Comments on the Final Report "Assessment of NOx Emissions Reduction Strategies for Cement Kilns – Ellis County"

INTRODUCTION

On January 24, 2006, the Portland Cement Association ("PCA") submitted comments on the Draft Final Report prepared by ERG, Inc. for the Texas Commission on Environmental Quality ("TCEQ") on cement kilns in Ellis County. Although minor revisions to the Draft are contained in the Final Report many of the same concerns remain with the Final Report.

COMMENTS

Executive Summary

1. Page 1-3 of the Final Report states: "The only "available" wet kiln control technique fully evaluated…..is the conversion of the wet kilns to modern dry preheater/calciner units." Later in the same paragraph, however, the Final Report concedes that: "….this may mean that SNCR has become an available control technology for wet kilns." After becoming aware of the preliminary information regarding SNCR testing on a wet kiln in Lumbres, France, representatives of TXI Operations, LP ("TXI") and Schreiber Yonley & Associates ("SYA") separately visited the facility in 2006. Based upon their evaluation of the Lumbres operation of the SNCR system, TXI and Ash Grove Cement Company ("AGC") believe that SNCR has the potential to reduce NOx emissions on their wet kilns in Ellis County. TXI has been granted the necessary authorizations to test SNCR on one of its Ellis County wet kilns and conducted the test during the week of October 22, 2006. AGC is preparing an application for a permit to test SNCR on all three of its Ellis County wet kilns, and hopes to initiate testing in December 2006. AGC submitted a permit application on October 2, 2006 for a full scale installation of an SNCR system on one of its three kilns in Ellis County. AGC plans to install and start using the system in December of 2006 and to subsequently permit and install SNCR on the other two kilns in the winter of 2007 to 2008.

2. Section 1.1.1, Page 1-4 of the Final Report fails to acknowledge that SNCR systems have been installed on both Holcim kilns in Ellis County. These systems have been in operation for a number of months and are achieving NOx reductions of 40 -50 percent at a molar ratio of 0.7 and negligible ammonia slip. The baseline/starting point for the cost analysis for these kilns should begin at these emission rates.

3. Section 1.1.1, Tables 1-1 through 1-8 of the Final Report.

a. Inconsistent Cost Effectiveness Numbers

The cost effectiveness numbers for SCR, SNCR and LoTOx do not match the costs found in the text in Section 4 or Tables 4-1-2 or 4-1-6 of the Final Report.

b. Inflated SCR Control Efficiencies

The control efficiencies stated in all of the Tables both in Section 1 (Executive Summary) and Section 4 use SCR percent NOx controls of 80 to 85 percent. This level is described in Section 1.1. Page 1-2 as "…conservatively estimated as 80-85%." Section 1.1.5.2, page 1-15 references coal fired boilers achieving 90% or better as justification for the 80-85% being conservative. However, the Final Report then states in Section 4.1.1, page 4-4 that SCR on boilers achieve "...80 to 90 percent or higher." On page 4-5, the Final Report states that: "…guarantee levels on SCR systems being provided in the power industry are in the 90-94% range." First, based on the statement on page 4-4, 80 to 90 percent is achieved on boilers. Therefore, if the boiler control efficiency is being used as a basis, the 80-85% used for the cement kiln cost analysis does not reflect a conservative estimate of the control efficiency. No allowance has been made for the additional factors facing a cement plant SCR system. Secondly, the emission baseline and control efficiency of the SCR system at the Solnhofen cement plant contained in Section 4.1.1, page 4-7, are incorrect as they are inconsistent with the levels reported by Solnhofen's plant management to cement industry representatives in May 2006. A full report of that visit is contained in Attachment 1. Per plant management, the baseline emissions without either SCR or SNCR range from about 800 to 1200 mg/Nm3. The SCR system reduces NOx emissions to 500 mg/Nm3, or approximately 50 percent control efficiency for SCR. Page 4-7 states that Solnhofen achieves 200 mg/Nm3. In contrast, Solnhofen plant management stated that the full scale system does not and has not operated at 200 mg/Nm3. While the baseline of 1050 mg/Nm3 stated on page 4-7 is within the range provided by plant management, the 200 mg/Nm3 has not been achieved during full scale operations. Page 4-13 states that the facility outlet NOx averages 500 mg/Nm3. In fact, according to annual emissions reports prepared by Solnhofen, in 2004, the Solnhofen plant only achieved the required 500 mg/Nm3 level 72.3 % of the time and in 2005, only 90.8% of the time. Copies of these reports are contained in Attachment 2. When plant management was asked by cement industry representatives if he believed that the 80-85% control efficiency proposed by the Draft Final Report were achievable, he said that he did not agree. See Attachment 1.

Therefore, the use of 80 -85 percent control efficiency for SCR in a cement plant is incorrect; it grossly overstates the control efficiency that has been demonstrated at Solnhofen and does not take into account the characteristics of the gas streams in Ellis County that could cause such control efficiencies to be lower.

One other cement plant (similar to the Solnhofen kiln), located in Italy, began operating an SCR system in June 2006. However, there are no published CEMS or stack test data available to document the SCR control efficiency of this new SCR system.

The use of the arbitrarily high control efficiency for SCR in the cost analyses for the Ellis County kilns directly impacts the cost effectiveness calculations such that the costs appear to be much lower than they would be if a correct control efficiency were used. The use of this high control efficiency also results in an inaccurate representation of the tons of NOx reduced if SCR is implemented. See Table 4-1-1 on page 4-18.

c. Underestimated SNCR Control Efficiencies

In contrast, for SNCR, the Final Report utilizes a control efficiency of 35% for all except the Holcim kilns. Data contained in Section 4 of the Final Report show ranges of NOx control efficiency between 10 and 90+ percent. The use of a 35% control efficiency for SNCR and an 80 - 85 % efficiency for SCR skews the cost effectiveness numbers and the tons removed numbers in such a way to create an impression that SCR is the preferred technology. In fact, for the only cement plant (Solnhofen) that has operational history for both SNCR and SCR, the NOx reduction achieved using SCR (approximately 50%) is currently being achieved using SNCR. Moreover, as noted above, the report filed by Solnhofen with the German government (Attachment 2) states that the 50% NOx reduction that was achieved using SCR, occurred only about 90% of the time during the last full year of operation of the SCR system and only 72.3% of the time during 2004.

d. Incorrect LoTOx Cost Estimate

The costs for LoTOx do not include the costs for scrubbers for the wet kiln systems. Scrubbers would be necessary to address the SO3 generated by the LoTOx process. Failure to use scrubbers could lead to corrosion from sulfuric acid mist, and/or the formation of detached plumes from the reaction of the stack gases in the atmosphere. Moreover, the estimated cost does not include waste management costs associated with management of the wastewater and solid waste that would be generated by the LoTOx system.

e. Conflicting TXI Kiln 5 NOx Emission Rate Numbers

Page 1-8 and page 4-30 of the Final Report provide conflicting NOx emission rates for TXI #5 kiln. Page 1-8 states (1.36 lb./ton) 1.5 lb./tonne, and Page 4-30 states 1.9 lb/tonne (1.73 lb./ton). The plant reports that the actual average over the past three years is 1.7 lb/ton, which is a lower NOx emission rate than Solnhofen has achieved with the use of either SCR or SNCR.

f. Inaccurate NOx Emission Reduction Assumption for TXI Wet Kilns

On pages 1-6 and 1-7 of the Executive Summary, ERG states that it has assumed that the NOx emissions for all 4 of TXI's wet kilns will be reduced by 30% due to a presumption that mid-kiln firing will be applied "as required under the current SIP." The current SIP does not require mid-kiln firing on all wet kilns. Other alternative means of compliance (e.g., source cap) are authorized for cement kilns. It appears that TXI will be able to comply with the source cap alternative contained in the current SIP by applying mid-kiln firing to one of its wet kilns. Therefore, this assumption by ERG is incorrect. This results in inaccurate emission rates for TXI's wet kilns in Tables 1-3, 1-4, 1-11, and 1-12.

Section 4.1.1 SCR

Page 4-5
The Final Report states that SCR on a dry kiln with preheat would be located downstream of the cement kiln and pre-heater furnace and cyclones which: "…would be a big advantage over the Selective non-catalytic reduction (SNCR) process, which must be carried out in process conditions." First, for a preheater/precalciner ("PH/PC") kiln, such as the dry kilns in Ellis County, SCR would not be applied as an end-of-the-pipe technology so this statement has no relevance. Second, as has been documented at many facilities in the US and Europe, SNCR carried out "in process" has been in operation on many cement kilns without problems. More than 60 plants in Europe are currently operating SNCR systems on PH/PC kilns for NOx reduction.

Pages 4-5 and 4-6
The Final Report states that "The high dust, high temperature characteristics of coal plant emissions thus are similar to those of cement kiln exhaust gases." While it is true that both are high dust, high temperature applications, the dust loading in cement plants is typically about an order of magnitude higher than that found at coal fired boilers. See the Graph comparison in Attachment 3. This makes operation of a SCR system on a cement kiln very dissimilar to the operation on a coal fired boiler.

Page 4-6.
The Executive Summary is very definite that SCR works at cement plants. However, page 4-6 states: "…the recent successful use of SCR at a German cement plant demonstrates that these and other issues may have been resolved and the SCR is, under certain conditions, a technically feasible alternative for significantly reducing NOx emissions from cement kilns."(Emphasis added) This statement itself implies that under different conditions, SCR may not work.

The Final Report states that the Solnhofen SCR has been in successful operation since 2001. In fact, the SCR system has not operated since at least early 2006 and an SNCR system is currently being utilized to meet the NOx emission limit. This fact has been documented in the SYA report contained in Attachment 1. Moreover, "successful" operation would normally not mean compliance with a permit limit only 90.8% of the time (as the Solnhofen kiln performed during 2005) or 72.3% of the time (as the Solnhofen kiln performed during 2004). *See* Attachment 2.

The Final Report also states that a vacuum cleaning system is being used to clean the SCR catalyst bed at Solnhofen. This is incorrect. Solnhofen plant management showed cement industry representatives the SCR system in May 2006. The system, after several years of development, currently is equipped with a hot air blower system which blows heated air through nozzles mounted across 2 parallel bars which are the width of the catalyst bed. When the SCR is in operation these bars continuously traverse back and forth across the catalyst bed directing the heated air onto the catalyst to prevent dust buildup. Even with this continuous blower system, the SCR catalyst periodically requires additional cleaning.

Page 4-7
The Final Report states: "The SCR system is achieving NOx emission reductions far in excess of those achievable using SNCR. Prior to installation of SCR. the Solnhofen plant, with SNCR, was achieving NOx emissions of 700 to 800 mg/Nm3 (equivalent to 2.8 to 3.2 lb/tonne clinker). With SCR, the plant has been achieving approximately 200 mg of NOx/Nm3 (0.8 lb. /tonne clinker). Based on an uncontrolled NOx emission rate of 1050 mg/Nm3 (4.2 lb./tonne clinker), the emission rate corresponds to a NOx control efficiency of 80% for SCR compared with approximately 25-35% control efficiency for SNCR. It has been indicated, however, that the SCR system was capable of achieving a lower NOx emission rate (they are not using all of their beds), but that they were operating at 200 mg/Nm3 since German law only required a NOx emissions limit of 500 mg/Nm3." This statement is not correct for several reasons. First, and most significant, Solnhofen has not been achieving 200 mg/Nm3. Annual reports for the facility (see Attachment 2) document that the facility operates at 500 mg/Nm3 on average but, at times, even exceeds this value. There is no publicly available information to support the Final Report's assertion of 200 mg/Nm3. Furthermore, Solnhofen facility management confirmed during a site visit in May 2006 that the full scale SCR system had not operated

at 200 mg/Nm3. Second, since early 2006, the facility has not been operating the SCR system. It has been operating an SNCR system which has been achieving the same 500 mg/Nm3 emission rate.

Page 4-8
The Final Report acknowledges that the Solnhofen kiln is smaller than the preheater/precalciner kilns in Ellis County. However, the magnitude of that size difference is omitted. Given that TXI #5 is 5 times the size of Solnhofen, this size difference is significant in terms of gas volume and the size of an SCR system.

Page 4-10
The Final Report states: "It is argued that high dust loading could plug or foul the SCR catalyst beds. However, the Solnhofen SCR system has operated at a dust loading of 80 g/Nm3, a relatively high dust loading. The level of NOx removal shows that high dust loading can be managed to avoid catalyst plugging and fouling issues while maintaining high level of control." While the dust loading at Solnhofen is relatively high compared to coal fired boilers, it is lower than the dust loading at Ellis County preheater/precalciner kilns (102g/Nm^3 to 177.8 g/Nm^3). Solnhofen took innovation, well beyond what is utilized at coal-fired boiler SCR systems, to develop a cleaning system adequate for the Solnhofen dust loading. The Solnhofen plant does not have high sulfur or alkali as is the case with the Midlothian kilns. Therefore, the dust particles at the Ellis County kilns will be stickier and harder to remove that even those at Solnhofen.

As stated in PCA's comments on the Draft Final Report, a comparison of the physical characteristics of cement dust particles to that of ash from coal fired boilers shows that, while fly ash is typically spherical in nature and of relatively consistent size, cement dust particles are larger, very jagged and irregular in shape and size. The plugging potential for a cement kiln particle would be higher. This theory was proven by Solnhofen. Initially Solnhofen installed honeycomb catalyst with a standard pitch used in other industrial applications. According to plant management this catalyst plugged almost immediately. Solnhofen then tried specially manufactured catalyst with larger pitch until a size, appropriate for the cement dust generated by the Solnhofen kiln, was developed.

Page 4-11
The Final Report discusses the use of different catalyst formulations to reduce SO2 oxidation to SO3 and indicates that this may reduce the NOx reduction efficiency. The Final Report states: "However, the Solnhofen SCR system is achieving a high degree of NOx control." This statement implies that Solnhofen has solved the NOx efficiency versus SO2 oxidation problem. This is not correct. Solnhofen has no sulfur or alkali in its raw materials. Solnhofen management indicated that the fuel sulfur must be kept below 1% to prevent sticky deposits in the tower. As a result Solnhofen's SCR does not have to address SO2 oxidation at all. In fact, SO2 emissions are nearly at the lower detection limit of the CEMS. Therefore, not only has Solnhofen not demonstrated that it addresses the SO2 oxidation versus NOx reduction issue; it has not demonstrated the 80-85 percent NOx reduction in the Final Report. In contrast, the Ellis County kilns have

sulfur both in raw materials and fuels as well as significant alkalis. Thus, an SCR system for these kilns will have to address the SO2 oxidation issue.

Page 4-12
The Final Report acknowledges that a bypass around the SCR system is necessary to protect the catalyst from high temperatures. However, it fails to discuss the fact that during SCR bypass there will be zero NOx control. It fails to estimate the frequency or duration of these periods or to include these periods of zero control in the overall control efficiency.

Page 4-13
The Final Report states that Solnhofen's inlet NOx concentration varies from 1000 to 2030 mg/Nm3 and the outlet varies from 300 to 726 mg/Nm3 with an average outlet of less than 500 mg/Nm3. This conflicts with the Executive Summary and Page 4-7 where the report states that Solnhofen has been achieving 200 mg/Nm3. During the site visit in May 2006, Solnhofen management indicated that NOx inlet concentrations range from 800-1200 mg/Nm3 with outlet concentrations of approximately 500 mg/Nm3.

Page 4-14
The Final Report states that the free lime in the kiln system inherently controls the formation of undesirable byproducts. However, SCR systems on the long wet kilns would be installed after the particulate control device and would require scrubbers to address the SO2 to SO3 conversion byproducts.

Page 4-14 General Conclusion
The Final Report relies on power plant experience to draw conclusions regarding NOx reduction rather than the actual reductions demonstrated by the single SCR system on a cement plant with operating history. As a result it uses 80-85 percent NOx reduction for the SCR analysis rather than the 50 percent demonstrated at Solnhofen.

Pages 4-14 to 4-16, SCR at the TXI Kilns.
The cost analysis utilizes 80% NOx reduction efficiency for TXI #5 kiln and 85 percent for the four wet kilns. The use of 80-85 percent inappropriately skews the NOx emissions numbers. TXI #5 is currently, without add-on controls, emitting less pounds of NOx per ton of clinker produced than Solnhofen emits using SCR or SNCR. It is a well understood principle that lower concentrations in a gas results in lower reaction activity and, therefore, results in lower NOx reduction potential. The Final Report recognizes this basic principle, but arbitrarily reduced the control efficiency for SCR on TXI #5 by only 5 percent from the already unrealistic 85% control efficiency that the Final Report claims is possible for the Ellis County kilns.

In addition, the cost estimates for SCR for the TXI kilns fails to include the cost for a new ID fan. In order to accommodate the estimated additional pressure drop across the SCR system, the fans would need to be replaced for all of the kilns at a cost of between 350,000 and 1 million dollars per kiln. Furthermore, installation of larger ID fans would possibly necessitate the addition of Regenerative Thermal Oxidizer (RTO) units on TXI

#5 or other projects such as a cooler vent system to eliminate some of the gas stream. This type of system would cost approximately $8 million.

TXI#5 already has a wet scrubber. However, the wet kilns do not. The SO2 oxidation that will occur in the wet kilns' SCR systems will necessitate the installation of wet scrubbers for each SCR system at a cost of 8 to 10 millions dollars per kiln. Neither the ID fan cost nor the scrubber cost has been included in the cost analyses.

The heat recovery system proposed by the Final Report may not be technically feasible. Therefore, gas reheat costs may be underestimated by the cost analysis in the Final Report.

Finally, the scenario of one SCR system controlling all four wet kilns is not technically feasible. Each kiln requires periodic scheduled maintenance as well as occasional unscheduled maintenance resulting in significant swings in air flow volumes and velocities. Given that flow distribution issues are common even for steady-state installations such as coal-fired boilers, the reduction or increase in airflow and velocity associated with the startup or shutdown of a kiln will significantly impact gas distribution through the catalyst. This could result in either excessive erosion of the catalyst, or deleterious settling of dust particles that could blank off catalyst pores and reduce catalyst control capacity. In addition, if a problem occurs with an SCR unit that controls emissions from multiple kilns, all kilns would have zero control resulting in a significant increase of NOx emissions in the air shed.

Page 4-16, SCR at the Holcim Kilns.
The same comment regarding the inappropriately high NOx control efficiency for SCR also applies to the Holcim kilns.

Although the Holcim kilns have been using SNCR for several months, the Final Report does not acknowledge it. Holcim is achieving a control efficiency of 40 to 50 percent with SNCR. This compares favorably with the control efficiency that has been achieved with SCR at Solnhofen. When the periods of zero control efficiency are included (for those periods when the SCR is bypassed), it becomes questionable whether any additional NOx reduction would be achieved by replacing SNCR with an SCR system.

As was true for the TXI kilns, the additional pressure drop that would result from the SCR system would require that both of the Holcim ID fans be replaced. It is estimated that these fans would cost between 750,000 and one million dollars. This cost was not included in the SCR cost evaluation for the Holcim kilns. Furthermore, installation of larger ID fans would possibly necessitate the addition of Regenerative Thermal Oxidizer (RTO) units on TXI #5 or other projects such as a cooler vent system to eliminate some of the gas stream. This type of system would cost approximately $8 million.

Page 4-17, SCR at the Ash Grove Kilns
The same comment, as stated for TXI, regarding the inappropriately high NOx control efficiency for SCR applies to the Ash Grove kilns.

The same comment, as stated for TXI, regarding multi-kiln SCR systems applies to the Ash Grove kilns.

The same comment, as stated for TXI, regarding heat recovery applies to the Ash Grove kilns.

As with the TXI wet kilns, wet scrubbers would be required after the SCR systems at a cost of 8 to 10 millions dollars each. These costs were not included in the cost evaluation in the Final Report.

The existing ID fans cannot address the additional pressure drop from SCR systems. They would need to be replaced at a cost of 350,000 dollars each. These costs were not included in the cost evaluation in the Final Report.

The site configuration at the Ash Grove facility would require that the SCR system construction be elevated to allow for traffic flow. These costs have not been included in the cost evaluation in the Final Report.

Section 4.1.2 SNCR

Page 4-25
Table 4-1.3 shows SNCR test data at various molar ratios, all less than 1:1, with NOx reduction efficiencies up to 65 percent. Also on page 4-25, the Final Report states that results from 148 SNCR trials on 5 different kilns resulted in NOx reductions of 15 to 75 percent and that temperature appeared to be one of the main detriments to the effectiveness of the technology. The Final Report also includes results of other SNCR tests of 10 -50 percent, 80 to 85 percent, 40 to 90+ percent and 72-83 percent. One test reported results of only 10-20 percent. However, this test was not conducted at the optimum temperature location. The Holcim kilns are currently achieving 40 to 50 percent NOx reduction with SNCR. The Solnhofen plant is achieving 50 percent reduction using SNCR. All of these data, the majority of which is included in the Final Report, indicate that NOx reduction when cement plants utilize SNCR can range from 10 to 90+ percent depending upon site specific conditions. The use of 35 percent NOx reduction efficiency for SNCR and 80 -85 percent for SCR inappropriately biases the conclusions of the Final Report toward SCR when, in fact, the only facility that has utilized both SCR and SNCR has achieved equivalent reductions from both technologies.

Page 4-29, SNCR at Holcim
The discussion regarding SNCR systems for the two Holcim kilns has not been updated to acknowledge that both kilns now have operating SNCR systems which have been achieving 40 to 50 percent NOx reduction.

Page 4-30, SNCR at TXI
TXI #5
Due to the low NOx emission rate at TXI #5 kiln, the Final Report acknowledges that a NOx reduction of 35 percent from the use of SNCR on this kiln may not be achievable. However, the cost analysis goes on to utilize the 35 percent efficiency. The SCR cost

analysis utilizes 80 percent NOx reduction efficiency. The chemical reaction for the two technologies is identical - the SCR catalyst merely allows the reaction to occur at a lower temperature. Therefore, the low concentration that would cause the NOx reduction for SNCR to be low will also have the same effect on SCR. Both technologies should be assigned the same NOx reduction efficiency for TXI #5 and this efficiency should be lower than 35 percent given Kiln 5's already very low NOx emission rate.

Page 4-31, TXI Wet Kilns.
As noted in comments on the Executive Summary, TXI has recently performed SNCR testing on one of its Midlothian wet kilns. Therefore, decisions regarding the possible NOx reduction for SNCR should be delayed until the test results are available.

The Final Report proposes an innovative SNCR technology using mid-kiln injection of packets of urea or other reagents in the tires fired at mid-kiln. This type of system by its "batch" nature is unlikely to result in stable NOx reduction efficiencies.

SNCR at Ash Grove
Page 4-31, Ash Grove Wet Kilns
Ash Grove is in the process of obtaining the necessary approvals to test an SNCR system similar to the Lumbres, France SNCR operation on one of its three wet kilns. Testing is scheduled to start in December 2006. Decisions regarding the possible NOx reduction for SNCR should be delayed until the test results are available.

The TXI comment regarding the innovative SNCR mid-kiln system proposed in the Final Report also applies to the Ash Grove wet kilns.

Section 4.3.2, LoTOx

The LoTOx technology has not been tested or installed on an application with the complex chemistry of a cement plant. According to the LoTOx vendor, BOC, LoTOx has been commercially implemented only on the following types of facilities: a 1000 HP natural gas boiler, a 25 MW coal-fired power plant, a stainless steel pickling plant and a lead recovery furnace. Installations at a sulfuric acid plant and refinery FCCs are underway.

The cost evaluations for all of the wet kilns, which do not currently have wet scrubbers, would require the scrubbers in order to address the SO3 formation from SO2 during oxidation. The costs for the scrubbers, at 8 to 10 millions dollars each, needs to be included in the cost evaluation for LoTOx.

Cost estimates provided by BOC for LoTOx systems of various sizes indicate that the capital and operating costs are in the range of $2000 - $3000 per ton of NOx removed. However, discussions with other knowledgeable sources (including scrubber manufacturers and others) indicate that the capital cost of such a system for the wet kilns would be approximately $20 million, approximately $50 million each for the Holcim dry kilns, and approximately $100 million for TXI Kiln 5.

The cost evaluations in the Final Report should also include a discussion of the tremendous amount of electrical energy that will be required to operate LoTOx systems on the cement kilns in Ellis County. Both the cost and the environmental impact of this electrical use should be addressed.

Page 4-48
The Final Report indicates that the nitrate captured in the wet scrubbers at TXI #5 and the Holcim kilns might have a negative impact on the plant's synthetic gypsum. The Final Report proposes that this nitrate should be captured in the wastewater from the dewatering process and the wastewater could be used by farmers for fertilizer. It cannot be assumed that the wastewater can be beneficially reused. Therefore, the cost and environmental impact associated with trucking wastewater offsite for treatment and disposal should be included in the evaluation of LoTOx technology.

As with the SCR systems, the current kiln ID fans will need to be replaced if LoTOx systems are installed.

The assumption in the Final Report that LoTOx is transferable to cement manufacturing is not based upon any documented test data for similar gas volumes and constituents. Based on the technical, economic and environmental issues that have been identified, it does not appear that testing of this technology on a cement kiln is warranted at this time.

Kiln Upgrades or Conversions.

The costs to upgrade Holcim's # 1 calciner, and the costs to convert the existing Ellis County wet kilns to preheater/precalciner kilns with equal capacity are estimated in the Final Report. These costs are low, and do not consider all of the factors that would be included in an actual cost assessment for a kiln conversion. It is unlikely that it would be economical to replace the existing kilns with kilns of equivalent capacity. Nearly all such conversions that have occurred in the last few years have resulted in significant net increases in production. Therefore, the actual reduction in emissions of any pollutant is a factor of the new kiln capacity. Therefore, the use of 65 percent NOx reduction as a result of wet to dry kiln conversion is inappropriate. As far as the upgrade of Holcim #1, the predicted benefit is 40 percent NOx reduction. The facility has already achieved this reduction through the use of SNCR at a substantially lower investment.

Section 5, Chemistry of Ellis County Materials and Impacts on Control Determinations.

This section discusses the results of analytical tests conducted on raw material samples from the Ellis County kilns. However, it does not compare the results for the Ellis County kilns to kilns outside of Ellis County as required by Task 2 of the Scope of Work for the Final Report.

CONCLUSIONS

As a summary, the Final Report prepared by the ERG Team fails in the following respects:

- The Final Report fails to compare the composition of the Ellis County raw materials to those found in other states and countries.
- LoTOx is identified as "transferable" technology based upon its alleged use on similar types of sources. The facts do not support this conclusion.
- Both LoTOx and SCR would require extensive pilot testing to determine whether full-scale control units would be technically feasible. The delays and costs associated with the pilot tests have not been addressed by the Final Report, yet such tests do not appear warranted given the technical, economic, and environmental issues that have been identified relative to these technologies. Moreover, SNCR appears to be an available technology for the Ellis County kilns and data show that SNCR can achieve NOx reductions similar to those achievable using SCR on a cement kiln.
- The Executive Summary conflicts with data and cost information contained in the body of the report.
- The Final Report states that the Solnhofen SCR has been achieving 80 percent NOx reduction. This is not the case. The facility annual reports as well as statements by plant management indicate that the facility has been achieving a NOx emission rate of 500 mg/Nm3, not the 200 mg/Nm3 level stated in the Executive Summary and in parts of Section 4. In fact, page 4-13 of the Final Report contradicts the Executive Summary by stating that the Solnhofen SCR outlet is 500 mg/Nm3. At 500 mg/Nm3, the SCR is achieving 50 percent NOx reduction.
- The Final Report does not acknowledge that since at least January 2006, Solnhofen has been using SNCR instead of SCR and achieving the same 50 percent NOx reduction efficiency.
- The Final Report fails to include a discussion of Holcim's SNCR system which has been achieving 40 to 50 percent NOx reduction, and instead uses a 35 percent NOx reduction for the cost evaluation for SNCR for the Holcim kilns.
- The Final Report uses an unsupportable, high SCR NOx reduction efficiency of 80 percent when the only operating SCR on a cement plant for which data are available has been achieving an approximate 50 percent reduction efficiency. Speculation that Solnhofen could achieve lower NOx emissions with the use of additional catalyst is inappropriate.
- The Final Report fails to compare the Solnhofen facility to the Ellis county kilns in terms of dust loading and sulfur and alkali content in raw materials and fuels.
- The Final Report inappropriately concludes on page 4-7, that SNCR would not achieve NOx emission reductions as high as SCR. The Solnhofen facility has achieved the same reduction, 50 percent, with both SNCR and SCR. The data contained in the Final Report document SNCR systems efficiencies ranging from 10 to 90+ percent.

- The use of unsupportable, high SCR control efficiencies and much lower SNCR efficiencies skews the report conclusion toward SCR.
- The concept of multi-kiln SCR systems is fatally flawed. The use of one control device on multiple emission units would either result in operation of multiple emissions units without control when the control system malfunctions, or would result in the shutdown of multiple productions units at once for the failure of one control device. Shutdown of multiple units would have far-reaching economic impacts, and would be physically detrimental to the kiln systems themselves.
- The Final Report fails to include significant cost items such as new ID fans for all kilns, and scrubbers for the wet kilns which would be required for both SCR and LoTOx systems.
- The Final Report fails to address the additional energy demands required by a LoTOx system, as well as the waste management issues associated with such a system.