

BACKGROUND INFORMATION FOR THE CEMENT INDUSTRY

Cement Production

During the past 10 years cement production has more than doubled. This increased production has been the direct result of two factors of an international economy. First, the high price of oil has resulted in an increase in the costs of highway construction, making concrete highly competitive with asphalt, and secondly, the increase in construction activities in several new world countries and developing countries in the Middle East, India, and China.

This high demand for cement to feed the concrete industry has put substantial pressure on companies to begin reactivation of old kilns and to build new kilns to meet the demand. In addition, the cement industry has looked for ways to reduce their manufacturing costs and has turned to alternatives to oil and gas to fire their kilns. They have found that the disposal of waste oils and old tires is a way to reduce fuel costs, and they may in fact be paid to dispose of these materials in a more environmentally friendly way in their kilns.

Cement Process

Cement is a powder produced from a variety of clay materials, including alumina, silica, limestone, and iron oxides. It is used as a binding agent, most often as a component of mortar and concrete. Among the most common types are Portland cement, white cement, and masonry cement. Approximately 97 percent of the cement used in the manufacture of concrete is Portland cement, which consists primarily of a kiln fired, fused powder, known as clinker, that is ground and combined with small amounts of gypsum, or a similar material. Portland cement is produced in five grades designed to lend certain properties to concrete. Masonry

cement, produced by adding limestone to Portland cement, is a hydraulic cement used as a component of mortar for masonry construction.

Cement is manufactured in five kiln types: wet process, dry process, preheater, precalciner, and semidry process kilns. The same raw materials are used in wet and dry process kilns however, the moisture content and processing techniques differ, as do kiln designs. Wet process kilns must be longer in order to dry the wet mix, or slurry, which is fed into the kiln. Dry process kilns produce high temperature exit gases, which can be used to generate electrical power. Preheater, precalciner and semidry processes before kilns are common devices and are widely used today. The fused cement nodule formed within a cement kiln is known as clinker. The most common method of cooling clinker is a traveling grate, which is cooled by ambient air. The cooled clinker is transferred to storage. When mixed with gypsum the mixture is then ground to produce a homogeneous cement powder, which is sent to bulk storage or shipped by truck or rail.

Air Emissions From Cement Plants

- Visible emissions points
 1. Rock drilling and blasting operations from quarrying operations
 2. Haul roads
 3. Materials handling and transfer operations
 4. Grinding, blending, and packaging operations
 5. Kiln operation including the feed system and fuel firing

- Particulate Emission
 1. Kiln dust (trace metals)
 2. Particulate controls exhaust

- Gaseous Emissions
 1. Nitrogen oxides

2. Sulfur oxides
3. Carbon monoxide
4. Hydrocarbons (certain organic compounds)

Control Options

1. Dust suppression systems
2. Use of Electristatic precipitators or Baghouses
3. Choice of low polluting fuels for firing the kiln
4. Choice of low NOX burners

Cyclone Cement Company (CCC)

Cyclone is a medium-sized company located in Plume County in the State of Confusion. Plume County is an oblong shaped county with a large city, Vertigo, located in the northeast quadrant of the county. Cyclone Cement Company (CCC) is located about 50 miles to the southwest of Vertigo in a small town (Cyclone). Cyclone has grown during the past 10 years from about 2,000 residents to 20,000 residents. Due to an interstate highway that ran from Vertigo past Cyclone, the area is being developed as a bedroom community for Vertigo.

CCC started as a small quarrying operation about 60 years ago. Until recently, this family-owned business fit quite nicely into the pastoral setting of southwest Plume County. In fact, the town was named after the Cyclone family, which provided most of the jobs for the townspeople. About twenty years ago, a second-generation son took over the operations of the quarry and through research and obtaining a metallurgical degree from the State University, he discovered that the rock of the quarry had all the elements necessary for the making of cement.

The local demand for cement increased substantially in the 1980's due to the rapid expansion of jobs, homes, and office buildings in nearby Vertigo. In 1985, the first

wet process cement kiln started producing 900 tons per day of high-quality cement. The kiln ran for about 10 years without a major breakdown or rebuild. Production leveled off at about 750 tons per day. The company was following major world events when about ten years ago they decided they would replace their old kiln with a new modern 1500-tons per day dry process kiln, fire it with natural gas, and add a heat recovery boiler to produce electricity. The price of oil made its rise for fuel almost prohibitive but the worldwide demand for cement was driving cement prices skyward. It was a good time for Cyclone to minimize production costs and maximize profits. Within two years, CCC doubled their workforce to fifty employees and started their new 1500-ton capacity kiln on schedule. They took their old kiln out of service for major repairs and rebuild. Although they were producing twice as much cement as they ever could, the price and the demand for cement world over was still high and escalating.

On February 1, 2012, the Plume County Air Pollution Control Program issued a Notice of Violation to Cyclone Cement Company. Cyclone requested a meeting to discuss the alleged violations and resolve the issue, The meeting takes place on March 8, 2012.