ISSN (Online) : 2319 – 8753
ISSN (Print) : 2347 - 6710

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization Volume 3, Special Issue 4, April 2014

Two days National Conference – VISHWATECH 2014

On 21st & 22nd February, Organized by

Department of CIVIL, CE, ETC, MECHNICAL, MECHNICAL SAND, IT Engg. Of Vishwabharati Academy's College of engineering, Ahmednagar, Maharastra, India

Ground Water Contamination by Leachate

Manoj P. Wagh, Piyush K. Bhandari, Swapnil Kurhade

Assistant Professor, Department of Civil Engineering, P. D. V. V. P. College of Engineering, Ahmednagar, India.

Assistant Professor, Department of Civil Engineering, P. D. V. V. P. College of Engineering, Ahmednagar, India.

Assistant Professor, Department of Civil Engineering, S. K. N. College of Engineering, Pune.

Abstract— Safe and reliable disposal of municipal solid wastes and residues is an important component of integrated waste management. Open dumps, commonly found in Asian countries, are land disposal sites at which solid wastes are disposed of in such a manner that does not protect the environment, susceptible to open burning, and exposed to disease vectors and scavengers. Leachate is a polluted liquid emanating from the base of the landfill, which contains innumerable organic and inorganic compounds generated due to which serious ground water contamination was observed in wells. Present paper is a case study of Uruli Devachi (Open dump site), near Pune (M.S.) where daily 1000–1200 tonnes of solid waste are disposed at Uruli-Devachi village, and the site was dealing with problems of frequent fires, smoke, flies, birds and bad odour. PMC was spraying the waste with water to prevent fires, resulting in even greater quantities of leachate generated due to which Serious ground water contamination was observed in wells.

Keywords—leachate, landfill, contamination.

I. INTRODUCTION

In many Asian countries, solid waste disposal method still remains as open dumping for reasons such as, ignorance of the health risks associated with dumping of wastes, acceptance of the status due to lack of financial resources to do anything better and lack of political will to protect and improve public health and the environment. Many old landfills and dumpsites existing throughout the developing countries pose a threat for human health.

"Leachate "refers to liquids that migrate from the waste carrying dissolved or suspended contaminants. Leachate results from precipitation entering the landfill and from moisture that exists in the waste when it is disposed. Contaminants in the buried refuse may result from the disposal of industrial waste, ash, waste treatment sludge, household hazardous wastes, or from normal waste decomposition. If uncontrolled, landfill leachate can be responsible for contaminating ground water and surface water. The composition of leachate varies greatly from site to site, and can vary within a particular site. Some of the factors affecting composition include:

- Age of landfill
- Types of waste
- Degree of decomposition that has taken place
- Physical modification of the waste (e.g. shredding).

Once ground water is contaminated, it is very costly to clean up. Today's landfills, therefore, undergo rigorous surveying, design, and construction procedures that provide many safeguards for the control of leachate migration.

ISSN (Online) : 2319 – 8753
ISSN (Print) : 2347 - 6710

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization Volume 3, Special Issue 4, April 2014

Two days National Conference – VISHWATECH 2014

On 21st & 22nd February, Organized by

Department of CIVIL, CE, ETC, MECHNICAL, MECHNICAL SAND, IT Engg. Of Vishwabharati Academy's College of engineering, Ahmednagar, Maharastra, India

II. GENERATION OF LEACHATE

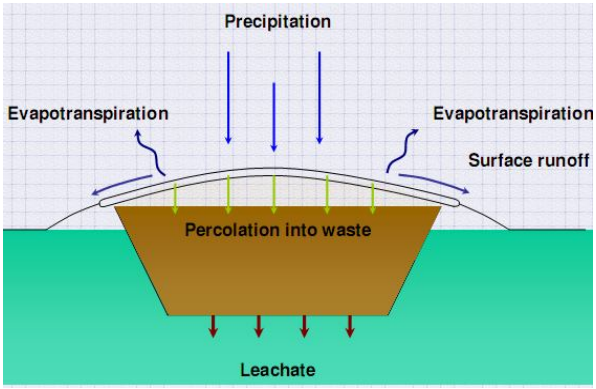

Fig. No.1 Leachate generation

III. EFFECT OF LEACHATE

Landfill leachate contains chemicals, biological and metal ions such as iron. It is both anoxic and acidic, and has a distinct odour. Unless a landfill has a method of collecting and purifying the leachate, it will enter and contaminate groundwater supplies. The health risks, if leachate is left untreated and allowed to contaminate groundwater supplies, include skin irritation, nausea, vomiting, and headache, while chronic exposure can lead to anemia, kidney damage, prostate cancer, lung cancer, memory loss, coma, headaches and depression

Fig. No.2 a Normal Plant

Fig. No.2 b Anatomy of plants stem after exposed to 1 % leachate

Fig. No.2 c Effect of Leachate on Skin

IV. TECHNIQUES USED IN URULI DEVACHI LANDFILL PROJECT

Wastes are openly dumped and then odofresh solutions are sprayed on dumped waste for reducing odour. For faster decomposition process (45 days) they spray Effective Microorganism Solution (2 kg Molasses +100 liter water for 7 days). Due to these techniques used in Uruli Devachi Landfill Project more leachate were generated.

ISSN (Online) : 2319 – 8753
ISSN (Print) : 2347 - 6710

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization Volume 3, Special Issue 4, April 2014

Two days National Conference – VISHWATECH 2014

On 21st & 22nd February, Organized by

Department of CIVIL, CE, ETC, MECHNICAL, MECHNICAL SAND, IT Engg. Of Vishwabharati Academy's College of engineering, Ahmednagar, Maharastra, India

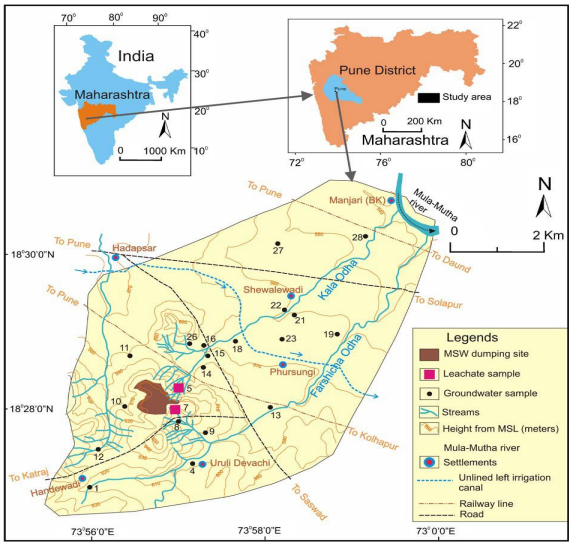

Fig. No. 3 Location map of the study area

Table No 1. Leachate and well-water characteristics

Parameter	Samples				
	I	II	III	IV	V
p^H	3.87	4.26	4.87	5.13	7.23
Conductivity at 25^0C (μ/cm^2)	NM	NM	6.24	8.24	1.203
COD (mg/l)	78350	31244	834	716	2226
BOD (mg/l)	30100	10112	703	412.16	3.27
TDS (mg/l)	740	817	940	1230	113
TSS (mg/l)	25387	6100	1129	521	51
Total Solids (mg/l)	26127	6917	2069	1742	125
Ca + Mg (mg/l)	472	133	25	71	30
Bicarbonates (mg/l)	400	270	15.4	10	05
Sodium (mg/l)	24700	13716	2437	2612	29.12
Chloride (mg/l)	10212	1312	314	52	36
Total Alkalinity (mg/l)	10800	1334	212	62	42
Total hardness (mg/l)	40200	69103	12134	3312	1044
Sulphate (mg/l)	140	18	7012	7.05	2.17
Carbonate (mg/l)	NM	NM	NM	NM	09
Test of corrosivity	Positive	Positive	Positive	Positive	negative

ISSN (Online) : 2319 – 8753
ISSN (Print) : 2347 - 6710

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization Volume 3, Special Issue 4, April 2014

Two days National Conference – VISHWATECH 2014

On 21st & 22nd February, Organized by

Department of CIVIL, CE, ETC, MECHNICAL, MECHNICAL SAND, IT Engg. Of Vishwabharati Academy's College of engineering, Ahmednagar, Maharastra, India

Fig. No.4 a More Leachate is Generated

Fig. No.4 b Spraying E.M.Solution

Samples of leachate and groundwater were collected from the following locations. Sample I: Leachate samples collected from percolation tank Nos 1–3 (Figure.5.*a*).Sample II: Leachate sample collected from landfill storage tank. Sample III: Well water (well located 500 m away from the landfill site; Figure. 5. *b*). Sample IV: Well water (well located 800 m away from landfill site; Figure. *c*). Sample V: Well water (well located 1200 m away from landfill site). The leachate and well-water characteristics are given in Table 1

Fig. No.5 a Leachate samples collected from Percolation tank no. 1

Fig. No. 5 b. Well-water sample no. 1 (located 500 m away from landfill site)

Fig. No. 5 c. Well-water sample no. 2 (located 800 m away from landfill site

ISSN (Online) : 2319 – 8753
ISSN (Print) : 2347 - 6710

International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization Volume 3, Special Issue 4, April 2014

Two days National Conference – VISHWATECH 2014

On 21st & 22nd February, Organized by

Department of CIVIL, CE, ETC, MECHNICAL, MECHNICAL SAND, IT Engg. Of Vishwabharati Academy's College of engineering, Ahmednagar, Maharastra, India

V. CONCLUSIONS

Government of India has laid down the Municipal Solid Waste (Management and Handling) Rules 2000 for all Municipal Councils and Municipal Corporations. It is now binding on them to dispose off Municipal Solid Waste [MSW] in a scientific manner. Scientifically designed landfill is one of the most effective ways for proper disposal of MSW. Selection of site for landfill is important to avoid environmental, ecological, social and economical problems. For Indian environment ground water depth, soil at selected site and water supply well are important criteria.

REFERENCES

1. Central Pollution Control Board, (CPCB, 2000);"Manual On Municipal Solid Waste Management", Ministry Of Urban Development, New Delhi, India
2. Supreme Court Guidelines on "Solid Waste Management" in class 1 cities in India
3. Ministry of Environment and Forest - Government of India, MSW 2000 Rules
4. Municipal Solid Waste (Management & Handling) Rules 2000