

Solvay Chemicals

technical

P U B L I C A T I O N



Application of SOLVAir™ Select 50 for SO₂ Control at Cemex's Odessa, Texas Cement Plant

Cemex Odessa Oil Well Construction Type 2 Cement Plant

Cemex controls SO₂ concentration in the off-gas with the addition of Select 50 into the cement feed. The Odessa plant produces about 600KTPY of 40 into the cement feed. The location has a substantial limestone source and has been producing there since 1958. They have been producing cement with pre-heater dry kiln since 1978. Sand, limestone, and iron ore are shipped to the plant in bulk via truck and rail. The plant contains crushing; dry grinding circuit, pre-heater system, two long dry kilns, baghouse gas cleaning circuit. The kilns operate between 1200°F and 2000°F.

SOLVAir Select 50 from Solvay Chemicals, Inc., Green River, Wyoming, is added to pre-heater feed circuit depending on the sulfide and sodium chemical balance. The actual rate of addition of Select 50 is varied in response to the SO₂ concentration in the kiln off gas and sodium, calcium potassium and sulfur in the clinker. Select 50 adequately controls the SO₂ concentration in the kiln off-gas.

The Cemex, Odessa plant had concerns about the high volatile concentrations in their clinker. These high concentrations can affect set times (high sulfur), cause expansive cement, off gas emissions concerns, and build up in the pre-heater and kiln. Volatiles are substances in the kiln feed and fuel that vaporized in the hot zones and condense in the cooler zones. These volatiles tend to build up in the kiln. The operating problems created by the volatile retention are overheating of the chain section, ring formation in the pre-heater and kiln. This in turn reduces kiln draft, tower plugs, more ring formation and then loss of production and down time.

The ideal kiln system should have unrestricted movement of the solids into the kiln, the off-gasses and clinker out of the kiln. But because of the melting and boiling points (below) of the volatiles this will not happen.

The consequences of these facts lead to the following results: As the material increases in temperature, the volatiles melt/boil, then vaporize. Some condense in the cooler sections and hotter pre-heater stages. The remaining volatiles exit the kiln out the stack.



The Volatile Cycle

In a nutshell, the steps of the volatile cycles are as follows:

- Melting/vaporization condensation
- Coating dropped
- Buildup removed

In studying the volatile build up, high alkalinity is less of a concern than high sulfur levels. High alkali causes a light powdery build up but high sulfur causes a hard solid build up. Unfortunately, Odessa is plagued by high sulfur. Odessa studied the volatiles and their effect on build up and as a result, analysis of the hot meal. They arrived at the following conclusions:

Total volatiles should be kept at less than 5% to avoid build up:

- CI <1%
- SO₂ <2.5%,
- Na₂O <4%
- Sulfur/Alkali Molar Ratio >1 harder build up
- Sulfur/Alkali Molar Ratio >1 softer build up

Determination of the Molar Ratio

Cemex has determined that by the adding SOLVAir Select 50:

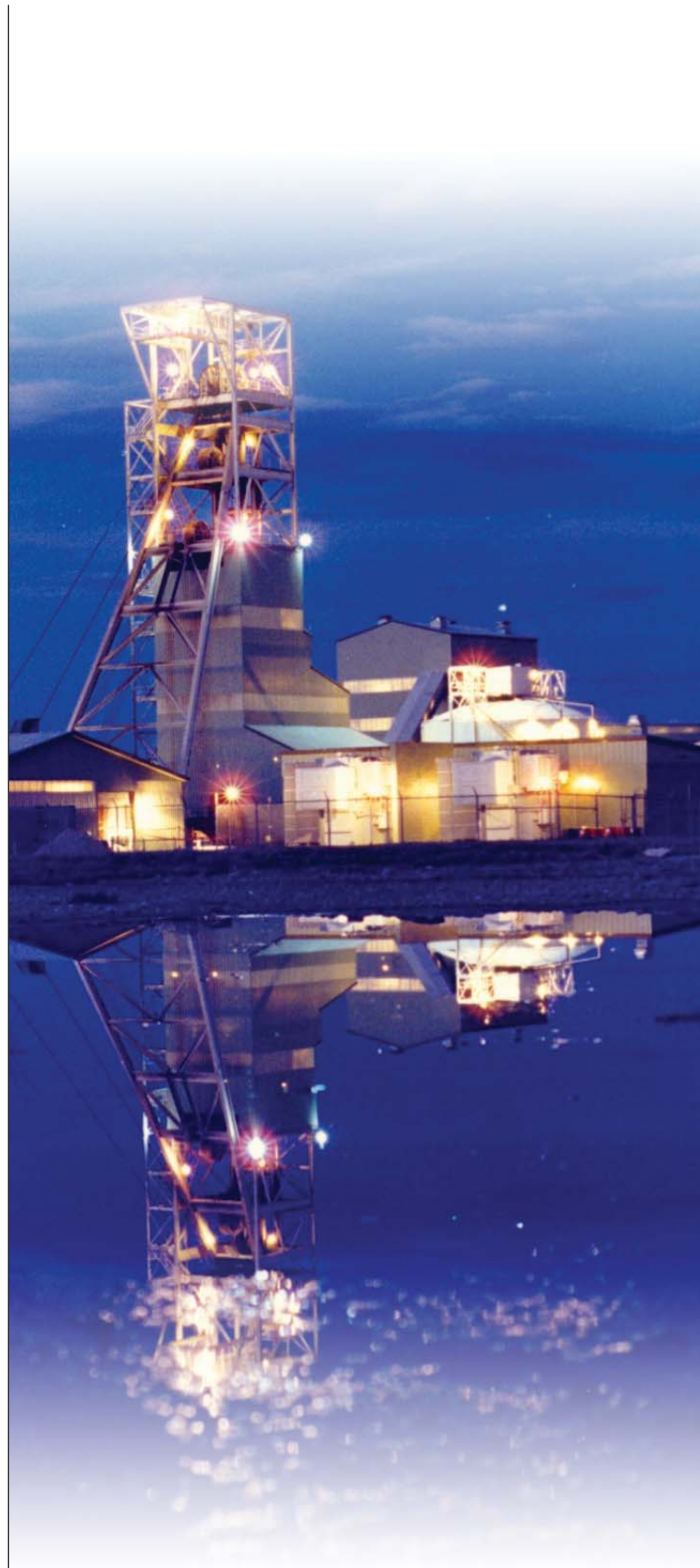
- It will remove SO₂/SO₂
- Reduce build-up in pre-heater tower
- Reduce ring formation in kiln
- If not added they will see ring formation in 18 hours caused by sulfur
- Using the XRF to monitor the mole ratio and keeping the MR between 0.8 to 1.2 will greatly improve their production time

Conclusion

SOLVAir Select 50 has many applications in neutralizing acidic gases in many different industries. It rapidly calcines when heated at or above 135°C (or 275°F). The popcorn-like crystal structure change creates a large and reactive surface for adsorption and neutralization with acidic gases. Since Cemex added Select 50 in their kiln feed to control the SO₂ concentration in the off-gas they have been able to operate their plant without build up resulting from uncontrolled volatiles in the gases in the pre-heater and kiln.

References

Smith, P. 1991, "Economics of Sorbent Injection for Coal Fired Boiler Acid Gas Control", R-C Environmental Services and Technologies.



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This product has relatively small amounts of crystalline silica quartz with concentrations generally less than 2 percent. Repeated exposure to respirable size particles of crystalline silica can cause adverse health effects such as silicosis (a progressive lung disease) and possibly cancer. Product contains a chemical known to the State of California to cause cancer.

BEFORE USING, SEE MATERIAL SAFETY DATA SHEET (MSDS) FOR THIS PRODUCT C.A.S. NUMBER: 533-96-0 (Sodium Sesquicarbonate)

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