

Texas Commission on Environmental Quality
WORK ORDER UNDER THE CONTRACT BETWEEN TCEQ AND CONTRACTOR:
Eastern Research Group, Inc.

Work Order No. 582-4-65589-05-06

Contract No. 582-4-65589

Contract Amount \$400,000.00

Contract Balance \$100,000.00

Work Order Amount for FY 05 \$100,000.00

Contract Balance (Balance After This Work Order) \$0.00

Work Order Amount for FY 06 \$100,000.00 (upon amendment of the Contract)

Time Line

The work shall begin upon issuance of a Texas Commission on Environmental Quality (TCEQ)-executed Notice To Proceed and must be completed no later than 154 days after the work order is issued by TCEQ unless amended by both parties. Contractor must submit a final payment invoice/request as well as a release of claims within 45 days of TCEQ's approval of the final technical deliverable for this Work Order.

Purpose

This study purpose is to explore potential NO_x emissions reduction strategies for cement kilns in Ellis County and across Texas. This project will assess new technologies not previously considered provide solutions for the specific mix of kilns and raw materials present in Ellis County.

Background

In order to fulfill obligations in the Dallas/Fort Worth Litigation Settlement Agreement TCEQ, in consultation with the Plaintiffs, EPA, and Intervenor the Portland Cement Association, shall develop a scope of work and select a consultant to perform a cement kiln study. This study must evaluate the potential availability of new air pollution control technologies for cement kilns in the DFW 8-hr nonattainment area, including consideration of selective catalytic reduction. A final report shall evaluate and establish the type of controls which may be technically and economically applied to the TCEQ identified cement plants in the DFW area.

References

None

Total Amount of this Work Order

Total amount of this Work Order shall not exceed the amount shown on the face of this Work Order unless the amount is changed by a Work Order Amendment.

SCOPE OF WORK

PRIMARY TASKS

Task 1 - Work Plan:

The Contractor shall submit and obtain approval of a Work Plan describing the work to be performed for TCEQ. Requirements for the Contractor's Work Plan are laid out in the Contract and this Work Order including "Special Requirements / Instructions to Contractor."

Deliverable: TCEQ approved Work Plan

Deliverable Date: Within 7 days after NTP is issued by TCEQ

Task 2 - Composition of Ellis County Raw Materials

The Contractor shall conduct research to determine and identify the chemical, mineral and elemental composition of limestone and all other raw materials used in clinker production in Ellis County including, but not limited to, sulfur, organic content, calcite, dolomite, aragonite and pyrite. Ranges of percent composition contained in Ellis County raw materials should be included based on valid statistical samples representative of the variability in each raw material. Appropriate test methods must be used. In Task 2, Contractor shall include a comparison of raw material composition used in the cement kiln processes in other states and countries.

Deliverable: Preliminary draft Report and supporting data

Deliverable Date: Within 21 days after NTP is issued by TCEQ

Deliverable: Analysis meeting/Conference call

Deliverable Date: Within 23 days after NTP is issued by TCEQ

Deliverable: Final draft report

Deliverable Date: Within 35 days after this Work Order is issued by TCEQ

Task 3 - Literature Research

The contractor shall conduct a literature survey of NO_x emission control technologies from kilns in Texas and other states and countries as well as any differences and/or similarities in environmental rules. This research shall include, but not be limited to, reports, studies, articles, information from plant personnel, vendor guarantees, regulatory agencies and publications from kilns in Texas and other states and countries. New Source Review permits that have been issued and draft permits or applications under review, federal permits, other authorizations and any findings on Reasonably Available Control Technology, Best Available Control Technology, and Lowest

Achievable Emission Rates must be reviewed and summarized for Texas and other states and countries. Data from NO_x control technologies implemented in Ellis County during the course of this study must be included. In Task 3, Contractor shall research industrial practices of NO_x emission control technologies that have been used on combustion units other than kilns.

Deliverable: A draft listing of sources to be used in the report
Deliverable Date: Within 10 days after NTP is issued by TCEQ

Deliverable: Preliminary draft Report and supporting data
Deliverable Date: Within 21 days after NTP is issued by TCEQ

Deliverable: Analysis meeting/Conference call
Deliverable Date: Within 23 days after NTP is issued by TCEQ

Deliverable: Final draft report and supporting data
Deliverable Date: Within 35 days after NTP is issued by TCEQ

Task 4 - Kiln Conversion

The contractor shall determine measures necessary to convert a wet process to a dry or semi-dry process for each of the wet kilns in Ellis County and the possible impacts on cement production. The report must illustrate whether or not each kiln has the potential of being physically modified and a justification for each. In Task 4, Contractor shall provide a summary table indicating which wet kilns have the potential to be modified

Deliverable: Preliminary draft Report and supporting data
Deliverable Date: Within 35 days after NTP is issued by TCEQ

Deliverable: Analysis meeting/Conference call
Deliverable Date: Within 37 and 51 days after NTP is issued by TCEQ

Deliverable: Final draft report
Deliverable Date: Within 56 days after NTP is issued by TCEQ

Task 5 - Low Temperature Oxidation

In Task 5, Contractor shall include an analysis of the application of a LoTO_x system for kilns, both with and without existing scrubbers. The analysis must include estimates of cost per ton of NO_x reduction figures for each TCEQ- identified kiln including, but not limited to, costs associated with purchase, installation, and operation.

Deliverable: Preliminary draft Report and supporting data

Deliverable Date: Within 35 days after NTP is issued by TCEQ

Deliverable: Analysis meeting/Conference call

Deliverable Date: Between 37 and 51 days after NTP is issued by TCEQ

Deliverable: Final draft report

Deliverable Date: Within 56 days after NTP is issued by TCEQ

Task 6 - Kiln Specific Application

In Task 6, Contractor will analyze the operational limitations of each kiln in Ellis County. The analysis must include a feasibility study for the application of all possible reduction technologies such as, but not limited to, LoTOx, SCR and SNCR, including design limitations and structure placement and costs associated. The report must estimate cost per ton of NO_x reduction and the lb NO_x/ton of clinker emission rate. The report must consider whether or not each control technology has the potential of being physically applied to each kiln and a justification for each. A summary table indicating which kilns have the potential to be modified for each technology must be presented as well as the expected lb NO_x/ton of clinker emission rate.

Deliverable: Preliminary draft Report and supporting data

Deliverable Date: By August 31, 2005

Deliverable: Analysis meeting/Conference call

Deliverable Date: Between 65 days after NTP is issued by TCEQ and August 31, 2005

Deliverable: Final draft report

Deliverable Date: Within 84 days after NTP is issued by TCEQ

Task 7 - Chemical Reactivity

In Task 7, Contractor shall explore the chemical reactions of the chemicals, minerals and elements for the raw materials identified in Task 2. These identified chemical properties shall be compared with chemical reagents used in NO_x reduction control technologies including, but not limited to, ammonia or urea used in Selective Catalytic Reduction (SCR) and Selective Non Catalytic Reduction (SNCR) and ozone used in low temperature oxidation (LoTOx). The reactivity with stack gases and at optimal injection points or installation locations must be considered if the appropriate data is provided by Ellis County kiln owners or operators.

The report for this Task shall contain all products of chemistry associated with the reactivity of Ellis County raw materials and reagents used in reduction technologies on high, mid and low ranges of composition for each kiln. In Task 7, Contractor shall consider and identify these reactions and their relationship to (1) the formation or increase of any criteria pollutants or precursors to criteria pollutants exiting the stack or from fugitive sources, (2) compounds that may be formed in the catalyst beds, (3) compounds that may cause corrosion of equipment downstream of the reaction,

(4) increases in or occurrences of reagent slip from streams, (5) increases in or occurrences of the formation of salts, acids or other compounds; (6) any other possible causes of fouling and/or loss of efficiency; and (7) any other adverse environmental effects. The results of this analysis shall be provided in a matrix format (e.g. high concentration of chemical in raw materials with low concentration in reagent, etc). Any findings in this task should be compared to issues with raw material used in the cement kiln processes in other states and countries. _

Deliverable: Preliminary draft Report and supporting data
Deliverable Date: Within 63 days after NTP is issued by TCEQ

Deliverable: Analysis meeting/Conference call
Deliverable Date: Between 65 and 79 days after NTP is issued by TCEQ

Deliverable: Final draft report
Deliverable Date: Within 84 days after NTP is issued by TCEQ

Task 8 - Changes to Raw Materials and Processes

In Task 8, Contractor shall investigate and identify chemical changes that can be made to Ellis County raw materials or process changes that can be made to improve the effectiveness of each NO_x reduction technology application and determine which NO_x applications are viable for each kiln in Ellis County. This report must include a detailed description of each process and/or chemical modification, how the modification improves the effectiveness of the reduction technology and associated incremental costs and/or cost savings._

Deliverable: Preliminary draft Report and supporting data
Deliverable Date: Within 91 days after NTP is issued by TCEQ

Deliverable: Analysis meeting/Conference call
Deliverable Date: Within 93 days after NTP is issued by TCEQ

Deliverable: Final draft report
Deliverable Date: Within 98 days after NTP is issued by TCEQ

Task 9 -Summary of Reductions Associated with Technologies

The contractor shall summarize the NO_x emission reductions associated with the following technologies: (1) technologies currently being utilized in Ellis County such as low-NO_x burners and mid-kiln firing, (2) the technologies that are being utilized in other states and countries not used in Ellis County and (3) NO_x reducing technologies that have been successfully applied in full-scale commercial installations on combustion units other than kilns, but are not applied to kilns. In Task 9, Contractor must include percent NO_x reductions and lb NO_x/ton of clinker associated with each existing technology currently in place and operating in conjunction with an existing kiln. The Contractor must include the expected NO_x reductions from the application to each kiln in Ellis

County of technologies in other states and countries. The Contractor must also include other technologies that have been successfully applied in full-scale commercial installations on combustion units other than kilns in Ellis County. This task must include cost per ton of NO_x reduced figures.

Deliverable: Preliminary draft Report and supporting data
Deliverable Date: Within 98 days after NTP is issued by TCEQ

Deliverable: Analysis meeting/Conference call
Deliverable Date: Within 107 days after NTP is issued by TCEQ

Deliverable: Final draft report and executive summary
Deliverable Date: Within 140 days after NTP is issued by TCEQ

SECONDARY TASKS

Task 10 - Kilns Located in Counties Other than Ellis County

In Task 10, Contractor shall conduct an analysis of the raw materials utilized at existing Texas kilns in counties other than Ellis County. The report for this Task will discuss whether each NO_x control technology application requires more operational and/or chemical modifications than Ellis County kilns or if the same modifications can be utilized in counties other than Ellis County. This analysis must include the associated and expected cost differences in the application of each NO_x control technology.

Deliverable: Preliminary draft Report and supporting data
Deliverable Date: Within 100 days after Notice To Proceed (NTP) is issued by TCEQ

Deliverable: Analysis meeting/Conference call
Deliverable Date: Within 121 days after NTP is issued by TCEQ

Deliverable: Final draft report
Deliverable Date: Within 154 days after NTP is issued by TCEQ

II. SUMMARY OF DELIVERABLES

Deliverable	Deliverable Due Date
Task 1:	No later than 7 days after the work order is issued by TCEQ
Task 2:	No later than 35 days after the work order is issued by TCEQ
Task 3:	No later than 35 days after the work order is issued by TCEQ
Task 4:	No later than 56 days after the work order is issued by TCEQ
Task 5:	No later than 56 days after the work order is issued by TCEQ
Task 6:	August 31, 2005
Task 7:	No later than 84 days after the work order is issued by TCEQ
Task 8:	No later than 98 days after the work order is issued by TCEQ
Task 9:	No later than 140 days after the work order is issued by TCEQ
Task 10:	No later than 154 days after the work order is issued by TCEQ

III. CONTRACTOR KEY PERSONNEL REQUIRED FOR THIS WORK ORDER

Walter Koucky, Eastern Research Group

IV. CONTACTS FOR PARTIES

Contact for TCEQ
Karen K. Hill
Air Quality Planning and Implementation Division
Building F
Cube: F-4S C498
Phone: (512) 239-2968
Fax: (512) 239-5687
E-mail: khill@tceq.state.tx.us

V. SPECIAL REQUIREMENTS / INSTRUCTIONS TO CONTRACTOR:

1. Confidentiality. Information submitted by Ellis County cement plants may include information which is not subject to release under the Public Information Act. Contractor agrees to treat ALL information submitted by the Ellis County cement plants as confidential, and not to release it to any entity other than the TCEQ, unless specifically required by law (e.g., by a court order). In addition, Contractor shall require each employee or subcontractor or subcontractor's employee who has access to this information to sign a confidentiality agreement in a format acceptable to the TCEQ.

2. Coordinating Project Work Orders with State Fiscal Year Funding. This Work Order describes a project which will be completed during two TCEQ state fiscal years, using funds appropriated to TCEQ in two fiscal years and chargeable to this contract under two different Annual Contract Prices. In order to accomplish this TCEQ intends to issue two Work Orders, this one and a second project Work Order covering all tasks remaining unfinished at the end of this Work Order which are to be performed in the subsequent fiscal year. CONTRACTOR agrees that CONTRACTOR shall complete all the tasks in this Work Order within the authorized amounts specified in this Work Order for each fiscal year and the CONTRACTOR'S approved Work Plan (as they may be from time to time amended). Further, all terms and conditions of this Work Order (as it may have been from time to time amended) shall apply to the second project Work Order. All deadlines of this Work Order and the CONTRACTOR'S Work Plan (as they may be from time to time amended) shall apply to the second project Work Order and are not discharged at the end of this Work Order (end of the fiscal year, August 31). However, this provision does not obligate TCEQ to issue a subsequent year Work Order, nor restrict TCEQ's rights under the contract to cancel this Work Order, in whole or in part.

In order to divide the Work between fiscal years, Contractor shall include in its Work Plan provided in response to this Work Order, a budget and schedule showing the tasks and the expenditures will be completed during the present fiscal year under this Work Order and also the tasks and expenditures which will be completed during the subsequent fiscal year under the second project Work Order. If TCEQ does not issue a subsequent Work Order to complete the Work Order using subsequent year fiscal funds, then all portions of the Contractor's Work Plan describing work to be done during the subsequent fiscal year shall be deemed stricken from the Work Plan.

Texas Commission on Environmental Quality

WORK ORDER UNDER THE CONTRACT BETWEEN TCEQ AND CONTRACTOR: Eastern
Research Group, Inc.

Work Order No. 582-4-65589-05-06

NOTICE TO PROCEED

Contract No. 582-4-65589

Contract Amount \$400,000.00

Contract Balance \$100,000.00

Work Order Amount for FY 05 \$100,000.00

Contract Balance (Balance After This Work Order) \$0.00

Work Order Amount for FY 06 \$100,000.00 (upon amendment of the Contract to increase funds)

The TCEQ issued Work Order No. **582-4-65589-05-06** to the Contractor on _____. This Work Order is deemed to include a Work Plan. The TCEQ is now providing the contractor with a Notice to Proceed with the work described in the Work Order and Work Plan. The work may begin on the date this Notice to Proceed is executed by the TCEQ.

TCEQ:

Texas Commission on Environmental Quality

By: _____

(Authorized Signature)

Candice Garrett

(Printed Name)

Director, AQPID

(Title)

Date: _____