

**BEFORE THE ARKANSAS SOIL AND WATER CONSERVATION COMMISSION**

**In the Matter of:**

**The Designation of the Alluvial and Sparta Aquifers within Arkansas, Jefferson, and Prairie Counties, and Parts of Lonoke, Pulaski, and White Counties as a Critical Ground Water Area**

**CGWA 1998-2**

**FINDINGS OF FACT AND CONCLUSIONS OF LAW AND  
COMMISSION ORDER**

After review of the evidence contained in the record of this matter, the Commission adopts the following Findings of Fact and Conclusions of Law and Order:

**FINDINGS OF FACT AND CONCLUSIONS OF LAW**

Based upon the record in this matter, the Commission adopts the following Findings of Fact and Conclusions of Law:

**I. Introduction**

1. In July of 1998, the Arkansas Soil and Water Conservation Commission designated the alluvial and Sparta aquifers within Arkansas, Jefferson, and Prairie Counties and portions of Lonoke, Pulaski, and White Counties as a critical ground water area, hereinafter "Grand Prairie Critical Ground Water Area."
2. The designation as it applied to Arkansas County was appealed to the Arkansas County Circuit Court. In case CIV 98-39, the issue of what parts of Arkansas County should be included in the Area was remanded to the Commission "for such further action as it may deem necessary." On January 13, 2000, the Arkansas Supreme Court dismissed without prejudice an appeal of the Order. Pursuant to an order of the Commission dated January 20, 2000, the Commission's staff investigated the matter and reported its findings and recommendations to the Executive Director, who submitted the staff recommendation for public comment.
3. As required by the Arkansas Administrative Procedure Act, Arkansas Code Annotated §25-15-201 *et seq.* and the Arkansas Ground Water Protection and Management Act, Ark. Code Ann. §15-22-901 *et*

seq., hearings were held in DeWitt, Arkansas County, on June 8, 2000, and at Little Rock Arkansas on June 9, 2000. Written public comments received before June 16, 2000, were made part of the record.

4. The hearings were very well attended with over 109 people at the DeWitt hearing and over 12 at the Little Rock hearing. Mr. Russell D. Berry, an attorney, attended both hearings on behalf of his approximately 300 clients, while Mr. Park Eldridge, an Arkansas County landowner, made a presentation at the Little Rock hearing on behalf of himself and approximately 168 fellow landowners from the southern end of the county. Many written arguments and comments were received, including a detailed review of the evidence submitted by Mr. Berry. Evidence received during the public comment period is included in the record and was considered.

5. The administrative record in this matter includes the administrative and court records filed in Arkansas County Circuit Court Case CIV-98-39, this Report, and the *Arkansas Soil and Water Conservation Commission Ground Water Protection and Management Reports for 1998 and 1999*, and the transcripts and exhibits associated with the public hearings and meetings.

6. In making a determination whether to include Arkansas County in the Grand Prairie Critical Ground Water Area, the Commission answered this question:

What areas, if any, in Arkansas County have developed, or trends indicate they may develop, significant ground water depletion and/or degradation?

In answering the question, an analysis was made under Rule 403.1 with the aid of guidelines set out in part A of that rule. In addition, as required by part B of the rule, "specific geologic and hydrologic characteristics of the area judged by the Commission staff to warrant inclusion" were considered. The designation concerns two aquifers, the alluvial, and the Sparta, so a separate analysis was made for each.

7. Each analysis was made according to Commission Rule 403.1. As stated by Mr. Berry in his Objections to Recommended Findings of Fact and Conclusions of Law, the criteria listed in part A of the rule are "non-exclusive criteria provided as guidelines for addressing ground water quantity and quality." (R. 371) Though analysis using the criteria is required, they are not litmus tests for designation. It is not necessary to show, for example, a one (1) foot per year decline over five (5) years in a given area to include it in the designation.



Rule 403.1. provides as follows:

DESIGNATION.

Using all pertinent data, an analysis will be made to determine those areas that have developed, or trends indicate they may develop, significant ground water depletion and/or degradation. Designating an area indicates that limitation of withdrawals through the use of water rights may be necessary in order to maximize the present and continued beneficial use of the area's remaining ground water resources.

A. Criteria used in an analysis leading to a recommendation of a Critical Ground Water Area will consist of, but not be restricted to, the following parameters:

1. Water Quantity:

(a) For water table conditions (unconfined aquifer): Average declines of one (1) foot or more have occurred annually for a minimum of five (5) years and/or water levels have been reduced such that fifty percent (50%) or less of the formation is saturated.

(b) For artesian conditions (confined aquifer): Average declines of one (1) foot or more have occurred annually for a minimum of five (5) years and/or the potentiometric surface is at or below the top of the formation.

2. Water Quality: Ground water quality has been degraded or trends indicate probable future degradation that would render the water unusable for the beneficial uses of the aquifer.

3. Projections/Hydrologic Boundaries: Consideration will be given to a safe yield of ground water pumping strategy for the aquifer including the utilization of a ground-water flow model, the natural hydrologic boundaries of the aquifer, and projected water-level declines.

B. A report shall be prepared based on criteria in Section 403.1 A as well as specific geologic and hydrologic characteristics of the area judged by Commission staff to warrant inclusion. The report shall contain a map showing recommended boundaries and the explanation of proposed action.

C. A public hearing will then be conducted within each county of the proposed area in accordance with the Administrative Procedures Act.

D. After consideration of all evidence, public comments, and recommendations of Commission staff, the Commission may issue an order designating the Critical Ground Water Areas and the boundaries thereof.

8. The term, "and/or," as used in the analysis under Rule 403.1 means "either or both of." *Black's Law Dictionary* 86 (6th ed. 1990).

9. Many public comments were received both orally at the public hearings and in writing. In addition to those in support of designation, comments against designation fell into two general areas: 1) that the water level declines are limited to north and central Arkansas County, and 2) that the staff does not have good data or science to back up its conclusions, and that the staff manipulated the data to indicate the need for a Critical Ground Water Area.. These concerns are addressed in detailed responses attached as Exhibits B and C to the Recommended Findings of Fact and Conclusions of Law and Order.

Evidence of moderate declines and static or increased water levels was presented by several people. It ranged from citing measurements taken with a Coke bottle and string (R. 113), to memories of

water levels at times when pumps have been pulled from wells (R. 115—116), to well construction reports produced by licensed water well contractors (R. 414—424). The information presented, while not gathered with the same scientific oversight as the data used by the staff, is not in conflict with the picture of slow declines and some static levels on the perimeter and southern end of Arkansas County presented by the staff conclusions. The staff's conclusions as to the extent and pattern of past and future declines discussed below are sound and were not rebutted by this evidence.

Comments of geologist Dr. Jerry Overton were filed by Mr. Berry with his Addendum to Objection to Recommended Findings of Fact and Conclusions of law. The many misapprehensions about the data gathered and interpreted by the Commission's staff and by the USGS are addressed in Exhibits B and C to the Recommended Findings of Fact and Conclusions of Law and Order. The objections and comments are appreciated, but are not successful in rebutting the staff's conclusions. The exhibits show that the scientific evidence presented by the staff and by the USGS are a sound basis for recommending that the Commission find that Arkansas County has developed and trends indicate the future development of significant ground water depletion and/or degradation.

10. The primary concern of those who object to designation is fear of state restriction of ground water use. While the General Assembly did provide for regulation in the Arkansas Ground Water Protection and Management Act, it is not the intent of the Commission to take this step at this time. State law and Commission policy embodied in the Ground Water Protection and Management Act and Commission Rule 404.5 provide exemption from regulation for landowners who achieve a twenty (20) percent reduction in ground water use by implementing conservation measures or by conversion to surface water use, or who implement water conservation plans employing generally accepted water conservation practices are exempt from regulation.

Ongoing and proposed conservation efforts are very encouraging. The 168 Stewards of the Land representing ownership of approximately seventy-five (75) percent of farm land ownership in southern Arkansas County presented letters to the Commission pledging to endeavor to reduce ground water use by twenty (20) percent over the next five (5) years. They plan to implement new irrigation methods, such as side-inlet irrigation, to save water and plan to install devices to measure ground water withdrawals. Under the Act and Rule 404.5, these landowners would be exempt from regulation if they achieve their conservation goals.

Another group of southern Arkansas County landowners under the leadership of Jerry Lee Bogard intends to form an irrigation district in their region to provide surface water to farmers. In addition, they have, and plan to continue to, implement on-farm water conservation projects.



The proposed conservation efforts, including land leveling, conversion from ground to surface water use, and the construction of reservoirs are eligible for state tax credits. For conversion from ground to surface water use within a Critical Ground Water Area, the Water Resource Conservation and Development Incentives Act provides a credit of fifty (50) percent of project costs. Outside a declared Area, landowners are limited to a ten (10) percent credit. In 1999, the General Assembly expanded the available credit to include the installation of water metering devices at the same rate as conversions. Ten (10) percent credit and fifty (50) percent credits are available outside and inside Critical Areas, respectively.

Since regulation is not proposed at this time, since a significant number of Arkansas County landowners plan to engage in conservation projects for which enhanced tax credits are available, since existing water use would be protected by grandfathering if regulation occurs, and since landowners who reduce water use or who have conservation plans are exempt from regulations, any detriments of designation are far outweighed by the benefits. The Commission cannot in good conscience ignore the ground water problems in any portion of Arkansas County and cannot designate any less than the entire county.

To ensure that the proposed conservation efforts are given time to show results and to further reassure those who are concerned about the possibility of regulation, the Commission should not take steps to implement regulation of alluvial aquifer water use for a period of five (5) years following designation.

## **II. The Alluvial Aquifer in Arkansas County**

The alluvial aquifer in Arkansas County has developed significant ground water depletion and trends indicate that significant depletion will continue and degradation of water quality may occur. It meets the requirements of Commission rule 403.1 and should be made part of the Grand Prairie Critical Ground Water Area. See Exhibit A.

### **1. Description of the Aquifer**

The alluvial aquifer consists of 60 to 140 feet of sand and gravel and underlies all of Arkansas County. The Mississippi River Confining Unit, composed of up to 80 feet of fine-grained sand, silt, and clay overlies it. Under the aquifer there are less permeable aquifers and confining units of the Mississippi Embayment. The alluvial aquifer is connected hydraulically to several rivers, streams, and other bodies of water. Rainfall infiltration and inflow of surface water recharge the aquifer, while water is removed from the aquifer by pumping and outflow to surface water bodies.

The aquifer has been pumped in ever-increasing amounts for agricultural irrigation since the early 1900s. Arkansas County now withdraws more alluvial aquifer water than any other county in Arkansas.

## **2. Water Level Declines**

Alluvial aquifer wells monitored in Arkansas County have shown steady declines throughout the period of record. As early as 1928, a cone of depression where there is a significant slump in the potentiometric surface, or water table, was observed. Water levels in the cone dipped as low as 120 feet above sea level in the DeWitt area and 140 feet above sea level near Stuttgart. The potentiometric surface has dropped approximately 100 feet in the DeWitt area and approximately 130 feet in the Stuttgart area since pumping began. This is an average decline of over one (1) foot per year for the past one hundred (100) years.

Though Stuttgart, Almyra, and DeWitt are centered in the most pronounced cone of depression in the county, the cone has widened dramatically since it was first observed. Surrounding ground water is drawn down the cone's sloping sides toward the center. The cone continues to expand as water is taken faster than the aquifer can be recharged. A map indicating the observed growth of the cone, indicated by the 110 foot above sea level contour interval in Arkansas County in 1938, 1944, 1959, 1985, 1992, and 1999, was introduced into the record by Todd Fugitt of the Commission's staff. (R. 320—323) As the map indicates, the cone first appeared between Stuttgart and DeWitt and expanded along an axis roughly parallel to the Arkansas and White Rivers. As of 1999, the cone had grown to approximately half the width of Arkansas County and had stretched to cover an area from just northeast of Gillett all the way to Carlisle in Lonoke County. This growth continues to accelerate.

Declines in Arkansas County vary from seemingly minor to quite drastic, depending on where measurements are taken. From 1994 to 1999, individual well declines ranged from 0.59 feet to 15.54 feet. Wells measured in both 1998 and 1999 exhibited declines of 0.09 to 5 feet. A pattern in these declines is observable showing that the parts of Arkansas County adjacent to the Arkansas and White Rivers have not experienced declines of the same magnitude seen in the center of the county. Higher water levels on the perimeter of the cone of depression might be interpreted by some as a sign that there is no problem with the alluvial aquifer on the perimeter of Arkansas County and that the critical designation should not apply there. Understandably, water users on the perimeter who have experienced less dramatic declines, static water levels, or even increased water levels may hope that the aquifer under their land is not in danger. The sense of security felt on the perimeter will soon fade. Though declines farther from the center are less pronounced, they will accelerate as the cone of depression spreads as a result of continued depletion of the aquifer and interception of recharge along the perimeter.



Some slowing in the rate of water level declines has been observed in the alluvial aquifer in recent years, which may also lead some to conclude that the aquifer is not in danger. This trend is attributable to the proximity to the rivers providing inflow to the aquifer and to increased use of the Sparta aquifer. As a cone of depression develops it tends to reach a point where, rather than getting deeper, it expands laterally. Declines will level off within the existing cone, but dwindling ground water supplies will be observed as the cone grows into areas which have not yet experienced severe declines. In Arkansas County, alluvial declines have slowed within the cone, and the most dramatic declines tend to be found in to northwest as the cone creeps toward the area of least recharge.

It also must be noted that some Arkansas County wells showed a rebound from declines in the early 1970s. Hydrographs of these wells located near the Arkansas River show the sudden increase in ground water levels coincided with the completion of the McClellan-Kerr Arkansas River Navigation System, which stabilized river water levels by creating a higher, more reliable source of recharge. Though ground water levels increased at that time, declines have resumed at the same rates as were observed before the system was completed.

The existing cone of depression has been shown to increase in all directions, and trend analysis indicate that this will continue as long as withdrawals exceed the recharge available. Isolated increased water levels still occur, but modeling predicts that those users will soon see declines. Even if pumping rates were held at current levels, declines that will render the alluvial aquifer unable to support agricultural irrigation will occur early in approximately fifty (50) years. Water level data, water use data, and ground water flow models indicate that water use continues to increase in Arkansas County.

These declines will soon cause the widening cone of depression to expand beyond Arkansas County. The map referred to above to illustrate past growth of the cone of depression shows the results of computer modeling that indicate this growth over the next 50 years. By 2050, the alluvial aquifer will have dropped to at least the 110-foot potentiometric contour under all of Arkansas County except isolated areas near Reydell and the southernmost tip of the county where recharge from rivers is greatest.

Eventually, the aquifer will not be able to sustain either the quantity or the quality of ground water supplied in the past. This will result in increased pumping costs, decreased well yields, increased well interference, the threat of degradation in the form of salt water intrusion, land subsidence, and reduced recharge to streams and wetlands. In addition, many wells will have to be deepened or redrilled at great cost to water users.

The supply of water available for irrigation will not be the only loss. The Arkansas and White Rivers are hydraulically connected to the alluvial aquifer and their base flows depend on ground water levels. Excessive withdrawals near the rivers, streams, and wetlands can adversely affect and surface water levels. Wildlife will be affected by lower surface water levels, as will navigation. Baseflow of

streams from ground water adjacent to Arkansas County has already been reduced such that only seasonal recharge from bank storage is available to the rivers during the dry season of late summer. The historic flow pattern from the aquifer into rivers has been reversed by depletion so the rivers now recharge the aquifer system at a rate of approximately 167 million gallons per day.

### **3. Decreased Saturated Thickness of the Alluvial Aquifer**

The “saturated thickness” of an unconfined aquifer is the portion of the aquifer that is filled with water. A large part of the alluvial aquifer in Arkansas County is less than 50 percent saturated. This area corresponds to the growing cone of depression discussed above.

The immediate effect of a loss of saturated thickness is an inability to acquire water from the aquifer. In areas where there is less than 50 feet of saturation, well yields have dropped to less than 100 gallons per minute. Stored water also helps support the structure of the aquifer. As pumping removes water, the aquifer can be damaged by collapse of that structure, causing loss of storage capacity and possibly land subsidence.

The long-term availability of water cannot be ensured as long as ground water use exceeds sustainable yield levels, levels at which withdrawals are greater than recharge. The entire alluvial aquifer in Arkansas County is one hydrogeologic basin depending on recharge from the Arkansas and White Rivers. Excessive withdrawals from areas in Arkansas County where the saturated thickness has not dropped to less than 50 percent are intercepting recharge and otherwise removing water from this system, thus contributing to continued declines and loss of saturated thickness.

### **4. Degradation of Water Quality**

Excessive pumping of the alluvial aquifer can cause salt-water intrusion. If over pumping of the alluvial aquifer continues at current rates, salt-water intrusion may render the water unsuitable for drinking and, ultimately, for agricultural purposes.

### **5. Geologic and Hydrologic Characteristics of the Alluvial Aquifer in Arkansas County Warranting Inclusion of Entire County in the Grand Prairie Critical Ground Water Area**

The natural hydrogeologic boundary for the alluvial aquifer in Arkansas County is the White River to the east and the Arkansas River to the southwest. This boundary corresponds to the county line. The aquifer extends beyond the political boundary of the county to the northwest into the current Grand Prairie Critical Ground Water Area.

The entire hydrogeologic system must be viewed as a whole, because withdrawals and recharge in any part of the hydrogeologic system affect water levels elsewhere. Ground water flow data indicates



that water in the alluvial aquifer is moving from the rivers down the sloping cone of depression toward the center of Arkansas County. Withdrawals in areas near the Arkansas and White Rivers, where water is more plentiful, reduce the available supply of recharge to the middle of the county. Users near the rivers who benefit from higher levels and slower declines are doing so at the expense of their neighbors near the center of the county. This may violate some users' correlative right to ground water use and lead to litigation. See Jones v. Oz-Ark-Val Poultry Co., 228 Ark. 76, 306 S.W. 2d 111 (1957).

Though some areas of Arkansas County exhibit less-serious declines than others, there is a countywide trend of increased water use and decreasing levels. As withdrawals continue to exceed recharge, the existing cone of depression will spread to encompass the entire county.

Since the base flow to surface water bodies in and bordering Arkansas County depends on the level of water in the whole alluvial aquifer, it is vital to designate the whole county as critical. Continued over use where the water table is higher reduces the base flow and reduces recharge to the remainder of the aquifer.

The established county line provides the most reliable delineation of the parts of Arkansas County to be included in the Grand Prairie Critical Ground Water Area. Water level contour maps indicating water levels, flow direction, and areas of significant declines must be revised annually to track dynamic ground water system changes in response to environmental factors and withdrawals from wells. Contour lines vary year-to-year, sometimes by a great amount. It is not possible to use such changing lines to delineate boundaries of the Critical Ground Water Area. The established and familiar boundary provided by the county line includes the entire hydrogeologic system, so it is the most readily available and logical method of defining the Critical Ground Water Area.

The designation is a non-regulatory means of focusing educational and conservation efforts on a serious environmental threat. Including the entire county will aid conservation education programs implemented by agencies such as the Arkansas County Conservation District, whose boundaries are those of the county, the Cooperative Extension Service, which provides services on a county basis and the ASWCC. Tax credits available from the ASWCC for reduction of ground water use should be made available to all water users in Arkansas County to encourage countywide conservation, which will reduce stress on the entire aquifer.

### **III. The Sparta Aquifer in Arkansas County**

The Sparta aquifer in Arkansas County has developed significant ground water depletion and trends indicate that significant depletion will continue and degradation of water quality may occur. It meets the requirements of Commission rule 403.1 and should be made part of the Grand Prairie Critical Ground Water Area. See Exhibit A.

## **1. Description of the Aquifer**

The Sparta aquifer underlies all of Arkansas County, where its thickness averages from approximately 400 to 800 feet. It is underlain by the Cane River Formation and overlain by the Cook Mountain Formation, both of which are effective confining units, making it a “confined” aquifer.

The Sparta is composed mainly of sand with considerable amounts of silt, clay, shale, and lignite in lenses throughout the unit. Lithologically, it varies considerably both vertically and laterally.

The Sparta aquifer is the major source of good quality drinking water in eastern Arkansas, including Arkansas County and is increasingly being used for agriculture.

## **2. Water Level Declines**

Increasing declines in the overlying alluvial aquifer have forced many water users in Arkansas County drill into the deeper Sparta to obtain sufficient water. From 1995 to 1999, water levels in 20 of 21 Sparta wells monitored both years in Arkansas County declined. These declines averaged 17 feet over this five-year period. From 1998 to 1999, 16 wells exhibited declines ranging from 2.94 feet to 22.75 feet, with an average of 9.4 feet—this was over a one (1) year period. Declines are accelerating and indicate that the aquifer is not being recharged as fast as it is being pumped.

In Arkansas County, the Sparta is a “confined” aquifer, meaning that the water is under pressure. As water levels decline, the potentiometric surface, or hydraulic pressure head, of the formation is lowered. Where removal of water reduces lowers the potentiometric surface to below the top of the formation, the aquifer compacts under the weight of overlying formations. This compaction can permanently reduce the aquifer’s storage capacity, reducing the yield of wells drilled into the formation. Not only is the aquifer’s capacity to store water affected, but its transmissivity, the ability of the aquifer to allow water to move through the aquifer, will be reduced, lowering the volume of water available water to wells. Water levels must be maintained above the top of the Sparta aquifer to protect its continued usefulness. Projections indicate that if the rate of decline is not slowed, the potentiometric surface of the aquifer will drop below the top of the formation within approximately fifty (50) years.

Municipal water systems have historically been the primary users of Sparta aquifer water in Arkansas County. Since Sparta water needs very little treatment, it is very well suited for drinking. At the same time, agricultural ground water users have depended on water from the alluvial aquifer, which can provide a much greater volume of water than the Sparta at a much lower cost. Historic patterns are changing, though, as the alluvial aquifer is depleted. As water levels in the alluvial aquifer continue to decline, deeper wells are drilled which reach into the Sparta. Approximately 35 new Sparta wells are drilled in the Grand Prairie annually according to water well construction reports filed with the Arkansas Water Well Construction Commission. A map introduced into evidence by the Commission’s staff



illustrates how new wells in the Sparta aquifer are following the expansion of the alluvial aquifer cone of depression. (R. 20) Use of water from the Sparta aquifer in Arkansas County has increased from 17.39 million gallons per day (Mgal/d) in 1965 to 104.54 Mgal/d in 1998. This is an increase of 501 percent. Hydrographs, line graphs plotting water level elevations across time, show that this increase has caused water levels to decrease at increasingly higher rates. A cone of depression has recently developed in Arkansas County. This trend in the Sparta will continue as long as current levels of use continue or increase.

Though water users continue to turn to the Sparta aquifer, it does not have the alluvial aquifer's storage capacity or ability to transmit water and cannot be relied upon as a replacement for the alluvial. A very general comparison of the Sparta and the alluvial aquifers can be made by considering the volume of water stored in each formation. One (1) square mile of confined Sparta aquifer with a thickness of one (1) foot (with a specific yield of 0.0001) can provide 0.06 acre-feet (19,554 gallons) of water. By contrast, a similar volume, one (1) mile square by one (1) foot thick, of the alluvial aquifer yields approximately 192 acre-feet of water (with a specific yield of 0.3). This means that the alluvial aquifer can supply 3000 times the amount of water as the same volume of confined Sparta aquifer. Transmissivity of the alluvial aquifer ranges from 30,000 to 45,000 feet squared per day as compared with the Sparta aquifer that has a transmissivity of 4,000 to 17,000 feet squared per day. Water is transmitted through the alluvial aquifer at a rate ranging from 1.76 to 11.25 times faster than through the Sparta. It is vital to the future of water levels in Arkansas County that this difference in the two aquifers' ability to provide water is understood.

Ground water modeling scenarios generated by the USGS (Hays, *et al.*, 1999), show that, if ground water pumping of the Sparta aquifer continues at current rates until the year 2027, water levels will drop from 25 to 60 feet in south and southeast Arkansas County and as much as 180 feet around DeWitt. Another modeling scenario, which considers the current rate of water pumping increase (with Lonoke and Prairie Counties doubling their ground water removal rates), indicates that ground water levels in the Sparta Aquifer in Arkansas County will drop from 60 to 100 feet in south and southeast Arkansas County and as much as 220 feet in the DeWitt area. Computer models show the existing Sparta cone of depression in Arkansas County expanding as current water use patterns continue. By 2027 the cone of depression in Arkansas County will have grown so large that it will converge with the cone currently observed in Jefferson County.

At current pumping levels, the aquifer will not be able to sustain either the quantity or the quality of ground water supplied in the past. Increased pumping will cause dramatic acceleration of declines, and the potentiometric surface of the aquifer will eventually drop below the top of the formation. To guarantee the long-term protection and use of the Sparta aquifer, use should voluntarily reduced to sustainable yield levels.

Continued declines will result in increased pumping costs, decreased well yields, increased well interference, and the threat of salt-water intrusion.

### **3. Degradation of Water Quality**

Water quality data reveal that 21 Sparta wells in three Grand Prairie counties have salinity levels above the Environmental Protection Agency (EPA) drinking water standards. In Arkansas County, 13 wells were monitored for water quality, and four (4) showed salinity above EPA limits. As water levels decline in the Sparta aquifer, reducing its pressure, saline water can enter to fill the void, causing degradation of water quality.

### **4. Geologic and Hydrologic Characteristics of the Sparta Aquifer in Arkansas County Warranting Inclusion of Entire County in the Grand Prairie Critical Ground Water Area**

The Sparta Aquifer underlies all of Arkansas County. Any analysis of the aquifer and any efforts to provide for its long-term reliability as a source of good water, especially for drinking, must take the whole county into account. There is significant water level decline in the county and continued significant declines and degradation are projected for the entire county. Critical designation of only parts of the Arkansas County would not be scientifically sound and would be confusing to the public.

The entire hydrogeologic system must be viewed as a whole, because withdrawals and recharge in any part of the hydrogeologic system affect water levels elsewhere. Withdrawals from the Sparta cause an immediate reduction in the system's pressure. Well interference and competition for water will lead to litigation. See *Jones v. Oz-Ark-Val Poultry Co.*, 228 Ark. 76, 306 S.W. 2d 111 (1957).

Though some areas of Arkansas County exhibit less-serious declines than others, there is a countywide trend of increased water use and decreasing levels, especially in the Sparta as the alluvial aquifer is depleted. As withdrawals continue to exceed recharge, the existing cone of depression will spread.

Established to the southwest by Bayou Meto and the Arkansas River and to the east by the White River, which form natural hydrogeologic boundaries, the county line provides the most reliable delineation of the parts of Arkansas County to be included in the Grand Prairie Critical Ground Water Area. Water level contour maps indicating water levels, flow direction, and areas of significant declines must be revised annually to track dynamic ground water system changes in response to environmental factors and withdrawals from wells. Contour lines vary year to year, sometimes by a great amount. It is not possible to use such changing lines to delineate boundaries of the Critical Ground Water Area. The established and familiar boundary, in the form of the county line, which includes the entire hydrogeologic system, is the best way to outline the Critical Ground Water Area.



The designation provides a non-regulatory means of focusing educational and conservation efforts on a serious environmental threat. Including the entire county will aid conservation education programs implemented by agencies such as the Arkansas County Conservation District, whose boundaries are those of the county, the Cooperative Extension Service which provides services on a county basis, and the ASWCC. Tax credits available from the ASWCC for reduction of ground water use should be made available to all water users in Arkansas County to encourage countywide conservation, which may help save the aquifer from continued depletion.

### **ORDER**

Based on the Findings of Fact and Conclusions of Law, the Commission adopts the following Order:

Section 1. Having met the requirements of Section 403.1A of the Commission's rules, the alluvial formation within Arkansas County is designated as a Critical Ground Water Area pursuant to Arkansas Groundwater Protection and Management Act. See map, Exhibit A.

Section 2. Having met the requirements of Section 403.1A of the Commission's rules, the Sparta formation within Arkansas County is designated as a Critical Ground Water Area pursuant to Arkansas Groundwater Protection and Management Act. See map, Exhibit A.

Section 3. This designation does not include institution of regulatory authority.

Section 4. The Commission and staff will take the following actions.

(a) Technical Review Committee review of water projects will emphasize avoidance of increased use of alluvial and Sparta formation water and, when possible, reduction of the use of the alluvial and Sparta formations within the Critical Ground Water Area.

(b) Water Plan Compliance review of projects under Ark. Code Ann. §15-22-503(e) and Title VI of the Commission's rules that make additional use of the alluvial and Sparta formation within the Critical Ground Water Area should be approved only when there is no other economically or technically feasible alternative, or when human health requires.

(c) The Commission's financial assistance programs authorized pursuant to various laws and Title V of the Commission's rules, will give priority to projects within the Critical Ground Water Area that use surface water, other less stressed aquifers, and ground-water conservation.

(d) The Commission's conservation, education, and information program required pursuant to Ark. Code Ann. §15-22-907, will focus its efforts within the Critical Ground Water Area on technology

transfer, training, technical assistance, research, and demonstration projects. A portion of the water use fees collected pursuant to Ark. Code Ann. §15-22-913 and 914 should be used to encourage conjunctive water use including, when appropriate, the substitution of surface water, use of less stressed aquifers, and water conservation for alluvial and Sparta aquifer water within the Critical Ground Water Area.

(e) The Commission's staff will encourage the use of state income tax credit available under the *Water Resources Conservation and Development Incentives Act* (Ark. Code Ann. §26-51-1001 to 1014).

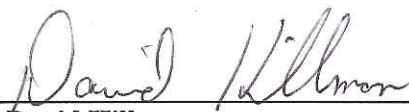
(f) As required by Commission Rule 403.2A, the staff is directed to continue monitoring the situation within the Critical Ground Water Area and to report back to the Commission periodically.

(g) Five (5) years after designation, the Commission staff shall report to the Commission on the success of landowner efforts to conserve ground water from the alluvial aquifer.

(h) The Commission shall maintain jurisdiction over this matter and shall enter additional orders as it deems necessary.

Section 5. The Commission will not take steps to institute regulation of alluvial water use in Arkansas County for a period of five (5) years following the date of this designation.

**IT IS SO ORDERED, this 15<sup>th</sup> day of November, 2001,**

  
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**David Hillman**  
Chairman

**ATTEST:**

  
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**J. Randy Young, P.E.**  
Ex-Officio Secretary