REVIEW OF TEXAS REGULATIONS, STANDARDS, AND PRACTICES RELATED TO THE USE OF COAL COMBUSTION PRODUCTS

Final Report

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EERC DISCLAIMER

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NOMENCLATURE

AASHTO	American Association of State Highway and Transportation Officials
ACAA	American Coal Ash Association
ASR	alkali silica reactivity
ASTM	American Society for Testing and Materials
ASTSWMO	Association of State and Territorial State Waste Management Officials
C^2P^2	Coal Combustion Products Partnership
CCP	coal combustion products
CO_2	carbon dioxide
DOT	Department of Transportation
EERC	Energy & Environmental Research Center
EPA	Environmental Protection Agency
FAQMP	Fly Ash Quality Monitoring Program
FGD	flue gas desulfurization
FHWA	Federal Highway Administration
GLO	General Land Office
LCRA	Lower Colorado River Authority
LEED	Leadership in Energy & Environmental Design
NAA	National Asphalt Association
NO_x	Nitrogen oxide
NRM	nonhazardous recyclable materials
ODOT	Ohio Department of Transportation
PRB	Powder River Basin
QA/QC	quality assurance/quality control
RCRA	Resource Conservation & Recovery Act
RENEW	Resource Exchange Network for Eliminating Wastes
RMDB	Recycling Market Development Board
SB	Senate Bill
STRONGER	State Review of Oil and Natural Gas Environmental Regulations Inc.
TAC	Texas Administrative Code
TBPC	Texas Building and Procurement Commission
TCAUG	Texas Coal Ash Utilization Group
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resources Conservation Commission
TRI	Toxic Release Inventory
TWC	Texas Water Code
TxDOT	Texas Department of Transportation

REVIEW OF TEXAS REGULATIONS, STANDARDS, AND PRACTICES RELATED TO THE USE OF COAL COMBUSTION PRODUCTS

EXECUTIVE SUMMARY

Texas was selected as the pilot state for an in-depth review of its coal combustion product (CCP) programs, policies, and use practices because of its progressive approach to CCP utilization and its support network to implement such activities. The review process, including state selection rationale, advisory board member selection, interviewee identification and confirmation, questionnaire development, and other logistical issues, are described.

Based on information obtained during the Texas state review processes, the following items were identified as keys to successful CCP utilization in Texas:

1. Formation and perseverance of the Texas Coal Ash Utilization Group
2. Proactive regulatory developments in Texas
3. Adaptable federal and state legislative provisions
4. Newly adopted Texas Department of Transportation (TxDOT) specifications
5. Strong building industry coupled with green building initiatives
6. Texas utilities generally producing good-quality fly ash
7. Development of statewide online recycling resources

Although Texas has a 60%–70% CCP utilization rate, the following barriers were identified during the review that currently prohibit increased CCP utilization in Texas:

1. Education and attitude among district and local highway personnel, architects, engineers, and contractors
2. Consistency of CCP supply
3. Liability issues among generators and users
4. Limited markets for flue gas desulfurization (FGD) material and bottom ash
5. Transportation and infrastructure issues
6. Local and abundant asphalt supply

In addition to barriers, the following potential threats were identified during the review that could hinder CCP utilization in the future:

1. New pollution control requirements
2. Ability to retain institutional knowledge at Texas Commission on Environmental Quality (TCEQ) and TxDOT
3. Class C vs. Class F issues related to alkali silica reactivity
4. EPA could reconsider its Resource Conservation and Recovery Act determination

The following activities were suggested during the review as actions that would help increase CCP utilization in Texas:

1. Adopt performance-based concrete specifications
2. Develop profitable markets for FGD material and bottom ash that consider transportation costs
3. Exempt beneficial reuse from federal Toxic Release Inventory reporting
4. Change how the material is perceived
5. Build off of Leadership in Energy & Environmental Design's (LEED's) success
6. Promote industry success outside of the CCP industry
7. Produce a hybrid/blended fly ash
8. Develop markets for low-quality fly ash
9. Provide economic incentives for using recycled materials

Using the keys, barriers, threats, and actions identified during the state review process, other states with less successful CCP utilization can learn from what Texas has done right and implement similar activities in their own states. This report provides an analysis of how the Texas experience can be transferred to other states.

REVIEW OF TEXAS REGULATIONS, STANDARDS, AND PRACTICES RELATED TO THE USE OF COAL COMBUSTION PRODUCTS

BACKGROUND

About 46 million tons of coal combustion products (CCPs) are beneficially used in the United States each year, but nearly 75 million tons are still being disposed of in landfills (American Coal Ash Association, [ACAA], 2003). A few key barriers and trends need to be addressed in order to increase the utilization rate. A frequent barrier that hinders the use of CCPs is the broad range of state laws, regulations, policies, and guidelines regarding the use of CCPs (ACAA, 1998). Some states (Pflughoeft-Hassett et al., 1999) have worked to develop progressive and effective guidance for CCP utilization, while other states still lack the resources and information to feel comfortable with a more progressive approach. For example, the use of CCPs in nonconcrete applications is not well addressed in state environmental regulations or in Department of Transportation (DOT) specifications. It is anticipated that state reviews will provide the opportunity to identify the nonconcrete applications (i.e., controlled low-strength materials, highway road base and subgrade, soil stabilization, and construction materials) that warrant consideration and, perhaps, development of regulations and standards and specifications at the federal and state levels. In addition, fly ash utilization in the United States is not keeping pace with coal consumption, and federal purchasing of fly ash concrete has decreased 50% since 1996. Although fly ash concrete is a common material used by various federal and state DOTs, these trends are alarming and show that the use of this material needs to be improved. It is important to review existing state regulations, standards, and use practices to provide information that can lead to the adjustment of these barriers.

In 2003, the U.S. Environmental Protection Agency (EPA) announced the Coal Combustion Products Partnership (C^2P^2) program to promote the beneficial use of CCPs and the associated environmental benefits. The participation of EPA is a key element of this effort, as many of its efforts on the federal level filter down to state and local governments. Yet, despite EPA's policy support, CCP use is often dependent on state and local environmental regulations and construction.

OBJECTIVE

The primary objective of this pilot effort was to develop an interdisciplinary team to work with a cooperating state to evaluate regulations and use practices within the state's government and private sectors pertaining to CCP use. The deliverable was to develop a deployment package of a presentation, final report, and other documentation for distribution to the project's advisory board and EPA. This review was intended to be a pilot program that may provide impetus to EPA to perform additional state reviews.

SCOPE

The scope of the pilot review, as identified by the project's advisory board members, was to evaluate the various factors related to CCP utilization. In order to focus the study on current practices, which are most readily transferable, the pilot review highlighted various CCP use practices, including highway construction and building practices, but did not consider the use of CCPs at mine sites, as originally intended by the project's administrative team. This was not to diminish the significance or use of CCPs at mine sites as a high-volume application but to recognize the national regulatory debate on the use of CCPs at mine sites, which is being conducted independently of this review.

PRE-SITE VISIT REVIEW PROCESS

The following tasks were completed prior to the site visit. Tasks are listed in order; however, many tasks were implemented concurrently.

Task 1: Establish an Administrative Team

A project administrative team was established to perform the majority of the administrative work, including organizing the review, compiling findings, and writing reports. Ms. Tera Buckley, Energy & Environmental Research Center (EERC), acted as team leader, and other team members were Ms. Debra Pflughoeft-Hassett, EERC; Mr. John Sager, EPA; and Mr. John Ward, Headwaters Resources.

Task 2: Select a Pilot State

The project's administrative team conducted an extensive evaluation to select the pilot state. The team looked for a pilot state with an existing and successful CCP beneficial use program and infrastructure that allowed good cooperation between industry and state agencies. It was intended that this "model" state could provide information to other states attempting to increase CCP use through examples of successful interaction among all stakeholders. Project administrative team members agreed that the pilot state should be progressive, without being aggressive to the point of exhibiting a model that would be difficult to replicate in other states. The pilot state selected needed to be a realistic prototype. For example, California would not be a good choice because it produces very limited supplies of coal ash and tends to have a reactionary response to environmental issues. Further, it was agreed that the pilot state should be successfully implementing beneficial use policies that can be, in part, assessed by the acceptance of citizen and environmental groups. Finally, the project administrative team agreed that a range of issues should be addressed by the potential pilot state. The range of issues could be represented by the authorized or allowed CCP uses in individual states. Ideally, the potential pilot state would have an established CCP network and demonstrated successful communication between industry and state agencies.

Based on this rationale, the administrative team first determined which states have rules, regulations, or polices authorizing or allowing CCP use (see Figure 1).

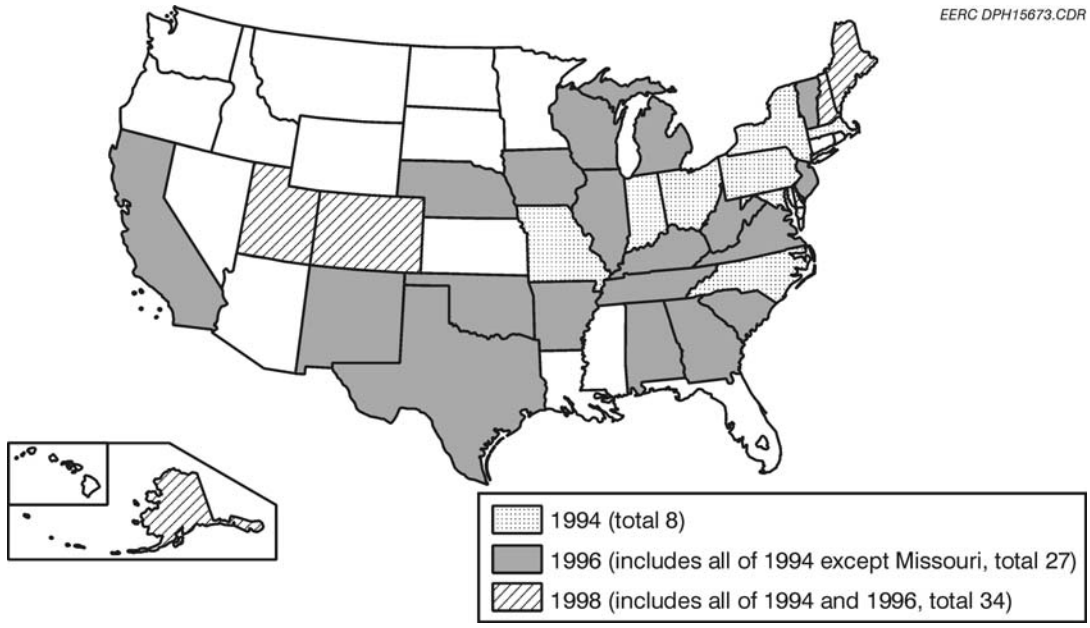

Figure 1. States with laws, regulations, policies, or guidance authorizing CCP utilization.

*Dates note when significant policies were finalized.

Next, input was sought from various groups, including the Association of State and Territorial Solid Waste Management (ASTSWMO) and the American Association of State Highway and Transportation Officials (AASHTO). States that were recommended or volunteered to participate as the pilot state included the following:

- Colorado
- Illinois
- Indiana
- North Dakota
- Ohio
- Pennsylvania
- Texas

These states were further analyzed to determine which beneficial uses were allowed in each state. Table 1 presents CCP use by the potential states summarized from the ACAA's State Solid Waste Regulations Governing the Use of CCPs (ACAA, 1998).

Table 1. State Uses of Coal Ash by State

	IL	IN	ND	OH	PA	CO	TX
Cement/Concrete Products	★	☆	★	★	★	☆	★
Flowable Fill	★	★		★			★
Structural Fill	★	★	☆	★	★		
Road Base/Subbase	★	★	☆	★	★		★
Mineral Filler in Asphalt				★			★
Snow and Ice Control	★	★		★	★		
Roofing Shingles	★			★			★
Blasting Grit				★			★
Grouting				★		☆	★
Mining Applications	★	★	☆	★	★		
Waste Stabilization				★	★		★
Filler in Plastics/Paints/Metals	★			★			★
Mineral Recovery	★	★		★	★		
Soil Amendment	★		☆	★	★		
Ingredient in Product		★		★	★		★
Aggregate				★	★		★
Landfill Cover							
Walking/Driving Surface	★			★			★
Bricks/Ceramics/Insulation				★			★
Artificial Reefs							★
Well Construction						☆	★

★ = Authorized ☆ = Allowed

State Selection Rationale by State

The following is a state-by-state review of the states identified as potential model pilot states. All states under consideration were coal-mining states. To further narrow the pilot state selection, the following criteria were evaluated:

- Public acceptance of state CCP use policy
- Established support network
- Demonstrated ongoing industry, government, and public communication

It should be noted that the state selection process was conducted prior to the project's advisory board revising the scope to exclude mining applications.

Colorado

Colorado, suggested as a potential pilot state by members of the coal ash industry, allows only three use applications and has relatively new use authorization. Because Colorado authorizes very few applications, it was excluded from further consideration, but should be considered as a target state for the information transfer related to this study.

Illinois

Illinois authorizes 11 utilization applications, and those authorizations have been in place since 1996. Illinois has a university actively conducting coal ash-related research. Southern Illinois University at Carbondale and the Illinois Clean Coal Institute regularly fund research related to ash, but Illinois still appears to lack a readily available and coordinated support network from the industry side. However, there is some indication that the Departments of Transportation and Environmental Protection may provide a support network.

Indiana

Indiana allows eight use applications, but the public acceptance of CCP use is not very positive. Indiana's Hoosier Environmental Council is an example of an organization whose actions have had long-term effects on CCP use and public opinion. The Hoosier Environmental Council is an adamant opponent to the use of CCPs, touting numerous cases of CCP ground and surface water contamination and CCP's negative effects on human health. Because the actions of the Hoosier Environmental Council negatively affect public acceptance of CCP use, Indiana is not considered a model pilot state.

North Dakota

North Dakota, considered primarily for EERC logistical reasons, only allows five use applications and, as noted in Figure 1, did not have authorization in 1998, implying that these authorizations are relatively new. North Dakota does not have a track record of productive interaction between the utility industry and the North Dakota Department of Health. The EERC's coal ash research program and support from the North Dakota Industrial Commission have resulted in a large number of CCP utilization-related efforts in North Dakota, yet resistance is noted from regulatory agencies. North Dakota is not a candidate for a model pilot state and should be considered as a target state for the information transfer of the results of this study.

Ohio

Ohio authorizes the most beneficial use applications (18) for coal ash. Ohio State University offers an established coal ash research program with contacts within Ohio, an extension agent focusing on CCP utilization, and support from the Ohio Coal Development Office. Ohio State University's CCP Pilot Extension program works **"**to develop and promote standardized practices and procedures acceptable to private sector end users and government regulators; serves as an information center and coordinates, sponsors, and presents at seminars and similar events; assesses the markets for CCP uses; and conducts many related activities" (CCPOhio, 2004). It has a history of working with industry, government, and the public to remove CCP utilization barriers.

In addition to the positive aspects noted, there are also political issues that have been brought to the forefront recently. These primarily revolve around the Ohio Department of Transportation's (ODOT's) purchasing practices. More than 90% of ODOT's paving work is asphalt, not concrete. The issues for this effort are twofold: 1) fly ash concrete in paving is a key

use application, so ODOT may not be the best source of information on encouraging this use and 2) ODOT representatives may not be open to or available for inquiries on their practices because of upcoming hearings on the issue. While Ohio would otherwise be ranked very high in the selection process, these items could significantly impact the outcome of the state review if Ohio were selected.

Pennsylvania

Pennsylvania was high on the list of potential pilot states because it was identified as having model activity in the development of CCP beneficial use policies as early as the first EERC Barriers Report (Pflughoeft-Hassett et al., 1999). As shown in Figure 1, Pennsylvania already authorized CCP use in 1994 or earlier. Pennsylvania authorizes ten use applications. Pennsylvania has support from ASTSWMO members, but it does not have a documented industry support group. Public acceptance of CCP use in Pennsylvania has been problematic recently in the mining application area. For example, Pennsylvania recently experienced opposition from the public regarding coal ash use to mitigate acid mine drainage. Pennsylvania's state environmental officials and mining companies support the use, but neighbors to the site bitterly oppose the use, fearing the coal ash will leach into the groundwater and contaminate wells (Rubinkam, 2003).

Texas

Texas was high on the list of potential pilot states because it was recognized as having model activity in the development of CCP beneficial use policies as early as the first EERC Barriers Report (Pflughoeft-Hassett et al., 1999). Texas established authorization of CCP use between 1994 and 1996 and is second only to Ohio with the number of authorized uses. With the Texas Coal Ash Utilization Group (TCAUG) and Texas Coal Combustion Products Coalition, Texas has an existing support network that supports coal ash utilization. TCAUG's mission is "to work with and assist public and private agencies, organizations, and associations to remove barriers to environmentally/technically sound utilization of coal combustion by-products." This organization has worked to remove utilization barriers in Texas since it was established and has assembled information on coal ash for Texas regulatory agencies.

EERC State Selection Conclusions

The selection process was easily narrowed to Illinois, Ohio, Pennsylvania, and Texas based on the assembled information. Illinois and Pennsylvania have significantly fewer approved or authorized use applications than Ohio and Texas, so the selection was further narrowed to Ohio and Texas.

In comparing and contrasting Ohio and Texas, Ohio has the advantage of accepting the somewhat controversial uses of CCPs in mining applications, soil amendment, and structural fills. Recent developments in use practices in Ohio may significantly impact the future of CCP use in concrete, a major beneficial use application, and may prohibit a smooth state review process. The project administrative team agreed that with the TCAUG, Texas offered the best support network to facilitate the review process. Anecdotal information indicates that CCP use in

mine settings and soil amendment was recently instituted in Texas. For these reasons, the project team selected Texas as the pilot state for review.

Task 3: Form an Advisory Board

A second team, the project advisory board, was formed to provide input to interviewee selection, assist in the development of a standard questionnaire, and review findings. Advisory board members and associated contact information are listed in Appendix A.

Task 4: Assemble a Review Team

A select group of individuals from the advisory board and administrative team comprised the review team. The primary role of the review team was to administer the meetings at the review. Review team members and associated contact information are listed in Appendix A.

Task 5: Create a Review Guide

Similar review processes including STRONGER (State Review of Oil and Natural Gas Environmental Regulations Inc.) and the Federal Highway Administration's Recycled Aggregate Review were evaluated. Using frameworks developed under these independent reviews, a review guide was developed for Texas that included background information for interviewees and targeted questionnaires for each discussion group (see Appendix B). It became apparent as the interview list began to form that targeted questionnaires were needed for different review sessions because various issues applied to the wide cross section of interviewees. To facilitate appropriate discussions, the following four discussion groups were formed to answer questions posed by the review team:

- Government agencies – directors and other key personnel of state or regional transportation and environmental agencies
- Marketers/end users – CCP marketers and ready-mix suppliers
- CCP generators – utilities/producers of CCPs
- Special interest – environmental and citizen groups, research institutions

The project's administrative team and advisory board members carefully selected questions for each discussion group. All questions are in keeping with the scope of the review defined by the project's advisory board members.

Task 6: Develop a List of Interviewees

With input from the advisory board, the administrative team developed a list of potential interviewees for each of the discussion groups identified in Task 5. Table 2 lists all potential companies/associations/organizations to be reviewed. Key contacts were identified for each of these companies/associations/organizations, and all contacts were asked to participate in the

Table 2. Potential Interviewees

Government Agencies
Texas Commission on Environmental Quality*
Texas Department of Transportation*
Texas Recycling Market Development Board
Marketers
Boral Material Technologies, Inc.*
Headwaters Resources*
Lafarge North America*
Mineral Resource Technologies, Inc.*
End Users
Alamo Concrete Products, Ltd.*
Association of General Contractors of Texas
Austin Energy's Green Building Program
Centex Materials, LLC*
Lattimore Materials Company*
Lone Star Ready Mix
Southern Star Concrete*
Texas Building and Procurement Commission
Texas Concrete and Aggregates Association
Texas Mining & Reclamation Association**
Texas Railroad Commission, Surface Mining and Reclamation Division**
TXI Operations, LP
Transit Mix Concrete
CCP Generators
American Electric Power*
Lower Colorado River Authority*
Sempra Energy Resources
Texas Coal Ash Utilization Group*
Texas Coal Combustion Products Coalition*
TXU Energy Company*
Special Interest
BRIDGES to Sustainability
Neighbors for Neighbors
Potts & Reilly L.L.P.**
Public Citizen–Texas Office**
Rice University
Sierra Club, Lone Star Chapter*
Texas Clean Air Working Group
Texas Transportation Institute, Texas A&M University*
The North American Coal Corporation**

* Participated in the review.

**Accepted invitation but was uninvited once the scope was revised to exclude mining applications.

review. Some declined because their mission did not fit the scope of this effort, and others declined because of scheduling conflicts. The final list of interviewees and associated contact information is located in Appendix C.

Special interest groups were highly debated by the project's advisory board members. After the study's scope was redirected to not include mining applications, several special interest groups originally identified as interviewees were no longer candidates to participate (i.e., Neighbors for Neighbors and Public Citizen).

Task 7: Prepare an Agenda

The review was scheduled for September 13–15, 2004, to coincide with a C^2P^2 Workshop in Austin, Texas, on September 16, 2004. Lloyd Gosselink Blevins Rochelle & Townsend, P.C., in Austin, Texas hosted the interviews, with the exception of Texas Commission on Environmental Quality (TCEQ) and Texas Department of Transportation (TxDOT), which took place at their offices.

The final agenda is included in Appendix C. The open meeting was scheduled on the last day for interviewees not able to attend their scheduled meeting time. In addition, a conference call was held on September 23, 2004, for interviewees who wanted to participate but had scheduling conflicts. Written comments were also accepted.

STATUS OF CCP PRODUCTION AND UTILIZATION IN TEXAS

Texas ranks fifth nationally among states with coal production and is the largest producer of lignite coal. Lignite constitutes approximately 97% of the near-surface coal resources in Texas. The most significant bituminous resources are in the north-central and southern parts of the state. Recoverable coal reserves in Texas are estimated to be 673 million tons, about 3% of U.S. recoverable coal reserves (Railroad Commission of Texas, 2004).

According to ACAA (2003), 121.7 million tons of CCPs were produced in the United States in 2003, and 38% of those materials were used. Texas is the largest consumer of coal in the United States consuming 105,376 short tons in 2003 (Energy Information Administration, 2004) and, consequently, is the largest producer of coal ash (TCAUG, 1994), producing about 15 million tons of coal ash per year, or about 12% of the national total. In fact, 83% of the Texas industrial solid waste stream is made up of coal ash. Currently, 60%–70% of coal ash produced in Texas is beneficially used, up from 15% in 1992. In some instances, Texas utilities are using 100% of the ash they produce and are reclaiming material from their landfills to recycle. Fly ash produced in Texas is exported to Florida, New Mexico, and Georgia. Small amounts are imported from Arizona and Oklahoma.

Figure 2 shows the production and utilization of CCPs in Texas in from 1996–2002 (Akers, 2004a).

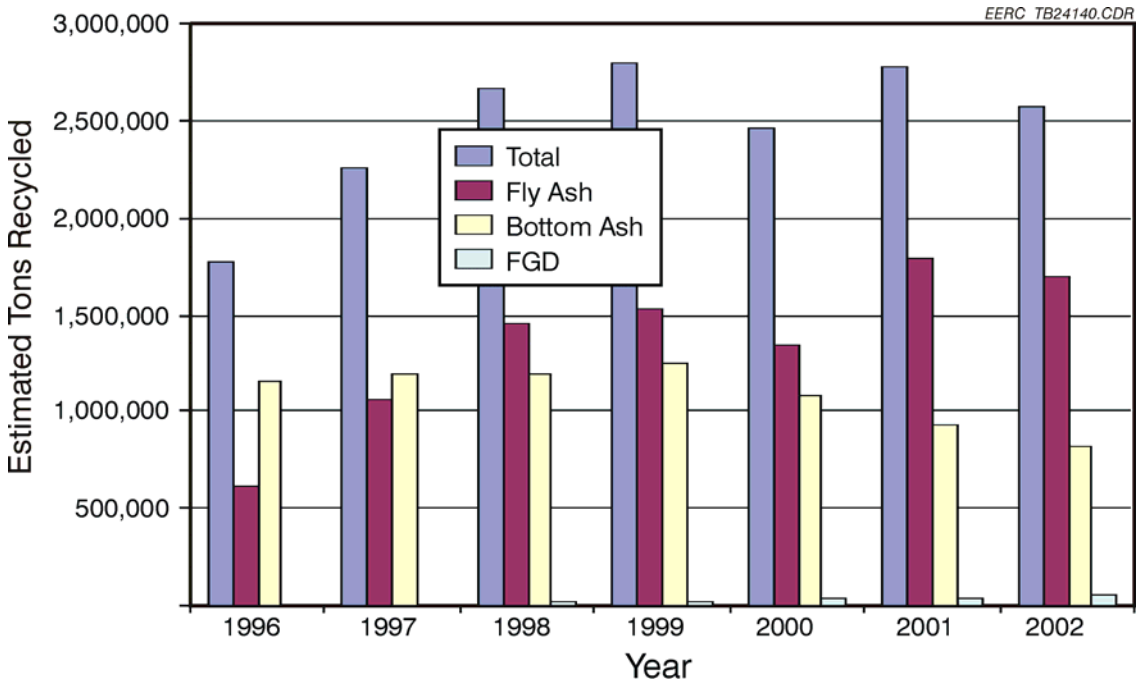

Figure 2. Production and utilization of CCPs in Texas from 1996 to 2002.

KEYS TO SUCCESSFUL CCP UTILIZATION IN TEXAS

The dramatic increase (~55%) in CCP utilization in Texas over the past 10 years can be directly attributed to the following key factors. The authors believe the "keys" are listed in order of importance.

Key 1: Formation and Perseverance of TCAUG

In 1990, the Texas utilities, ash marketers, environmental consultants, and university professors formed TCAUG to promote the use of CCPs and remove the barriers prohibiting utilization, such as deed recording in highway road construction projects. TCAUG was instrumental in getting state legislation passed in 1991 (Senate Bill [SB] 1340) that encouraged recycling and required state and local governments to amend their specifications for road and bridge construction to include CCPs. In 1993, TCAUG was again influential in getting language added to SB 1051 which established the Recycling Market Development Board (RMDB) and charged this body with developing a study to identify economic and regulatory incentives and disincentives for recycling and identifying existing and potential markets for, among other materials, CCPs. As part of SB 1051, the Texas General Land Office (GLO) prepared two market studies entitled "Texas Recycles: Marketing Our Neglected Resources" and "Texas Recycles II: Marketing Our Neglected Resources," to lay the groundwork for strategies to develop and expand recycling industries and markets in Texas (Akers, 2004b).

The GLO report issued in 1994 identified regulatory barriers at the Texas Natural Resources Conservation Commission (TNRCC) (predecessor agency to TCEQ) as one of the major impediments to increased CCP utilization. As a result, the TNRCC, GLO, TCAUG, and TxDOT formed a task force to study the issue. TCAUG hired EPRI to present technical information to the task force, and Texas university professors provided case studies where CCPs were used successfully. The result of this cumulative effort was an issuance of a coproduct regulatory guidance letter in 1995 by the TNRCC that recognized that CCPs utilized in many construction applications could be best accomplished if the materials were not considered a solid waste (see Appendix D). With this letter, recycling of CCPs in Texas began to increase substantially (Akers, 2004b).

Finally in 2001, TCEQ formed a working group to meet with TCAUG to draft an agency rule that would convert the 1995 guidance letter into an agency rule. This effort took several months of negotiation and drafting and ultimately produced what is commonly referred to as the "Eight Waste Criteria Rule" (30 Texas Administrative Code [TAC] Chapter 335) (Akers, 2004b).

The collaborative effort between TCAUG, TCEQ, TxDOT, and the GLO resulted in proactive regulations that cleared the way for coal ash recycling in Texas. TCAUG used a push–pull strategy in its approach, by consulting many levels at each of the state agencies. In addition, TCAUG presented one universal voice from industry to state agencies. TCAUG attributes its success to these strategies and its tenacity over a 10-year period.

Key 2: Proactive Regulatory Developments in Texas

TCEQ is the second largest environmental agency in the world, second only to EPA. TCEQ 1) regulates the disposal of solid waste; 2) enforces prohibitions against unauthorized discharges of contaminants to any water in the state; 3) enforces prohibitions against unauthorized emissions of air contaminants or activities that contribute to or that cause air pollution; and 4) promotes waste minimization and pollution prevention activities throughout the state of Texas.

Under previous TCEQ regulations, a facility that provided written notification of a particular beneficial use was not required to provide additional notification. In some cases, numerous uses were recognized by the state as the result of research presented by industry groups (see Appendix D) or individual companies. Those approved uses are still valid under current regulations.

In an effort to develop a single beneficial use rule for solid wastes, TCAUG and a similar association from the steel industry approached TCEQ to revise its solid waste rules. It was decided that taking a statewide approach would be the most effective way to get a solid waste rule approved that applied to a number of industries. As a result of these efforts, the following proactive regulation was adopted by TCEQ.

Amendment to 30 TAC Chapter 335 – Industrial Solid Waste and Municipal Wastes

Proposed on October 27, 2000, and adopted on April 20, 2001, the amendment to TAC Title 30 Chapter 335, commonly referred to in Texas as the "eight-waste criteria rule" but through rulemaking became a seven-waste criteria rule, was perhaps the most influential rule that opened the doors for coal ash use in Texas by omitting utilized CCPs from the state's definition of solid waste so long as the material continues to meet all of the following criteria:

1. A legitimate market exists for the recycling material as well as its products.

2. The recycling material is managed and protected from loss, as would be raw materials or ingredients or products.

3. The quality of the product is not degraded by substitution of raw material or product with the recycling material.

4. The use of the recycling material is an ordinary use, and it meets or exceeds the specifications of the product it is replacing without treatment or reclamation. Or if the recycling material is not replacing a product, the recycling material is a legitimate ingredient in a production process and meets or exceeds raw material specifications without treatment or reclamation (note: treatment may impact future flue gas desulfurization (FGD) utilization; this is in another section of the report).

5. The recycling material is not burned for energy recovery, used to produce a fuel, or contained in a fuel.

6. The recycling material is a legitimate ingredient in a production process and meets or exceeds raw material specifications without treatment or reclamation.

7. The recycling material must not present an increased risk to human health, the environment, or waters of the state when applied to the land or used in products which are applied to the land (Akers, 2004a).

The rule (30 TAC 335.1 Subchapter R) classifies industrial solid wastes into the following three categories:

- Class I – Any industrial waste that is toxic; corrosive; flammable; a strong sensitizer or irritant; a generator of sudden pressure by decomposition, heat, or other means; or may pose a substantial present or potential danger to human health or the environment. Besides nominal exceptions, CCPs produced in Texas are not categorized as Class I wastes.

- Class II – Any industrial waste which cannot be described as hazardous under Class I or does not meet the criteria for Class III. The majority of CCPs produced in Texas are categorized as Class II wastes.

- Class III – Inert and essentially insoluble industrial waste. Some bottom ashes produced in Texas are categorized as Class III and are, therefore, not subject to the TCEQ's eight-waste criteria rule.

TCEQ's classification is a self-classification system, meaning utilities classify their own materials. Data generated by the utility to classify its materials are subject to TCEQ audit. The vast majority of CCPs produced in Texas are exempt from solid waste classification. As a result, CCPs are able to compete in the marketplace like any other raw or manufactured material. No permits or prior approvals are required as long as the CCPs meet the eight-waste criteria rule.

If CCPs are stored or disposed as wastes, the General Prohibitions in 30 TAC 335.4 apply along with other solid waste regulations in Chapter 335. All wastes must be properly tested and classified (30 TAC 335.503). All wastes disposed of must be deed-recorded (30 TAC 335.5), and related waste management units must be listed on the facility Notice of Registration. Technical guidelines (30 TAC 335.3) provide the basis for proper siting and design of landfills. The TCEQ requires groundwater monitoring for landfills and surface impoundments.

Key 3: Legislative Provisions

The Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901 et seq., and its state counterparts regulate the generation, storage, treatment, and disposal of hazardous wastes. Section 3001(b)(3)(A)(i) of RCRA, the Bevill Exemption, excluded certain large-volume wastes, including CCPs, from regulation under Subtitle C as hazardous wastes. EPA is currently drafting regulations under Subtitle D of RCRA (nonhazardous solid wastes) for CCPs disposed of in landfills or surface impoundments. The need for and scope of RCRA regulation of CCPs used as fill in surface or underground mines are still being evaluated.

The majority of state requirements regarding CCPs are designed to regulate disposal. A few states have adopted laws governing CCP use, but requirements vary widely among states. Applications for permission to use CCPs are frequently handled on a case-by-case basis or under generic state recycling regulations. States that do specify acceptable use applications for CCPs are the states where the most progress has been made regarding ash utilization. The Texas legislature adopted the following three provisions that drastically impacted coal ash utilization in Texas.

Texas Water Code 26.12 – Unauthorized Discharges Prohibited

Texas has a prohibition in its Texas Water Code (TWC) 26.121 that allows TCEQ to take corrective action if any action (e.g. the use of a product like CCPs) harms the waters of the state. The law states that no person may discharge waste that causes pollution of any water in the state. Corrective action is taken in the enforcement of the prohibition.

SB 1340 – CCP Use in Road and Bridge Construction

Texas SB 1340 was passed in 1991 to encourage recycling and the use of recycled products, with the objective to minimize the landfilling or incineration of solid wastes. One of the waste streams cited for minimization in this bill is "fossil fuel combustion recycled material"

(Section 15) or, herein, CCPs. The bill required that state, county, and municipal entities amend their specifications by January 1, 1992, to allow CCP use in road and bridge construction if technically appropriate and economically justified (TCAUG, 1994).

SB 1051 – Establishment of the Recycling Market Development Board

Texas SB 1051 was passed in 1993 and established the RMDB, which consists of heads of the TCEQ, Texas Building and Procurement Commission (TBPC), and TxDOT. The board was charged with coordinating the recycling activities of all state agencies and pursuing an economic development strategy that focuses on the state's waste management priorities and development of recycling industries and markets (RMDB, 2004). RMDB efforts regarding CCPs are primarily focused on fly ash use in concrete.

Key 4: Newly Adopted TxDOT Specifications

TxDOT's role is to write specifications for construction defining how CCPs are to be incorporated into TxDOT projects. TxDOT was one of the last state agencies to adopt coal ash specifications, adopting its rules in August 2004. Until that time, TxDOT granted special specifications and provisions on a district and statewide basis. From 1982 to 1996, TxDOT only incorporated CCPs into 41 roadway applications (Year of the Recycled Roadway Materials, 1999). However, a dramatic increase in fly ash utilization was observed once TxDOT made the materials use a priority. Since January 1996, TxDOT used fly ash in approximately 2600 projects. In 8 months of 2004, it used fly ash in about 80 projects.

The coal ash industry generally agrees that once TxDOT decided to write specifications, it adopted specifications that helped incorporate CCPs into more TxDOT projects. However, there was some concern from industry regarding TxDOT's specification of a minimum of 20% fly ash and maximum of 35% fly ash use in concrete. Some in the coal ash industry would like TxDOT to move toward adopting more performance-based specifications. There were also some reservations from industry about TxDOT allowing its specifications to be used at the discretion of its 25 district engineers. TxDOT believes this approach is effective because each district has its own issues that need to be addressed on an individual, case-by-case basis.

DMS-4610 – Fly Ash

This product qualification specification was revised in August 2004 (formally DMS-8900) and establishes the requirements, test methods, and the Fly Ash Quality Monitoring Program (FAQMP) for Class C, Class F, and ultrafine fly ash used in concrete products.

TxDOT has a prequalified list of suppliers of 35 Class C and Class F fly ashes. TxDOT accepts the product suppliers' certifications of fly ash quality; however, it does reserve the right to conduct random sampling of prequalified materials for testing and to perform random audits of test reports.

DMS-4615 – Fly Ash for Soil Treatment

This product qualification specification was adopted in August 2004 and establishes the requirements and test methods for Class C and Class F fly ash used in subgrade or base treatment. It also describes the FAQMP.

DMS-11000 – Evaluating and Using Nonhazardous Recyclable Materials

This specification was adopted in August 2004 and covers the process for evaluating the environmental factors associated with nonhazardous recyclable materials (NRM) not addressed in other department specifications. Fly and bottom ash are considered NRMs because they have established histories of use by the TxDOT.

Product Application Specifications and Special Provisions

TxDOT adopted several product application specifications in June 2004 allowing CCP use. Some of those applications include the following:

- Item 247 – Flexible Base
- Item 265 – Fly Ash or Lime–Fly Ash Treatment (Road-Mixed)
- Item 334 – Hot-Mix Coal-Laid Asphalt Concrete Pavement
- Item 341 – Dense-Graded Hot-Mix Asphalt (QC/QA)
- Item 344 – Performance-Designed Mixtures
- Item 346 – Stone-Matrix Asphalt
- Item 401 – Flowable Backfill
- Item 421 – Hydraulic Cement Concrete

In addition, TxDOT issued special specifications and provisions for CCP use including the following:

- Special Specification 3157 – Cold Processed – Recycled Paving Material for Use as Aggregate Base Course (1993)

- Special Provision to Item 421 Portland Cement Concrete (1993)

Key 5: Strong Building Industry Coupled with Green Building Initiatives

According to the U.S. Census (2004), Texas populations in 1980, 1990, and 2000 were 14,229,000, 16,986,000, and 20,852,000, respectively. Overall construction activity in Texas was low in the 1990s, but as the recession lifted, the construction industry flourished. The cement shortage and building boom in the 1990s helped make fly ash concrete widely accepted throughout the state. In addition, the state has a long construction cycle because of its warm climate, which in turn abates long-term fly ash storage issues.

Coupled with the strong building industry and demand for building materials such as concrete, the state is rather progressive with regard to green building. Austin is leading the green

building movement in Texas with its Austin Energy Green Building program. The city wanted to promote energy conservation, and thus the green building movement was born. Austin offers incentives such as rebates for energy conservation in buildings and technical support to those wanting to build green. In addition, the U.S. Green Building Council's LEED (Leadership in Energy & Environmental Design) program is gaining popularity in the state. Texas has 55 registered LEED projects and ranks ninth in the country for the number of LEED-accredited projects (Folliard, 2004). The LEED program encourages CCP recycling by offering points for products containing recycled materials. It has become a benchmark for sustainability, and 18 of LEED's 69 possible assessment points are related to concrete.

Key 6: Texas Utilities Generally Produce Good-Quality Fly Ash

Quality requirements for fly ash vary from state-to-state depending on the intended use. Fly ash quality is affected by fuel type and various aspects of the combustion and emission control processes. Texas utilities primarily burn Powder River Basin (PRB) subbituminous and Texas lignite coals, which generally produce high-quality Class C and Class F fly ashes appropriate for use in concrete. By producing a consistent, high-quality product, Texas has been able to develop a mature fly ash concrete market in most areas of the state. However, as the state implements the federal government's pollution control requirements, the quality of the fly ash, particularly those produced from burning Texas lignite, may be negatively impacted and may no longer be suitable for use in certain applications.

Key 7: Development of Statewide Online Recycling Resources

TxDOT and TCEQ developed the following programs online recycling resources that promote the use of recycled materials, including CCPs. These resources demonstrate the agencies' willingness to promote CCPs as a recycled material.

- TxDOT's Road to Recycling Initiative – In 1999, TxDOT highlighted CCPs in its "Year of the Road to Recycling" campaign. The campaign included the development of a 46-page CCP summary document that includes a material overview, research summaries, case studies, a list of TxDOT specifications currently allowing use of CCPs, material sources, and a summary of TxDOT experience with the material (www.dot.state.tx.us/gsd/recycle/mat.htm).

- TCEQ's Resource Exchange Network for Eliminating Wastes (RENEW) – This network assists industries and business to market their surplus materials and by-products to other areas (www.renewtx.org).

- TCEQ's Recycle Texas Online – This database allows companies who handle recycled materials to post product information (www.tnrcc.state.tx.us/exec/sbea /rtol/).

REPORTED BARRIERS TO INCREASING CCP UTILIZATION IN TEXAS

The following barriers were identified during the Texas state review process. The authors believe the barriers are listed in order of significance.

Barrier 1: Education and Attitude

Attitude and education were mentioned as key barriers by virtually all of the utilities, ash marketers, and ready-mix producers interviewed. Ignorance or unwarranted negative feelings toward CCPs were cited among district and local highway personnel, architects, engineers, and contactors. The lack of education can be attributed to the fact that engineers coming out of college receive, on average, less than 18 hours of concrete training in their materials class. In those 18 hours, CCPs are briefly mentioned, and professors often reference old data. It was suggested that negative feelings could often be attributed to one bad experience using the material. In most instances, if CCPs were used in a project that failed, the CCPs were typically blamed for the failure even if CCPs were not the cause. This reaction typically occurs when users are not educated about the material. Negative feelings and lack of education are interconnected and can have detrimental impacts on coal ash use. For example, at one time, the Austin concrete market almost turned to an all-cement market because of one misuse resulting from a lack of education about the material. However, TxDOT did cite instances where CCPs were initially blamed for a failure, and TxDOT's laboratory subsequently confirmed the correct reason for the failure. These types of corrections are imperative to overcoming education and attitude barriers.

During the review, TxDOT did note that it was interested in increasing education efforts among district offices because large variations of use were noted between offices. This could be because highway personnel tend to be more familiar with lime and cement and, therefore, use these materials more often. TxDOT and the Federal Highway Administration (FHWA) influence local offices by setting specifications and offering technical assistance as requested. TxDOT and FHWA have conducted demonstration projects and made the results available to local offices. TxDOT and FHWA also perform outreach activities such as technical presentations and host annual short courses for local offices. Educational tools used by FHWA include its "Fly Ash Facts for Highway Engineers" manual and "User Guidelines for Waste and Byproduct Materials in Pavement Construction" located online at www.rmrc.unh.edu/Partners/UserGuide/begin.htm.

A contradictory statement regarding education was heard between ash marketers and ready-mix producers. The ash marketers stated that ready-mix producers themselves were sometimes a barrier, but the ready-mix producers interviewed appeared to have a technical knowledgebase on proper CCP use and stated they did not require technical support from their ash marketers.

Individual conflicts among architects, engineers, and contractors are where ash marketers and ready-mix producers are making the most progress in overcoming attitude and education barriers. Ready-mix producers, in particular, feel this group is easier to approach than municipalities and state agencies. An effective method used by ready-mix producers to get fly ash concrete incorporated into a project is to hold a joint meeting with the architect, engineer, contractor, and buyer and describe the economic, performance, and environmental benefits of using the material. One ready-mix producer even goes as far as to say that decision makers have

an ethical obligation to use fly ash concrete because it reduces CO_2 emissions. At this meeting, decision makers should describe how they want the concrete to perform, and the ready-mix producer will design a mix to meet those performance specifications.

Barrier 2: Consistency of Supply

Recently, plants burning lignite coals are beginning to blend lignite with western coals. Plants burning predominantly lignite coals generally produce Class F ash, and those burning predominantly western coals produce Class C ash. Both generally produce high-quality ashes appropriate for use in concrete, but consistency varies from plant to plant.

CCP generators and ash marketers each have stringent quality assurance/quality control (QA/QC) protocols, yet TxDOT and ready-mix producers indicated that fly ash storage is limited and the quality on a truck-by-truck basis is inconsistent. If there is a change on the combustion side, there is a resulting change in ash quality, making it difficult to produce a consistent product. In addition, TxDOT noted instances when fly ash was specified for a project but was not available. The limited storage capacity could be attributed to the fact that Texas has a long construction cycle and typically sells ash as it is produced.

A blended ash (Class C and Class F) may alleviate these issues. Marketers and ready-mix producers said they were pursuing the possibility of producing a blended ash and expect one to enter the marketplace in the next 18 months.

Barrier 3: Liability

Liability was a prevailing word mentioned in all of the review sessions. By classifying CCPs as products, the material has the same advantages as all other recycled materials. However, liability lies primarily with generators and users because generators assume the responsibility of classifying the material in accordance with 30 TAC 335.4 Subchapter R and users take on the liability of using the material properly.

TCEQ tends to be more risk tolerant than other state environmental agencies because it has a rule in place that allows it to take corrective action if waters of the state are harmed (see Texas Water Code § 26.121 page 13). This law moves the liability from TCEQ to the persons responsible for using the material.

In certain applications (i.e., remediation activities), liability concerns are more prevalent than others. CCP generators will not allow their by-products to be sold for applications they do not approve of because of liability. If someone misuses their product, they fear they will be liable for cleanup costs and damages. These fears are warranted because there have been cases in Texas where builders were awarded “future damages” in cases where the material may have been misused.

Barrier 4: Limited Markets for FGD Material and Bottom Ash

The fly ash concrete market in Texas is mature; however, FGD material and bottom ash are not fully utilized. Bottom ash competes with the state's abundant natural resources (i.e., sand, gravel, aggregates), and because of transportation costs, bottom ash is often more expensive than natural resources. West Texas is an exception because it does not have an abundance of these resources. The presence of pyrite in bottom ash also limits the potential for beneficial use. Marketing bottom ash for some applications requires process changes to prevent pyrites from being intermingled with bottom ash. Bottom ash is used for structural fill on a limited basis, but this application is not as widely accepted in Texas because the use constitutes disposal. Some bottom ash is also used in clay brick manufacturing and other commercial products. It is estimated that 25% of CCPs produced in Texas are FGD materials. There is an effort under way on the combustion side of utilities to make wallboard-ready FGD gypsum (lower moisture and chloride contents). However, TCEQ's eight-waste criteria rule prohibits any treatment of recycled materials. This stipulation could dramatically impact the use of FGD material if, for instance, the chlorides in the material have to be removed to make the material suitable for wallboard. Removing the chlorides is a simple process but could be interpreted by TCEQ as treatment, thereby preventing the material from being recycled under the exemption.

Barrier 5: Transportation and Infrastructure Issues

Transportation costs are often the deciding factor to use CCPs in a potential project. Power plants are located in areas that are not heavily populated, so transportation is necessary to get CCPs to major markets. Some utilities also have poor infrastructure, making it difficult to transport their material by anything other than trucks. In many instances, it is simply not economical to use CCPs. For example, in the case of using CCPs in road building, it is not economically advantageous to use CCPs if the ash has to be hauled a long distance.

In some remote areas of Texas, fly ash is not available through small local ready-mix suppliers. Ready-mix producers interviewed were large-volume producers and did state that it is not economically feasible for some smaller producers to have a fly ash silo.

Barrier 6: Local and Abundant Asphalt Supply

Texas leads the United States in on-shore oil and natural gas production and, therefore, has a plentiful supply of asphalt. According to the National Asphalt Association (NAA) (2004), about 94% of the nation's roads and highways are surfaced with asphalt. NAA also concludes that numerous studies within the United States and Europe have shown that asphalt pavements generally have a lower life cycle cost than concrete. Conversely, ready-mix producers in Texas agree that although asphalt has a lower initial cost, it has a longer life cycle cost because asphalt has to be replaced more often than concrete. Regardless of cost, Texas has an abundant and local supply of asphalt, and its big oil industry promotes the use of asphalt paving in Texas.

POTENTIAL THREATS THAT COULD IMPACT FUTURE CCP UTILIZATION IN TEXAS

Texas currently has a thriving coal ash industry, but several potential threats were identified during the review that could hinder the future of CCP utilization in Texas. Based on review discussions, the authors believe the following threats are listed in order of importance.

Threat 1: New Pollution Control Requirements

The U.S. electric utility industry has been addressing air emission issues for many years, and the coal-fired power plants in Texas are no exception. When federal regulation requires reduction of various air emissions, power plants have necessarily responded. The responses frequently have had a subsequent impact to the type, quantity, and quality of the solid materials produced at a specific power plant. One example of these types of impacts is the requirement to reduce sulfur dioxide emissions, which has primarily been accomplished through installations of FGD systems. These FGD systems generally produce a high-volume CCP, but the quality and characteristics of the product are dependent on the specific system. More recently, many coal-fired power plants have had to reduce nitrogen oxide (NO_x) emissions, and a variety of NO_x control technologies have been implemented across the United States. It was noted that several Texas power plants that previously produced a high-quality ash currently produce a fly ash with a noticeable decline in quality, namely, the presence of unburned carbon at varying levels. Typical of the broader U.S. experience, the fly ash exhibiting increased levels of unburned carbon inhibits the production of concrete with the air entrainment needed to produce concrete that performs well under freeze–thaw conditions. Plants burning subbituminous coal have not exhibited an increase in unburned carbon even where NO_x reduction strategies have been implemented, but plants burning Texas lignite have had varied results. Already, the reduced supply of quality fly ash has been noted as a threat to inclusion in TxDOT projects where high volumes of consistent fly ash are needed over the duration of large, long-term projects.

Potential threats to the quality and quantity of fly ash available in Texas include the implementation of controls for mercury emissions. While the technologies for each of these types of controls are still in development and demonstration phases, the utility industry indicated some concerns about how the installation of these new technologies will impact the Texas CCP markets, especially the fly ash market for concrete. Typical demonstration-scale mercury emission controls incorporate the addition of an activated carbon sorbent to collect mercury present in flue gases. If this activated carbon is combined with the fly ash at a power plant, it is expected to result in an even greater impact to the quality of the fly ash as it relates to concrete use with similar technical issues as noted above. It should be noted, however, that there are mercury capture technologies that do not use activated carbon. In many mercury control technology scenarios, various CCP streams will have increased concentrations of mercury. Questions regarding whether this material will continue to meet the TCEQ's exemption criteria and the ultimate fate and transport of entrained contaminants will need to be addressed.

Threat 2: Ability to Retain Institutional Knowledge at TCEQ and TxDOT

It may be difficult for TCEQ and TxDOT to retain institutional knowledge of CCPs as staff is turned over. TCEQ's rules, in particular, are subjective in their interpretation, and TCAUG worries that regulations may be interpreted differently by new staff who are not as educated on CCP issues as the current staff. Unless a specific rule is adopted, staff knowledge and acceptance of the benefits from these materials may be lost when staff turnover occurs. Reeducation may be required in the future.

Threat 3: Class C vs. Class F Issues Related to ASR

Classifications (Class C vs. Class F) play a large role in the ability to use fly ash for concrete applications. Sulfate attack has significantly reduced the use of Class C fly ash as a portland cement replacement in Texas concrete. Last year, a Texas ready-mix supplier switched to all Class F fly ash because of alkali silica reactivity (ASR) issues. Class C fly ash is no longer being used in areas of Texas that have sulfate-rich soils. However, it is important to note that, in some cases, more Class C ash may mitigate ASR. For example, a 10%–15% use of Class C can pass American Society for Testing and Materials (ASTM) C618 requirements for sulfate resistance. A 1997 study also indicated that the use of Class C fly ash, rather than contributing to ASR, actually reduces ASR to acceptable levels when using high-alkali cements (Styron, 1997).

Threat 4: EPA Could Reconsider Its RCRA Determination

Additional pressure from special interest groups and studies evaluating the health effects of coal ash utilization could prompt EPA to reconsider its RCRA determination of CCP classification as nonhazardous wastes. EPA's active Deputy Administrator stated, "If the states and industry do not take steps to address these wastes adequately in a reasonable amount of time or if EPA identifies additional risks to public health, EPA will revisit this decision to determine whether a hazardous waste approached is needed" (Schimmoller, 2000).

ROAD MAP TO INCREASED CCP UTILIZATION IN TEXAS

The following activities were suggested during the reviews as actions that would help increase CCP utilization in Texas. The proposed actions are to be implemented by a variety of CCP players, including governments at the federal, state, and local level; utilities; ash marketers; ready-mix producers; academia; and industry groups. The suggested actions were generated by interviewees and are listed in order of significance.

Action 1: Adopt Performance-Based Concrete Specifications

Texas ready-mix producers indicated a strong need to develop performance-based concrete specifications, rather than having material-based specifications that do not consider performance.

Initiatives on the federal, state, and local level will be required to adopt performance-based concrete specifications. Federal entities such as AASHTO and ASTM, as well as private and

government entities, must first demonstrate the long-term substantiality of concrete developed according to performance specifications. Following the demonstrations, an education process from industry to government will need to be initiated.

Action 2: Develop Profitable Markets for FGD Material and Bottom Ash That Consider Transportation Costs

The fly ash market is well developed in Texas, but FGD material and bottom ash are underutilized. Ash marketers find it difficult to find profitable markets for these materials considering the transportation costs involved with getting the material to the end user. The cost to transport bottom ash to markets it often cost-prohibitive because bottom ash has to compete with locally available natural resources. In addition, FGD material has numerous handling issues that can be costly. Wet FGD has a moisture content from 30% to 60%, thus requiring the transportation of water along with solid particles. To alleviate this issue, the moisture content at the time of transport should be minimized.

One way to resolve transportation issues is for manufacturing facilities (i.e., bricks, aggregate, wallboard) that use CCPs as a primary raw material to locate manufacturing facilities in close proximity to the power plant. This practice is conducted in Texas on a limited basis. During the reviews, it was suggested that C^2P^2 could help identify markets where bottom ash and FGD material could be used as raw materials to manufacture products.

Action 3: Exempt Beneficial Reuse from Federal Toxic Release Inventory (TRI) Reporting

During the review, the question was raised, "Why do you have to report beneficial uses of CCPs as 'releases to land' under federal TRI?" It was suggested that TRI should exempt beneficially reused material and only require reporting of material that is sent to a disposal site. EPA offers site-specific exemptions but said that in order to get an exemption for all utilities, there would have to be a large test case from a large utility with support from industry groups such as ACAA. Some industry representatives interviewed believe this change is necessary because some definitions of release contradict the goals of C^2P^2. In addition, TRI reporting takes considerable effort, and this change would be an incentive for the power plant manager to reuse more material.

Action 4: Change How the Material Is Perceived

CCPs can be defined using a variety of terms, such as coal combustion and utilization by-products, coal combustion wastes, or just simply coal ash. The industry debates that since utilities are not in business to produce coal ash (a product), then coal ash must be considered a by-product. Others proclaim that if a material is used or recycled, then it must be a product. Conversely, others believe that the material should be termed a waste, no matter whether it is disposed of or beneficially utilized. Nevertheless, the names "by-product" and "waste" have powerful effects on consumers. TCEQ was able to develop a rule that puts CCPs in the same category as other recycled materials such as plastic, aluminum, and paper by defining any reused CCP as a product. However, there are situations in Texas where the material, whether it is reused

or disposed of, is still perceived of as a waste. If the industry as a whole could change how legislative bodies perceive coal ash, it could put coal ash on the same platform as other recycled materials.

Action 5: Build Off of LEED's Success

The LEED program has been successful in the United States by simply defining what it means to "build green" and by offering recognition to those who build green. It was suggested that the coal ash industry should develop a similar program led by FHWA which defines what is means to build green roads and offer recognition to those who do it successfully. Some interviewed believe that to build green roads, the contractor must use every "environmentally friendly" source available, while considering the performance specifications and economics.

It was further suggested that the current LEED system does not favor the use of fly ash in concrete from a percent content standpoint. The ready-mix producers noted several projects that were LEED certified that did not use fly ash as portland cement replacements in the concrete. In addition, a popular green building conference held in Austin did not address coal ash. Ready-mix producers do not understand why LEED does not say that concrete must contain fly ash. To address these issues, it was suggested that there should be a coal ash voice in the LEED program, perhaps the American Concrete Institute or ACAA.

Action 6: Promote Industry Successes Outside of the CCP Industry

The Texas coal industry has an abundance of success stories, so many, in fact, that many groups interviewed did not identify any particular success stories. Large-scale, high-profile success stories noted in a document provided by TCAUG (Akers, 2004a) include the following:

- The City of San Antonio's new multipurpose sports and convention arena (Alamo Dome) was constructed using more than 6000 tons of fly ash as a substitute for portland cement in structural concrete. Construction was completed in 1993.

- The Lower Colorado River Authority's (LCRA's) new headquarters as built in 1992 and included 20% direct replacement of portland cement in construction concrete.

- Fly ash was used to replace portland cement in concrete during the construction of the Hemisfair Arena Parking Garage in San Antonio.

- About 2300 tons of fly ash concrete was used to construct the River Center Marriott Hotel, located on the Riverwalk in San Antonio.

- Fly ash (7200 tons) was used as a direct replacement for portland cement for the construction of taxiways for the San Antonio International Airport. An additional 600 tons of fly ash was used to backfill the open trench around the drainage culvert.

- Direct replacement of portland cement with fly ash in concrete was used to construct several roadways in Texas, including State Highway 71 and Dallas Central Expressway.

- The 10,475-foot-long cable-stayed bridge over the Houston Ship Channel will be constructed using 8000 tons of fly ash. The use of Class F fly ash will reduce the cost of the concrete and improve the workability and sulfate resistance of the finished product.

- Fly ash and FGD gypsum were used in Harris County to form a solid roadbase for street repairs.

- Other noteworthy projects include the use of 12,100 yd^3 of CCP pellets to stabilize reef substrate and enable attachment of oyster spat by Reliant Energy, the Port of Houston Authority, and the National Marine Fisheries Service

Promoting successes should go beyond successful utilization projects. The overall benefits associated with CCP use should also be promoted, including decrease in the demand for landfill space, conservation of natural resources, reduced carbon dioxide emissions, economic savings for end users, reduced overall cost of generating electricity, and production of better products.

Success may be commonplace to those intimately involved with coal ash in Texas, but there are audiences that have not heard the message yet. The green building movement in Texas has helped to promote successes outside of the immediate coal ash industry; however, more can be done to reach other audiences.

Federal programs are doing more to promote the industry's successes. For example, EPA's C^2P^2 program plans to highlight successful case studies online and reward the industry for its achievements in promoting, using, and researching CCPs. The C^2P^2 program strives to bring the industry together to reduce barriers and promote increased CCP use.

Action 7: Produce a Hybrid Blended Fly Ash

Texas has experienced issues with Class C fly ash causing ASR; thus the product cannot be marketed to the concrete industry. Interviewees said that, within the next 18 months, it is anticipated that a hybrid ash will be introduced into the marketplace that will not meet ASTM C618 but will be sold as a performance-based concrete admixture. There may be acceptance issues, particularly by TxDOT, with regard to using a hybrid blended ash. It is not known yet if the new material will be accepted in the marketplace.

Action 8: Develop Markets for Low-Quality Fly Ash

As the quality of fly ash produced declines as a result of new emission control technologies, new markets need to be developed that use lower-quality CCPs. It was suggested that high-volume, low-quality markets such as flowable fill should be pursued.

Action 9: Provide Economic Incentives for Using Recycled Materials

The environmental benefits of utilizing CCPs are well known, but perhaps more could be done to promote using recycled materials. It was suggested that end users could receive emission credits for using fly ash as a partial replacement for portland cement because by using fly ash,

the user is preventing CO_2 emission from cement production. During the review, the consensus was that economic incentives would need to be subsidized by the federal government. However, one might argue that state governments can and should provide such economic incentives on their own. Montana already provides such tax incentives. If California can restrict CO_2 emissions in the absence of federal mandates, then it follows that states can also provide tax incentives in the absence of federal action (Aljoe, 2004).

TRANSFERRING THE INFORMATION FROM THE TEXAS EXPERIENCE TO OTHER STATES

With the information gained from the review of CCP stakeholders in Texas, it is reasonable to initiate a description of how the successes in Texas may be translated to other states. Preliminary recommendations can be made, understanding that the following caveats hold true in Texas and may not be true in other states:

- Texas experienced a building boom in the 1990s, helping to make fly ash concrete widely accepted throughout the state. In addition, the state has a long construction cycle because of its warm climate, which, in turn, abates long-term fly ash storage issues.

- CCPs can be recycled as long as the application does not present an increased risk to human health, the environment, or waters of the state when applied to land or used in products applied to the land. Texas has regulations in place that require remediation of activities, including CCP utilization, where damage to waters of the state has occurred.

- A relatively large number of coal-fired power plants in Texas produce good-quality CCPs.

Actions that were noted as key to successful CCP utilization in Texas that may translate to other states are summarized as follows:

- The formation of a CCP industry group provides a forum for industry to work together to educate government agencies, potential users, and other CCP stakeholders. The CCP industry group can seek and coordinate with other state industry groups working on recycled material issues.

- The CCP industry group can develop a comprehensive guide to beneficial uses for CCPs within the state and use the guide to educate both the environmental and transportation departments to initiate the development of environmental regulations and transportation specifications that promote the beneficial use of CCPs.

- The CCP industry can support demonstration projects to develop the type of technical information that government agencies identify as necessary for CCP use to move from the demonstration to the commercial phase.

The actions noted require commitment and leadership by the CCP industry. It is less likely that a state environmental department will take the initiative to develop approvals, policies, or regulations to facilitate CCP utilization without the impetus of an industry-sponsored effort to bring the opportunity of CCP utilization to the attention of the agency. DOTs may be more assertive in evaluating applications that incorporate CCPs because of the potential for improved performance and cost savings, but industry participation and support in these potential DOT efforts are likely to guarantee successful projects and experience from which DOT representatives can draw upon to develop specifications.

The reviewers can make the following recommendations to environmental and transportation officials in states where CCPs are underutilized:

- Review the environmental regulations governing recycled materials that are currently in place in Texas.

- Evaluate the types of CCP applications allowed by TxDOT and the TxDOT specifications for CCPs.

- Refer to the Fly Ash Facts for Highway Engineers published by FHWA for information on transportation-related applications for CCPs.

- Relay questions on CCP utilization to local or national industry groups or a university-based research group that specializes in the area of CCP utilization.

CONCLUSIONS

Based on the review sessions and supplemental information presented in this report, the following conclusions can be drawn:

- The formation of TCAUG was the driving force for increased CCP utilization in Texas. TCAUG approached groups at numerous levels at state agencies and pursued them for over 10 years. It was this multilevel approach and its tenacity that TCAUG attributes to its success.

- TCEQ's eight-waste criteria rule and its ability to enforce the state water code paved the way for increased CCP utilization by putting CCPs on the same level as other recyclable materials.

- TCEQ's TWC 26.121 allows it to be more flexible on exempting coal ash from the definition of solid waste by serving as a safety net. If coal ash is used improperly, TCEQ can go back to TWC 26.121 and correct the problem.

- TxDOT adopted new specifications in 2004 that specify CCP use on a percent replacement basis. TxDOT said the largest barrier to using more coal ash is an air entrainment issue from too much carbon in the ash and an inconsistent supply.

- The utilities and ash marketers said the most beneficial action C^2P^2 could take is to find more beneficial use applications for FGD material and bottom ash. This group also felt strongly that TRI reporting requirements are overly burdensome and inappropriate in many instances.

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APPENDIX A

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REVIEW OF STATE REGULATIONS, STANDARDS, AND PRACTICES RELATED TO THE USE OF COAL COMBUSTION PRODUCTS

Texas State Review
September 13–15, 2004
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REVIEW OF STATE REGULATIONS, STANDARDS, AND PRACTICES RELATED TO THE USE OF COAL COMBUSTION PRODUCTS

Texas State Review
September 13–15, 2004
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APPENDIX B

TEXAS REVIEW GUIDE

REVIEW OF STATE REGULATIONS, STANDARDS, AND PRACTICES RELATED TO THE USE OF COAL COMBUSTION PRODUCTS
TEXAS REVIEW GUIDE
SEPTEMBER 13–15, 2004

Purpose

The primary goal is to review factors related to the use of coal combustion products (CCPs) in Texas and develop a roadmap/model that may help Texas and other states increase the use of CCPs in an environmentally sound manner. Texas was selected as the pilot state for an in-depth review of its CCP programs, policies, and use practices because of its progressive approach to CCP utilization and its support network to implement such activities. Following the review, a deployment package of presentations, reports, and other documentation will be assembled for distribution to the projects' advisory board members. This review is intended to be a pilot program and may provide impetus to the U.S. Environmental Protection Agency (EPA) to perform additional state reviews.

Scope

The scope of the Texas review, as identified by the project's advisory board members, is to evaluate the various factors related to CCP use in Texas. In order to focus the study on current practices, which are most readily transferable, the Texas review will highlight various CCP use practices including highway construction and building practices and will not consider the use of CCPs at mine sites. This is not to diminish the use of CCPs at mine sites but to recognize the national regulatory debate on the use of CCPs at mine sites, which is being conducted independently of this review.

Process

The review team will travel to Texas to visit state agencies and other key players involved in CCP utilization. Five discussion groups will be formed to answer questions posed by the review team. The discussion groups include the following:

- Government agencies – directors and other key personnel of state or regional transportation and environmental agencies
- Marketers/end users – CCP marketers and ready-mix suppliers
- CCP generators – utilities/producers of CCPs
- Special interest – environmental and citizen groups, research institutions
- Open meeting – open

Instructions

Please come to the review prepared to answer the following list of questions, and assemble all applicable information prior to the review. Your participation will help provide a fair and balanced characterization of the state's CCP issues. Please answer the questions as completely as is reasonably possible without stating proprietary information. For questions that do not apply to your specific situation, answer not applicable. If you would prefer to answer questions in writing as well, please provide written comments to Tera Buckley at tbuckley@undeerc.org. The time allotted for the review is noted at the beginning of each questionnaire. All questions must be answered within the scheduled time frame. The corresponding role call (to be provided at the review) must be completed at the beginning of the review. The review will be recorded.

GOVERNMENT AGENCIES

Time allotted: 3 hours

1. What is your agency's role in the use of CCPs?

2. What type of infrastructure (i.e., employees, programs) does your agency have dedicated to CCP management?

3. Please list and explain any successful projects/applications using CCPs. Why were they successful?

4. Please list and explain any problematic projects/applications using CCPs. Explain the problems encountered and any instances where the use of CCPs was precluded in a project.

5. Please list and explain any cases in Texas where the use of CCPs has caused environmental damage or resulted in violations of environmental requirements. Describe any corrective actions, monitoring, and follow-up employed to address the issue.

6. In your opinion, what is the biggest obstacle hindering the increased use of CCPs in Texas? How could this obstacle be addressed?

7. How would changes to the chemical or physical composition of CCPs impact your agency's role in the generation, use, or disposal of CCPs? For example, new air pollution control requirements may increase the mercury content of CCPs.

8. For which of the following CCPs does your agency have guidelines, guidance documents, material specifications, regulations, orders, or statutes? If applicable, provide references for and dates of the specific guidelines, guidance documents, material specifications, regulations, orders, or statutes related to CCPs.

   a. Fly ash

   b. Bottom ash

   c. Flue gas desulfurization material

   d. Boiler slag

   e. Cenospheres

   f. Fluidized-bed combustor ash

   h. Other _____
   i. Other _____

9. Which of the following sources of information does your agency rely on in approving the use of CCPs in particular applications?

   a._____ Surveys of current practices (federal or state)
   b._____ Demonstration projects
   c._____ Internal (agency) testing and evaluations
   d._____ Technical report submitted by qualified consultants
   e._____ Research projects or reports by other agencies, research institutions, or consultants
   f. _____ Other _____
   g._____ Other _____

10. What further research, laboratory work, or policy initiatives would be necessary to assist your agency in overcoming barriers?

11. In general, how do you perceive the position Texas has taken toward CCPs in comparison to other states?

CCP GENERATORS

Time allotted: 3 hours

1. Are there any operational or business issues that impact the way you process or handle CCPs?

2. What types of quality assurance/quality control procedures are employed at your company with regard to CCPs?

3. How would changes to the chemical or physical composition of CCPs impact your company's role in the generation, use, or disposal of CCPs? For example, new air pollution control requirements may increase the mercury content of CCPs.

4. Are there any environmental policies, permits, regulations, or statutes that impact the way you process and handle CCPs?

5. Are you or your CCP users (marketers/contractors) provided the flexibility to make the decision to utilize CCPs when the material meets standard specification requirements or does the state require additional approvals and testing?

6. Please list and explain any successful projects/applications using CCPs. Why were they successful?

7. Please list and explain any problematic projects/applications using CCPs. Explain the problems encountered and any instances where the use of CCPs was precluded in a project. Describe any corrective actions, monitoring, and follow-up employed to address the issue.

8. Provide details of any ongoing or completed research and demonstration projects regarding CCPs.

9. In your opinion, what is the biggest obstacle hindering the increased use of CCPs in Texas? How could this obstacle be addressed?

10. What barriers has your company overcome to increase the use of CCPs? How?

11. What further research, laboratory work, or policy initiatives would be necessary to assist your company in overcoming barriers?

12. In general, how do you perceive the position Texas has taken toward CCPs in comparison to other states?

MARKETERS/END USERS

Time allotted: 3 hours

1. Provide a general description of CCP use in Texas, including production, markets, and prices. Specifically, describe the current state of CCP use in road building and commercial and residential building construction projects.

2. Please indicate your thoughts on the current specifications or guidelines that you are aware of in the state of Texas related to CCPs. Are there any environmental policies, permits, regulations, or statutes that impact the way you process and handle CCPs? What specifications or guidelines do you feel promote or restrict CCP utilization? What changes would you like to see made to the current specifications and guidelines?

3. Please list and explain any successful projects/applications using CCPs. Why were they successful?

4. Please list and explain any problematic projects/applications using CCPs. Explain the problem encountered and any instances where the use of CCPs was precluded in a project. Describe any corrective actions, monitoring, and follow-up employed to address the issue.

5. How would you describe the competition between traditional raw materials and CCPs? (i.e., portland cement vs. fly ash; natural gypsum vs. flue gas desulfurization [FGD] gypsum)?

6. What is the use ratio between spec and nonspec ash? What barriers do you encounter in selling nonspec ash?

7. How would changes to the chemical or physical composition of CCPs impact your company's role in the generation, use, or disposal of CCPs? For example, new air pollution control requirements may increase the mercury content of CCPs.

8. In your opinion, what is the biggest obstacle hindering the increased use of CCPs in Texas? How could this obstacle be addressed?

9. What barriers exist that prohibit the use of CCPs in Texas? What state or federal regulations could be implemented to overcome these barriers?

10. What further research, laboratory work, or policy initiatives would be necessary to overcoming barriers to CCP utilization?

11. In general, how do you perceive the position Texas has taken toward CCPs in comparison to other states?

SPECIAL INTERST

Time allotted: 90 minutes

1. In your experience, what are the significant factors impacting the use of CCPs in Texas?

2. Please indicate your thoughts on the current specifications or guidelines that you are aware of in the state of Texas related to CCPs. What specifications or guidelines do you feel promote or restrict CCP utilization? What changes would you like to see made to the current specifications and guidelines?

3. How would changes to the chemical or physical composition of CCPs impact your association's/company's role in the generation, use, or disposal of CCPs? For example, new air pollution control requirements may increase the mercury content of CCPs.

4. Provide details of any ongoing or completed research or demonstration projects regarding CCPs. Specify any successes or problems.

5. In your opinion, what is the biggest obstacle hindering the increased use of CCPs in Texas? How could this obstacle be addressed?

6. What further research, laboratory work, or policy initiatives would be necessary to overcoming barriers to CCP utilization?

7. In general, how do you perceive the position Texas has taken toward CCPs in comparison to other states?

OPEN MEETING

Time allotted: 2 hours

1. In your experience, what are the significant factors impacting the use of CCPs in Texas?

2. Please indicate your thoughts on the current specifications or guidelines that you are aware of in the state of Texas related to CCPs. What specifications or guidelines do you feel promote or restrict CCP utilization? What changes would you like to see made to the current specifications and guidelines?

3. How would changes to the chemical or physical composition of CCPs impact your association's/company's role in the generation, use, or disposal of CCPs? For example, new air pollution control requirements may increase the mercury content of CCPs.

4. Provide details of any ongoing or completed research or demonstration projects regarding CCPs. Specify any successes or problems.

5. In your opinion, what is the biggest obstacle hindering the increased use of CCPs in Texas? How could this obstacle be addressed?

6. What further research, laboratory work, or policy initiatives would be necessary to overcoming barriers to CCP utilization?

7. In general, how do you perceive the position Texas has taken toward CCPs in comparison to other states?

APPENDIX C

PARTICIPANT LIST AND FINAL AGENDA

REVIEW OF STATE REGULATIONS, STANDARDS, AND PRACTICES RELATED TO THE USE OF COAL COMBUSTION PRODUCTS

Texas State Review
September 13–15, 2004
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Review of State Regulations, Standards, and Practices Related to the Use of Coal Combustion Products
Texas State Review Agenda
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Austin, Texas

	Monday, September 13, 2004		Tuesday, September 14, 2004		Wednesday, September 15, 2004	
	Review Team A	**Review Team B**	**Review Team A**	**Review Team B**	**Review Team A**	**Review Team B**
8:00 a.m.						
8:30 a.m.				**Users** Alamo Concrete Products, Centex Materials, Lattimore Materials Company, Southern Star Concrete	**Open Meeting** American Coal Ash Assocation, Texas Coal Ash Utilization Group, Texas Commission on Envrionmental Quality	
9:00 a.m.						
9:30 a.m.						
10:00 a.m.						
10:30 a.m.			**Special Interest** Texas Sierra Club			
11:00 a.m.	Review Team Kick-Off Meeting				Review Team Re-Cap Meeting	
11:30 a.m.						
12:00 p.m.			Review Team Lunch			
12:30 p.m.						
1:00 p.m.						
1:30 p.m.	**Government** Texas Department of Transportation		**CCP Generators/Marketers** American Electric Power, Boral Mateial Technolgies, Inc., Lower Colorado River Authority, Texas Coal Ash Utilization Group, Texas Coal Combustion Products Coalition			
2:00 p.m.						
2:30 p.m.						
3:00 p.m.	**Government** Texas Commission on Environmental Quality					
3:30 p.m.						
4:00 p.m.						
4:30 p.m.						
5:00 p.m.			Review Team Wrap-Up Meeting			

Review Team A: Debra Pflughoeft-Hassett, Rick Bye, Lisa Kost
Review Team B: Tera Buckley, John Sager

APPENDIX D

1995 LETTER TO COAL ASH UTILIZATION GROUP FROM TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

August 25, 1995

Ms. Patty L. Akers, Chair
Regulatory Subcommittee
Texas Coal Ash Utilization Group
c/o Lower Colorado River Authority
P.O. Box 220
Austin, TX 78763

RE: Coal Combustion By-Products and Texas Natural Resource Conservation Commission Regulations

Dear Ms. Akers:

I would like to thank you and your association for inviting this agency to become involved with the Texas Coal Ash Utilization Group's (TCAUG) efforts to explore and promote the safe and legitimate use of coal combustion by-products within the state of Texas. Information submitted by your association and the Electric Power Research Institute (EPRI) has been invaluable in helping agency staff better understand the coal ash by-product uses being explored as well as the potential disincentives agency rules pose to such uses.

The purpose of this letter is to convey to the TCAUG, in writing, the agency's position on certain coal combustion by-product uses that constitute co-product uses for particular fly ash, bottom ash and flue gas desulfurization (FGD) materials which would be considered Class 3 or Class 2 waste if disposed. This information can be found in the enclosed attachment.

If you have any questions regarding this letter, please do not hesitate to contact Minor Hibbs, Director of the Industrial and Hazardous Waste Division at (512) 239-6592 or Nancy Worst of the Office of Intergovernmental Affairs at (512) 239-6090. If Mr. Hibbs or Ms. Worst is unavailable, you may also contact Scott Green or Vanessa Schiller of Mr. Hibbs' division at (512) 239-6832.

Sincerely,

Dan Pearson
Executive Director

DP\SG\mac

103-9

COAL COMBUSTION BY-PRODUCTS

WASTE VS. NONWASTE ISSUES
BROUGHT FORWARD BY THE
TEXAS COAL ASH UTILIZATION GROUP
(July 1995)

The Texas Coal Ash Utilization Group (TCAUG) and the Electric Power Research Institute (EPRI) has submitted a variety of information to the agency regarding fly ash, bottom ash and flue gas desulfurization (FGD) materials which would be considered Class 3 or Class 2 waste if disposed. Of those considered Class 2, they could be considered Class 3 except for elevated total dissolved solids levels and/or leachable metals when submitted to the 7-Day Distilled Water Leachate Test.

Based upon our review of that information and in order to clarify misconceptions that we have discovered during our review, we would like to state the following.

In regards to recycling, let us first dismiss the misconception that just because a material comes from an industrial site, it is a waste. Many materials coming from industrial sites are legitimately reused/recycled and are never considered industrial wastes or wastes at all. It is true that some of these materials will eventually be disposed; however, their industrial or nonindustrial status will be determined at the time of disposal.

Secondly, the agency recognizes that many recycling opportunities are legitimate, beneficial and do not constitute waste management. After reviewing and evaluating the coal combustion by-product uses information TCAUG and EPRI provided, we feel that the following coal combustion by-products (when used in the following ways) are co-products and not wastes when legitimately used in a manner consistent with recognized local, state, and federal standards or general industry practice or standards:

CO-PRODUCT USES			
APPLICATIONS	FLY ASH	BOTTOM ASH	FGD MATERIAL
Concrete and Concrete Products	X	X	
Cement/Fly Ash Blends	X	X	
Raw Feed for Cement Manufacture	X	X	X
Precast Concrete Products	X	X	
Lightweight and Concrete Aggregate	X	X	
Roller Compacted Concrete	X	X	
Soil Cement	X	X	
Flowable Fill	X	X	
Oil Well Cementing	X		

Roadbase, Subbase and Subgrade Material When Covered By A Wear Surface	X	X	X
Road Construction Material (Unsurfaced)		X	
Masonry	X	X	X
Blasting Grit		X	
Roofing Material	X	X	
Insulation Material	X	X	
Wallboard/Sheetrock			X
Artificial Reefs	X	X	
Road Surface Traction Material		X	
Mineral Filler (e.g. plastics, paint, rubber matting, carpet backing, bricks and asphalt)	X	X	
Waste Stabilization and Solidification	X		

We would also like to note that, in accordance with the definition of a waste, coal combustion by-products, that would be considered Class 3 if disposed, are not considered wastes if they are legitimately used to construct roads. This is so because the agency recognizes roads as one type of surface improvement.

If the agency were questioning the legitimacy of a use/reuse activity, it would evaluate specific criteria as it related to the material and the recycling activity. In other words, the following criteria would be used to distinguish between a material that is discarded (waste) and a co-product.

1. A. Each constituent found in the material is also normally found in the raw material it is replacing.

OR

B. If any constituent is not normally present in the material it is replacing, it must not present an increased risk to human health and/or the environment and/or waters of the state.

2. A legitimate market exists for the material as well as its products.

3. The material is managed and protected from loss as would be raw materials and/or ingredients.

4. The material can be used as a product itself or to produce a product as it is generated without treatment or reclamation.

For example, a Class 1 material treated to meet the Class 2 classification criteria could not be considered eligible for a co-product designation.

5. A. The use of the material is an ordinary use and it meets and/or exceeds the specifications of the product it is replacing.

OR

B. The material is a reasonable ingredient in a production process and meets and/or exceeds raw material specifications.

6. The quality of the product is not degraded by substitution of raw material with the material.

While we recognize that responsible use of coal combustion by-products results in beneficial products and substitutions, we are also aware that coal combustion by-products could be used inappropriately. Mismanagement of these materials could result in some degree of risk to human health and the environment.

Should such an unfortunate event occur, Chapter 26 of the Texas Water Code would still be applicable and enforced. It is the obligation of the coal combustion by-product producer and user to ensure that the material is being used in a safe, legitimate and responsible manner.

Please also be reminded that if nonhazardous coal combustion by-products were to be considered wastes, they could still be recycled or used under the regulations of 30 Texas Administrative Code (TAC) Section (§)335.24 (Requirements For Recyclable Materials and Nonhazardous Recyclable Materials).

These recycling regulations require the following:

1. A 90 day prior notification of intent to recycle which includes a description of:

   A. the waste;
   B. the recycling process; and
   C. any storage prior to recycling

AND

2. A prohibition against the threatening of the waters of the state, the creation and maintenance of a nuisance, and/or the endangerment of the public health and welfare.

There would be no deed recordation requirements (30 TAC §335.5 (Deed Recordation)) if the material were legitimately recycled, even if it were applied to or placed on the land.

In regards to the 90 day prior notification, it is possible that once TCAUG has provided information on a new coal combustion by-product use, its members would not need to wait an additional 90 days before recycling the material.

Again, we would like to thank the TCAUG for its efforts in exploring uses for coal combustion by-products. We would like to continue working with TCAUG on the status of coal combustion by-products in other uses as they arise and as resources permit.