

NATURAL RESOURCES COMMISSION

Minutes - January 18, 2000

MEMBERS PRESENT

Michael J. Kiley, Chair
Larry Macklin, Secretary
Damian Schmelz
Jack Arnett
Joe Siener
Rick Cockrum
Steve Cecil
Elizabeth Admire

NATURAL RESOURCES COMMISSION STAFF PRESENT

Steve Lucas
Sylvia Wilcox
Tawnya Whittington

DEPARTMENT OF NATURAL RESOURCES STAFF PRESENT

Jack Costello	Executive Office
Paul Ehret	Executive Office
Carrie Doehrmann	Executive Office
Brent Shike	Executive Office
Carrie Bales	Executive Office
Ihor Boyko	Legal
Col. Larry Allen	Law Enforcement
Deborah Lawrence	Special Projects
John Friedrich	Forestry
John Bergman	Parks and Reservoirs
Mark Reiter	Fish and Wildlife
ICO Scott McDaniel	Law Enforcement
ICO David Cruser	Law Enforcement
ICO Guy Cobb	Law Enforcement
Bruce Stevens	Reclamation
Gary Miller	Parks and Reservoirs
John Richardson	Reclamation

GUESTS

Rae Schnapp	Dr. Jody K. Tishmack	Beth Aikins
Gordon Thompson	Judy Thompson	Rick Hollenkamp
William A. Miller	A. Carol Miller	Mary Frances Neyhouse
Otto Neyhouse	Daniel J. Lefler	Carol Miller
Richard Lefler	John D. Smith	Dan McNerny
Bruce Palin	Doug Emmons	Sean Griggs
Jim Meiers	Dixie Wagner	Dean Ice

Bob Duncan	John Gibson	Greg Foote
Barbara Hensley	Mary Bookwalter	Jack Miller
Guinn Doyle	Dave Barnard	Jim Dewes
Jodi Holt	Charles Norris	Dr. Don Cherry
Jeff Stant	Patricia A. Waters	Konrad J. Banaszak
Barbara Marlowe	Jody Gurnitz	John Gurnitz
Perry Dively	Linda Dively	John Blair
David Scott Coker	Jane Maurer	Judy Mooney
Mike Mooney	Marc Szewczyk	Tim Maloney
Robert Fry	Bradley C. Paul	George Boyles
Debbie Nispel	Brian Wright	Andy Knott
Clarke Kahlo	Duane Davison	Nat Noland
Daniel J. Lefler	Senator John Waterman	John Price
Sam Klawitter	Barb Hensley	Ellsworth Dively
David Agranoff	Dr. Bradley Paul	Charles H. Norms
Max Goodwin	Guinn P. Doyle	

MONTHLY REPORTS

Michael J. Kiley, Chair, called to order the regular monthly meeting of the Natural Resources Commission at 10:09 a.m., on January 18, 2000 in the Garrison Restaurant at Fort Benjamin Harrison, Indianapolis. With the presence of eight members, the chair observed a quorum.

Damian Schmelz moved to approve the minutes of December 14, 1999. Steve Cecil seconded the motion. Upon a voice vote, the motion carried.

Chairman Kiley entertained a motion with respect to the election of officers for the ensuing year. Joe Siener nominated Michael Kiley as Chairman, Jack Arnett as Vice-Chairman, and Larry Macklin as Secretary. Damian Schmelz seconded the motion. There were no other nominations. On a voice vote, the officers were elected.

Larry Macklin provided the Director's report. Director Macklin said, "as always, the State Museum was very successful with the holiday activities. I am very proud of the museum staff once again." In December, Director Macklin attended the Great Lakes Executive Committee meeting in Ann Arbor and said he will have a report later. He reported the DNR is currently conducting interviews of candidates for a transition project director for the new State Museum. He said candidates are from several different states.

Director Macklin reminded the Commission the Legislature is in session, and a report will be furnished later concerning legislation affecting the DNR. Director Macklin said in the last few weeks he has been "greatly involved" with the White River contamination "and the resulting loss of hundreds of thousands of fish." He said he was "very proud of the staff members who have given their professional attention and time over and above their normal workloads to this event." He thanked the DNR employees who "held down the fort" and helped to keep the agency

running during this time. He said restoration of the White River ecosystem would be a long-term project.

Jack Costello, Deputy Director of the Advisory Council for the Bureau of Lands and Cultural Resources, reported that the Council did not meet this month. He also reported "bad news from the US Army Corps regarding Mississenewa Dam. The damage is extensive and the repair schedule will be three to five years to get the job done." He said the Corps wanted to stay at winter pool, which is 712 feet. Costello indicated the DNR is trying to get the Corps to change the elevation to 717 feet. He said the time estimate for repair is based on funding, so if additional funding can be obtained, the period could be shortened.

Chairman Kiley asked what the 717 feet would do to the marina operation. Costello responded there would not be a marina operation. He said larger boats could not be accommodated. He stated there would be a public meeting on January 27 in Peru.

Joe Siener, Chairman of the Advisory Council for Water and Resource Regulation, reported the Council met, but there was nothing to report at this time.

Paul Ehret, Deputy Director of the Bureau of Resource Regulation, reported January was "a busy month." He said there was media coverage concerning the coal combustion waste issue. He informed the Commission there was a lengthy feature article in the INDIANAPOLIS STAR on December 26 regarding dam safety in Indiana. Ehret said there are 1,200 dams that are within the jurisdiction of the Division of Water. He reported the article discussed issues relative to dam safety and the frequency of inspection. Ehret said he attended the "very successful" annual meeting of the Indiana Division of Soil Conservation Districts.

BUREAU OF LANDS, RECREATIONAL, AND CULTURAL RESOURCES PERMANENT APPOINTMENTS AND PERSONNEL INTERVIEWS

Personnel Interview for Assistant Curator for the T.C. Steele State Historic Site.

Steve Cecil presented this item. He said, "as always, there were two excellent candidates, which made it a difficult decision to make a recommendation." He reported that after deliberations the Personnel Committee recommended Todd Klass as the Assistant Curator for the T.C. Steele State Historic Site.

Steve Cecil moved to approve Todd Klass as the Assistant Curator for the T.C. Steele State Historic Site. Jack Arnett seconded the motion. Upon a voice vote, the motion carried.

DIVISION OF FORESTRY

Consideration of a request by Hoosier Energy Rural Electric Cooperative for a four-year permit for the installation, operation, and maintenance of a 69kV electric circuit via an existing utility corridor across Selmier State Forest.

Jack Arnett moved to approve the four-year permit for the installation, operation, and maintenance of an electric circuit across Selmier State Forest. Damian Schmelz seconded the motion. Upon a voice vote, the motion carried.

Consideration of a request by Jackson County Water Utility for a four-year permit for the installation, operation, and maintenance of a four-inch waterline via a utility corridor across Vallonia State Nursery.

Jack Arnett moved to approve the four-year permit for the installation, operation, and maintenance of a four-inch waterline across Vallonia State Nursery. Damian Schmelz seconded the motion. Upon a voice vote, the motion carried.

DIVISION OF STATE PARKS AND RESERVOIRS

Consideration of a request from the Town of Liberty for an easement on a portion of Whitewater Memorial State Park to install a water line and water meter pit.

Jack Arnett moved to approve the request by the Town of Liberty for an easement on a portion of Whitewater Memorial State Park. The motion was seconded by Damian Schmelz. Upon a voice vote, the motion carried.

Consideration of a draft prospectus for Lick Fort Marina at Patoka Reservoir.

Gary Miller presented this item. He said the marina was developed 20 years ago. Miller reported the lease had a ten-year life, together with two five-year options. The DNR would be at the end of the second five-year option later this year. Miller said approval of a new prospectus was needed to receive proposals from the existing operator or new operators.

Chairman Kiley asked if it would be appropriate for the Commission to approve the draft prospectus. Miller explained that after the Commission approved the draft prospectus and the Department receives a proposal, the Department would come back before the Commission and ask for approval to negotiate with the proposed operator.

Rick Cockrum moved to approve a draft prospectus for Lick Fort Marina at Patoka Reservoir. Damian Schmelz seconded the motion. Upon a voice vote, the motion carried.

DIVISION OF FISH AND WILDLIFE

Consideration of a request for easements across Whitewater Public Access Site and Vinyard Gamebird Habitat Area for the installation of a fiber optic cable.

Jack Arnett moved to approve the request for easements across Whitewater Public Access Site and Vinyard Gamebird Habitat Area. Damian Schmelz seconded the motion. Upon a voice vote, the motion carried.

**LEGAL PROCEEDINGS
NRC DIVISION OF HEARINGS**

Consideration of the Report of Public Hearings, (including Public Comments, DNR Response to the Public Comments, Analysis by the Hearing Officer, and Recommendation of Hearing Officer), Regarding Rule Amendments for the Disposal of Coal Combustion Waste in Indiana Surface Coal Mines; Administrative Cause #97-223R; LSA #98-133.

Chairman Kiley stated that the Commission will "do its best to arrive at what is an equitable solution. Maybe the Legislature, in their infinite wisdom, will give us some assistance in this session." Chairman Kiley said an announcement would be made when the Commission reconvened for discussion among the members of the Commission, and, if necessary, the arrival at a decision with respect to the adoption or non-adoption of the rule as proposed.

For full discussion, see following comment.

Chairman Kiley stated that there would not be a determination made by the Commission today on proposed coal combustion waste rules. He stated that Governor O'Bannon, in a letter, requested that the Commission delay the vote on the proposed rule. [Letter in its entirety follows.]

Dear Chairman Kiley:

I am writing today regarding proposed rules dealing with coal combustion waste (310 IAC 12) that are scheduled for consideration for final adoption by the Natural Resources Commission (NRC) on Tuesday, January 18, 2000. I have received communications from both supporters and opponents of the rule.

I am requesting that you ask members of the NRC to consider delaying the vote on this rule for two weeks so that the parties can work toward a compromise or pursue other processes for dealing with regulation of coal combustion waste, including legislation. I understand that it would be possible for you to receive comment on the rule Tuesday but continue your deliberations and vote for two weeks.

Thank you for considering my request. If you need more information on the procedural implications of a continuance, please contact Carrie Doehrmann, General Counsel for the Department of Natural Resources at 317-232-4020.

Sincerely,

Frank O'Bannon
Governor

Kiley stated that the Commission would honor the Governor's request in respect to a continuation of a final determination on this rule. He stated further that it is conceivable the Legislature may undertake some responsibility in this session with respect to the disposition of coal combustion waste. Kiley explained that this is an issue that was placed upon the Commission by the Legislature when the Legislature decided the jurisdiction for the disposition of fly-ash and coal combustion waste should be under the exclusive purview of the NRC and the DNR, rather than IDEM.

Kiley addressed the Governor's letter, by stating in part: "I am told that if it is necessary for this Commission to meet specifically to consider a vote on the rule, that it certainly does not have to be done within the two week period as suggested by the Governor. The rule has to be signed and approved by the Governor not later than April 30, 2000. If nothing is done in the Legislature with respect to this rule, or if compromise is not finally arrived at, what we would propose to do is have a special meeting of this Commission sometime in the early part of March in Indianapolis for the purpose of discussion only among the Commission members. At that particular meeting, there would be no further input or reception of testimony in regard to the issue."

Kiley then asked the Hearing Officer to provide her report, and opened the floor for comments by professional personnel within DNR and then to interested citizens:

Sylvia Wilcox, Hearing Officer, stated in part: First, I would note that you have a letter along with your document that was passed out this morning. In error, I omitted a letter from Don Mottley in the public hearing comments. Mr. Mottley, as he states in his letter, was present at the Jasper and Indianapolis public hearings. With the several hundred comments, I apologize for missing one in the report, which is provided for your consideration. On February 23rd and March 4th of last year, public hearings were held regarding the coal combustion waste disposal rules that were given preliminary adoption by the Commission. The hearings were very well attended and summaries of all the public comments are provided in the report in your packet. I will speak briefly just to specific recommendations following and would note that, after the comments were given, the Department was given an opportunity to respond to those same comments before recommendation was made.

Specific recommendations are made to some typographical issues in 310 IAC 12-3-93.1 as set forth on page 74 of the report. In the LSA publishing of the proposed rule, the less than or equal to signs were omitted from the constituents that are listed there. I would ask that those be reinserted. Items two through six are also typographical issues where references were made to letters or omissions of an "or" in section 4A. Those issues are pretty basic and I would ask that those be corrected by the Commission before final adoption.

Public comments were extensive regarding coal combustion waste co-mingling with groundwater. There were several comments that asked that that not be allowed. The Commission has considered that issue previously in two administrative cases. I provided for your consideration the case HEC v. Foertsch Construction Company, which was appealed to the Daviess Circuit Court. A final ruling was made regarding one of the issues, which was the ability of coal combustion waste to co-mingle with groundwater. The ruling by the Daviess Circuit Court judge indicated that Indiana SMCRA does not necessarily prohibit the contact of

groundwater with coal combustion waste. However, there might be a situation where it should be prevented, and that it is where coal combustion waste may be found to be toxic-producing. With that finding, the Court says that there is not necessarily a prohibition for coal combustion waste and water contact. I would recommend in 310 IAC 12-3-93.1 that the correction cited in one through six, on page 74, be given final adoption.

Specific recommendations are made to 310 IAC 12-5-1-60 regarding many comments concerning the need for groundwater standards. The previous citation in the rule was to the IDEM groundwater standards, which do not exist. Several comments indicated that the reference to non-existing rules would cause vagueness and ambiguity problems. I agree with those comments. The Department responded to those comments by suggesting revision to that section and struck all references to the Department of Environmental Management applicable non-degradation standards or groundwater standards. The Department inserted references to the Indiana SMCRA hydrology rules. With that revision, the rule section is not vague or ambiguous in my opinion, and ripe for your action.

There are several comments regarding the need for groundwater standards. It was the Commission's original thought that groundwater standards would be included. By way of suggestion, the Commission can order that the rule be revisited upon IDEM's final adoption of groundwater standards. This would create a rule package that would have to go through public comment and the public hearing process similar to this one. Again, I understand that is under the purview of the policy-making authority of the Commission. With that, I would recommend the changes as proposed by the Department, in striking the references to groundwater standards and inserting the references to Indiana SMCRA hydrology standards, be given final adoption.

Bruce Stevens stated in part: My name is Bruce Stevens and I'm a field supervisor with the Division of Reclamation. I'm a staff member that's been involved with the proposed coal combustion waste disposal rule work group meetings since the beginning of the process. I have been before you twice previously with respect to this issue.

Before going into a discussion on the rule, I'd like to take just a moment to describe the rule making process. In January of 1998, the coal combustion waste rule making work group held its first meeting. Many disciplines and interests were represented in the group including: citizens, the Hoosier Environmental Council, other environmental groups, electric utilities, the coal industry, Indiana Department of Environmental Management staff, Indiana Geological Survey staff, and the Department of Commerce. The work group met a total of nine times between January and June 1998. At the conclusion of these work group meetings, a team of individuals from government, as well as the work group facilitator, met individually with representatives of the utilities, the coal industry, and the environmental groups. Throughout the process each submission from each party was studied and carefully considered. Consensus was reached on only a few definitions and a desire not to regulate the beneficial use of coal combustion waste. Major issues to which no consensus was reached include: the test method for waste characterization, the volume permissible for disposal, the classification system for waste characterization, groundwater monitoring locations and compliance points, and how groundwater standards are to be applied in this rule.

Regardless of the fact that a consensus was not reached on many issues, I believe that the workgroup process was worthwhile. It provided a forum in which to discuss the issues at hand, allow verbal and written input from each participant, and provided an enhanced awareness of ideas, positions, and perceptions from each party.

I will now speak with regard to the issues, which do not have a consensus. The definition of coal combustion waste generated considerable discussion within the group. In several drafts, we tried to provide a definition which included all that was believed to fall within the statute giving DNR regulatory authority over the material. At the time the statute was adopted, combustion practices included the use of non-coal fuels in quantities that had no material effect on the composition of the resulting ashes generated. It seemed as though more specific the language became in the draft the more ambiguous the meaning became. The rule before you today contains the definition of coal combustion waste, which is drafted consistent with what we interpret from the statute. Coal combustion waste, which is proposed for disposal, will be classified into two groups, Class A and Class B. The Class A waste is that which leachate analyzes at or below 10% of the standard for RCRA metals. This waste correlates to IDEM's Type III restricted waste material and it's similar to most mine spoil materials. Class B waste is that which leachate analyzes at greater than 10% but less than 25% of the standard for RCRA metals and correlates to IDEM's Type II restricted waste. Disposal for any waste, which leaches greater than 25% of the RCRA standard, is not allowed in a coal mine by this rule.

There are two types of disposal methods recognized within the rule. The first is the backfill method, which occurs with the ongoing advance of the surface mining pit and in which the thickness of coal combustion waste within the pit cannot exceed ten feet. The second type is the monofill method in which disposal takes place in a specific designated area and can exceed ten feet in thickness. Disposal of Class A waste can take place in either the backfill or in monofills, while Class B waste is restricted to monofills disposal only and has additional monitoring requirements associated with it. The reason for the monofill restriction for Class B waste is because the Class A material is considered to be quite benign and similar to mine spoil chemistry. While the Department believes that Class B material can be disposed in a mine setting without adverse impact, we recognize that requiring this material to be placed in monofills will enable monitoring to be conducted in a more precise manner and will confine this type of waste to specific areas.

There has been a great deal of controversy concerning the disposal of coal combustion waste beneath the post-mine groundwater table. It has been stated that no other state allows disposal beneath the groundwater table; this is not true. There are other states, including Illinois, which allow disposal in unlined mine pits beneath the groundwater table and have for many years. I have personally spent considerable time with the Illinois Mining Regulatory Hydrology personnel and they have stated that, with respect to the pit disposal, we are doing nothing different than they are and that some of their disposal settings are very similar to ours.

There have been numerous test methods discussed or proposed at various stages of rule drafting. The test method which is included in the rule before you is the ASTM D 39A7-85 Shake Extraction of Solid Waste, more commonly known as the neutral leach test. This test method is the one that is currently in place and is often times allowed for coal combustion waste landfills at

IDEM regulated sites when requested. While the parties agree that the toxicity characteristic leaching procedure, known as the TCLP, is not the appropriate test method for disposal in a coal mine setting, there is one other test method proposed which was given consideration. This test is a modified version of the standard leaching test, which was originally developed by the University of Wisconsin. We are not aware of any regulatory authority used to modify the standard leaching test; and therefore, we know nothing of the credibility of the results that it yields. This proposed test has not been verified, nor has the modifications suggested been accepted by the American Society for Testing Materials. We strongly believe that it is not appropriate to use a test method that lacks general acceptability within the scientific community. The Department for over eight years has used the test proposed in the rule, and significant amounts of data exist resultant of this test method. So, we already have a good idea of the quality of specific ash sources. This test has also been accepted as a waste characterization test by the American Society of Testing Materials. While we recognize that there is no test which has been developed specifically for coal combustion waste in a mine setting within the Illinois coal basin, we believe the test and the rule is the most representative. It has been upheld in previous adjudicatory matters, and would give credible data on the waste that is proposed for disposal. Should a test be developed and accepted as proper for coal combustion waste disposal at coal mines in the future, we are willing to consider revision of the rule to incorporate such a test.

The current disposal program requires one sample to be analyzed prior to disposal. The proposed rule requires a minimum of three samples be analyzed prior to disposal. The current program requires one sample be analyzed on a quarterly basis. The proposed rule requires one sample on a monthly basis for the first twelve months of disposal, four more samples on a quarterly basis following the initial twelve months of disposal, and then analysis on an annual basis including the three samples for initial characterization. That means that a minimum of 15 samples in the first twelve months will be submitted. The initial three characterization samples will be averaged for initial permitting purposes, and then throughout the disposal the most recent twelve samples will be averaged as a rolling average for the purposes of insuring that waste classification does not change. This is a tremendous amount of data that will be available and will enable the Department to ensure we have an excellent blueprint of how the waste reacts or is capable of reacting.

After any initial testing or re-testing takes place, a form is required to be submitted to the Director, in which the generator of the coal combustion waste certifies that the material tested and to be disposed under this rule meets the definition of coal combustion waste. Also, that the materials to be shipped is representative of that which was tested and that collection and analysis has taken place in accordance with the requirements of this rule. The generator will also certify regarding where the waste is being sent.

The program currently in place does not contain volume restrictions. The rule before you does contain volume limitations based on an amount of coal ash, compared to the amount of coal mined. For Class A material, the volume that can be disposed is up to a maximum of 50% of the coal tonnage removed. For Class B material, the volume that can be disposed is up to a maximum of 25% of the coal tonnage removed. At no time can the volume of Class A and Class B cumulatively exceed 50% of the tonnage of coal removed. Coal mined in Indiana normally yields up to 25% ash when considering emission controls, which may be used at the generator.

With the recent enacted clean air requirements by the Environmental Protection Agency, this percentage will likely increase as new technologies are utilized although the actual amount of coal being burned will not. Quarterly reports are required to be submitted that state the tonnage of coal combustion waste disposed on the permit and the tonnage of coal sold from the permit. This will ensure that volume restrictions are adhered to. Also, a map that shows the location of coal combustion waste disposal will be required to be submitted on an annual basis.

As I stated previously, Class A waste is considered to be similar to mine spoil and relatively benign in nature. Groundwater monitoring for Class A waste is to be consistent with current SMCRA rules. Monitoring for Class B placed waste has several requirements including perimeter monitoring, and vertical testing or monitoring of strata that exists below the elevation of the pit floor. Wells are to be placed no more than 300 feet from the mined out area. Placing monitoring wells within the area that had coal extracted will not yield information that makes it possible to determine whether any impacts which may occur were due to the rock disturbed by mining, or from the coal combustion waste because of the similar characteristics of the two. Monitoring should not take place in the fill. The Department of Environmental Management does not require monitoring within the fill either. Water that leaves the site is that which should be monitored. The monitoring requirements in this rule will allow for the gathering of groundwater data prior to any coal combustion waste placement during the mining and disposal process and after mining and disposal has ceased. With this method any increased levels of constituents will easily be distinguished from background analysis and action can be taken to correct these situations.

The rule currently does not contain groundwater standards. The general assembly did not give the Department authority to adopt groundwater standards; therefore, actual numeric standards do not appear in the proposed rule. We had initially thought that the IDEM groundwater standards would become rule prior to adoption of this package. Unfortunately, although it is progressing, adoption has not happened as yet so we have revised this rule package to remove all reference to the IDEM groundwater rule. This language has been placed with references to hydrologic performance standards from the Surface Mining Control and Reclamation Act. Although, there is no actual reference to the IDEM groundwater standards rule, upon adoption by IDEM, these standards will immediately apply as surface mining rules state at 310 IAC 12-5-16(c), that "in no case should Federal and Indiana water quality statutes, regulations, rules, standards, or effluent limitations be violated." This language is a catchall for any standards included in the adopted IDEM rule, which would apply to coal combustion waste disposal at a surface mine. Upon adoption of the IDEM rule the Department may be required to adopt rules concerning implementation. If this is the case, a rule will be written which includes those things mandated by the IDEM groundwater standards rule.

There are corrective action provisions within this rule in the event of a release that exceeds applicable groundwater standards at the compliance monitoring well locations. The permittee is required to submit to the Director a plan that describes in detail the actions that should be taken and a timetable for taking such action. This action includes, when applicable, the treatment, the replacement of water supplies, additional monitoring to determine the magnitude of the release, the prevention or removal of water from contact with the coal combustion waste, and the succession of disposal operations.

Commissioner Cockrum stated: First of all, I want to complement the staff. I have gone through my notes. I've read everything sent to me and I find it, as I'm sure everyone else does, very conflicting, very frustrating at times to sort through all of the data. I've found the staff response to be very, very well done in addressing some of the comments and responding to them. I thought that they did a superb job in that. When we discussed the preliminary rule we talked about IDEM adopting the groundwater standards. I am curious as to where we are in that process? Stevens explained it was his understanding that IDEM's groundwater standards had been preliminarily adopted and are in the comment stage with comments being finalized.

Duane Davidson stated in part: I live in Zionsville, Indiana. About seven or eight years ago, I was in Rio de Janeiro, Brazil and I was swimming on a beach very close to Ipa Nema. And, all of a sudden within ten minutes the entire beach was cleared. I had questioned why that happened, and a local had told me that it was a regular occurrence because the city's main sewer line was put under the beach and put out about three miles into the ocean. That was their system of disposal. Often times when there was a storm, the waves brought the effluent back in. I thought, that's not a good way of handling waste and I just kind of dismissed it as a Third World option. I never would have assumed that that could happen here in the United States.

When I go to a store and I see a price of an item I would expect to pay that price. Often times I'm told later that there's a service charge, sales tax, a delivery fee, and the like. I've often heard that we have among the cheapest power in the country, but I don't feel like that's the whole story. If I were told ahead of time that the disposal of things like the coal ash that we're talking about were not included in the price that I'm paying then I would be quite upset. In fact, that is the case. When I pay for electricity I expect that a state like Indiana needs to take the forefront and not meet minimal standards. Minimal standards based on federal regulations might be an option for other states, but it should not be for Indiana. We expect more and we deserve more. When I pay for my electricity bill or my power bill I want it to reflect the true cost of the production of that electricity. The true cost includes responsible disposal and I don't believe that any of the proposals that are set forth address a responsible way of disposal.

Mary Brookwalter stated in part: I agree with the gentleman before me that the fair price should reflect what it takes to give a legacy to our children that is worthy of us and worthy of their good health and well being. I don't want anyone here to feel like a latter day Marie Antoinette when they speak to the people of Southern Indiana. When she asked, "The people are starving, what will they eat? There is no bread. Remember, let them eat cake." In Indiana, I don't want us to be saying, "Let them drink Evian in Southern Indiana." We deserve equal protection under the law and I only ask that you think very carefully when you look at the evidence and the scientific proof. Only a dog does not foul its own bed. It does return to its own vomit. And, I am asking - - this is a nasty way of phrasing things-- but I'm asking for a measured consideration of scientific evidence. If you do that, I think you will come to a reasonable response all of you gentleman and ladies.

James Dewes stated in part: I'm against what, I'm not sure exactly. I just got involved in this process. I would hope that you can make a decision based on the facts. Make sure that you know if we're going to put this coal in the ground that it's not going to pollute our water. The aquifers

under the state of Indiana are some of our greatest natural resources. Indiana is a beautiful state. It's one of the most beautiful states, I think, having grown up here. This is a heavy responsibility. The future of aquifers and also the streams that are around these areas are in jeopardy. when you make your decision, feel comfortable that you know all of the facts and that you know that the groundwater will be protected. If you don't think that it will, if you don't think you have all the facts, if you think it's being pushed too far too soon, then don't do it. Delay the process, get the facts out, but whatever you do make a good decision to preserve the future of our aquifers and all of our natural resources.

Gordon Thompson asked whether any Commission member live on or near any area where coal ash is presently buried? Chairman Kiley said that at least two members reside on or near coal ash disposal areas. Thompson proceeded to state in part: My wife and I used to have the pleasure of living within a half mile of a dump and within a 150 yards of a strip pit. We have since then moved to a different location. There is a lot of talk now about the GMOC that farmers are planting. Most of this ground is strip pit ground now being reclaimed and will be put into agricultural production one of these days. What's the effect of this coal ash? What's it going to do? What effect will it have on growing crops? Things like that are things that nobody has looked into yet. I personally would like to see the state give everyone affected a 100-year insurance policy that nothing would ever happen to them due to CCW being buried on their property or affecting their groundwater.

William Miller stated in part: I live on State Road 64, 1 ½ miles from where Black Beauty intends to dispose coal combustion waste or CCW. I ask for equal protection. If I lived near the PSI/Gibson property, I would be protected by rules formulated and enforced by the Indiana Department of Environmental Management. We call them IDEM. There is no similarity between IDEM rules and rules this body is considering. I am proud to be a Hoosier. I consider the state of Indiana above that of Illinois and Kentucky. I want rules better than the rules of those adjoining states, or at least they should be as good as their rules.

With regard to financial assurance, if there cannot be financial assurance for at least 30 years, why should there be any financial assurance at all? With regard to the period for monitoring, if there can not be monitoring for 30 years, why should there be any monitoring at all? With regard to the distance of the monitoring wells or from the actual disposal site, if there can be no monitoring wells no farther than that permitted under IDEM rules, why not have the state of Indiana lease some federal properties and put those monitoring wells on top of Pike's Peak? If these were the rules then there would be no need for corrective action, because one could never determine that corrective action was needed. Therefore, corrective action could be eliminated from the rules if they're there now. The rules you are considering are ridiculous. I urge you to make them consistent with IDEM rules or trash them and start fresh, ensuring that I have the same protection as if I lived 1 ½ miles from PSI/Gibson that has a landfill, a CCW site in Illinois or a CCW disposal site in Kentucky.

Daniel Lefler stated in part: I live in rural Gibson County where I understand this CCW waste is going to be dumped, basically. From what I understand, this is something that really troubles a person when we aren't being safeguarded. I mean, you're just saying well, we're going to dump it and everything will be all right. Well, I don't believe that there is any guarantee in that. The

Governor and the State, you know, they care about us, which is great. They pass seat belt laws that protect me and that's super in my eyes. Then we're just going to dump this CCW waste and not think of the consequences of protecting me. It's pretty inconsistent. I strongly urge that if this is passed, I believe that the utility companies should be strongly held responsible for this dumping. I just want to say that I am totally against the proposals.

Richard Lefler stated in part: I live in Barton Township, which is about 1 ½ miles from where they are digging now in East Barton Township. I'm four miles from the place they're digging in Center Township. I'm kind of representing the dairymen in my area, because when we had to leave they were still milking cows so they couldn't be here. We have four dairies within 1 ½ miles of the digging in East Barton Township. I understand that they are going to have a site near Mackey or Summerville, and another one in Oakland City. These guys depend on fresh water for their operation. If the water is ruined, they are supposed to bring in piped water, which they can't afford to water their cows with. It's too expensive. So, there is no guarantee for their operations. As a citizen, there is no guarantee whatsoever that I can drink this spring water that comes up from the ground. My house is within ten feet of a fault that is full of water. It comes out to the top of the ground. We have deer, quail, rabbits, and wildlife. If the worst of this ash gets into our water, it will eliminate wildlife.

Pigeon Creek will drain the water that is coming from here and it goes through Evansville. They are going to make a park out of Pigeon Creek. Now we are going to send poison down on them? I don't think the citizens of Evansville know what's going on really. I know we've got to dump the ash. I know that we want electricity. That's all I'm about, protection, a guarantee. You can't guarantee anything, but a near guarantee. This rule that they have now doesn't guarantee me anything. It is all promises. Promises don't make it. The guys in California know about that. The NTBE has destroyed one community after another.

I'm an old man. I've seen what happens in politics and promises. Promises are so easy especially for big manufacturers. They've got the power; they've got the money; and they will guarantee me anything, anything to make me happy. I'm dependent on you guys to make a rule. Raise the price of electricity. This cheap stuff has run me out of business. I am a farmer. Cheap food has run me out of business, and one day we will all pay for cheap food. Let's not dump this stuff without a way so we know in time. See, this doesn't give us any time. Once polluted, time will find it under these rules. We need to know immediately when it's leaking.

Mary Frances Neyhouse stated in part: I am from Oakland City, Indiana. I am reading this letter for Nancy Gilhousen who couldn't attend today's meeting because of employment. The letter states: I am from Oakland City, Indiana, the heart of coal mine country. On January 10th, I took a day off of work and came to Indianapolis to speak to Legislators regarding the coal combustion waste disposal issue. The school at which I teach is presently without a Spanish teacher, and I have been covering my area, French, and helping out in Spanish. I feel I have a responsibility to my students and the school. And therefore, I am unable to speak to you personally today. I do however, feel very strongly about this issue. The coal combustion waste disposal rule being proposed is, putting it quite simply, wrong. I am not asking that the coal combustion waste not be dumped, nor am I asking that the coal companies and utilities foot the bill to dispose of coal in a safe manner. I am willing to pay my fair share. But, I am asking that the coal combustion waste

be dumped safely, and in case of groundwater contamination, those responsible for the dumping be held accountable for the cleanup.

Under this coal combustion waste ruling up for adoption, groundwater contamination will not be so dramatic as that of a fish kill in the White River. It will occur over a period of years and go unnoticed until contamination becomes severe and widespread making cleanup a near impossibility. The coal combustion waste disposal ruling needs to ensure: that disposal is done in a safe location, that the waste does not come into contact with the groundwater, that the disposal sites be monitored several years, that the water quality standards be established in the ruling, and that those responsible for the dumping be held financially accountable should groundwater contamination occur. I am not asking for anything that can not be done, and I am willing to help share the expense. This is reasonable and fair, and I am sure you would feel the same way if it were being dumped in your backyard.

David Coker stated in part: I am from Evansville, Indiana. I participated in the roundtable discussions that took place over the course of several months in 1998 that led up to the promulgation of this rule. I have a quotation on my AOL profile on the Internet by Ezra Pound, and it says, "Man is an overcomplicated organism. If he is doomed to extinction it will come from a want of simplicity." Those words were written or uttered close to 50 years ago, I imagine, before World War II, and long before we ever had to deal with the notion of utilities churning out hundreds of millions of tons of this material on an annual basis. But nevertheless, those words are as true today as when they were uttered over 50 years ago.

Last week, I had an article published in the Evansville Courier and Press which some of you may have seen. I would like to share with you a couple of paragraphs. "If this rule is passed, for the next decade the regulatory environment in this state will function like a magnet for literally hundreds of millions of tons of this material from all over the Midwest. Indiana will once again become a dumping ground for another form of industrial refuse from adjacent states, just as it has for special waste and landfills here in Southwestern Indiana." On an annual basis Browning Farris Industries, the operation that runs our local landfill in Vanderburg County, has accepted increasing tonnage of out of state special waste.

I should make the case that this rule is going to essentially do the same thing with regard to this material, because of the fact that coal mining is a way of life now in the utility industry. We are not going to be putting the refuse of Indiana coal into these mine sites. This coal is going to come from all over the place, and we are not going to have any idea as to what kind of trace elements are going to be in it once it is deposited in those sites. Most people also do not realize the extent to which this issue is closely linked with national transport utility deregulation. Utilities that recently have been negotiating long-term contracts with coal operators want to minimize their resource-input costs. They also want to minimize their costs with response to disposal of these materials. Clay liners and maintenance of monitoring wells cost money, we all know that. But, I as a consumer of electrical power, just as many, many others from my city, and my county, and my portion of the state are willing to pay our fair share. If this means putting it in the rate base, put it in the rate base like other environmental safeguards have been done in the past. Quite honestly, this issue is going to be a political issue throughout the rest of this year. There are those of us in this group that are opposed to this rule that will remember these things on Election Day.

Greg Foote stated in part: I am a former citizen³/₄seven years in Orange County³/₄but now I live in Indianapolis. I am concerned about the nature of any board which does not represent the total populous, but which tends to represent the powerful, the corporations, utilities, and politics. I might be right or wrong, but I do have that feeling that the commonality of people should be on boards like this. We are as capable of understanding the scientific implications as anybody else who also might not be truly a scientist.

Water demand, and uses of it, are going to go up and so are the prices. This will all continue. We, therefore, must increase our inspection and protection of all sources of water for human beings or for wildlife, that includes wells, rivers, and our reservoirs. We need pure safe water. We Americans think it's always going to be there³/₄as we've thought our forests were always going to be there³/₄they aren't. There are more and more of us and there is less and less of this marvelous bounty that we have been accustomed to.

I would like also to make a reference to a dead man, Aldo Leopold. 50 years ago he spoke of something we still have not achieved as a people, and he called it the "land ethic." I still don't hear our churches, or our politicians, nor our corporations coming close to including his principals in their decisions. I do believe that this is an ethical issue. I hope that we can develop a specific test for the problem that we are facing, not a generic one for coal combustion waste. I believe that where there is a possible threat to public health we should adopt the precautionary principal and assure safety beforehand rather than wait for dangerous health consequences, which may or may not occur in the future. If they do, they will take a long time to get scientifically reported and acted on and probably be too late to correct.

John Blair stated in part: I am the president of a group called Valley Watch in Evansville. Our purpose is to protect the public health and environment of the lower Ohio Valley. We drove through some ice this morning to get up here, and the first thing I heard was suggested revisions to this plan. One of them is that the proposed rule incorporated proposed numeric groundwater standards that should suddenly be tossed out and we use the SMCRA standards. That seems like a pretty substantial change in this rule. I realize that the Department of Natural Resources legal staff has said it is not a substantial legal change. Whenever you take a major thing like groundwater standards out of a rule and replace it with something that nobody discussed through the first tier of hearings and everything, that is substantial. The man from IDEM stood up and said, "Well we could also revisit the waste characterization if things change." How many times are we going to revisit this rule after we pass it out? It sounds like getting the cart before the horse. If the rule is not solid enough today to stand on its own, then it shouldn't be passed. We have a crisis of credibility in this state in everything environmental. For years, I, as a public citizen who ran an environmental group, has fielded questions pertaining to natural resources and the responsibility to the Department of Natural Resources day in and day out because nothing would be done by the Department of Natural Resources. Nothing would be done about brine, oil well drilling, and that sort of thing in Posey County in particular.

In the 23 years that I have been involved in environmental things in Indiana, I have probably attended 1,500 public hearings. Indiana is first in air pollution. 100% of our streams and lakes have fish consumption advisories due to mercury and PCB's and we put into the air 2 ½ times the

amount of carcinogens that the state of California does. You've had some responsibilities over those streams issues particularly and the fish consumption. But, I don't see any action coming from this group. It's high time that you sit down with the drawing board again and say, "We're going to change things here." Indiana has gone down the tubes long enough. This issue is the icing on the cake for the people of southwestern Indiana.

Clark Kahlo stated in part: I live in Indianapolis. My group is Protect our Rivers Now. In the interest of time, I would simply like to echo and second the preceding speakers who have spoken against this proposed rule. I urge you also to do that.

John Price stated in part: I have two jobs. I am an attorney and also Republican candidate for Governor. I would like to address you very briefly today on your proposed rule changes with a suggestion, and I make this in a respectful manner. That is, that you consider scrapping entirely these rule changes and going back to the drawing board and considering the approach followed by other states. Coal combustion waste material in the state of Indiana should not be allowed to be placed in open strip mines below the water table, but placed in clay lined disposal sites with leachate monitoring to follow.

I have been in Southwestern Indiana a great deal over the past few years. My discussion with the residents of Southwestern Indiana, many people you have heard today, is that there is a significant healthcare concern. It is my opinion that healthcare and the protection of healthcare is to a state the same thing that the national defense is to the federal government. We have no higher duty in our state than to protect health. If that means that some persons are affected from a financial viewpoint, health always trumps the financial considerations.

I've heard it said by some in the industry that all this really does is take coal and recycle it and put it back where it came from. I would submit that taking a lump of coal, burning it and putting it back in a powdered form with trace elements doesn't even come close to that. Even a lawyer can figure out that that is not correct. I would highly recommend that the Commission make a reconsideration placing the public health first and reject the adoption of these rules.

State Senator John Waterman stated in part: With this issue, this proves that government doesn't work. This thing has been bouncing around like a ping pong ball, and everybody shoves it off, and the money that follows this issue opens new doors and just keeps rolling and getting bigger. I'd like to see the board just put it back in the Legislators' hands where it belongs. Every representative and Senator that represents that district has been writing letters to the Governor opposing this. We represent the people. It's supposed to be for the people, of the people. This just doesn't work here, and I just don't understand what's going on.

I'm just hoping that you guys can shut this down and start all over from scratch. It's not the way to do it. I've lived in a coal district all of my life. A lot of my family members work at coal companies as engineers, and I've been general contractor. If you people want to come down to Sullivan County, I can show you some travesties that have happened over the last 30 years. It's still going on today where they are not putting back the top soil and the subsoil. You need to really look at this subject and look into what is really going on down in southern Indiana. I will

give you an open-ended invitation to take a tour down in our area and to show you what really is going on.

Ellsworth Dively stated in part: I live down by Farmersburg, Indiana, Sullivan County, right where Black Beauty is now. I just moved there four years ago. I had to semi-retire and it's a beautiful country down there. My family lives around there, and that's the reason that I moved back there. About a year after I moved back, the coal company started mining. I hear all this about dumping the fly-ash and I worry about the well. The well has been there for 30 years, and I have had it tested for everything that I can think of from arsenic, to boron, to mercury and it cost me \$800. I hope that the well is not going to go bad. I hope that the blasting and everything else doesn't ruin the well. When they want to put this stuff in the ground, I know they put the topsoil back and they raise corn, and wheat, and all of this stuff, but it's everything that is below the top of the surface. I can go out there and bury batteries, dump oil, and everything else and bury it. I could probably grow tomatoes on top of it, as long as I put good dirt on top of it. If we let them put this in there and it gets in our water and ruins the water, I'm too old to start again. I can't just leave that property, because it's not going to be worth a dime to me or anybody else. Nobody is going to want it because there's no water. I just can't start it again.

I'm leaving it up to you people to really take a look at what's going on and to check thing out. The coal company, even if my well does go bad, won't be responsible to bring water to where I can raise my pigs, chickens, and have a garden or anything else. Make sure that this is going to be safe for me and all the people that live in that area fifty years from now when things start getting out of hand and there's now way to clean it up. I wish you'd take a look at it today before things get out of hand.

Mike Mooney stated in part: I live in Indianapolis, in Rocky Ripple on the White River. I would like to tell you that I feel strongly that there is a relationship between the catastrophe that this city and this state has witnessed in what happened to the White River and the killing of all of those fish for 40 miles. This is a great catastrophe and is one that we all have to learn from desperately. I am just a citizen who simply enjoyed the river and loved it. I took it very much for granted and allowed the environmentalist groups to speak and to try and educate. I was very, very indifferent to it. I am responsible for that as much as anybody in this room or in this state because of my indifference. I think we, as people, have seen that the institutions and agencies that were there to protect us simply didn't work. I don't believe it is because they are vicious people or careless people. I simply believe it was because we simply didn't realize the fragility of the ecosystem that we live in today in the year 2000.

All of the planning and all of the rules that we need to proceed on from this day forward have to change. I think we all agree we need it. We need a fresh look and for the future of this state and for the future of our children. If they are ever to experience clean water, or ever to experience nature as we have been privileged to do, we have to look on this Commission right here. It is in your hands and in our lawmakers' hands. It certainly needs to be in the hands of everybody in this state at this time. I hope that every Commission meeting you have is packed with people, because it is something that we need to pay attention to out of the sense of reverence. Or, as the gentleman said earlier, "out of the sense of human ethics for our children."

David Agranoff stated in part: I am with Education for a Sustainable Future. We are an International environmental organization based out of Bloomington. I want to remind this committee of a few facts. First off, 95% of rural U.S. population depends on groundwater for drinking. 43% of the water used on farms comes from groundwater in the United States. Groundwater is an important part of an interacting environment, just like the air, the oceans, the seas, the lakes, the rivers, everything. Ground has to interact with everything else. It is very important. A lot of these farmers we've heard from today depend on this groundwater, but they also have runoff and waste, too. Unfortunately, if you allow this coal combustion to be leaked into the groundwater, it's going to create a "witches brew" kind of like the one we saw in the White River. We don't know what interaction nitrates and ammonia created by the runoff from these farms is going to do with the coal combustion waste. I don't really want to find out. It took 25 years for groundwater contamination, just north of St. Louis, to cause huge problems for the Mississippi River because the Mississippi River is so deep, and it took so long for the groundwater to leach out. We also just didn't have any idea that it was causing problems. The state of Missouri has spent a lot of money cleaning this up.

This leads me to the question of how energy is made. I've heard a lot of people say today that, "Well, let's just raise the prices. Let's just deal with it." Well, I'm fine with that. I'm fine that we raised the prices, because we should be paying for the amount of damage that we're doing. I would like to question how we create the energy? I would like to see the state of Indiana be a leader in finding alternative forms of energy to give to its people so maybe we wouldn't have to have these problems. I'm not going to apologize for the coal industry. I'm not going to get up here and say what they do is okay. I would be willing to accept more rates to pay for what they do. If these rates are what it takes to make sure we are not dumping this coal right into our groundwater, then I am willing to do it. I just want to make clear that this would be a catastrophe for the many reasons that I have listed above. Don't let this happen.

John Gurnitz stated in part: I live in Farmersburg, near a Farmersburg mine site. I am within less than 2,500 feet from a mine. In response to these photographs, I also contacted the DNR and Black Beauty Coal Company in relation to what happened to my well. I had promises from both parties to bring fresh water out to me. After 60 days, it never happened. We are dealing here today with an honor of trust. Do we trust these people? Can we trust these people? Should we continue to trust these people? Can we believe what they say, that this doesn't or will not affect our groundwater? We rely completely upon our wells. After this occurrence, we had to have a new well dug approximately 320 feet, and right now we are still afraid to drink our water. I would urge everyone in this room today to come out and take a drink of what you might see in those photographs. The Department of Natural Resources told us they would be glad to come out and drink some of that. Of course, they never showed up. Black Beauty responded the exact same way. I would like to ask today that the proposed rule that is up for adoption be completely dismissed and completely restructured.

Jody Holt stated in part: I am from Madison County. I agree wholeheartedly with everything that has been said here. I applaud Mr. Blair's passion, because that is what it is. A lot of the society lacks in that these days. Look at all of the most recent cleanups that we've had to make. We have technology now that our forefathers didn't have. Look at the NTBE thing that hit 60 minutes. I was appalled, and they don't even have the technology to clean it up. Well, you guys have the

technology to monitor this, so the regulation needs to be restructured. By the time this problem really comes to be a big problem, most of you guys are going to be long gone. You won't even be here and God help us that our kids will have to clean up another one of our screw ups.

Dixie Wagner stated in part: I am from Vanderburg County. I have worked on environmental issues for about the last decade, mainly in the area of solid waste. I want to remind you all that it wasn't too long ago that people spoke at meetings just like this and told boards just like this that liners weren't required. They told them that no toxicity was involved, but we all know better than that now. I don't think that any one of you would propose that we approve the siting of a landfill without a liner requirement. When I read this rule, I was amazed that that requirement was not in there. I agree with the speakers that have spoken today. In my eyes, the rule is totally, totally inadequate. I can't tell you how amazed I am that this is the best the utility has to offer. I personally take that as an insult as a citizen of Indiana. I think that we need to learn from our past mistakes. We need to stop engaging in magical thinking that somehow it's not going to happen here in Indiana, because it certainly has before and we couldn't handle it. I am sure that it certainly will again if things like this are allowed to happen. To approve this rule as it is now would be a clear indication that you are not concerned enough about the citizens of Indiana to offer them equal protection under the law.

Jack Miller stated in part: I live here in Indianapolis. The 20th Century is littered with unintended consequences of technology. I'm old enough to remember when they said atomic power was too cheap to meter; vinyl chloride is going to save the world; DDT, let's get rid of all the bugs; asbestos, great stuff; leaded gasoline, Freon, the list is really a long one. I am aware of a few corporations who created Superfund sites and then just disappeared. They leave us with the cleanup. Once some procedure is in place, it's really hard to get rid of it, or to recall it, or to clean it up. The health of Indiana residents must be the primary concern, not cheap electricity, and not fat utility profits. We are going to pay for this one way or the other. We can either do it with higher priced electricity or higher cancer rates, birth defects, etc. I was born in Indiana, and I'd love to see Indiana on the cutting edge of protecting health and the environment, not dragged kicking and screaming into the 21st Century. I urge you to start over with this rule, with your eyes on the citizens' health and well being, not just corporate profits and their health and well being.

Charles Norris stated in part: I'm president and principal of a hydrogeologic and geologic consulting company, GeoHydro, Inc.. The company is headquartered in Denver, Colorado. I principally reside in Northeastern Illinois. I'm here speaking on behalf of the Hoosier Environmental Council, myself, and also GeoHydro staff in Evansville, Indiana. I would like to think that I am speaking here today to convince you to reject this rule. I don't think on a fundamental basis that I think that's going to happen, and that creates some conflicts for me as to even whether or not it's worth the expenditure of resources to speak. I think that it is important for a number of reasons from satisfying administrative remedies possible to making sure that the press and the public understand that this rule has good strong opposition for extremely valid scientific reasons.

I want you, as individual Commission members, to not have the luxury down the road when you are confronted on the streets, or in the halls of the Capital, or perhaps in your own homes when

ramifications of accepting this rule incur down the road, five, ten, two years down the road to say, "I didn't know." Regardless of the decision that you come to, it's important that you have been told exactly what happens under this rule and that your decision is made with that understanding. This is a bad rule. If you accept it, you are accepting a bad rule. It is bad from a policy standpoint; it is bad from a scientific standpoint. Ironically, most issues related to rules of this nature, "The devil is in the detail." In the case of this particular rule, however, the devil isn't in the detail, the devil is in the entire framework of the rule. If this is a bad rule, what is the basic framework for a good rule? The requirement of a good rule, with respect to any rule that is involved in environmental issues, is that there are basically four elements that are common to a good rule. First, there is a standard—and by a standard we are just saying that there is a contamination level beyond which there is unacceptable pollution. There is a line drawn in the sand that says if this particular contaminant gets worse than this, in the air, in the surface water, in the groundwater, that is no longer acceptable. That is the basic framework under which the entire rest of the rule operates.

Secondly, a good rule has monitoring. By monitoring, I am talking about observations that are taken at times and places that are capable of detecting a problem. A good rule must allow and require responsiveness. If there is unacceptable contamination, or the likelihood that there will be unacceptable contamination, there is an action and a remediation that takes place.

Finally, a good rule requires responsibility. Those that cause the problem, stay around long enough to clean up the problem. Those are characteristics of any good environmental rule. The rule should address any special needs or characteristics of the material being regulated. An example of this, under rules of surface mining, is that the disposal of sulfide minerals is stipulated in areas where oxygen is not readily available, because oxygen is the primary reactant with sulfides that creates the problems. If those are the characteristics of a good rule, why is this a bad rule? There is no standard. There were problems before where the standard was listed as being a standard that had not yet been promulgated, or was not yet in place. The solution is to do away with the standard completely.

We're not arguing anymore about whether the standard should be ten or five, that would be detail. What this rule says is that there is no unacceptable level of pollution that can be caused by CCW. I don't think that the elimination of the standard can be considered a non-significant change to this proposed rule. This rule has no effective monitoring. If you read this rule, you will see several pages discussing monitoring wells and placement of monitoring wells. The simple fact is that the monitoring program that is provided in this rule has been cynically designed to be ineffective. The monitoring positions are hundreds, thousands of feet, and in some cases, miles away from where the monofills are going to be placed and are not even required for CCW that is dumped in backfills.

Bruce Stevens pointed out that there is no monitoring required within the waste masses themselves that this is appropriate, and even IDEM does not require monitoring within the waste masses that they are regulating. There is one major difference though. Under this rule, these are not landfills. These are not disposal sites that have any kind of deed restrictions. There is absolutely nothing that keeps a developer from selling homesteads right on top of a monofill where purchasers will be seeking potential water supplies from underneath them. An IDEM

landfill is never going to have anyone potentially drinking that water. That does not apply to this disposal and this disposal rule.

There is no remediation required under this rule. Bruce Stevens read you the paragraph talking about the conditions under which remediation would be triggered. There are discussions within the rule of remedial activities, but, as he read to you earlier this morning, that is triggered by the exceedence of an applicable numerical standard. This rule does not have numerical standards. There can be no violation, because there is no standard. There will be no detection of a problem by design. If somehow, inadvertently, it can be established that a water well was lost, the only response that's going to occur is that that water well will be replaced. There will be no cleanups, no remediation, and no source removal.

Finally, there is no recognition in this rule of the fact that CCW's principal reactant and primary reactive agent of CCW is water. Just as oxygen is the primary reactant with sulfide minerals, water is the primary reactant with coal combustion waste. CCW should be isolated from its primary reactive agent. The state of Wisconsin has established that quite clearly in remediation of its damage sites that the isolation of the material from water immediately starts cleaning up the contamination that occurred. This rule ensures disposal in contact with water and will literally build aquifers of CCW that will be filled with CCW leachate.

For those who believe that there is no risk from this material to start with, then whether or not this is a good rule becomes a moot point. There is a need for a good rule. CCW can and does cause damage. It can and does cause severe damage. The basis for this statement is observation. It is not theory; it is not literature review; it is not computer modeling; it is not a projection of principals; it is observation in the field. The conclusion is not just mine; it is not HEC's. It is a conclusion of the state agencies in at least Wisconsin, North Dakota, New York, Virginia, Alabama, Florida, Michigan, Illinois, Wyoming, Utah, Arizona, the United States Environmental Protection Agency. There are Superfund sites that have been under cleanup under the jurisdiction of the United States Environmental Protection Agency that have no waste in them except coal combustion waste. It is a conclusion acknowledged by David Hassett, a chemist who often speaks for the proponents of this and similar rules.

In his testimony at the Little Sandy administrative hearing, he testified that he could inundate you with bad sites. In less than six months, the Hoosier Environmental Council, using a technique no more sophisticated than cold calling state agencies around the country, have identified more than 60 sites that are under administrative clean-up around the country, including those in Indiana. The information on these has already been provided to you in the docket, and I'm not going to go into the redundancy of listing them or providing the detail again today. I do want to emphasize that the damage from these sites can be severe, not just subtle excursions above standards for those states that have standards, but grotesque damage. In some cases, CCW has rendered groundwater useless for any beneficial purpose^{3/4}consumptive, agricultural, industrial, ecological. The only thing it could potentially be used for, I suppose, is fire suppression. Contamination levels can and do exceed the minimization of sea water, and it occurs at levels in order of magnitude or higher, worse than what we see as a result of coal mining spoils in Indiana. Here I am talking about SMCRA permitted coal mines. Don't be confused by the people who trot out acid mine drainage problems in abandoned mine lands remediation projects. That is not what we're talking about here. We are talking about the

wholesale disposal of these materials in SMCRA permitted mines that are designed to minimize groundwater damage within the mine area and avoid groundwater damage outside the mine area. Here is no question that this type of contamination would be clearly visible, clearly identifiable and should trigger remedial response by detection of monitoring wells within the spoil, near the mine sites.

The Division of Reclamation has demonstrated an inability to manage both solid waste and mining. It has issued inappropriate permits, including a processing facility permit to a utility that does no coal processing and has no permanent facilities. It's using the area solely for an ash dump, and now for coal gasification waste dump. That is to say, it has approved dumping of waste that is absolutely unauthorized by the Indiana State Legislature. Coal gasification wastes unrelated to coal combustion are being dumped in one facility at present, and I think we can expect it in others down the line. The Division did not even test this material for the carcinogens that should have been a primary concern. It is currently espousing in the press and at meetings positions that are in direct conflict with the entire concept of the surface mining law and its own permits. It is espousing publicly that the water in mined lands are already trashed; and therefore, don't need additional protection. Any level of contamination is permitted within the permit area, and there are no water resources to be protected within a surface mined area. They should read their own permits and decide which of these stories is true.

You will hear or have heard suggestions that coal combustion waste is just dirt from the swamp being taken back to the swamp, and that the problems with the waste at the AB Brown Station are not of concern because all they're doing is burning table salt, sodium chloride. As though, in some way, that eliminates the problem that is documented in the field. This is a cynical sophistry that is the chemical equivalent of telling the citizens of Oklahoma City they had nothing to worry about from Timothy McVey because his truck didn't have anything in it but fertilizer, diesel fuel, and aluminum foil. What goes into a chemical reaction is not what is of concern, what comes out of the chemical reaction, what comes out of the dual alkaline desulfurization system, what comes out of the burner as coal combustion waste. It is the properties of these materials that have got to be addressed, not the materials of their origin.

You have heard or will hear that this material is impermeable, and that in months nothing goes through in one research project. What you will not hear is that the research project was specifically designed with specifically selected materials engineered for the specific purpose of being impermeable. That's not what we're talking about in these coal mines. There is no engineering involved. There is no selection of materials for particular physical or chemical properties. In fact, the materials that will go to the mines will be the materials that do not lend themselves to this kind of beneficial reuse. You will be told or have been told that basically CCW is non-reactive, and if it is reactive, there are only beneficial reactions that clean up groundwater or create good minerals. Again, there are materials that, if properly selected, handled, and under proper engineering have great beneficial purposes and uses. There are research programs ongoing at Purdue University, at Southern Illinois University, and at other universities around the country that are designed to identify which CCWs fit into this category, and designed to find ways in which those can be used as road base, impermeable barriers, and structural fills. I applaud that use, but that is not what this rule is addressing.

This rule is to be addressing those materials that do not behave that way and do not have those applications. Those are the materials that are going to be dumped and those are the materials that this rule has to protect Indiana from. Accepting this rule is going to open up a Pandora's box. I am not talking about an environmental Pandora's box, because we know what's going to happen there. It's going to create new levels of cynicism, new levels of outrage. There are going to be new opposition players with new opposition budgets, agendas, and tactics. So far, this issue has been one in Indiana that has been restricted to CCW disposal and methodologies and it has been kept local. It is my personal opinion that that is no longer going to be the case.

In conclusion, I would urge you not to adopt this rule. Not because of the ramifications^{3/4}although I do want you to be aware of them--but it is a bad rule, and it will have a bad affect. Whether or not you do accept it, though, at least now you do know, and have been told, and no longer have the luxury of saying, "I didn't know."

Commissioner Cockrum asked Norris where the coal waste Superfund site was located. Norris said that he believed there were at least two Superfund sites, but the one he was aware of was in Virginia. a lot of information about those sites. I'd like to have who is a professor from Virginia Tech, he's an aquatictoxicologist or what they call an aquaticcotoxicologist- - he's published many, many papers on the effects of coal combustion waste on ecosystems, both acute and chronic effects in various parts of the country. I would like to have him present next about the actual damage that the contamination is causing to the ecosystem.

Dr. Don Cherry stated in part: I am a professor of Aquatictoxicology at Virginia Tech, and I have been there for 26 years. I've published over 360 papers in my career, and 36 of them on CCW waste material. I have also interacted and consulted with over four-dozen industry giants across the country, so I know the industrial sector very well. In 1973, for a ten-year period I developed all of the studies at the Savannah River Project in South Carolina on CCW. Those were acutely toxic effects. Since then there have been a number of new studies in the chronic area, which I'm going to talk about in a few minutes.

The CCW area I have been researching quite well throughout my career. Let me explain the mechanism as to why CCW is toxic. It's called heavy metal and trace element enrichment on the ash particle surfaces. In the 1970s, there were three papers published on this phenomenon in which, after coal is burned in the furnaces, it goes up the electrostatic precipitators and is caught there due to the Clean Air Act. However, those precipitators were a lot cooler in temperature than a furnace is. Then come all of these trace elements, and as they go up the precipitators, they condense and collect on the surface of the ash particles. I published a study in 1987 that took some high powered technology of ionmicroscopy in which we actually burned into the ash particle surfaces from the outside inside and measured the middle accumulation, how high it was on the surface, and how it declined inside the particle. This is a phenomenon that exists that's different from the bottom clinker coal ash or heavy bottom ash that stays out of precipitators and doesn't get the elemental enrichment.

The key problem of toxicology with CCW is the enrichment problem. We have been evaluating a number of different CCW sites, the groundwater monitoring program, and I've been looking at the number of ecological studies in the literature, plus my own of all these past years. Let me just

give you some examples of the disparity between the elemental content that's in the groundwater wells versus EPA's safe limits for aquatic life and for the public health. For example, in North Dakota there is iron at 395 parts per million. That is a level that is 1,300 times higher than EPA limits for the protection of human health. There is also cadmium at another site in Wisconsin in which the levels are 1,226 parts per billion. The water quality safe limit is 1.1 parts per billion. That is a 1,000 fold increase in the safe level by the EPA. At another site, there is Zinc at 51,000 parts per billion. That is 1,100 fold higher than safe levels for aquatic life. There is selenium as high as 1,100 parts per billion, and that is over 200 fold greater than for the protection of aquatic life. I will come back to selenium in a few minutes, because it is a silent killer in CCW.

Now, let's go to Indiana. The Bailey Generating Station in the Dunes area has zinc as high as 2,300 parts per billion, 50 times higher than it should be. Iron-47 parts per million which is 47 times higher than it should be. Cadmium is 800 parts per billion, 725 times too high. I can give some other sites such as the Merrill Generating Station in which has aluminum as high as 2,800 parts per billion, and that is three fold too high. The AB Brown Generating Station has sodium as high as 14,000 parts per million, 280 fold too high for protection of human health. There are other sites, but let me go on to some of the specific ones in which there are toxicological data besides the monitoring data.

When we did the Savannah River Studies, we were looking at acutely toxic effects. Since then that system has been modified and cleaned up, and the new studies that have come out have now found a new chronic impairment. In the handout about the fish, you will see that they are deformed. There is a large concern about the EPA saying, "Where have the frogs gone?" The new CCW studies of the Savannah River project showed they have a deformed mouth. They have 90% loss of their teeth; they can't eat and they can't compete; they can't swim too well. The snakes are getting higher bio-cumulation problem. For here, we have a new subtle situation occurring there. That's the good news and here is the other news. In Blues Lake, North Carolina, the 1970-1974 Due Power developed their reservoir. In this reservoir, after it was filled, there were 20 different species of fish in that community. Then they released fly ash into that reservoir, and in two years 17 of those 20 fish species disappeared, died. Two remaining were alive as adults, but were sterile. There was one, the mosquito fish, who was so powerful and tolerant that they can live there. The key problem was selenium. It had a general concentration of ten parts per billion in the reservoir that was creating this toxic and reproductive impairment effect. In the last few years we have found that selenium, at the current protective limit of five parts per billion by the EPA, is not protective enough. Numerous studies are showing that this bio-cumulation of selenium that is in the water, goes into the organism and stored in its tissue, and then that organism is eaten by a bigger organism and then it goes up the line and the selenium increases. In more recent literature, it's showing that there are bio-cumulation effects at the levels of one to five parts per billion, and that the EPA limits for selenium are going to go lower.

Selenium is the one major constituents that have been ignored in CCW. There's not much data there, because of the solid nature of bio-cumulation. It is a silent killer that is a problem. Then the birds and the mammals eat these contaminated fish, and they will suffer and go away, too. Let me just bring up one other one, the TBA Bullrun Plant in Oakridge, Tennessee. In this particular study, is a CCW seep flowed into the Clinch River, and the study put cages of catfish

to see how toxic the material was. The catfish died between 24 and 72 hours later after being placed into this material of high metals, high iron.

You've heard earlier that over 90% of the rural American public uses groundwater. That also amounts to 130 million people who use groundwater daily in this country. It is our last natural resource. It's called fossil water and has been around for eons, but can be quickly polluted by the trace elemental concentrations in the CCW. In Indiana, 80% of the rural areas that use groundwater, it is a very important resource. In conclusion, fly ash causes huge impacts at low levels, much lower than ever known about before. Like the example for selenium. The monitoring wells at many of these CCW sites that have been reviewed are orders of magnitude higher, not one, not two, sometimes three orders of magnitude higher than the protection of human health in aquatic life.

Brian Wright stated in part: Dr. Darrell Leap is a tenured professor at Purdue University. He sent these comments, unfortunately he has to teach classes today so he was unable to come. He is very concerned about this rule and in his comments he states that dumping these in the unlined pits is dangerous to ground and surface water for the following reasons: For the effect that there will be no barrier between CCW and groundwater is cause for concern because toxic chemicals from the CCW can enter groundwater, which supplies 50% of Indiana's drinking water supply. As we've heard earlier that goes up to 80% in rural areas. The movement into the groundwater of these toxic substances are likely from the hydraulic head moving into these disposal sites. So, it's increasing the movement rate of the groundwater supplies. This is occurring when water comes back in to fill up the void created by the mines constant pumping of groundwater. Such increased heads will be open even slightly wider near disposal sites, which means you will have even greater transport of these water systems in the lower aquifers underlying the existing aquifers. Once the toxic materials enter the groundwater system, it's very hard to clean them up. Groundwater cleanup is a very expensive process.

Mr. Leap goes on to state that the extra cost of lining these pits with clay bentonite liners, or other impermeable that exists, would not be an excessive cost and would be a worthwhile investment to protect our groundwater supplies. It's a protection commonly used in landfills. It is common sense approach to keeping contamination from occurring. At the very least, these toxic substances should be supplied above the water table.

I will move on to comments from Hank Hychema, a professor of groundwater hydrology at Indiana University. Mr. Hychema is also writing to express extreme concern about this rule in its current form. He is a tenured professor at the School of Public Environmental Affairs at Indiana University. He has helped develop several different groundwater transport models, including doing work for EPA in this category. He is extremely concerned of this concept with this practice of dumping in mines, saying that it falls much shorter than groundwater monitoring requirements applied to landfills in other parts of the state where CCW is dumped.

During my testimony of March 4, 1999, I enumerated the various technical deficiencies of the proposed rule. Rather than repeating myself in this letter, I would like to point out that I agree with HEC's concerns regarding protecting the groundwater integrity proposed by the current rule, and particularly, in this letter to Governor O'Bannon, January 4, 2000. I would like to add not

only is the proposed technique of groundwater monitoring using wells open to all geological formations ineffective, but also increases the risk of contamination, spreading, or creating short circuits between aquifers that are otherwise separated from each other by low permeable formations. We have had several people ask- What exactly will the impact on agriculture be? Agriculture is an important part of the economy of Indiana, especially Southwest Indiana. This country has seen 2/3 of farming it is estimated relying on groundwater as a source of irrigation. This is an important resource to the economy of Indiana. Numerous scientific studies have found high levels of boron in fly ash has a definite effect that can render groundwater unfit for use in agriculture. The US Department of Agriculture has set a irrigation of two parts per million of boron for beans and corn, and almost every single CCW site we have examined those levels are exceeded by orders of magnitude in water flowing down gradient from CCW sites. We have found two studies that show that CCW can have an extremely toxic effects on corn, one of these being McMurphy, et al., 1996. They found that the leachate producing fly ash over one week period impacted the DNA, plant height, cell structure, and cell cycle of the corn plants. They concluded from their studies that the leachate resulting from the weathering process of fly ash is toxic to plants.

These results are backed by a study that studied the use of fly ash as a soil amendment for two different types of soil. This was intended to hopefully use fly ash ironically for boron deficient soil. What they found was even small amounts of fly ash had such high levels of boron that it reduced the plant growth in the corn. Even at the small amounts in the soil, it was having a toxic effect. In Indiana's own monitoring wells, you can find high levels boron, tens of times higher than what is recommended by the USDA.

What happens when we dispose at mine sites? Looking at Universal, we find boron levels at least 37 times higher than what is considered safe for irrigation. CCW will render the groundwater unfit for irrigation at these mine sites. This is an important resource relied on by farmers. The fly ash is allowed to come in direct contact with groundwater. It will raise boron levels to the point that that groundwater cannot be used for irrigation; therefore, this land's ability to sustain crops will have been reduced by the disposal practice of CCW. This is not in compliance with the tenant of state and federal mining law of returning that land to original or better uses. This disposal practice will limit future uses. As we have heard earlier, it is going to make it dangerous to put groundwater wells for home use in these lands. So, we are limiting the ability for homes outside of city water systems. We are limiting the ability for farms for irrigation.

It is important that this rule's primary goal should be the protection of groundwater for use in future and present generations. Unless the separation of these materials at the very least from groundwater is done, that goal cannot be accomplished by the rule in its current form.

Dr. Rae Schnapp stated in part: I would like to address this Commission in urging not to move forward with the rule today. One reason why I am concerned about this rule is because it is relaying so heavily on the groundwater rule that is not yet in place. I am the Co-Chair of the Groundwater Task Force, and I have serious concerns about that groundwater rule as well. Part of the concern is that it does not take a preventative approach. It actually does not specify any action to be taken until the groundwater becomes unfit to drink at some unspecified distance

from the source. And, it also contains pretty broad exemption for mining activities. I am concerned about both of these rules.

Part of my concern is based on industry testimony that the contaminant in coal combustion waste is immobile. I think there is a lot of evidence that that is simply not true. The industry is relying heavily on a naturally occurring clay layer in the mine area to act as a liner. There are several problems with this. First of all, the clay is not continuous. The clay layer is being relied upon to attenuate any contamination that does move through the ash. Certainly, clay can bind metals and entrap them for awhile, but after the clay particles, which are very tiny, become saturated with metals, the clay colloids can actually act as a vehicle for those metals to move into groundwater, because those particles are so small.

A similar problem exists with attenuation of high and low extreme pH levels, because the attenuation of pH results in the formation flocculates that are also very tiny particles that are mobile in groundwater. These flocculates are very toxic to fish. Both of these scenarios, the clay colloids and the flocculates can result much higher concentration of the metals in groundwater than you would find based on the solubility of the metals alone. They actually carry more contaminants into the groundwater.

If attenuation works as well as the industry proposes that is will, I think it would have been much more difficult for the Hoosier Environmental Council to identify sites where contamination has already occurred. There have been more than 64 sites identified. I just want to say that there really are some beneficial uses for coal combustion waste, and that it should not be disposed of in our groundwater. I will rely on this Commission to help protect the groundwater.

Max Goodwin stated in part: I would like to make it clear that the work that I have done on coal combustion waste, going as far back as the early 90s, has not been in any sort of paid work as counsel. I am not a professional in that sense. My time has been volunteered. I thought it might be helpful to see some ash, which I believe is probably fly ash. I have passed around a few photographs of one of the actual dumpsites that we are concerned with here in a monofill area. It shows water standing on. You might think that, "Well, maybe it is really impermeable." I took about a ½ cup of ash last night, added water, and then punched three or four holes in the bottom of the cup with an ice pick. It drains very slowly, but by this morning, there was just a little bit of water on the top and virtually none now. You can see that it passes through quite easily. It gives a lay person a little better feel for what we are dealing with when you look at the pictures. You can see some of the same types of material, but this is really what they really look like.

One of the points I was to address at some length, but cannot now, is the myth that other states are no better. HEC has written extensively on this in its own publication. And, after getting all the regulations and rules from other states that are available, Pennsylvania requires ash be put eight feet above the water table and Kentucky requires four. There is no time to make all the comparisons of different state regulations. It is quite clear that, overall, Indiana's rule would be weaker than any the other states rules mentioned. You can pick out some particular thing from some other particular state that is no worse than Indiana's, but you cannot find a rule that is as weak as this proposed rule overall.

Secondly, the financial responsibility in bonding requirement, which DNR actually drafted was taken out by the Governor's Assistant. I think that needs to be pointed out to you this morning, because this Commission approved that very condition in DNR v. Foertsch, in which the Administrative Law Judge put conditions on the permit. One of them was that the reclamation bond must be held until the groundwater is recharged and the flow can be measured at the monitoring well, which might be many years in the future because you have to wait a long time after the coal mine stops pumping. This Commission approved that condition as being lawful. DNR's counsel agreed that it was lawful. The coal company took that to judicial review. Since this preliminary adoption of this rule, the Daviess Circuit Court affirmed that condition as being lawful in the state of Indiana. So, to say, as the Governor's Assistant has said, it wouldn't be lawful is really completely incomprehensible to me. The lawyers for the government, if they believed that they had no legal authority, they should not have been proposing any such an agreement with any such condition which they did before this Commission, and in judicial review.

The bonding requirement, for instance, can be handled on a case by case basis. We've got it in one permit, but this rule would wipe it out. We would actually weaken what we fought through a twelve-day hearing in a very long process to have this Commission approve.

The absence of groundwater standards, which was promised in writing from the Governor's Assistant, did not come about yet she pushes for the rule to go ahead and be adopted. We have reached a stage where, although the Governor has used the word "compromise," what we need is leadership. The reason for that is that there has been a lot of compromise from one side only. We did not favor taking this away from IDEM. We said all along that it has got to be at least as protective as it would be under landfill standards administered by IDEM. We have pointed out that there are five or six ways where it is not as protective. We still have those today, so things are not things that can be compromised. They are things that the public wants.

This Commission ought to either turn this back over to IDEM; let the Legislature have it if you think that would be best; or it must end up adopting a rule that gives the people of Southwest Indiana as much protection as other people in this state. The public has made it very clear that they want two things. You can see it in the comments that were four to one against this rule in your rule. They want a rule that is at least as strict for utilities and coal companies as it is for them when they have to get rid of their household waste by paying to have it put in a proper sanitary landfill. And, they want a rule that is as protective for Southwest Indiana citizens as other parts of the state get. When the utilities dump the waste or store the waste any place other than a coal mine in Southwest Indiana, they must follow the stricter rules. That's basic fairness and that's what people and half a dozen Legislators are wanting, insisting on. That's what the public is crying for.

We all have different perspectives and biases. That doesn't mean we don't all have honest opinions, but we have to recognize where we come from. I have gotten some new perspective in the past year since this preliminary rule was adopted. I have a very new concern that we are not doing anything to prevent cancer. One out of three people now living are going to get cancer, and the trend is worsening unless we find ways to prevent it. Many scientists believe that 80% of cancers are caused by environmental factors because some of us are weak. Our immune systems

cannot overcome the constant damaging that our cells get of what we are taking in. That's what will happen here. I have watched the people around the mine suffer too long. This needs to stop. It needs to stop by leadership, not by saying we will go out and compromise with the utilities and the coal companies. That is not the way to solve this problem. I ask you to go home and look at your wife, children, and grandchildren, and determine that you won't just let this go on as business as usual as it has been going on. We need a new dedication.

Jeff Stant stated in part: We thank the Governor for asking you to take public testimony today on this rule, but not vote on final adoption. We have wanted his involvement in this matter for some time. While we doubt a resolution of these issues can be reached in two weeks, we do that an equitable resolution that protects the interest of all Hoosiers can be arrived at in a short period if the Governor demands it.

We are here today to ask you not to final adopt this rule to dispose coal combustion waste in active strip mines until it includes basic safeguards. If mines are to become huge dumps for waste from power plants, something mining law never intended, than Southwest Indiana citizens who live around these mines deserve a rule that accomplishes the following:

1) It should isolate these wastes from groundwater by requiring placement above the water table in lined sites. This requirement is meant by our landfill rules to keep leachate from toxic forming materials from reaching groundwater. At a minimum, Kentucky, Pennsylvania, Ohio, Illinois, and West Virginia can require power plant waste to be kept above the water table in mines. I emphasize that the vast majority of Illinois' twelve permitted sites, ten are not allowing the disposal below water table. And, for those two that are, the ash test leached above the drinking water standards, not 50, 60, and 90 times above the standards which is what this rule allows. You are not getting the whole story when the DNR staff tells you Illinois is the same as us. It is not. When the Coal Council tells the paper that, it is being grossly untruthful. Illinois is much stronger than we are. Illinois has a groundwater protection rule that requires corrective action if standards are exceeded.

2) This is not about using alkaline ash to treat acid groundwaters. It's about dumping ash, which is toxic forming, into perfectly potable groundwater for the sake of cheap disposal. An action that was supposed to be eliminated years ago by waste disposal laws and should not be allowed here or anywhere else.

3) The rules should give regulators the ability to identify when a problem exists. It should require that there be effective groundwater monitoring around these sites with wells close enough to the waste to insure that regulators will be able to discover pollution before a wide problem develops. It is very easy to determine a baseline concentration from monitoring wells. The idea that the spoils will mask contamination from groundwater has been completely disproved at the Universal Mine site, the only site where DNR has enough data to tell what is happening, and where the sulfates and boron are much higher in the water down gradient from the ash. This notion you have to have the monitoring wells a mile away in unmined strata is ridiculous, and that is what has been proposed and approved in permits. The rule has to provide an unambiguous standard for keeping groundwater safe, to require actions to address contamination problems by those causing them. If a problem develops, something has to be done to correct it. Clear and

corrective action standards are a cornerstone of our landfill rule. The Governor's Office promised that they would be in this rule before it is final adopted. That promise should be kept.

4) The rule should require that monitoring continue until regulators can be sure that no contamination problems have occurred. An administrative law judge concluded that this should be an explicit requirement in the Foertsch mine disposal permit. You agreed with that judge. The Attorney General's Office agreed with that judge. The Daviess Circuit upheld this requirement. That requirement was a part of this rule, and it should be re-inserted.

5) You should require that those causing contamination have to maintain responsibility until they have cleaned it up. If you break it, you fix it. This rule expressly avoids that by having a list of corrective actions, but then not tying that to numeric groundwater standards. So that, no matter how bad the pollution, if by some miracle chance that it is monitored, the permit holder has a perfectly legal argument to stand up and say they are in total compliance with their permit. You are setting this up so that people are going to be victimized and have to go to court to be made whole again. This rule should be designed to prevent that.

These are common sense requirements. They address issues that should not be issues. By using common sense and good faith, we believe that this controversy can be resolved with a rule that is fair to all Hoosiers. The concept that CCW is similar to mine spoil is a myth. It is no more correct than saying that the material you are asking your son or daughter to eat for lunch in the cafeteria line is the same as what is in the restrooms in the toilets. It is thoroughly and chemically altered. I do not mean that disrespectfully. It is fundamentally different, and they know that. It is unconscionable that they keep telling you that it is the same thing.

Establishing a baseline is critically important. We are able to discern the impacts from ash versus what is in the spoil water. A corrective action standard has to be based on tripping those baseline levels that are in the spoil water. If they are well above the safe drinking standards for sulfates, then that becomes the standard. We proposed that at the negotiating table. We were not trying to clean up mine water. You can monitor damage from spoil water coming from the ash.

Debbie Nispel stated in part: I am the Manager of Water Quality and Waste Management at Cinergy. I am testifying before you today as an employee, and also as a life-long resident of Indiana and a mother. As a large producer of electricity in Indiana, we do also produce coal combustion byproducts or CCBs. We believe that the prudent use of these as a resource is the right thing to do in the CCB case. Cinergy is engaged in several markets in Indiana to expand the use of CCBs in various products, thereby conserving energy and materials. These markets include raw materials for the manufacturing of Portland cement, lime and sand substitutes in concrete formulations, and fillers in paint and plastic products. In addition to products, there are large volume sites for specific uses for CCBs, such as structural fills, road subgrades and utility cut backfills.

Until such time that the market can support and accommodate all of our CCBs, Cinergy must rely on its onsite and offsite disposal opportunities including those in Indiana coal mines. The effects of leachable compounds and elements from CCBs in mining have been studied for decades. Cinergy has provided extensive data and information in this regard. Cinergy takes

seriously the ultimate liability and responsibility associated with CCB production and fate. Scientific research shows that if CCBs do impact the environment, it's localized, moderate, and, in fact, can be easily predicted. Cinergy in no way believes that its current onsite or offsite CCB disposal site performance constitutes a need for further regulation, including the CCB rule. However, in addition to our technical arguments, Cinergy simply asks you to vote to final adopt this rule.

Dana Meier said he was with the law firm of Ice Miller Donadio and Ryan, and representing Indiana Coal Council, and stated in part: I want to bring to your attention that EPA has studied the CCW disposal issue for a long time. EPA came out with an initial determination report in 1993. I just want to read a couple statements from that report. "That coal combustion wastes were generally not toxic, although there were some exceptions. That the exceptions were determined to be quite rare and average levels are substantially below 100 times drinking water standards." This seems to be inconsistent with a lot of what you have been hearing today. And, if what you have been hearing today is true, coal mine operators do not want that kind of stuff back in their mine spoils either. We do not believe that that's the kind of ash that's going to be in our Indiana sites.

The EPA also said that each ash source should be tested on a site-specific basis to verify that it falls within the expected norm. We believe that this is true. The Indiana rule that is proposed here has 22 ash tests that are done in the five-year permit period. It is far more than any other state that has ash disposal at coal mines. It is far more than what IDEM requires. It is far more than what we think is necessary, but we are willing to do that to make sure that we have a good idea of what ash is going back into our pits.

EPA said that groundwater contamination does not appear to be widespread, and only a few percent of all groundwater quality observations indicate that a primary drinking standard exceedence has occurred. When groundwater contamination does occur, the magnitude of the exceedence isn't large. This was from the determination that EPA made that these four high volume low toxic materials that we are really talking about today were not hazardous. As HEC says, that doesn't tell the whole story. It's still could be harmful even though it is not RCRA hazardous. We believe these materials, most of Indiana's ashes, leach out at a Type III IDEM restricted waste, less than ten percent of the federal limits. EPA, in their documentation, indicated that they were not greatly concerned about those types of materials.

There is more than one site in Indiana where DNR has data, the Key West site in particular. The DNR required Key West Mine to monitor an unpermitted ash disposal when the mine shut down. I have looked at the data from those groundwater wells, and I cannot distinguish any difference between the ash characteristics and the mine characteristics, and I cannot see that there has been any contamination at that site by the high pH ash. I would just suggest that, if you have concern about contamination, look at the data we do have.

This rule requires much more ash testing and also restricts the ash that can be disposed to 25 % of the federal limits. I know of no other state that has that requirement. I think that is a good thing to do, because it gives an extra factor of safety and comfort to, not only people that are around the mines, but the mine operators. If it is going to leach something off our property, we

do not want it. It doesn't matter what the groundwater quality standards say or do not say, SMCRA says we can't do that. We do not want to damage the land that is adjacent to our mines.

We believe that the CCW impacts are not going to be significantly different than the mining impacts. We think that this rule does provide adequate protection given the circumstances of the ashes that we want to dispose here in the sites that we have. We think that this should be adopted and we urge you to adopt the rule, because we need some regulatory certainty. We are sure you are going to have this issue back before you anyway, because I personally have three or four ash administrative hearings on the books right now. You will hear about those with or without this rule. We think this rule will give us some certainty as to where this Commission says things ought to be going with ash disposal.

To address to legal issues, there are no numeric groundwater standards in SMCRA or in this rule. I think we need those too for regulatory certainty. The Indiana statute says that IDEM does numeric groundwater quality standards. When they adopt those, the NRC is supposed to implement those through a rule. That's what the law says, and that's the way it has to be done. You have no choice about this. Notwithstanding that fact, there are groundwater standards^{3/4}not numeric^{3/4}but standards in SMCRA that insure protection, monitoring requirements, waste handling practices, and the standards give DNR the enforcement authority to do something about a problem.

The other issue is the long-term bonding or financial assurance. I do not believe DNR supported the long-term bonding condition in the Foertsch permit before the NRC. Both sides took judicial review in the Daviess Circuit Court. Our petition included that issue, but that issue was never before the Daviess Circuit Court. When this Commission came out with a preliminary adopted rule, Foertsch decided that they were going to live with what everyone else does. The issue was never heard. It was an issue that came from this NRC. I would say it is not lawful, because SMCRA sets forth what the bonding period is. There is a five-year liability period after mining has ceased, and you get the ground leveled off and revegetated, and then you have to have five-year monitoring. That is federal SMCRA. That is the same in every state. In addition to meeting those revegetation standards, you have to meet other certain provisions of SMCRA. SMCRA requires miners to restore the recharge capacity as well. I do not think you have the authority to adopt a rule that would extend the liability based on requiring full recharge.

Meier then called the following for comment:

Dr. Konrad Banaszak (Ph.D. in geophysiology) stated in part: Think about where you know where power plants exist in Indiana^{3/4}next to water supplies. They have to. They need water. It is almost inevitable that the power plant is located on a reasonably usable aquifer of generally rapid transmission of water. Think about Southwestern Indiana. What you see in lots of cases are rural water cooperatives, because it is very tough to get groundwater out of the rock, the spoil, and the other areas that are around. In general, it's not in an area of high aquifers. Coal spoil is, in fact, not exactly CCW, and CCW is not exactly coal spoil. Coal spoil is a natural product. It varies considerably in its characteristics. In fact, Indiana is generally blest with sulfite in coal spoil, but with enough other materials and mixed up enough so that acid mine drainage problems aren't as bad as they are in Pennsylvania. One thing we can agree on, if you look at the

Indiana structure around coal, there is an awful lot of shale and clays that get broken up during the mining process.

CCW is a manmade material. It is a glass, and it does react with water. It produces certain chemistry, and that's why the testing is going to be done. Mixing these is not like mixing acid and base and getting neutral. The attenuative capacity of coal spoil is clearly much higher than the attenuative capacity of the materials that are commonly found at utility sites. And, it's that attenuative capacity, that absorptive capacity, that will be utilized. We understand the hydrology such that we can monitor for those affects.

Dr. Bradley Paul stated in part: First of all, the characterization program that is proposed under these regulations looks a whole lot more like a research program than a regulatory scheme. It is very comprehensive with multiple samples and multiple types of tests including some that cover bulk composition. It is kept current by continued testing of the ash materials themselves. These ashes are going to be carefully screened before they are ever permitted for disposal and placement at mine sites.

These regulations include a very thorough monitoring program. This is complete with baseline monitoring before placement of the ash, and both up and down gradient monitoring after-the-fact. One of the things this kind of thoroughness in the regulations is going to do is prevent a lot of spurious arm-waving claims about alleged groundwater contamination.

You have heard a lot of questions on the topic of boron and what will it do to crops? We monitored very carefully for boron. It was supposed to be our marker element that was going to allow us to calibrate the dispersivity in our groundwater computer models. We knew how long it was supposed to take for the boron to get there. Guess what? It never got there. That is because soil materials and spoil materials are very effective at absorbing boron. In numerous studies they have looked directly below combustion residues to find out- is there an elevation in boron in those soils? The answer is, directly below, yes, there is. As a matter of fact, it persists for a full three feet. This is the kind of extensive contamination plume that you may have to worry about with boron.

We are currently doing some testing programs looking at the boron attenuation characteristics of mine spoils and mine soils. The program is ongoing. I can report only preliminary results. Most of these materials are very effective boron absorbers. We are not going to have boron plumes going anywhere, and the people who are sweating whether their crops will grow in the future, can probably breathe a big sigh of relief.

The monitoring program proposed under these regulations avoids a lot of common pitfalls that might otherwise occur. For one thing, the regulations require that the wells be sited in undisturbed ground, and the regulations explicitly require that they screen the intervals that are actually being used.

There are claims that monitoring wells are just plain too far away. Most of the time coal companies will begin mining the shallowest coal and they will continue to mine into the deeper coal. Most of the time water flows down hill, not up hill. The regulations explicitly require

location of closer devices for measuring the hydraulic gradient. The regulations explicitly require monitoring around any direction in which there is an outward hydraulic gradient. In other words, for the general case we are going to find the monitor wells around that site and not over yonder.

Complaints also about no monitoring required around Class A materials. First off, understand that these materials are being placed essentially replacing the coal seam as the mining sequence advances. You are not going to get any continuous data if the monitor well is placed in front of the mining sequence. You need to look at placing monitoring wells specific to the mining sequence. That is what the rules refer to. They refer to SMCRA and to the protection of the hydrologic balance. It is not called negligence; it is called common sense. That is what they are doing here. Do not let people tell you there is no hydrologic protection with Class A types of materials.

The limits are really safer than safe. People tell you there are no standards. There are all sorts of standards that are going to scream out, "dangerous materials," before they ever hit the site in the first place. The original work on RCRA found a factor of 100 times the drinking water standard to be safe for the most conservative elements under any kind of reasonable dilution and attenuation scenario. The Indiana regulations are tailored to specific elements that are potentially leachable from coal combustion products. It is probably a better-tailored set than I have seen practically any place else in really addressing the characteristics of coal combustion residues. They are tens times more conservative in the worse case that RCRA could find to be sustained. In fact, the regulations are far more conservative than the framers probably ever intended them to be.

Understand that most of your ultra-trace elements that are found in coal combustion residues follow very, very lognormal types of distributions. The Indiana regulations keep track of their coal combustion products on a rolling arithmetic average, and they just build in a factor of about ten safety on the ultra-trace elements that they probably did not realize they put there. Now, we are 100 times safer than safe.

When you look at ultra-trace elements leaching from coal combustion ash over time, what you will normally see is a pattern of flat lines and then an occasional spike here and there. Some people take outlying spikes and used those as the overall groundwater contamination and ignoring the other numbers, or that the distribution is lognormal. You would probably find a lot of the alleged contamination would simply disappear if you do the statistics right.

They put in another safety factor. The shake tests they are using for the primary characterization mechanism themselves drastically over estimate the potential of the combustion residues that put out leachate. Ash material is really soil material that has been raised to very, very high temperature. This is a point that basically the other speakers have already clarified, but it is important to understand what that does. About 50% to 90 % of most of your trace elements are going to be locked in glass phases. Glass phases are very stable. They do not leach rapidly. In fact, this is what we do with high level rad waste where we don't want to kill the entire world with plutonium.

The first water to hit that ash is going to pull off almost all the leachable ultra-trace elements into a single sample, and that is what they are going to use for the regulatory standard. If you take some of those same ash materials, and you do what is called a cascade test where you change the leaching medium, or if you do an ASTM column test where you run repeated pour volumes in contact with the same ash, the sustainable level of trace elements, especially on these ultra-trace elements, is less than 1/10 what you get in the first sample. In other words, they just built in another factor of ten. They are 1,000 times safer than safe.

These are regulations that are worth passing. They provide complete base characterization. Because you have the bulk chemical composition of the ash, and because the Indiana regulations now explicitly limit how much material you can put in there, you are going to have a handle on exactly how much trace. You are not going to have problems.

These regulations include an effective monitoring program. It collects statistically usable data. Up gradient and down gradient wells guarantee that you can use EPA tests for determining groundwater contamination fact or fiction. You are avoiding unstable local water tables. I have tried to put monitoring devices for years into spoils. It is quite a challenge to handle, and it could produce tremendous legal battles if you put wells in ill-founded locations. Keep something simple and statistically valid, which these Indiana regulations do. It monitors the water as the people use it.

The Class A and Class B limits contain large safety factors. 1,000 safer than safe on some of those elements, including safety factors that are an incidental effect of the regulations, and the regulators perhaps never really realized that they had built in. These regulations are going to protect the public, and they are going to protect them effectively. I encourage you to vote for their passage.

Dr. Jodie Tishmack said she is the Ash Management Coordinator at the Physical Facilities of Purdue University. Dr. Tishmack stated that she has a BA in geology and chemistry and a Master degree in soil science with a Ph.D. in civil engineering.

Dr. Tishmack stated in part: My purpose for coming before this committee today is mainly my concern over the negative effects that the proposed rule has on the use of coal ash for beneficial re-use. In 1988, the US EPA reported to Congress that coal combustion waste generally do not exhibit hazardous characteristics under RCRA characterization. Furthermore, the EPA encouraged the utilization of these wastes in order to reduce the volume that is needed for disposal. After almost a decade after these recommendations were made, the US has not significantly increased utilization of coal combustion byproducts. We use approximately 25% of the almost 100 million tons a year that we generate.

In Indiana, our State Legislature passed a law that the Solid Waste Board could not regulate certain beneficial uses of coal combustion byproducts. Yet, Indiana still does not utilize more than about 15% of our ash. I think part of the reason for this is because of comments made at meetings like this. The public has a perception that these materials are hazardous.

In 1995, the US Department of Energy published a report entitled "Barriers to the Increase Utilization of Coal Combustion Desulfurization Byproducts by Government and Commercial Sectors." They concluded that part of the problem was due to regulatory barriers. Regulatory barriers occur when 'state agencies consider the material as potential environmental hazards and place restrictions on coal byproducts that are not placed on conventional materials.' Regulations create a public perception that these materials are hazardous, and I think we have seen quite a bit of that today. In fact, some have suggested that this rule does not go far enough to protect our environment. If you follow that argument to its logical conclusion, you have to ask yourself, then how can it be safe to place hundreds of thousands of tons of coal ash into road construction projects without any regulations, without any liners, without any leachate capture systems, and without any testing whatsoever? How can doing the same thing in a coal mine be hazardous to the environment when it is not to put it into a road?

At Purdue University, we utilize 100% of the approximately 30,000 tons of ash that we produce. Historically, most of our ash has gone into backfill, but much of it is going into making topsoil and soil amendments. The name of the project is "Soiler Maker" in collaboration with Eli Lilly & Company. We developed a process in which we utilize coal ash, industrial bio-solids, municipal yard waste, and animal bedding to make compost. IDEM does regulate Soiler Maker under two permits that were issued to us in 1998. Our permit requires us to monitor metal concentrations in our products, and we find that they fall within the range found in natural soil. We mix our high pH coal ash, which also has a high boron concentration, directly with organic waste to make compost. The ash is in direct contact with the microorganisms, and yet, composting proceeds rapidly indicating that the ash has not killed these beneficial organisms.

We conducted a green house study to determine plant growth and metal uptake in the plant tissues. We found that in most cases plant growth actually doubled, or in some cases and in some soils even tripled with the addition of compost, which were very nutrient rich. Compost additions increase tissue concentrations of plant nutrients, such as potassium, phosphorus, boron, and calcium, but it did not increase concentrations of any heavy metals. Even though boron concentrations are elevated in our compost, its presence did not appear to reduce plant growth in our study. We looked at corn, wheat, and alfalfa, among some of the other crops. This year alone we manufactured about 10,000 tons of topsoil at Purdue. I used about 6,000 tons to build new lawns on campus. We put approximately 1,500 tons of coal ash into that material.

My philosophy is that any material can be used improperly and can result in harm no matter what material is. I am sure if you walk down any aisle in Walmart, you can see commercial materials on the shelf that have very strict rules about using them so they do not cause harm. In a world rapidly increasing population and dwindling natural resources, no usable resource should be thrown away. Regulations that treat coal ash as a potentially hazardous waste will be a barrier to ash utilization in our state, and we will continue to waste this valuable resource.

The argument that all the good ash is being used and it is the bad ashes that are going to the mines does not make sense. I would say approximately 90% to 95% of the ash in Indiana could be beneficially re-used. Probably the most significant barrier is transportation costs and competition from other natural resources such as limestone or sand and gravel. It is possible to use it beneficially.

Commissioner Cockrum asked whether all the ash produced by the Purdue power plant was utilized as topsoil additive. Dr. Tishmack explained that the Soiler Maker project has only been permitted since 1998, so Purdue has only been actually placing topsoil for a year and a half. Dr. Tishmack explained, however, with structural fill projects there was extensive groundwater monitoring contamination beneath the ash.

Sean Griggs stated in part: I am appearing on behalf of the Indiana Electric Association (IEA). The five-member IEA burn coal to generate electricity for the citizens of Indiana; and therefore, we have a very significant interest in this rule and how the byproducts of coal fired/electric powered generation are handled and disposed. We desire and make every effort to do that in a safe and environmentally sensitive manner. I would be remiss if I did not express IEA's appreciation for the diligence and commitment of the Hearing Officer and the DNR staff. IEA supports the final approval of the CCW rule with the Hearing Officer's recommended changes.

This rule protects the environment using a series of overlapping and redundant mechanisms. The most important protection is the initial characterization of the CCW. All CCW that is disposed at a mine site will be tested and will not be disposed unless it meets certain criteria set forth in the rule at 93.1. The bottom line is that the CCW that is allowed for disposal, Class A material, has very similar chemical composition to the natural materials found at the mine site. In fact, we have been told by geologists, who are familiar with native Indiana soils, that if certain Indiana surface soils had to meet these criteria, they would not be allowed to be used as backfill at a mine site.

The second mechanism is the monitoring of groundwater. Monitoring will occur both up and down gradient of the disposal area. We have groundwater rules that are being prepared by IDEM. We have a commitment from the DNR and a recommendation from the Hearing Officer that these rules be incorporated into this rule when IDEM finishes its work. The site geology at mine sites provides natural barriers to the movement of contaminants through the processes of absorption, attenuation, dispersion, and dilution. The CCW that is allowed under this rule and the volume restrictions would represent less than one percent of the total disturbed material at a mine site.

This particular rule involves issues that span the scientific disciplines of geology, geochemistry, hydrology, analytical chemistry, toxicology, and hydrogeology. With all due respect to the State Legislature, the scientific issues that are being considered here, and that are addressed in this rule, require the expertise of the DNR staff and of this Commission. IEA trusts this Commission we will act on this issue within the timeframes permitted by Indiana statute.

Guinn Doyle, resident of Indianapolis and appearing on behalf of Southern Indiana Gas and Electric (SIGECO), stated in part: SIGECO urges the Commission to adopt this rule as proposed. It represents the product of a great deal of work by a number of parties, and, as written, certainly provides more than adequate protection for the handling of CCW waste.

The genesis of Indiana's proposed rule is Illinois' equivalent CCW rule. CCW back haul opponents initially claimed that Illinois' rule was too lenient, however, using the Illinois rule as

it's starting point, the various parties engaged in a great deal of discussion and debate. The result of this rule making process is the proposed rule that is before you today. This rule is significantly more stringent than the Illinois rule from which it evolved. And, furthermore, is more stringent than similar rules in other states. SIGECO believes that, when viewed in its entirety, Indiana's proposed CCW rule is more stringent than any other states' equivalent rule.

The problem we have is that the opponents of CCW not only want to stop backhauling, their ultimate goal is prohibition of the use of coal as an energy source. Therefore, SIGECO believes that there is no political solution that will satisfy the opponents of CCW and urges this Commission to adopt the rule that is before you. The proposed rule is protective of Indiana's environment contrary to the assertions of the opponents to CCW.

Bruce Palin, Deputy Assistant Commissioner for the Office of Land Quality at IDEM, stated in part: I participated on the workgroup that reviewed these rules. I want to compliment the Department of Natural Resources for facilitating a rather lengthy discussion of all interested parties. A lot of information was provided, weighed, and taken into consideration from all sides in order to arrive at the rules you have before you.

Involvement with this topic was difficult for me, because it required that I adjust my frame of reference from typical landfill situations, which I have dealt with for years, to one which I was not as familiar with but learned a great deal about during the process. Typical landfill sites deal with establishing a landfill in a relatively pristine and undisturbed environment where groundwater flows in predictable directions, and the environment is in a relatively steady state. This is not the case with a mine site where millions of tons of soil have been excavated and backfilled, and where metals and contaminants occur in the soil have been exposed to the air and deposited in a manner that allows direct contact with surface and rainwater percolating through the more porous structure, creating chemical reactions which do not normally occur in a landfill site. It is these differences which had to be taken into account in developing these regulations that make them different from our solid waste disposal regulations.

The proposed rules do have features that provide environmental protection, including: banning disposal of coal combustion waste that leaches contaminants above a specific level; more frequent sampling and analysis of the waste than what our solid waste rules currently require; and reliance on the existence of a naturally occurring clay beneath the mine site, which in most cases is less permeable than compacted clay that we require. Given the environment these waste materials are going into, I believe that these regulations provide the appropriate level protection to prevent the coal combustion waste from exacerbating the quality of the environment around the mine sites. I believe, given the same set of circumstances, my office would have arrived at a similar set of rules.

Chairman Kiley stated that the Commission will "do its best to arrive at what is an equitable solution. Maybe the Legislature, in their infinite wisdom, will give us some assistance in this session." Chairman Kiley said an announcement would be made when the Commission reconvened for discussion among the members of the Commission, and, if necessary, the arrival at a decision with respect to the adoption or non-adoption of the rule as proposed.