

Comparative analysis of fugitive dust management system at construction site by major cities

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Abstract: Particulate Matter(PM) is one of the most critical pollutant which can cause a fatal disease if the human body inhales. Construction is the business that emits the most fugitive dust. It is therefore necessary to manage construction site. South Korea government focuses on the fugitive dust control measures defined in regulation being implemented properly. However the number of civil complaints related to fugitive dust emitted from construction site is the most in Korea. So it is necessary to check from the management system aspect. This paper compares and analyzes the fugitive dust management system which applied to the construction site of major cities in three countries, and finds out what needs to be supplemented by the domestic management system.

Key words: Particulate Matter, Fugitive dust, Construction site, Management system, Control measures

1. Introduction

Particulate matter contains microscopic solids or liquid droplets that are so small they can be inhaled and cause serious health problems. Particles less than 10 micrometers in diameter pose the greatest problems because they can get deep into your lungs, and some may even get into your bloodstream (U.S. EPA). South Coast Air Quality Management District (SCAQMD) Rule 403 in the U.S. defines fugitive dust as any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of the activities of any person. The construction industry, in particular, emits the most fugitive dust. In addition, most building construction work is carried out downtown, where sensitive receptors are resident, so special care is required. Construction sites are inspected mainly via the installation and operation of suppression facilities and the implementation of suppression measures. According to statistics from Seoul in Korea, 99.4% of complaints related to fugitive dust are related to construction sites. Although there are many reasons for this problem, it is important to evaluate the effectiveness of the regulations related to fugitive dust. This can be done by comparing construction site management systems after analyzing domestic and foreign fugitive dust regulations that apply to the construction sites of major cities.

2. Construction site management system

2.1. Seoul in South Korea

The South Korea Ministry of Environment legislates ambient air quality standards based on the 'Environmental Policy Act.' The overall air environment in South Korea falls under the umbrella of 'The Air Quality Preservation Act,' which was enacted to comply with ambient air quality standards and provide general guidelines for managing the air environment. The authority for managing air

quality is delegated to local authorities, who manage jurisdictions based on regulations. Seoul is a major local authority in this respect. 'The Air Quality Preservation Act' defines 11 business sectors that emit fugitive dust, of which the construction industry is one. Fugitive dust regulations apply only to those sectors. According to the regulations, the owner of a construction business must submit a business report and environmental management plan in advance of any proposed construction. During construction, measures should be taken to prevent fugitive dust, and a fugitive dust-suppression facility should be installed and properly operated. The construction site is inspected based on 'Standards for installation and necessary measures for suppressing fugitive dust emission' as provided in Article 58(4) of the 'Enforcement Regulations of The Air Quality Preservation Act.' These regulations define the suppression facilities to be installed for 11 emission processes, including stockpile, loading and unloading, transport, and suppression measures to be implemented. The reason why the regulation covers mainly the emission process is because it is applied to all 11 industries (including the construction industry) that emit fugitive dust, such as the manufacturing and transportation industry. The main focus of construction site inspections by local authorities is the appropriateness of the installation, the operation of the suppression facilities, and the implementation of the suppression measures required by the regulations. Rule 403 is a rule governing fugitive dust, and field personnel must comply with it.

2.2. Los Angeles (U.S.)

In the United States, National Ambient Air Quality Standards (NAAQS) are set by the Environmental Protection Agency (EPA). Based on the CAA, state governments should submit EPAs to SIPs. SIPs are an implementation plan established independently by the state to comply with environmental standards. In California, the plan is managed by the jurisdiction as an air district. An air district is classified according to the air basin, which reflects the atmospheric characteristics of the terrain. California consists of 35 air districts with 23 Air Pollution Control Districts (APCD) and 12 Air Quality Management Districts (AQMD). Los Angeles belongs to the South Coast Air Quality Management District (SCAQMD) of AQMD. SCAQMD is well established in stationary emission sources such as construction. SCAQMD implements a Rule Book, which is enforceable. The LA construction site is inspected by an SCAQMD air quality inspector, a civil expert who has a knowledge of fugitive dust and can determine visual emission opacity. The inspector assesses whether suppression facilities have been properly installed and operated, and he checks whether field personnel have implemented the suppression measures. The inspector also assesses compliance with regulations based on self-inspection written by field personnel and visual emission opacity assessment.

2.3. London (UK)

The UK is responsible for air quality management at the Department for Environment, Food & Rural Affairs (DEFRA). The main regulation is the 'Environmental Act 1995,' which establishes the National Air Quality Strategy (NAQS). The NAQS sets the target value of pollutant emission, and directs regulatory compliance at national and regional levels. However, it is not involved in direct guidance or action planning. Local Air Quality Management (LAQM), a policy system that reviews and evaluates the air quality of local environments, aims to ensure compliance with target values specified in the NAQS. London also provides guidance such as 'The Control of dust and emissions during construction and demolition SPG' to ensure compliance with LAQM. This guide provides general information on the risk assessment of fugitive dust. The reason for this configuration is that local authorities inspect construction sites based on monitoring records. Fugitive dust suppression facilities and measures are also proposed, but are presented only as best practice methods and have no legally binding power. But if a construction site violates the emission regulations, fugitive dust control measures are implemented as a reference for determining the penalty level. The owner decides and implements the monitoring level through consultation with local authorities and residents prior to the implementation of the project. The level of monitoring reflects the size of the construction, the risk of dust occurrence, and the number of nearby receptor

3. Comparison of management systems by major cities

After analyzing the regulations that apply to major cities, and examining the management systems of three major cities, we compare how the construction sites are actually managed. This analysis shows

there are two ways in which local authorities inspect construction sites. One is by using a monitoring system; the other is the application of fugitive dust control measures. The level of education of the inspectors who inspect the construction site is also an important factor. Table 1 shows the operating status of fugitive dust management systems at construction sites by city.

Table 1. Comparison of management system by city

No.		Seoul	LA	London
1	Monitoring System	None	Enforcing	Enforcing
2	Control Measures	Enforcing	Enforcing	Using as a reference
3	Inspector	Low educated	Civil expert	Well educated

Seoul focuses on the appropriateness of fugitive dust control measures when the construction site is inspected. There is no policy for monitoring. Inspectors, who are general officials in local authorities, are not regularly trained. Investigators only receive short-term temporary training before the site inspection. In LA, a SCAQMD air quality inspector, who is a civil expert, inspects construction sites. The inspector assesses the adequacy of the fugitive dust control measures, evaluates visible emission opacity by the naked eye, and reviews self-inspection records. London manages construction sites through a strong monitoring system. Field personnel should have a monitoring system in place through consultation, and carry out self-fugitive dust control measures to comply with emission standards. The control measures field personnel employ are used as a reference in the determination of penalty levels due to violations of the rules. The inspection of construction sites is centered on a strong monitoring system, and the employees of the Environmental Agency are trained in over 300 regular programs.

4. .Conclusion

The three major cities manage their construction sites in different ways. LA, especially, has implemented control measures and monitoring. Running both management systems ensures thorough management of the construction site. However, U.S. state and local authorities spend \$885,000 annually to train professionals in visible emission opacity determination. This is a burdensome expenditure from a budgetary point of view. The UK guide, 'The Control of dust and emissions during construction and demolition SPG' has identified that 'if the best practice methods identified in Chapter 5 are implemented, then the formation of dust and harmful emissions from the construction sites will be minimized. However, continuous site monitoring is still an important way for developers to manage the PM10, PM25 and NOx emissions during construction and demolition.' This means both methods are important. In Seoul, there is no institutional framework for site monitoring, so it is necessary to establish an inspection system for the fugitive dust control measures being implemented. In order to do so, a study should be conducted to evaluate the efficiency of regulatory control measures in the future.

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