

A STUDY ON EXTENT COMPLIANCE OF BOJONORD MUNICIPAL WASTES BURIAL PLACE ACCORDING TO ENVIRONMENTAL STANDARDS

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Abstract: Bojnourd city with a population of 182,751, producing 140 tons of garbage per day that this much waste volume is buried in only waste disposal site in the form non-normative in Abo Mosa elevations and heights. In this study in order to Study on Extent Compliance of Bojonord Municipal wastes Burial Place According to approved Standards of Environmental preserve organization of Iran there haven considered social and technical criterions ,and standards of hydrology, topography, geology, and region or climate and also distance from the areas under the Management of Environmental preserve organization of Iran. The present waste disposals despite of compliance with certain legal provisions have been placing and determined without any primary studies and exploited.

The results of this study indicating of unsuitable garbage waste disposal place considering to whole understudying conditions and factors that its abuse and deleterious health and environmental effects also at present is observable.

This also means that waste has been completely non-scientific buried and absence of suitable and efficient management in wastes part is clearly visible. With considering lack efficient plan existence for improvement and reducing hazards ahead in present place it is expected in near future the effects environmental issues are more apparent.

Keywords: Municipal wastes, wastes Burial Place, Burial Place Regulations, Environment , Bojnord.

INTRODUCTION

At the same time of mankind life earth has been used by human as a place to meet the needs of life and also the resulting waste disposal. At the outset due to the limitation of dwellers of the earth's population and the unavailability of sufficient lands for waste acceptance there was not a particular problem in this regard but along with rapid population growth, communities industrialization, accumulation of waste and how to manage it became an important and contemplate issue that this led to the development and delivery of waste management systems the last element of the required elements in the waste disposal system is expulsion. Landfill due

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to lower costs Landfill due to its low cost and wide range of waste disposals in most countries is the most common method than other options. One of the most difficult and critical tasks that most communities face in the implementation of a comprehensive management program of waste disposals is landfill sites locating. Burial in earth is most usual method for garbage removal. (Bormandi, Mahdi & Niko Del Mashala, 2009).

Bojnourd city as the center of North Khorasan province with a population over 182 751 people according to Census 1385 is located in 56 degree and 18 second to 57 degree & 44 second of east longitude and 37 degrees and 13 minutes to 38 degrees and 17 minutes in terms of geographical position the bulk of this garbage is buried in the only place in north east of city 'waste disposal of Bojnourd city in the end of Bagherkhan 's-3 land elevations, Baba Moussa heights with UTM coordinates: $x = 40S0533109, Y = 4152611$.

The presence of three villages and over 99 hamlets with residents in the central part of Bojnourd city and as result The jam or crowding and proximity to residential areas and a shortage of suitable land for garbage removal and also presence of Natural and recreational resources and good prospects on different sides of Bojnourd city limits Particularly leisure route and climbing mountains in the vicinity of Baba Moussa, the present garbage place, has made its Scientific study of the settlement status of this place and its organizing it more and more important. (Statistical Yearbook of North Khorasan province, 2009).

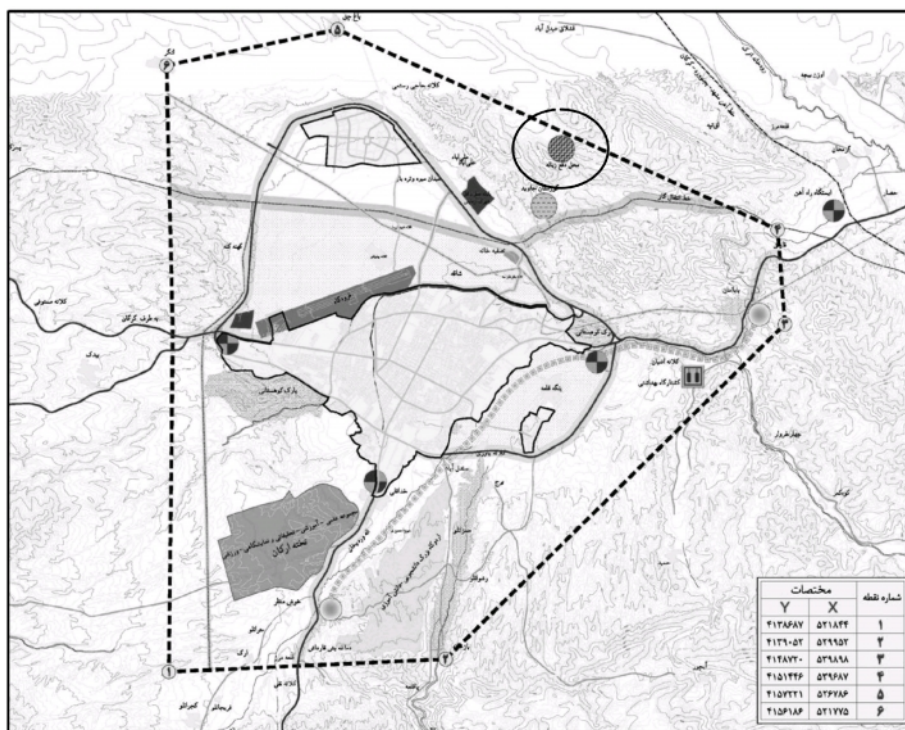


Figure 1: Position Privacy in Garbage Time in the North East of Bojnourd

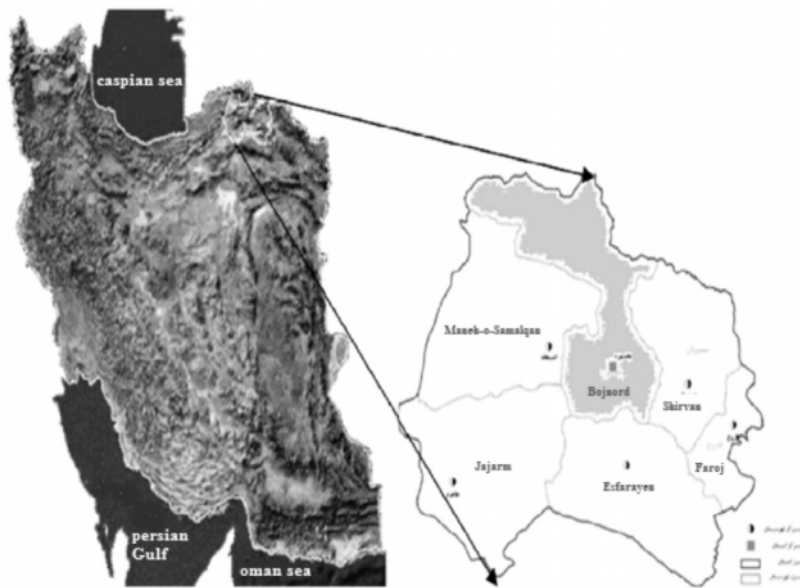


Figure 2: Location of North Khorasan Province and City in the Country Bojnourd

REGULATIONS OF REMOVAL OF ORDINARY WASTE LANDFILLS

In order to determine the optimal location of the municipal waste landfill in different countries the specific Criteria and standards will be considered, among the most important of this criteria is the understudying geographical specifications such as litho-logy and geo-morphology and slope and drainage, distance from the river and distance from the river Fault and also Social factors such as the population of studying city and distance from residential areas.

According to the definitions in the wastes management ordinary waste is called to all waste disposals that usually begetting from daily activities of humans in cities, villages and their outside such as home garbage and building rubbishes. According to act no. 3 of article 6 of executive regulation of waste disposal management, home ministry bounds to determine the removal of ordinary waste landfills according to environmental standards and coordinated to environment organization and Agriculture ministry on this basis and relying to article no. 12 of law and article no. 23 of executive regulation of waste disposal management and in order to destroying effects reduction of activities, places and installations relevant to processing and removal of ordinary waste and garbage, the related regulations have been complied and notified by environment conservation organization (Table 1) (environment conservation organization Pub. Tehran, 2007).

In addition to above said, In addition to the above-mentioned burning waste and garbage in open space and also burying special waste of hospitals and Discharge of sewage is prohibited in ordinary landfill. More ever, after selecting a suitable place for sanitary landfill the chosen place should be available to accept waste. (Basic Studies of North Khorassan Regional Water Company, 2010).

Table 1
Regulations of Removal of Ordinary Waste Landfills

Standard	Sub standard	Explanation
Technical & social	Distance from resident place	1 km.
	Distance from main road	>300 meter
	Minimum life of burial place	15-20 years
Hydrology	Underground water (in last 10 years)	>5 meters
	Distance of superficial water	1 k.m
Topography & geology	Slope	<15%
	River bed genus	Coarse bead and porous bedrock, cone fans, The limestone contains, Dolomite and Karst, Soluble rocks and Salt domes
Climate	The predominant wind direction	Being buried under the Populated areas upstream
	Rainfall	<300 millimeters in year
Environmental	Protected areas	1 kilometer

Among the most important factors that should be considered in preparing the landfill include: Mapping the location of buried place and its zoning, cleaning the buried area from existing obstacles, junction roads improvement to station and domestic roads construction , Design and construction of landfill cells, Place drained, Generation of gas and latex collection systems, Predict the type of soil other overlay materials, Fencing around the intruder to prevent entry of animals Annoying people and also stop the spread of waste, Creation of technical installations i.e. parking, store, Provide firefighting equipment.

Provide the proper equipment and facilities for residence and relaxation of workers.

After Preparation operations the place is ready for landfill. The Sanitary landfill method is a, certain engineering operations that by which the removal of ordinary waste landfills will done with minimal health and environmental hazards (sayed Nia Ahamd, 2005). The processes of sanitary landfill operations, including dumping waste in a controlled situation, Distribution and density in a thin layer to reduce the volume of waste material (thickness about 2 m) covering the material with a soil layer (thickness about 20 centimeter) and final layer covering of garbage (thickness about 20 centimeter) with soil (Monavari Masod, 2006). The main methods for sanitary waste disposal are: the surface method, trench or pit method and gradient method (In the valley-pit (which is apparently the dominant method used in the garbage place of Bojnourd city) Valley, ravine, dry excavation pits and mines can be used for landfill. Compression techniques and the placement of waste in landfills valley-pit will be changed with geometric shape of place, characteristics of available materials, hydrology and geology of place..... (Chobangelos Jorge, Neysn Helari, Vejel Samoel & Jafar zadeh hagheghfard, Yaghmayan, 2010).

THE FINDINGS OF THE PRESENT SITUATION OF BOJNOURD'S WASTE PLACE

Social and Technical Criteria

Distance from Residence

Bojnourd city's current landfill site is located within the city's Privacy Act. This place is of distance with 1 km from residential areas. However, being among these burial place of baba

mosa highlands and Proximity with climbing routes that is used by publicly and can be effected with considering the prevailing wind direction and moreover Shared access road to garbage place with Path leading to a new city's cemetery of Bojnourd (that is located in distance of 1km. from landfill) may have its particular issues.

Distance from Main Road

The distance of landfill from Bojonord-Mashad road is 1 km.

Minimum Life of Landfill

Based on general census statistics of population& Housing in 1385, Bojnourd city has over 182 751 people where daily producing garbage in average is 140 tons in this city. In other words the annual production rate of garbage in this city is equivalent to 51 100 tons. Waste at the landfill loses 20% of its original size and its every per cubic meter converted with 450 kg weight a volume of 0.2% per cubic that with considering to these standards The following assumptions can be honest about the garbage produced by the Bojnourd city (Purahmad Ahamad & others 2008):

- With assuming of daily production rate of 140 tons of garbage in Bojnourd city, annual waste generation rates will be 51 100 tones.
- Assuming that each cubic meter of waste is equivalent to 450 km. of 311 cubic meters Volume of daily garbage produced of Bojnourd city will be 113 515 cubic meters per year.
- Due to the initial volume reduction of waste at time of landfill, Assuming that 140 tons of waste produced during the day, to be buried in a layer to a depth of 3 meters (3 meter depth Lime and 1 m soil for final push).

For landfill will be required daily to an area of approximately 2074 square meters. If the depth of layer be considered 4 meters, menstruation of 15.55 square meters per day is required for landfill.

The total area being considered for the waste of Bojnourd city is approximately 8 hectares, and taking into account 40% of this area for basic installation such as safety belt, service buildings, access roads and other cases. Assuming with 140 tons of garbage buried daily at a depth of 4 meters, and including waste buried in the previous years can estimate the extent of area and present capacity needed for accepting waste disposal approximately.

However, it is not possible to make use and operating of this garbage place i.e. due to compliance issues such as neglecting appropriate pattern and required depth for burying, incineration of waste in place Separation and processing of recyclable wastes including metals, paper, plastic, and its transfer to other locations, lack of constructing required service and safety facilities and The lack of reliable statistics and information regarding to size of waste disposal buried in past years, and other effective factors, Accurate estimation of needed time and area. (Chobangelos & others 2010).

Hydrogeology and Hydrology Criteria

Hydrogeology Level

Alluvial aquifer of Bojnourd Plain with area of 89.7 square kilometer is one of smallest alluvial aquifer in north khorsan. The city of Bojonrod where is having centralization of state Covers a large part of the alluvial aquifer.

Most of under studying range heights of Bojnourd city is shaped with Limestone. Nutrition alluvial aquifer (especially in the southern highlands), Thickness, and feature a slight discharge of alluvium and Bojnourd city development, All these caused that we have been witnessed in increase the absolute height of underground water level in the alluvial aquifer this plain in recent years that this issue has created a numerous problems for residents of this city. The surface drainage and catchment area of plains Bojnourd After crossing the North and South highlands of Bojnourd enter into the aquifer alluvial plains of Bojnourd and from there leave this area towards east in order to and join to the Atrak River. The Bed rock aquifer alluvial of this plain mainly formed in the Neogene formations and quantitatively and qualitatively has a negative effect on the Hydrogeology of region.

Direction of groundwater flow from south to north and north east and the Hydraulic gradient increases towards east (Figure 3). Generally deep groundwater level is low plains of Bojnourd and a large part of the lowland (including the city of Bojnourd) has depth less than a 15 meters.

Shallow groundwater levels in the central plains of Bojnourd is Probably due to the reduction of surface earth topography and are the return water from agricultural and urban areas. The chemical quality of groundwater aquifer alluvial a plain of Bojnourd almost coincides with the direction of groundwater flow will be changed and from feeding areas in the south toward discharge areas in the north will be demolished. The underground water chlorine level varies from 100 milligrams per liter to 380 milligrams per liter in the North West and South East. (Statistical Yearbook of North Khorasan province, 2009).

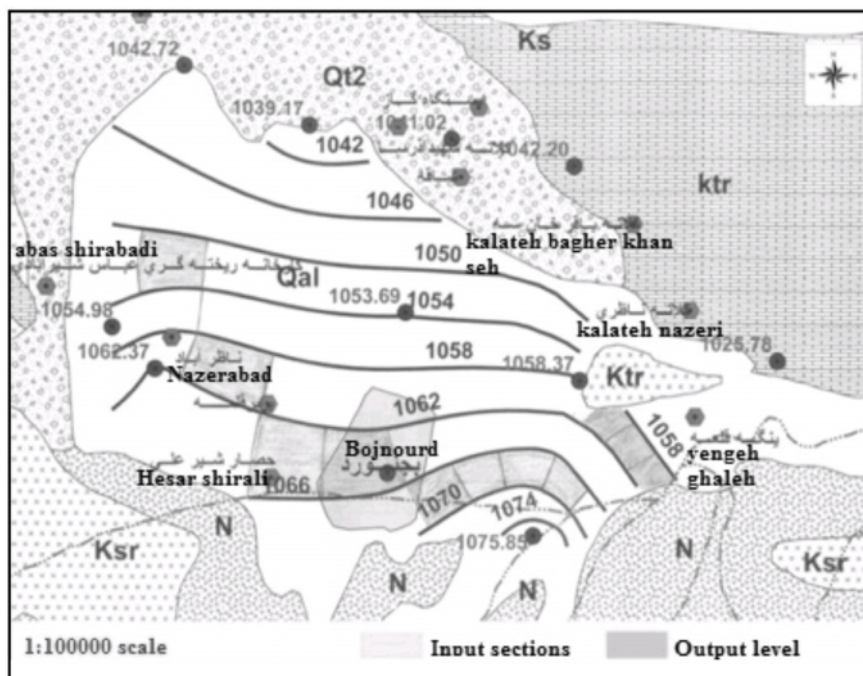


Figure 3: Input and Output Level of Underground Water from the Alluvial Aquifer Bojnourd

Underground water depths ranging from 21 to 37 meters of waste disposal of Bojnourd are varying, but according to the above-mentioned matters like direction of groundwater flow to the North East (where waste disposal of Bojnourd is placed in this position). Increase the hydraulic gradient to this place, crossing surface waterway and the existing floodway in catchment area of Bojnourd's plain of this limit and finally joint to Atrak river and also chemical changing and quality decrease of underground water, comply with the direction of flow towards the North and North East of Bojnourd's aquifer, with all these and considering the regional Hydrogeology can forecast the direct as well as indirect effect present and future of disposal waste of Bojnourd city on quality and quantity underground waters, especially in downstream areas. Because of the large limestone formations in this area, a major share of ground water discharge takes place by springs. Due to usage of water extraction from springs in various parts, more than 97% of water withdrawal from springs is used for agriculture and also less than 3 per cent is used for drinking water of the residents, that this issue reveals the necessity of scientific studies regarding of the extraction water quality of springs and their impressibility of seepage leakage from unsanitary landfill waste in Garbage place of Bojnourd. (Basic Studies of North Khorassan 2010).

Distance of Surface Waters Surface

The distance of waste disposal from Baba Aman River and also Atrak River as surface waters is 2 km.

Topography Criteria

Gradient

According to maps prepared in GIS medium Waste area slope of Bojnourd area waste disposal varies from 0 to 35 degrees.

The gradient of 18 to 35 degree is related to Valley areas of the region as a pit that can be used for landfills.

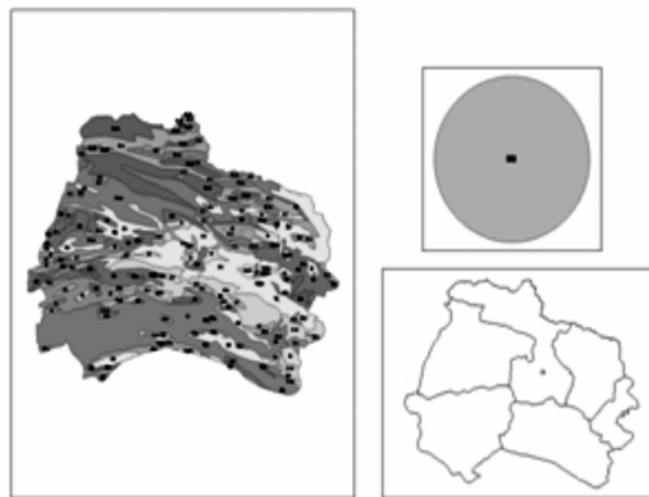


Figure 4: The Slope in the Range 2 km to Waste Time

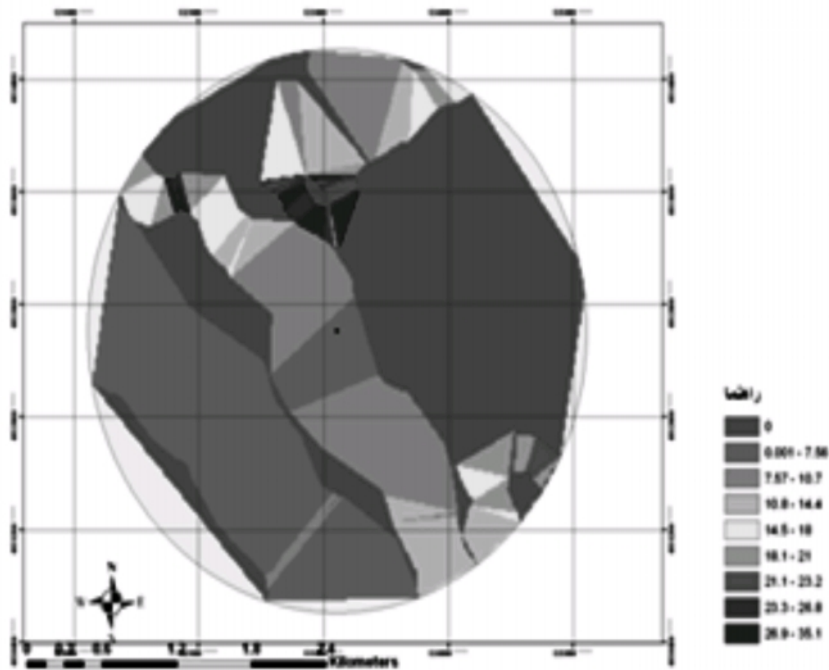


Figure 5: Formation of Garbage Sometimes within 2 km

Kind of Stone Bed

Area topography including relatively high mountains, with circular peaks, partially flat, consisting of Calcareous rocks, metamorphic, conglomerate, Sandstone and shale and also consists of soil cover, very low to shallow, and with non-uniform pebbles and number of medium to large stream embranchments.

The kind of understudying regional formation, Teygan formation (k_1), contain Thick layers of limestone and marl layers (shape-4), due to its hard, has rock topography maker in the region and mainly forms the peaks.

Relatively wide spread of carbonate lithology of this formations causes that establishing richest Productive reservoir area formed and most watery springs are resourced from these formation. If the landfill, has a steep slope and soil cover be erosive, if the soil is easily eroded occurrence of heavy rain can bring great damage the buried place should be flat or low slope.

In examining the bedrock profile, when the genus of bedrock be and has many open and numerous faults, latex or any other pollutant emissions without a reduction in its pollution and able to pass easily from the ground structure and underground water. Of course, being impervious bedrock may also be undesirable, since despite of lack of underground-water contamination, there is the possibility of contamination of surface waters that this problem should be solved with proper urban management (Hydarzadeh Nima, 2004).

Climate Criterion

The Predominant Wind Direction

The rose diagram shows the wind direction of Bojnourd city is from West to East (Meteorological Organization) that due to waste disposal place in north east City limits of Bojnourd, this place is not located the prevailing wind direction towards the location settlements and urban and residential areas in this respect, would not be affected just as with presence of Baba Mosa heights and elevation and climbing routes in the North East direction of garbage place that is influenced on users of this earia (for mountain climbing) and this matter has been observed in field studies particularly at time of waste incineration in place and the resulting smoke rise.

Generally, existence of wind in these regions, in addition of generating dust resulting of excavation and embankment operations cause for scattering of light things such as paper and plastics .therefore in order to prevent of creating such problems considering the prevailing wind direction the wind breakers should be constructed or create the fences to prevent light scatter objects (Hydarzadeh Nima, 2004).

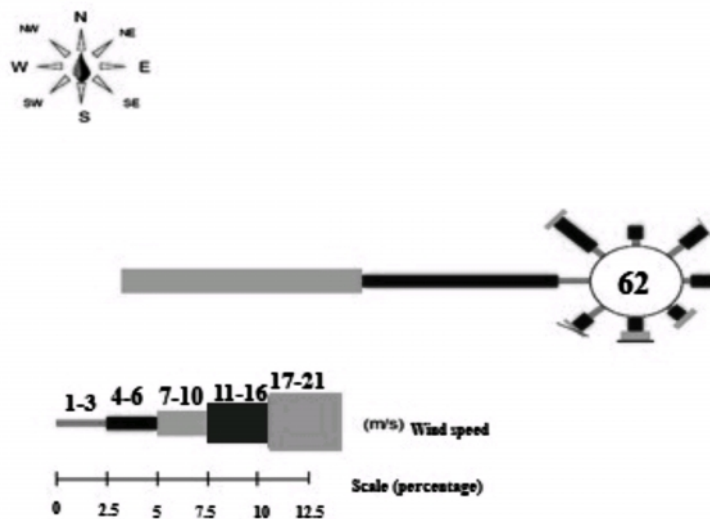


Figure 6: Graph Rose Bojnourd

Rainfall

The average estimated rainfall of studying range of Bojnourd with medium height of 1463 meters of above sea is 289 millimeters per year of which the plain with average height of 1175 meters consists of average rain of 262.5 millimeters and highlands with height average of 1625 meters allocates 304 millimeters of rain to themselves(Basic Studies of North Khorassan, 2010)

Environmental Criterion

Disposal site is not inside the protected area and under management of environment protection organization.

In addition to aforesaid in findings of present situation of disposal waste of Bojonorod city, the following matters also are considerable:

In the waste disposal place, the garbage burning take place that some part of this issue are due to spontaneously catch fire to a heap of waste i.e. because of methane gas discharge from wastes and lack of control and collecting it and other part occurs purposely by garbage searcher people in order to extract metals. The garbage separation takes place by garbage searcher people in landfills place and all days the number of 30 people are busy with collecting and separation of garbage that according to studies have been done by researcher some of this people have working contract with Municipality. This factor alone could affect the transmission of infection in city area.

The garbage carrying is done by open truck and waste emission and resulted latex is observed on the way of available road. More ever the access roads are dirty and are creating particular problems in different seasons like producing dust or mud on the way of traffic of heavy vehicles carrying garbage.

There has not been anything done regarding fencing, separation or green space creation in order to reduce entering of miscellanies people , animals and birds and reduce adverse visual. Burial is completely non-normative and construction of landfill cells, Place drained, Generation of gas and leachate collection systems, forecast and applying a coating material and also lack of required ancillary construction facilities required all these will increases the severity of adverse effects resulting.

CONCULSSION

The urban population of Bojonord from 20000 in year of 1957 has been increased to 180000 people in 2006 the issue of Severe mutations in a population, has issues such as removal and stockpiling of waste of 140 tons produced garbage in surrounding the city that its outcomes as can be observed is environmental pollution, low quality of health citizenship. This is the fact that solid waste management system is in a critical condition relatively and far from ideal situation is Bojnourd city and this issue This is more tangible when switching the location of solid waste disposal should be evaluated by use of locating regulations and standards to determine and clear the current location of the city landfill and considering that it is devoid of any kind of adopted principles and standards complying with the scientific and technical criteria.

Hence according to present research and with study of existing situation regarding garbage produce and produced garbage landfill of this city can conclude the following results:

- The place of landfill is located of more than one km. from urban facilities but junction road leading to landfill with the general cemetery (Javid park cemetery), it will have issues and Problems, including the release of leach ate from the waste and loss of non-standard trucks carrying the waste, and the effect on users of the cemetery. Local winds and release unpleasant odor, especially in warm seasons during year, concentration of animals and birds, and it has also problem of transferring infection

and pollution in to city level accordingly and affect on users of climbing routes of Baba Mousa highlands.

- The present waste disposal place of Bojonord city has capacity for maximum 7 years provided compliance with all standards related to waste disposal, this issue reveals the necessity of basic and scientific studies in order to accurate future locating of landfills and also to stop the present place and closure care after stopping this place (The green cover, runoff and erosion control, water treatment and gas collection and continues monitoring).
- The water ground surface is vary between 21 to 37 meters in understudying area but the presence of limestone formations in the region., many ramifications of floodways, also steep slope and the erosion of soil cover in using valleys for landfills all are of factors that has made this place to face the serious dangers and reinforcing the risk of contamination and latex influence into underground waters. Furthermore, considering that the direction of groundwater flow is from south to north and the north east of Bojonord city and the Hydraulic gradient increases towards and with attention to chemical quality decrease of underground water comply with the direction of its flow It can be adapted to the negative effects of present and future on drinking water and agriculture resources' due to placement of waste disposal in this area.
- The rainfall in total area is approximately 300 mm in year but the kind of effect and Rainfall intensity which is often with high intensity with storm rainfall with a short period of time has considerable effect on erosion and surface runoff in director slope and flow of latex in the region with attention to numerous Fault branches.

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