

MINUTES
NORTH CAROLINA SEDIMENTATION CONTROL COMMISSION
February 28, 2013
GROUND FLOOR HEARING ROOM, ARCHDALE BUILDING
RALEIGH, NORTH CAROLINA

The North Carolina Sedimentation Control Commission met on February 28, 2013 at 10:00 a.m. in the Ground Floor Hearing Room, Raleigh, North Carolina. The following persons were in attendance for all or part of the meeting:

COMMISSION MEMBERS

Ms. Robin K. Smith (Chair)
Mr. Joe Glass
Mr. Jonathan Bivens
Mr. Rob Weintraub
Dr. Rich McLaughlin
Mr. Kevin Martin

OTHERS

Mr. Mell Nevils, Section Chief, Land Quality Section
Mr. Toby Vinson, Chief Engineer, Land Quality Section
Ms. Stephanie Lane, Administrative Secretary
Mr. Gray Hauser, State Sedimentation Specialist, Land Quality Section
Mr. Matt Poling, Assistant State Sedimentation Specialist, Land Quality Section
Ms. Evangelyn Lowery-Jacobs, Sed. Education Specialist, Land Quality Section
Mr. John Holley, Land Quality Section
Mr. Shawn Maier, Assistant Attorney General
Mr. Phillip Reynolds Assistant Attorney General
Mr. Mitch Gillespie, NCDENR Asst. Secretary for the Environment
Ms. Gail Bledsoe, NC Forest Service
Mr. Boyd Devane, NC Division of Water Quality
Mr. Bradley Bennett, NC Division of Water Quality
Mr. Shelton Sullivan, NC Division of Water Quality
Ms. Cyndi Karoly, NC Division of Water Quality
Mr. Berry Jenkins, Carolinas AGC
Mr. David Harris, NC Department of Transportation
Ms. Jennifer Robertson, Atlas Environmental
Mr. Jacob Wiseman, NCSU
Mr. Randall Moore, Iredell County
Mr. Kirk Stafford, Town of Cary
Mr. Todd Hoefler Town of Cary
Mr. Steven Webb, NCHBA
Dr. Susan White, WRRRI

PRELIMINARY MATTERS

Ms. Smith informed those in attendance that the Commission lacked a quorum to be able to conduct official business. She indicated Mr. Martin was in transit, and Action Items would be delayed until his arrival.

Ms. Smith called the meeting to order and read Executive Order No. 1.

Mr. Weintraub expressed a potential appearance of conflict of interest with issues related to the Town of Cary. He is engaged in conversations with the Town regarding prospective project contracts.

Those in attendance introduced themselves.

Mr. Gillespie, NCDENR Assistant Secretary for the Environment, introduced himself to the Commission. He discussed his career in the environmental field, and offered his assistance to the Commission with future issues. He thanked the Commission for the opportunity to address the group, and for their efforts in public service.

Ms. Smith thanked Mr. Gillespie for his visit.

Ms. Smith indicated the agenda would be altered by beginning with the Information Items, due to the lack of a quorum for voting.

INFORMATION ITEMS

Division of Water Quality Report on Sedimentation Impacts -- Mr. Boyd Devane

Mr. Devane presented a powerpoint that summarized the Water Quality Report on Sedimentation Impacts. He discussed the roles of DWQ and DEMLR in protecting North Carolina streams from sediment pollution. He indicated the small areas of program overlap allow the two agencies to work together as a more efficient governmental operation. A copy of the Water Quality Report to the SCC is attached to the original minutes.

Mr. Weintraub asked how DWQ plans to address the issue related to overlap of post construction stormwater devices and sediment control.

Mr. Bennett indicated the DWQ Stormwater Best Management Practices (BMP) Manual does need to be updated to include guidance on sequencing of devices. The stormwater permit provides instruction on maintenance and stabilization of some devices that will be converted to permanent structures. Additional work is needed with collaborating agencies to develop guidance for BMP sequencing to ensure site stabilization, before water is routed to the permanent devices.

Ms. Smith called for a brief recess.

Ms. Smith called the meeting back to order.

Dr. McLaughlin moved to recognize the arrival of Mr. Martin, and that the Commission now had a quorum for voting. The motion was seconded by Mr. Bivens, and it was approved unanimously.

N.C. Forest Service Water Quality Activity Report -- Ms. Gail Bledsoe

Ms. Bledsoe summarized the fiscal year 2011-12 activities of the NC Forest Service (NCFS) water quality program and the non-point source pollution branch. The NCFS inspected 3,506 sites to monitor compliance with Forestry Practice Guidelines (FPGs). An additional 2,560 follow-up inspections were also conducted. The overall state FPG compliance rate was 97 percent. Three cases were referred to cooperating state agencies for enforcement action: two to DWQ and one to DEMLR.

Ms. Smith asked how the NCFS is made aware of logging activities. Ms. Bledsoe indicated permits are not required, but some sites are discovered by NCFS during travel to identified logging operations. The landowner, consultant or logger will usually report sites to NCFS to ensure compliance with FPGs, but complaints are also a source for locating sites.

Ms. Smith asked whether the site gets released by NCFS if it is in compliance. Ms. Bledsoe indicated a form is prepared to indicate the activity was completed, and the site was in compliance at the time of visit. The NCFS does not indicate complete stabilization of the site because there is potential for compliance issues to occur should an extraordinary rain event occur.

Dr. McLaughlin mentioned the sensitivity of the mountain streams to sedimentation, and asked if any work is being done in that region to address compliance problems. Ms. Bledsoe indicated additional training is being offered to loggers and timber buyers to raise awareness of selecting BMPs for various sites. The NCFS is also working to get another Water Quality Forester in the area to address issues with loggers.

Mr. Weintraub asked, "What is the percentage of sites visited by NCFS staff?" Ms. Bledsoe indicated it is often in the 80-85 percent range. There are rangers in every county, and they make rounds frequently to visit most of the active sites.

Mr. Glass asked for any comments on the interaction between NCFS and DWQ. Ms. Bledsoe indicated certain FPGs are referred directly to DWQ, such as questions regarding stream temperature. Occasionally feedback is requested from DWQ on problematic sites, which may be handled by NCFS through BMP implementation. Mr. Bradley Bennett added that DWQ regional staff work closely with NCFS when evaluating forestry exemptions, and there have been no issues with the relationship.

Ms. Smith asked if there has been any discussion on a notification system for forestry

projects. Ms. Bledsoe indicated there have been discussions in the past, but a system has not come to fruition.

Ms. Smith asked how disturbance greater than one acre is addressed. Mr. Nevils indicated the Sedimentation Pollution Control Act exempts forestry, if FPGs are being followed.

Ms. Smith encouraged NCFS to continue discussion on a notification system for forestry projects.

Recognition of Resignation

Ms. Smith informed the Commission of Dr. Voiland's resignation from the Commission, thereby reducing the number of total commissioners. The resignation was recognized and accepted. The reduction allows six members to be a quorum for voting.

PRELIMINARY MATTERS (cont'd)

Ms. Smith indicated the agenda would return to the beginning, and asked for a motion to approve the minutes from the November 14, 2012 meeting.

The motion to approve the minutes was made by Mr. Glass. Mr. Martin seconded the motion, and it was approved unanimously.

Reading of New Member's Economic Interest into Record

Mr. Hauser read the Evaluation of the Statement of Economic Interest filed by Ms. Charlotte A. Mitchell from the State Ethics Commission. There was a potential for a conflict of interest. Ms. Mitchell will fill the role of a member of the North Carolina Mining and Energy Commission who is a representative of nongovernmental conservation interests on the Commission. She is an attorney with the law firm of Styers, Kemerait & Mitchell. Thus, she has the potential for a conflict of interest and should exercise appropriate caution should Styers, Kemerait & Mitchell or her clients come before the Commission for official action. This would include recusing herself to the extent that these interests would influence or could reasonably appear to influence her actions.

ACTION ITEMS

Adoption of Practice Standards and Specifications for the Erosion and Sediment Control Planning and Design Manual -- Ms. Evangelyn Lowery-Jacobs

Recommendations of the Technical Advisory Committee (TAC) for Compost Socks and Riparian Area Seeding were presented. Ms. Lowery-Jacobs discussed the design criteria and construction specifications for the Compost Socks Practice Standard.

Ms. Smith thanked staff and the TAC for their work on the Practice Standards.

Mr. Martin moved to accept the Compost Sock Standard for inclusion in the Design Manual. The motion was seconded by Mr. Glass, and it was approved unanimously.

Ms. Lowery-Jacobs discussed the Riparian Area Seeding Practice Standard.

Dr. McLaughlin moved to accept the Riparian Area Seeding Practice Standard for inclusion in the Design Manual. The motion was seconded by Mr. Martin, and it was approved unanimously.

Local Program Reviews -- Mr. Matthew Poling

Mr. Poling reported on the reviews of Buncombe, Iredell and Pitt Counties, the Cities of Asheville and Wilson, and the Towns of Cary and Apex delegated programs. A copy of the Local Program Report to the SCC is attached to the original minutes.

City of Asheville -- On November 28, 2012, Darlene Kucken, Charles Koontz, Laura Herbert and Matt Poling conducted a review of the City of Asheville's Local Program. Seven staff members contribute 7.0 full time equivalents to the erosion control program. The City has 246 active projects and has reviewed 388 plans with 356 approvals and 32 disapprovals. The City has conducted 6,606 inspections, issued 27 notices of violation, and assessed 23 civil penalties in the past 12 months. Five projects were reviewed, four of which were in compliance.

The local program should implement the following recommendations to improve the program:

- 1) Continue to check for self-inspection records on site.
- 2) Remember to establish a timeline for establishing ground cover by documenting when slopes have been graded or areas are left idle.
- 3) Violations for exposed slopes and failure to provide permanent ground cover should be marked on inspection reports. Potential NPDES violations for ground cover should also be indicated.

Staff recommended continued delegation.

Dr. McLaughlin moved to continue delegation of the City of Asheville Erosion and Sediment Control Program. Mr. Bivens seconded the motion, and it was approved unanimously.

Buncombe County -- On November 29, 2012, Darlene Kucken, Kristin Hicklin and Matt Poling conducted a review of the Buncombe County Local Program. Two staff members contribute 2.0 full time equivalents to the erosion control program. The County has 404 active projects and has reviewed 24 plans, with 24 approvals and no

disapprovals. The county has conducted 1,706 inspections, issued 19 notices of violations, and assessed one civil penalty in the past 12 months. Five projects were reviewed, all of which were in compliance.

The local program should implement the following recommendations to improve the program:

- 1) Continue requiring that adequate ground cover is provided within the time limits of the local ordinance and approved plan.
- 2) Continue to check for self-inspection records on site.
- 3) Remember to establish a timeline for establishing ground cover by documenting when slopes have been graded or areas are left idle.

Staff recommended continued delegation. (Buncombe County received the award for best small local program on February 6, 2013.)

Mr. Glass mentioned the report specifies the County has 404 active projects with 24 plan reviews. He asked if there are many inactive sites. Mr. Poling indicated there are inactive sites working to get ground cover, and the local program is doing a good job.

Ms. Smith indicated that any issues with staffing should be brought to the attention of the Commission.

Mr. Martin asked, "What criteria are evaluated to determine adequate staffing?" Mr. Poling indicated frequency of site visits to ensure compliance, and the ability of the County to work with contractors on site issues.

Mr. Martin moved to continue delegation of the Buncombe County Erosion and Sediment Control Program. Mr. Glass seconded the motion, and it was approved unanimously.

Town of Apex -- On January 8, 2013, Joe Dupree, John Holley, and Matt Poling conducted a review of the Town of Apex's Local Program. Two staff members contribute 1.25 full time equivalents to the erosion control program. The town has 43 active projects and has reviewed 53 plans, with 20 approvals and 33 disapprovals. The town has conducted 495 inspections, issued 8 notices of violation, and assessed no civil penalties in the past 12 months. Five projects were reviewed, three of which were in compliance.

Mr. Poling mentioned that one non-compliant project was pumping sediment from a basin into wetlands on site. The basin embankment had been constructed, but the spillway pipe had not been installed before it rained. The contractor pumped out the basin in order to install the pipe.

Mr. Martin asked if DWQ and the Corps of Engineers (COE) were notified to determine whether wetland remediation were necessary. Mr. Poling indicated the Town issued a

NOV, which is automatically sent to DWQ.

Mr. Martin asked staff to follow up with DWQ/COE to ensure they are aware of the situation, to avoid continued downstream degradation. Mr. Nevils stated that a copy of the NOV is sent to DWQ for necessary action. He added the notification procedure could be changed to be more proactive with all local programs.

Mr. Poling stated that follow-up information had been received from the Town, which had been distributed to the Commission. The letter/pictures indicated the approved erosion and sediment control measures have been installed in accordance with the Town of Apex ordinance.

The local program should implement the following recommendations to improve the program:

1. Continue to check for self-inspection records on site.
2. Remember to establish a timeline for establishing ground cover by documenting when slopes have been graded or areas are left idle.

Staff recommended continued delegation.

Dr. McLaughlin moved to continue delegation of the Town of Apex Erosion and Sediment Control Program. Mr. Weintraub seconded the motion, and it was approved unanimously.

Town of Cary -- On January 9, 2013, Joe Dupree, Karyn Pageau, and Matt Poling conducted a review of the Town of Cary's Local Program. Three staff members contribute 2.5 full time equivalents to the erosion control program. The town has 51 active projects and has reviewed 212 plans, with 50 approvals and 162 disapprovals. The town has conducted 1,621 inspections, issued 48 notices of violation, and assessed 1 civil penalty in the past 12 months. Six projects were reviewed, five of which were in compliance.

The local program should implement the following recommendations to improve the program:

1. Continue to check for self-inspection records on site.
2. Remember to establish a timeline for establishing ground cover by documenting when slopes have been graded or areas are left idle.

Staff recommended continued delegation.

Ms. Smith asked if a representative from the Town would like to address the Commission. Mr. Todd Hoefler (Stormwater Engineering Technician) thanked the Commission for their support. He thanked staff for their guidance in implementing the Erosion and Sediment Control Program.

Mr. Martin moved to continue delegation of the Town of Cary Erosion and Sediment Control Program. Dr. McLaughlin seconded the motion, and it was approved unanimously.

Iredell County -- On January 17, 2013, Tamera Eplin, James Moore, and Matt Poling conducted a review of the Iredell County Local Program. Three staff members contribute 2.5 full time equivalents to the erosion control program. The county has 81 active projects and has reviewed 64 plans, with 60 approvals and 4 disapprovals. The county has conducted 703 inspections, issued 23 notices of violation, and assessed 20 civil penalties in the past 12 months. Five projects were reviewed, two of which were in compliance.

The local program should implement the following recommendations to improve the program:

- 1) Continue to check for self-inspection records on site.
- 2) While reviewing a plan, remember not to approve a plan that has conflicting timeframes for ground cover stabilization.
- 3) While evaluating approved plans, several runoff conveyance measures were noted as running uphill or not phased properly. The County should place more emphasis on ensuring that runoff conveyance measures are adequately planned. Pipe outlets should not discharge onto fill slopes.
- 4) Ground cover timeframes need to be more strictly enforced.

Staff recommended continued delegation.

Mr. Poling mentioned one non-compliant project which could have implemented additional measures (i.e., mulch, ditch liners and check dams) on site to prevent erosion. He added a NOV was issued by the County, and the contractor has been able to bring the site into compliance.

Mr. Poling stated that follow-up information had been received from the County, which has been distributed to the Commission. The letter indicates the steps taken to address recommendations made during the review with Land Quality staff, and a revised plan had been requested.

Ms. Smith indicated assistance could be offered from the regional office, if there are issues with plan review by the County.

Mr. Glass asked what degree of offsite sedimentation occurred with the projects reviewed. Mr. Poling indicated one project had slight offsite sedimentation, and was already under NOV with the County.

Mr. Weintraub mentioned frequent homebuilder complaints with the County regarding inconsistencies with enforcement. He asked whether staff had similar issues. Mr. Poling indicated the County had well organized documentation, but issues were

encountered with site inspections. He had no comment on inconsistencies with enforcement.

Ms. Smith asked if a representative from the County would like to address the Commission and asked how many civil penalties were issued last year by the local program. Mr. Moore, of Iredell County, indicated 23 NOVs were issued, including about 20 penalties for a total of about \$8,500.00.

Mr. Weintraub asked Mr. Moore what the appeals process consists of, considering 20 out of 23 NOVs received civil penalties. Mr. Moore indicated appeals go to the Office of Administrative Hearings and that there is an opportunity to get civil penalties reduced or rescinded, if the contractor is working toward compliance.

Ms. Smith asked if a PE is on staff for plan review and if there are training opportunities with assistance from the regional offices. Mr. Moore indicated there are two staff members in the erosion control program, but neither have PE Licensure. He added that the Mooresville Regional Office has offered assistance since the last review.

Mr. Weintraub asked if there is a requirement for a PE to perform plan reviews. Mr. Hauser indicated a competent person is the only requirement for reviewing plans.

Mr. Glass moved to continue delegation of the Iredell County Erosion and Sediment Control Program. Dr. McLaughlin seconded the motion. Mr. Weintraub abstained from the vote. The motion was approved by majority.

City of Wilson -- On January 24, 2013, Joe Dupree, and Matt Poling conducted a review of the City of Wilson Local Program. One staff member contributes one full time equivalent to the erosion control program. The county has 9 active projects and has reviewed 10 plans, with 10 approvals and no disapprovals. The county has conducted 184 inspections, has issued four notices of violations, and assessed no civil penalties in the past 12 months. Five projects were reviewed, all of which were in compliance.

The local program should implement the following recommendations to improve the program:

- 1) Continue to check for self-inspection records on site.
- 2) Evaluate compliance with NPDES requirements when reviewing plans.

Staff recommended continued delegation.

Mr. Martin moved to continue delegation of the City of Wilson Erosion and Sediment Control Program. Mr. Bivens seconded the motion, the motion was approved unanimously.

Pitt County -- On January 25, 2013, Pat McClain and Matt Poling conducted a review of the Pitt County Local Program. Three staff members contribute two full time

equivalents to the erosion control program. The county has 33 active projects. During the past year, the County has reviewed one plan, with one approval and no disapprovals, and has conducted 50 inspections. The County has not issued any notices of violations nor has it assessed any civil penalties in the past 12 months. Three projects were reviewed, all of which were in compliance.

The local program should implement the following recommendations to improve the program:

- 1) Continue to check for self-inspection records on site.
- 2) Evaluate compliance with NPDES requirements when reviewing plans.

Staff recommended continued delegation.

Mr. Martin moved to continue delegation of the Pitt County Erosion and Sediment Control Program. Dr. McLaughlin seconded the motion, and it was approved unanimously.

Memorandum of Agreements with Local Programs -- Mr. Gray Hauser

Mr. Hauser informed the Commission that MOAs were received from Avery County and Winston-Salem/Forsyth County just before the Commission meeting. He indicated the documents had been reviewed by Mr. Reynolds, and asked if the Commission would like to add those to the agenda today. Chairman Smith agreed to include the two additional MOAs on the agenda.

Mr. Hauser gave a brief discussion of the Memorandum of Agreement (MOA), approved by the SCC, to be adopted by each local program. Buncombe, Chatham, Jackson, New Hanover, Wake, Avery, and Winston-Salem/Forsyth Counties, the Cities of Burlington, Wilson, and Henderson, and the Town of Cary have signed the MOA and request agreement by the SCC.

Mr. Martin made a motion to approve the MOAs. The motion was seconded by Mr. Bivens, and it was approved unanimously.

Amendments to Lincoln County Erosion Control Ordinance -- Mr. Gray Hauser

Mr. Hauser informed the Commission that the amendments have been reviewed by staff. Modifications were included to amend the time limits for ground cover to model those in the NPDES Construction Stormwater Permit.

Staff recommended approval of the amended Lincoln County Erosion Control Ordinance.

Mr. Martin moved to approve the request from Lincoln County to amend the Erosion Control Ordinance. The motion was seconded by Dr. McLaughlin, and it was approved unanimously.

Amendments to Avery County Erosion Control Ordinance -- Mr. Gray Hauser

Mr. Hauser informed the Commission that the amendments have been reviewed by staff. Modifications included the addition of design standards for slopes/fills greater than 33%, and amending the ground cover requirements. The time limit for ground cover was updated to 21 calendar days, except for permanent ground cover on steep slopes, where it was left at 15 working days or 60 calendar days following completion of construction. This is still more restrictive than the 15 working days or 90 calendar days in the SPCA, but was probably not the intention of the County.

Mr. Nevils asked if the County has been contacted for clarification. Mr. Hauser has not yet spoken with a representative.

Mr. Martin asked if voting on the ordinance should be deferred, or approved with the option of revising at a later time. Mr. Hauser indicated the appropriate course of action would be approval with the option of revising.

Mr. Martin moved to approve the request from Avery County to amend the erosion control ordinance with an amendment for clarification. Mr. Bivens seconded the motion.

Dr. McLaughlin asked why the ground cover requirements were written as 15/60 calendar days, considering the overriding 7/14 day DWQ rules. Mr. Hauser indicated the SPCA only requires 15/90 days if the site is greater than one acre, while the 7/14 days is required in the erosion control plan for coverage under the General Stormwater Permit.

Ms. Smith called for a vote on the motion made by Mr. Martin. The motion was approved unanimously.

INFORMATION ITEMS (cont'd):

Report on Local Program Assistance by Regional Offices -- Mr. Gray Hauser presented a report on Regional Office Contacts with Town of Wake Forest, Avery County and Town of Southern Pines. A copy of this report is attached to the original minutes.

Mr. Hauser brought to the attention of the Commission that Land Quality is involved in discussions with Avery County regarding an inactive golf course project with severe erosion and sedimentation issues. The decision has not been made whether enforcement action will be taken, or if Land Quality will take over jurisdiction. Dr. McLaughlin asked the acreage of the project. Mr. Hauser indicated there are over 100 acres of cleared land. He added the topsoil was removed and exposed a sandy, infertile soil. Mr. Nevils informed the Commission that the County has a bond, and has been encouraged to use it for stabilization. He added Land Quality typically investigates the issue to determine if the local government is not properly handling a site, then

communicates with the Commission Chairman of the need to take concurrent jurisdiction.

Mr. Nevils indicated a meeting is planned with the County to encourage moving forward with the project. Concurrent jurisdiction will be requested, if no action is initiated by the County.

Mr. Glass asked what degree of damage is taking place on the inactive site. Mr. Hauser indicated severe offsite sedimentation into two streams has taken place, over the last four years. He added DWQ is familiar with the site, but no action has been taken on their part.

Enforcement Report -- Mr. Reynolds gave a summary of the Attorney General's enforcement report. A copy of this report is attached to the original minutes.

Mr. Weintraub suggested limiting presentation of the enforcement report by AG staff, only to point out significant deviations in trends. Mr. Reynolds will discuss the suggestion with Mr. Payne.

Mr. Martin stated the report should still be distributed, and a formal presentation should be conducted when issues arise. The Commission agreed to the suggestion made by Mr. Martin.

Land Quality Section Active Sediment Cases Report -- Mr. Hauser presented the status of Civil Penalty Assessments. A copy of this report is attached to the original minutes.

NCDOT Report -- Mr. Hauser presented a report on Immediate Corrective Actions issued by NCDOT. He briefly discussed the new form developed by NCDOT in response to concerns expressed about Design-Build Projects at the November Commission meeting. A copy of this report is attached to the original minutes.

Education Program Status Report -- Ms. Lowery-Jacobs presented a report on the past and current projects in the Sediment Education Program. A copy of this report is attached to the original minutes.

Sediment Program Status Report -- Mr. Poling provided a report on the LQS current plan approval, inspection, and enforcement activities statewide.

Land Quality Section Report -- Mr. Nevils provided a report on the current number of vacancies in the Section and other LQS activities and issues. He thanked staff for their efforts. Mr. Nevils also reminded Commission members of the need to complete ethics training.

Mr. Nevils mentioned several bills that may affect the Commission:

1. Senate Bill 112: Includes recommendations to the Environmental Review Commission for bonding and clarification of the local program appeals process.
2. Senate Bill 10: Rearranges several commissions, which may affect the Environmental Management Commission appointment to the SCC.
3. Senate Bill 74: Repeals all rules in the state, and requires re-adoption by each respective Commission.

CONCLUSION

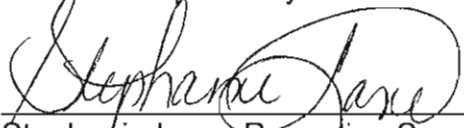
Remarks by the Director -- None

Remarks by the Commission -- Mr. Martin apologized to the Commission for arriving late to the meeting.


Remarks by the Chair -- Ms. Smith thanked staff and the Technical Advisory Committee for their efforts.

Adjournment -- Mr. Martin moved to adjourn the meeting. Mr. Bivens seconded the motion, and it was approved unanimously. As there was no further business, Ms. Smith adjourned the meeting.

Minutes Prepared By:


Stephanie Lane, Recording Secretary

Approved By:


Tracy E. Davis, Director, Division of Energy, Mineral, and Land Resources