

**Minutes of Emergency Meeting  
Grand River Dam Authority  
Board of Directors  
Tulsa, Oklahoma  
July 1, 2011**

An emergency meeting of the Board of Directors of the Grand River Dam Authority was held at New Dominion LLC, Tulsa, Oklahoma, on July 1, 2011. Notice was given pursuant to 25 O.S.A. § 301 et seq. by posting a notice of meeting on GRDA's Web site, [www.grda.com](http://www.grda.com), and by issuing a news release on June 30, 2011; by posting the agenda with the Craig County Clerk's office on July 1, 2011, at 9:04 a.m.; by posting said agenda at the principal office of GRDA and New Dominion LLC and on GRDA's Web site; and by E-mailing the news release to GRDA stakeholders.

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Vice-Chair Spears called the meeting to order at 1:38 p.m. The Secretary called the roll; all members were present with the exception of Directors Bartlett, Chernicky, and LaGere. Vice-Chair Spears declared a quorum.

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**BOARD MEMBERS**

David J. Chernicky, Chair	Absent
Stephen R. Spears, Chair-Elect	Present
Dewey F. Bartlett, Jr.	Absent
Greg R. Grodhaus	Present
Betty Kerns	Present
W. Brent LaGere	Absent
Chris Meyers	Present

**ADMINISTRATIVE**

Kevin A. Easley, General Manager/CEO	Absent
Michael Kiefner, Chief Operating Officer	Present
Gretchen Zumwalt-Smith, General Counsel	Present
Charles J. Barney, AGM Thermal Generation	Present
Carolyn Dougherty, AGM Market Analysis/Strategic Development	Absent
Dale Willis, AGM Transmission	Absent
Mike Herron, AGM Engineering, System Operations, & Reliability	Absent
Donna M. Jones, Secretary	Present

Others present were as follows: Dr. Tony Clyde, U.S. Army Corps of Engineers; Erin Hatfield and Jay Wright, ODEQ; Robert Echenrode, NEOREC; Shane Woolbright, MESO; Tyler Powell, Office of Oklahoma Secretary of Environment; Wendy Gregory, Governor's Office; Tad Jones, Grand Lake Association; Nick Conner, Oklahoma State Parks; Sherri Burris, Grand Lake State Parks; Terry Jones, Office of State Rep. Doug Cox; Randy Krehbiel and Rhett Morgan, Tulsa World; Kendra Montana and Joe Gray, Grove Sun/Miami News Record; Charles Spears, KWGS News; Jamie Lynn Oberg,

KOKI-Fox 23 News; Emily Baucum, KOTV; Noah Geld and Casey Roebuck, KJRH; Judy Florida, Oklahoma Marina Association; Diana Riley Patterson and Vinson Reed; McGraw Realtors; Dick Lane, Dick Lanes of Grand Lake; Chuck Perry, State Tourism Comm./Remax Grand Lake; Joe Harwood, Arrowhead/Cherokee Yacht Clubs; Jeremy Mullen and David Moon, Ugly John's Marina; Russ Soderberg, Harbor's View Marina; Rusty Fleming, Grand Lake Online; Tony Holden, lake homeowner, Tulsa; Mike Hedrick and John Underwood, Grand Lake residents; Justin Alberty, Darrell Townsend, Casey Davis, and Jim Frailey, GRDA.

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## **1. Discussion and Possible Action Regarding the Blue-Green Algae Presence at Grand Lake**

Dr. Townsend reported this meeting was scheduled today because over the past week, GRDA has been in consultation with its fellow resource agencies. There is a particular algae bloom that may pose a significant risk to health and public safety. The meeting was scheduled to bring the Board and the public up to speed before this July 4 weekend. Representatives are present with the Oklahoma Department of Environmental Quality (ODEQ) and the U.S. Army Corps of Engineers (Corps). Dr. Tony Clyde is the state's blue-green algae specialist and has worked with similar issues in Kansas. The conditions at Grand Lake are completely different than ever seen before. The blue-green algae outbreak has been confirmed to have toxins associated with it. It is felt this outbreak is not only toxic but also the current weather conditions are setting up to get worse rather than better. This is the second hottest June on record and forecasts for today through the holiday weekend and Monday are expected to be in the triple digits with light winds. These conditions are all conducive for this blue-green algae to expand and get larger. Dr. Townsend showed some slides of the conditions on Grand Lake. Wednesday or Thursday of last week, algae was found in Horse Creek, essentially the onset of the bloom. GRDA began to make calls to its fellow resource agencies. GRDA and its fellow resource agencies feel this bloom is unique in its size and scope and as

far as toxin results. After GRDA contacted the State Parks, they decided to close their beach at Bernice. GRDA wanted to warn the public about the scums because the toxins can be very concentrated in those areas. Positive results have also been found in Duck Creek. GRDA also wanted to warn people about their animals. It has been reported that dogs can die within an hour of ingesting the algae. Large amounts of scums were also found in Ketchum Cove. Dr. Townsend reviewed the test results from GreenWater Laboratories, a well-respected lab in Florida that is known for this type of analysis. The samples were collected on Tuesday and mailed overnight to Florida; the results were received late yesterday evening. The Microcystin (MC) numbers were as follows: Horse Creek (Tow), ~125 ug/L; Horse Creek (Grab), ~49 ug/L; Duck Creek (Tow), ~358 ug/L, and Duck Creek (Grab), ~10 ug/L. The World Health Organization in 2003 warned there is a high probability of adverse health effects when Microcystin is greater than or equal to 20 ug/L (micro grams per liter). At this point, the numbers are believed to be very conservative. Each subsequent day, there has been a marked difference in the algae bloom; the conditions are setting up to get worse before it gets better. As the bloom expands, there will likely come a point where they begin to die. As the bloom dies, the toxins are released. Blooms are also being seen in the main body of the lake. That scope and magnitude has never occurred in Oklahoma before. The 49 ug/L from Horse Creek from a grab is the highest reported toxin value ever recorded in Oklahoma. In response to a question by Director Meyers, Dr. Townsend reported that parts of Kansas have dealt with this issue in the past. Dr. Clyde reported about similar situations he dealt with in Kansas. Two of the local communities that provide water to the county ceased water withdrawals for seven days. The Kansas Department of Health and Environment (KDHE) responded to assist municipalities as they transferred to

alternative treatment methods to handle potential toxin production. There was not at that time any infrastructure in place to do toxin analysis that can be done now. Since then, a blue-green algae response plan has been created and has been implemented. Last week, the Marion Reservoir closed the beaches. Since then, KDHE took samples on Monday and have posted an advisory to warn people to stay out of the scums and to keep their pets and livestock away from the water. Director Grodhaus asked if GRDA is following the policy. Mr. Wright reported ODEQ has been working with multiple state agencies over several years to develop an implementation plan. Ms. Hatfield reported there are currently posters on Grand Lake warning people not to have bodily contact with the water, not to drink untreated lake water, and to keep pets off of the beach and out of the water. Fliers have been distributed. ODEQ has distributed about 2,000 to 3,000. Director Kerns asked about watering landscapes. Ms. Hatfield reported the main concern is bodily contact, so people should not walk through the water or let their pets or children on the lawns. Mr. Wright added that children and pets are at the greatest risk, mostly because people consume about half a pint of water in normal swimming activities. For an adult of 120 pounds, that amount is at the tolerable daily intake of the toxins at the standards set. If a child or dog of 60 pounds consumed that same amount of water, it is ten times the tolerable daily intake that is established for an adult under drinking water standards established by the World Health Organization (WHO). Director Spears asked about inhalation. Mr. Wright reported the cyanobacteria of blue-green algae have the capability to produce a series of toxins. Some produce more than one. The one being addressed now is Microcystin, and research shows it is an irritant to the skin of mammals, birds, and humans. Fish do not seem to be impacted by the presence of the algae or toxin at this point. One of the recommendations of the WHO is if a

person comes in contact with water with scums, foam, or algae or is discolored, they need to wash themselves and their pets with soap and fresh water. There are volatiles that come out and can aerosolize to cause upper respiratory issues associated with blue-green algae. In response to a question by Director Grodhaus, Mr. Wright answered that the bloom will run its course when it runs out of nutrients and light. In the current conditions of heat and light penetrating the water and calm days, it is basically waiting for the algae bloom to consume all the available nutrients in the water. In response to questions by Director Spears, Mr. Wright stated that right now, most of the toxins are being held in the cell, and that may flip-flop as the bloom starts to die off. Director Kerns asked if the algae can be treated, and Mr. Wright stated no. Other health effects are associated with chemicals. The amount of copper sulfate that would need to be used would create longer-term problems for the reservoir and public health. Director Spears asked about further health issues once the algae dies and settles to the bottom. Dr. Townsend stated the next step could be large fish kills associated with the die off, primarily due to the toxin release and the decay of the algae. Bacteria will start to break down the algae in the sediments, and that will suck all the oxygen out of the water. Large fish kills are primarily associated with low dissolved oxygen (DO) levels. The Microcystin is the toxin. GRDA cannot get lab results like GreenWater gets. GRDA runs positive negatives which give a very small range and are very rudimentary as far as accuracy. GRDA has been collecting samples daily and is seeing the algae crop up in other areas of the lake. They are very dynamic and difficult to predict and can move with wind shifts. Dr. Clyde samples are continued to be coordinated with ODEQ on cell count, another way to incorporate public health advisories based on the WHO guidelines. The Corps' experience with Marion Reservoir and another bloom in

Calington Cove on the R. S. Kerr Reservoir in 2007 when there were beach closures and closed off that cove is that it is dominated by Microcystis now. That does not have the ability to fix atmospheric nitrogen like a bean plant does, but other species of blue-green algae do have the ability to fix atmospheric nitrogen. Microcystis is leaving the bloom. As it dies off because of nutrient limitation—probably due to nitrogen rather than phosphorous—so there will still be plenty of phosphorous in the water, and then other species of blue-green algae will start to fix atmospheric nitrogen. They will then have the potential to create extensive blooms just like with the Microcystis. They produce an entirely different suite of anotoxins and have different LD50s, which are much lower. The lethal dose that killed 50 percent of the test population, their LD50s are lower, and it requires different tests which green water is able to do, which is why Grand Lake is getting some anotoxins. In response to a question by Director Kerns, Dr. Townsend stated this has never happened in any lake in Oklahoma to this extent. Dr. Wright stated there was one other bloom that caused a beach to be closed for three weeks in July 2007—Calington Cove at R. S. Kerr Reservoir. Based on the Corps' experience in Kansas, they were able to respond to it very quickly and had the WHO guidelines in place to have the lake manager close the beach. It is important to note that blue-green algae are natural components of the phytoplankton populations in all lakes in Oklahoma. The hot/dry conditions this summer is what has allowed the blue-green algae to dominate in Grand Lake and other reservoirs throughout the United States currently. In general, a bloom occurs in most Oklahoma lakes in late summer (August/September) that includes the entire population of algae, not just blue-green algae. It then dies off and goes back to normal levels. August and September temperatures are being experienced at the end of May and the beginning of June, right

on the end of some flooding that occurred in many of the watersheds in Oklahoma where there was significant nutrient loading. Then the flow cut down with still days and hot weather and light penetration into the water column. Director Spears asked if there is any way to eliminate or precipitate the nitrogen or phosphorous. Dr. Townsend stated the only real treatment he knows that has been used on smaller ponds is copper sulfate, but generally there are problems with DO after using it. Director Grodhaus asked if a recommendation would also include watering lawns—would that be the same magnitude risk as boating. Mr. Wright stated he was not certain it would be a risk at the same level as being immersed in the water. At the same time, if a person is getting in spray, that is primary contact which the ODEQ does not recommend. ODEQ does not recommend walking on lawns being sprayed with lake water. At the time the notices went out, ODEQ was not aware that is a common practice. In response to a question by Director Grodhaus, Ms. Hatfield stated ODEQ addressed the issues for humans and pets in the information distributed. Dr. Townsend added that GRDA has attached a link to its Web site for veterinarians and physicians that lists the primary symptoms. Mr. Wright added that ODEQ has contacted the Health Department. Director Grodhaus asked what the recommendation is. Dr. Townsend stated it is GRDA's recommendation to use common sense and no bodily contact with the water based on all the conversations over the past week and a half with ODEQ, the Corps, and others. Director Grodhaus asked about boating and spreading the algae. Dr. Clyde stated he did not think there is a risk of spreading by boating because it is already present all over the lake. The spray and fine mist created by outboard motors does potentially pose a risk of aerosolizing the secondary compounds, which not much is known about, that could cause some upper respiratory distress. In response to a question by Director

Kerns, Dr. Townsend stated GRDA has been in contact with ODEQ, the Corps of Engineers, indirect communication with USGS—the primary agencies—and the State Wildlife Department and State Parks. GRDA has not talked to the U.S. Fish and Wildlife Service. Mr. Wright added that on a state level, ODEQ, Oklahoma Water Resources Board, the Secretary of Environment's office, and the State Department of Health have been contacted. Mr. Clyde added that on a federal level, he has been in contact with the USGS and Centers for Disease Control. Director Grodhaus stated it appears a physical health concern has been described, but there are also thousands of families and businesses on the lake that will be left with horrific economic consequences after an already disastrous spring of storms and tornadoes, etc. He applauded everything going forward and addressing the health issues upfront, but he believed there needs to be a very active marketing and other campaigns for alerting the public this is not Armageddon, there are lakes throughout the world where people continue to boat and swim, it does not poison the lake or cause irreparable harm, and things will get back to normal. The economic health of the region will probably be as important as the physical. Director Spears stated the long-term needs to be addressed—policies in place and what can GRDA do as an agency to take steps to prevent this type of outbreak in the future. Dr. Townsend stated GRDA will be working closely with ODEQ and the Corps on their draft response plan. Mr. Wright added that the EPA is conducting a study, "The Total Maximum Daily Load Study," where they will identify nutrient sources throughout the watershed, including Arkansas, Missouri, and Kansas, as well as Oklahoma. They will set target goals for nutrient reductions. Farmers will be encouraged to institute best management practices, and contributions of the waste water treatment plants will also be examined. Dr. Townsend added that the GRDA Ecosystems Department has tried to

expand out to the watershed to addressing these issues. Most of the land mass comes out of the Kansas farms. Most of the people in the watershed reside in Missouri. Over the last four or five years, the Ecosystems Department has been reaching out to those people to share information and coordinate meetings among the states. The universities GRDA has partnered with are focusing on the watershed approach concept. That is how these issues will be addressed down the road. There are state political boundaries GRDA will have to find a way to cross, and there are also two EPA regions associated with the Grand Lake watershed. Director Grodhaus encouraged also working with the Tourism Department as this will also substantially affect them. Dr. Townsend said GRDA and ODEQ have been in contact with them. In response to a question by Director Meyers, Dr. Townsend stated this is a significant bloom event on Grand Lake. Director Grodhaus asked if there is a formal recommendation that staff is recommending. Director Spears asked if the Board needs to take any action, or is the meeting just informative. He thanked the press for being present and for helping to get the word out of the possible health risks and the actions people need to take to protect themselves. Dr. Townsend stated a recommendation of no bodily contact would be warranted. An action may be needed for the Lake Patrol to have the authority to tell people to essentially get out of the water. Ms. Zumwalt-Smith reported the ODEQ has warned the public of no bodily contact through warnings and fact-sheets. If the Board wants to prohibit bodily contact under the statutes, only the Board can stop the public from swimming in the lake because the lake statutorily remains open to the public for recreation unless the Board closes any portion of it for public health and safety. The Board has that authority. The Board does not have to do that, but if the Board chooses to prohibit swimming, a motion would be needed from the Board for the purpose of

health and safety. Another option is to continue along the line the ODEQ has started, which is to continue warning the public by posting signs and handing out fliers and issuing news releases that primary body contact—swimming, getting wet, riding PWCs—is strongly discouraged. That would not take Board action. Ms. Hatfield stated the ODEQ fact sheet recommends no bodily contact with water—no swimming and use caution when boating. Dr. Clyde stated the Corps' advisory that went out on a press release on its Web site for district reservoirs is based on the CDC and WHO guidelines associated with the ODEQ's advisory and that no bodily contact includes wading, swimming, water skiing, and jet skiing. Ms. Zumwalt-Smith stated Legal's recommendation would be to post strong advisory signs similar to what the Corps posted on its lakes. From a legal standpoint, Ms. Zumwalt-Smith would not recommend closing the lake. Dr. Townsend believed if the Board did not take an action prohibiting bodily contact, there might be a high risk of health problems with bodily contact. Mr. Fleming added that as far away as Corpus Christi, Grand Lake is already reported as closed. The public relations aspect has already been severely damaged. The real estate values on the lake have probably already taken a ten percent hit. The warnings have been out, and it has been on the news for four or five days. In Mr. Fleming's opinion, if the Board does take action on this, it then becomes a permanent rather than a temporary situation. Director Spears added if a resolution was adopted to prohibit swimming, the enforcement of that action would be literally impossible. GRDA has approximately 15 lake patrol officers available. The Board was in consensus that staff is doing everything possible to get the word out and to continue with the current action, that the warnings are in place, and people should take heed of them. Mr. Kiefner reiterated that the presence of blue-green algae in the waters of Grand Lake is a

temporary situation that will eventually be corrected by nature, and although GRDA is discouraging people from having contact with the water at this time, there are many other recreational activities people can enjoy around the lake. No Board action was deemed necessary. Director Spears recommended that the lake patrol officers reiterate the message with anyone they see swimming, etc.

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Director Meyers moved for adjournment at 2:50 p.m., seconded by Director Grodhaus, and voted upon as follows: Grodhaus, Kerns, Meyers, Spears, yes. *Motion passed (4-yes, 0-no, 0-abstained).*

  
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Donna M. Jones, Secretary

DATE APPROVED:

August 10, 2011  
GRDA Board of Directors