World Applied Sciences Journal 12 (4): 531-535, 2011
ISSN 1818-4952

Noise Pollution Due to Site Mobilization

Zaniar Tokmechi

Islamic Azad University, Sanandaj Branch, Sanandaj, Iran

Abstract: In this article, noise effects on workers, noise effects on environment and main sources of noise production in construction sites are explained and presented. Noise is a fact that you can't see, taste or smell. It has not received as much attention as other types of pollution, such as air pollution, or water pollution. The air around us is constantly filled with sounds. The prevailing source of noise pollution in construction site is from noisy facilities. In construction sites, batching plants and crushing plants noise can disturb wildlife habits. The findings show that the twin shaft mixer can produces much noise and most noisy part of crushing plant is its core called crusher unit. Also, Noises deal with the way the vehicles are operated and the procedures set for transportation. And, noise can have effects on animals and workers by causing stress, increasing risk of death by changing the site environment unwanted sounds.

Key words: Noise effect · Batching plant · Crushing plant · Mobilization

INTRODUCTION

Noise health effects are both health and behavioral in nature. The unwanted sound is called noise. This unwanted sound can damage physiological and psychological health. Noise pollution can cause annoyance and aggression, hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances and other harmful effects [1, 2]. Furthermore, stress and hypertension are the leading causes to health problems, whereas tinnitus can lead to forgetfulness, severe depression and at times panic attacks [1, 3].

Chronic exposure to noise may cause noise-induced hearing loss. Older males exposed to significant occupational noise demonstrate significantly reduced hearing sensitivity than their non-exposed peers, though differences in hearing sensitivity decrease with time and the two groups are indistinguishable by age 79 [4, 5].

High noise levels can contribute to cardiovascular effects and exposure to moderately high levels during a single eight hour period causes a statistical rise in blood pressure of five to ten points and an increase in stress [2] and vasoconstriction leading to the increased blood pressure noted above as well as to increased incidence of coronary artery disease.

Noise pollution is also a cause of annoyance. A 2005 study by Spanish researchers found that in urban areas households are willing to pay approximately four Euros per decibel per year for noise reduction [6].

The total noise that can be produced by a project is influenced by its site mobilization; therefore, the use of optimized mobilization helps to keep noise down.

Large projects such as dam construction involve different facilities including batching plants, crushing plants, etc. Moreover, controlling their facilities and choosing the best arrangement of them for noise controlling are extremely complicated. In addition, there is no simple solution to find an optimized plan. Thus, in this paper the noise effects caused by site mobilization is explained and presented.

Site Mobilization Management: Site mobilization management is an interdisciplinary field primarily devoted to optimize facility placement effects on the nature and workers. It can be achieved by optimizing facilities placements such as batching plants and crushing plants, having harmful effects on workers noise health. The duty includes managing the facilities placement to keep harmful effects down using the best arrangement of facilities. This duty can be assisted by computer programs. Figure 1 shows the campsite of Emarat dam in Iran.

Noise Pollution: Noise pollution is a type of energy pollution in which distracting, irritating, or damaging sounds are freely audible. As with other forms of energy pollution (such as heat and light pollution), noise pollution contaminants are not physical particles, but rather waves that interfere with naturally-occurring waves

Corresponding Author: Zaniar Tokmechi, Islamic Azad University, Sanandaj Branch, Sanandaj, Iran.
Tel: +98-918-873-1933, Fax: +98-871-3229437, E-mail: z.tokmechi@gmail.com.

Fig. 1: Emarat dam site mobilization

of a similar type in the same environment. Thus, the definition of noise pollution is open to debate and there is no clear border as to which sounds may constitute noise pollution. In the most narrow sense, sounds are considered noise pollution if they adversely affect wildlife, human activity, or are capable of damaging physical structures on a regular, repeating basis. In the broadest sense of the term, a sound may be considered noise pollution if it disturbs any natural process or causes human harm, even if the sound does not occur on a regular basis.

The prevailing source of noise pollution in construction site is from noisy facilities. In construction sites, batching plants and crushing plants noise can disturb wildlife habits, thereby affecting the manner in which animals in areas around site live. In site areas, material transportation, noisy facilities and even construction noise can cause sleep disruption in humans and animals, hearing loss, heart disease (as a result of stress) and in severe cases even mental instability.

Causes of Noise Pollution in Construction Sites: Noise is a fact that you can't see, taste or smell. It has not received as much attention as other types of pollution, such as air pollution, or water pollution. The air around us is constantly filled with sounds. While, most of us would probably not say we are surrounded by noise. Though for some, the persistent and escalating sources of sound can often be considered an annoyance. This "annoyance" can have major consequences, primarily to one's overall health. Thus, the noise sources in a construction site should be determined and explained. Figure 2 shows a simple noise distribution produced by a noise source.

Batching Plants: Batching plant, which is usually portable and can be taken apart and moved from site to site, is generally set up adjacent to the pile of screened aggregate. The plant may include separate hoppers for several sizes of fine and coarse aggregates, or only one

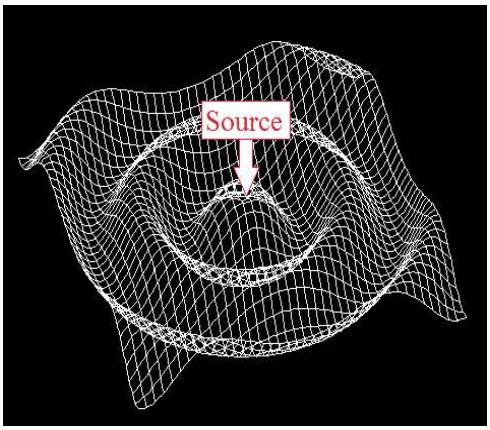

Fig. 2: Noise and its source

Fig. 3: Twin shaft batch plant

hopper for fine aggregate and another for coarse aggregate. It may have one or more divided hoppers, each containing two or more separate compartments for different sizes of aggregates.

A batching plant, also known as a concrete plant, is a device that combines various noisy ingredients to form concrete. Some of these inputs include sand, aggregate (rocks, gravel, etc.) and cement. Figure 3 shows a typical batching plant. A concrete plant can have a variety of very noisy parts and accessories including, mixers, cement batchers, aggregate batchers, radial stackers, etc. The noisy center of concrete batching plant is the mixer. There are three types of mixer, tilt, pan and twin shaft mixer. The twin shaft mixer can produces much noise by mixing concrete and large output (Figure 3, 4). While, the tilt mixer causes much less noise (Figure 5).

Crushing Plants: Crushing plant is usually used to crush rocks to final small particles in which lots of noisy crushing equipments are needed. We can say that

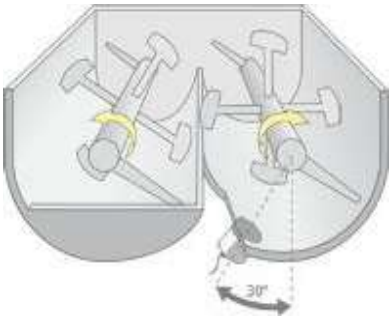

Fig. 4: Twin shaft noisy movement

Fig. 5: Tilt mixer

Fig. 6: Crushing plant part 1

the most noisy part of a crushing plant is its core called crusher unit. While, other parts of a crushing plant including, selecting, storage and washing parts of aggregates are not very noisy. Figure 6 to 11 show different noisy parts a typical crushing plant located in Zhaweh dam in Iran.

Fig. 7: Crushing plant part 2

Fig. 8: Crushing plant part 3

Fig. 9: Crushing plant part 4

Materials Transportation: Materials transportation is the movement of materials from one location to another. Modes of transport includes trucks, conveyors, rails, etc. Transportation systems consists of the fixed installations necessary for transport such as railways. Vehicles traveling on these networks may include trucks, truck mixers, bulldozers, etc. Noises deal with the way the vehicles are operated and the procedures set for transportation.

Fig. 10: Crushing plant part 5

Fig. 11: Crushing plant part 6

Noise Effects on Workers Health: Noise intensity is measured in decibel units. The decibel scale is logarithmic. Each 10 decibel increase represents a tenfold increase in noise intensity. Workers perception of loudness also conforms to a logarithmic scale. A 10 decibel increase is perceived as roughly a doubling of loudness. Thus, 30 decibels is 10 times more intense than 20 decibels and sounds twice as loud; 40 decibels is 100 times more intense than 20 and sounds 4 times as loud, 80 decibels is 1 million times more intense than 20 and sounds 64 times as loud. Distance diminishes the effective decibel level reaching the ear. Thus, if a crushing plant at a distance of 30 m rates about X decibels, to a worker which is close to crushing plant, the same crushing sound rates about 1.5X decibels.

Subjected to 45 decibels of noise, workers cannot sleep. At 120 decibels the ear registers pain, but hearing damage begins at a much lower level, about 85 decibels. The duration of the exposure is also important. Apart from hearing loss, such noise can cause lack of sleep, irritability, heartburn, indigestion, ulcers, high blood pressure and possibly heart disease. One burst of noise, as from a passing truck, is known to alter endocrine and neurological functions in many workers.

Noise Effects on the Site Enviroment: Noise pollution adversely affects the lives of millions of animals. There are direct links between noise and animal's health. Problems related to noise include increasing risk of death. It is the most common and often discussed environmental effect, but research has shown that exposure to constant or high levels of noise can cause countless adverse environmental effects.

Noise can have effects on animals by causing stress, increasing risk of death by changing the delicate balance in predator/prey detection and avoidance and by interfering with their use of sounds in communication especially in relation to reproduction and in navigation. An impact of noise on animal life is the reduction of usable habitat that noisy areas may cause.

CONCLUSION

The site mobilization frequently poses challenges in areas of environment and workers health and dealing with this type of problem is really important. Noise is one of the most important parameters that can be harmful for workers.

Noise is an unwanted sound. Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, disrupts or diminishes one's quality of work.

In this article, noise effects on workers, noise effects on environment and main sources of noise production in construction sites are explained and presented. The findings show that:

- The most important causes of noise production in a construction site are batching plant, crushing plant and material transportation.
- The noisy center of concrete batching plant is the mixer.
- The twin shaft mixer can produces much noise by mixing concrete and large output. While, the tilt mixer causes much less noise.

- Most noisy part of crushing plant is its core called crusher unit. While, other parts of a crushing plant including, selecting, storage and washing parts of aggregates are not very noisy.
- Noises deal with the way the vehicles are operated and the procedures set for transportation.
- Problems related to noise include stress related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption and lost productivity for workers.
- Noise can have effects on animals by causing stress, increasing risk of death by changing the site environment unwanted sounds.

REFERENCES

1. Field, J.M., 1993. Effect of personal and situational variables upon noise annoyance in residential areas. J. the Acoustical Society of America, 93: 2753-2763.
2. Rosen, S. and P. Olin, 1965. Hearing Loss and Coronary Heart Disease. Archives of Otolaryngol., 82: 236-245.
3. Kryter, K.D., 1985. The Effects of Noise on Man. Academic Press.
4. Rosenhall, U., K. Pedersen and A. Svanborg, 1990. Presbycusis and noise induced hearing loss. Ear Hear, 11(4): 257-263.
5. Fuller, R.A., P.H. Warren PH and K.J. Gaston, 2007. Daytime noise predicts nocturnal singing in urban robins. Biology Letters, 3(4): 368-370.
6. Barreiro, J., M. Sanchez and M.V. Grau, 2005. How much are people willing to pay for silence? A contingent valuation study. Applied Economics, 37(11): 123-136.