate and noteworthy effect on the encompassing surrounding ambience and water modality since:

- the shut portion of landfill is overlay with an waterproof compressed mud layer, geotextile layers, non-woven texture and pecial dough production so as to keep the water from invading the wastage location and arriving at the base of landfill
- the drainage from the bottom layer of landfill is gathered and the leachate moved to leachate lake,
- The evapotranspiration rate was expanded due to the biological collection (vegetal stratum soil) implanting of a vegetation extension on the landfill so as to lessen the leachate creation. The greater part of the fundamental biological and chemical criteria of the new leachates demonstrated lower denseness in the higher precipitation time than in the lower or arid period

C. Sulamaniah

Four soil samples were taken in Sulaymaniyah city in the region near the solid waste transfer. for research facility examination utilizing standard testing arrangements, digestion and evaluation methods for trace elements.

Table 6- indicates consequences of examination of 4 examples where elements are displayed as methods for complete groupings of the base components in agrarian soil at the investigation territory.

All examples were taken from soil of fields near the 40m from solidg waste heap and Table 7 shows physicochemical investigation of the landfill soil landfill soil in different country.

The mean estimations of trace elements in agricultural soils are likewise given in Table 6. In any case, this observation shows that Sulaymaniyah landfill is extensively sullied with heavy metals, which have quantifiable condensation close recommended cut-off value.

Table 6 -Results of soil sample analyzed in solid waste land fill near of Sulaymaniyah for a number of elements (mg/kg)

componen nt of soil sample	samples				Averag e	Standar d value
	1	2	3	4		
Pb	37. 3	44. 7	2 3	51. 5	39.12 5	100
Zn	475	145	301	105	256.5	300
Cu	37.2	24.5	32	33.13	31.70	100
Cd	7.75	5.21	2.11	4.29	4.84	1.8
Ni	111	80	107	115	103.25	100

Table 7: Physicochemical investigation of the landfill soil in different country[30]

Jurvey study	Heavy metal (mg/kg)					
	Cd	Pb	Ni	Zn	Cr	Cu
Spain (Getafe-Madrid)	—	16.9	6.4	73.9	1.5	13.5
Italy (Malagrotta)	0.1	53.6	10.3	25.6	16.8	6.3
Ghana	0.9	59.2	5.1	297.1	17.9	27.0
Algeria	1.07	45.5	44.4	78.9	91.42	63.47

The outcomes indicated that the mean denseness of trace elements in the soil examples at the sulamaniah were all under the Soil Guidance Values exclude from nickel and Cadmium that was extensively higher than the standard qualities. 3 examples had somewhat higher substance of Ni. The average cadmium substance of all examples was just about multiple times the standard worth (4.81 mg versus 1.8 mg). All examples were taken from soil of fields near the solid waste heap (inside 40 meters). There can be little uncertainty that the wellspring of the Cd defilement is the solid waste and the waste ingredients embroiled could be nickel-cadmium batteriespigmented products (plastics, ceramics, and glasses), polyvinylchloride (PVC) products, cadmium-coated alloys and electronic boards. Quaghebeur et al.

[31] revealed that nearly all substantial metals available in soils dirtied by homebred wastge can be dispensed with by runoff, channel out, and percolation. To be sure, the major wellsprings of hefty metals in household unit squander are dangerous materials, for example, batteries, paints, and inks. Some published investigations have detailed a similar perception in some different soils (Table 7). In any case, there is an extraordinary inconsistency in hefty metal condensation found in the landfills of the different country under examination, which could be expected to the differences in spatiotemporal qualities between these landfills and in quantitative attributes between the municipality waste they possess. For example, Cu was the most noteworthy (91.42 mg/kg) among all metals in Algeria, while Zn was the most elevated in Ghana, 297.1, and in Italy the maximum value is Pb (53.6 gr/kg).

VI. CONCLUSION

- The biodegradable portion of natural contaminants in leachate decline as a result of the anaerobic decay happening in by expanding the time of land fill.
- Develops or stabilized leachate include significantly more obstinate organics than youthful leachate.
- From the aftereffects of geoelectrical segments, the polluted territory happened and showed extremely low resistivity contrasted and encompassing zone
- In view of the time of ELS, landfill leachate at ELS could be considered as develop (balanced out) leachate. In the case that row leachate is prone to the natural environment without treatment, is the main source the ground water, generating landfill leachate from ELS considered as stabilized leachate (low biodegradability proportion, high amount of COD and low condensation NH₃-N) and it reduce the qualities of the surround water source. Because of absence of the best possible plan of ELS, the delivered crude landfill leachate cannot be gathered and observed. Youthful leachates are more dirtied than the stabilized ones where BOD₅ may attain till 81,000 milligram per liter for youthful and 4200 mg/l for stabilized specimens.
- The consequences of water test examination at three unique areas show that they are inside as far as possible as per the WHO (2003). All water investigated tests are appropriate for drinking and water system employments. The depth of this district is nearly 1.0-1.5 m which demonstrated the effect of septic tanks to the close to subsurface layers. The profundity that is exposed to defilement from the surface is approximate (1.0-14.0 m).
- BOD₅/COD proportion in youthful landfill, where biological action correlate to acid stage of anaerobic depreciation, arrives at value of 0.85.
- Aged land-fills create stabilized leachate with comparatively small COD and low mall biodegradability (BOD₅:COD proportion less than 0.).
- High quantity nitrate value demonstrate that the waste in landfill was oxidized, along these lines the sulfate decrease not happened, so sulfate condensation were larger than those of the recent examination where sulfates and nitrates had mean concentration of 630 mg/l and 1.37 mg/l, respectively.
- The outcomes got from this examination demonstrate that the checking that the observing wells in Kirkuk

- are downstream coordinating the leachate treatment framework and landfill field; along these lines
- elevated levels of Phosphate (PO₄ - 3) Sulfate (SO₄ - 2), Phosphate, Nitrate (NO₃ -), biochemical oxygen demand and chemical oxygen are normal for checking wells showing the movement of leachate in to ground water.
- The leachate at more significant concentrations levels decrease the plant growing. with the exception of the
- leachate from certain month, the precipitation was the biggest so the poisonous quality of leachate was lower, the contaminants in the leachate were weakened by precipitation, bringing about lower poisonous quality of leachate tests. For the most part, the water at the landfill site isn't dangerous if it is constructed and designed according to the engineering specifications. This observation shows that Sulaymaniah landfill is extensively sullied with heavy metals, which have quantifiable condensation close recommended cut-off value.
- The outcomes indicated that the mean denseness of trace elements in the soil examples at the sulamaniah were all under the Soil Guidance Values (SGV) exclude from nickel and Cadmium that was extensively higher than the standard qualities.

RECOMINDATION

1. Find locales at minimum 500m (preferably 1 kilometer) downwind of closest filtration and cleaning site. The site situated downhill from groundwater wellspring. The site situated at least 50m from surface water sources. Supply seepage trench downhill of landfill site on slanting area. Construction wall around the landfill and secure access to site.
2. conservation of groundwater pollution from leachate permeation from open dump/landfill site ought to be made obligatory with suitable Techniques.
3. ventilation system, chemical dosing and leachate gathering ought to be controlled for leachate treatment system.
4. more studies are required on the theme of environmental squalor in and around Sulaymaniyah, Kirkuk, and Erbil cities
5. The using of waste water by forming in Sulaymaniyah, Erbil and Kirkuk should not be permitted.
6. new controlled clean landfill area ought to be designed formed and put into utilization, in an area far away from the populate area.
7. Construction of sewerage treatment plants for sewerage waste water and recycling of the sewerage and also great part of the solid waste.

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