



**WATERBORNE OUTBREAK ASSOCIATED WITH RECREATIONAL  
WATER FACILITY  
FORD COUNTY, KANSAS  
AUGUST, 2005**

**Report Date:**  
February 2006

**Investigators:**

Kansas Department of Health and Environment – Jennifer Hill, Mary Ella Vajnar, Angela Huang  
Gray County Health Department – Rayne Maddox  
Ford County Health Department – Mary Alvarez, Angela Elders, Debbie Noble, Mark Shriwise  
Finney County Health Department – Megan Speer  
Comanche County Health Department – Karen Oller

**Author:**

Jennifer M. Hill, MPH, Epidemiologist  
Epidemiologic Services Section  
Bureau of Epidemiology and Disease Prevention  
Kansas Department of Health and Environment

**INTRODUCTION**

On August 11, 2005, Ford County Health Department contacted KDHE BEDP concerning a complaint made by a private citizen. Initially, the citizen claimed that after a group function (Group A) at a recreational water facility, 22 persons became ill with diarrhea and nausea. Gray County Health Department began collection a line list of all persons in Group A, who went to the recreational water facility.

**BACKGROUND**

Several local health departments in southwestern Kansas began working together to gather more information on individuals and groups of people who reported attending the recreational water facility and then developed diarrhea. The Water and Environmental consultant from CDC and the environmental inspector from Ford County Health Department were contacted to aid in the investigation. Eighty persons in two cohorts of persons who went to the recreational water facility were identified. Information on 60 persons who rode the slide was collected and 52 (87%) became ill with diarrhea. The most common symptoms were diarrhea (100%), stomach cramps (86%), and nausea (81%).

**METHODS**

**Epidemiologic**

Case definition: having attended the recreational water facility between July 23 through August 15 and developed diarrhea one to 12 days later or a household contact with diarrhea to a case. Information for 119 persons was collected by phone using a questionnaire and line list. The questionnaire assessed symptoms, exposure to the recreational water facility, other recreational

water, restaurants, social gatherings, farm animals, and source of drinking water. Data collected was used for both a case series and cohort investigations.

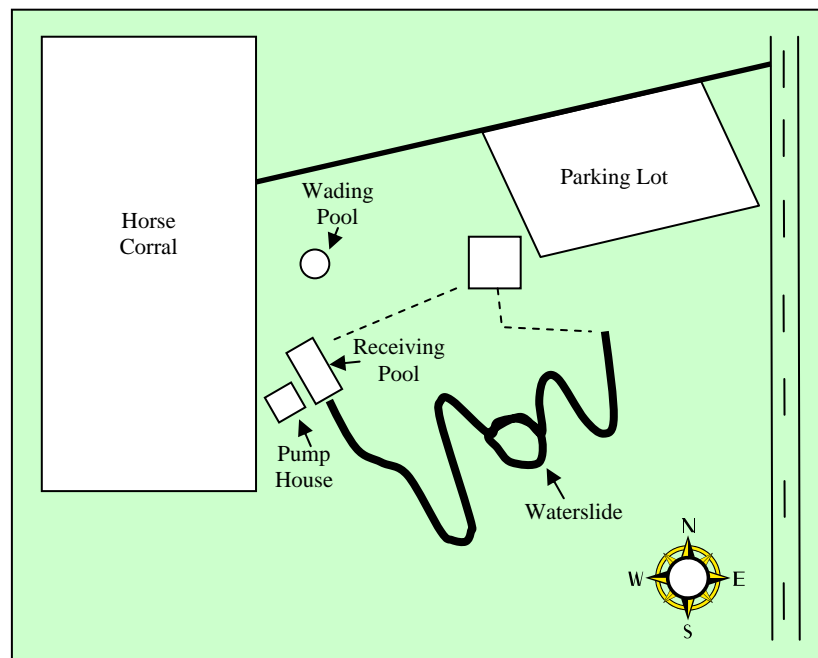
### Laboratory and Clinical

A total of 7 stool samples were collected and submitted to Kansas Department of Health and Environment Laboratory (KDHEL) for testing. Specimens were tested for bacteria, viruses, and parasites.

### Environmental

The recreational water facility was visited by an environmental inspector from Ford County Health Department on August 15. Information on the water filtration and layout of facility was collected. At the same time of the inspection, hyper-chlorination of the water was performed. Hyper-chlorination was completed on August 16, 2005.

**Figure 1:** Layout of Recreational Water Facility, Ford County, Kansas.



## RESULTS

### Epidemiologic

Eighty-five persons were identified in the waterborne outbreak in Ford County. One individual rode water slide at the recreational water facility twice while symptomatic with diarrhea. From both cohort investigations and individual case reports, a total of 81 persons reported developing diarrhea after attending the recreational water facility. Another 3 household contacts that did not use the recreational water facility developed diarrhea.

Cases were identified in the following counties: Comanche (2), Finney (2), Ford (23), Gray (56), and Sedgwick (2). During this investigation along with individual cases/ families, three cohorts were also identified: Group A (40 cases / 50 persons who rode the slide), Group B (12 cases / 14 persons), and Group C (8 cases / 9 persons).

The mean age of the cases was 16 years with a minimum and maximum of 1 year and 48 years, respectively. The most common symptoms were diarrhea, stomach ache, and nausea (Table 1). The average incubation period was 6.1 days (min, max: 1, 12) and the average recovery period was 3.6 days (min, max: 1, 7).

**Table 1:** Distribution of symptoms in individuals who met the case definition, Ford County 2005.

Symptom	n (%)
Diarrhea	85 (100)
Stomach ache	61 (72)
Nausea	55 (65)
Muscle aches	29 (34)
Fever/chills	15 (18)
Vomiting	12 (14)

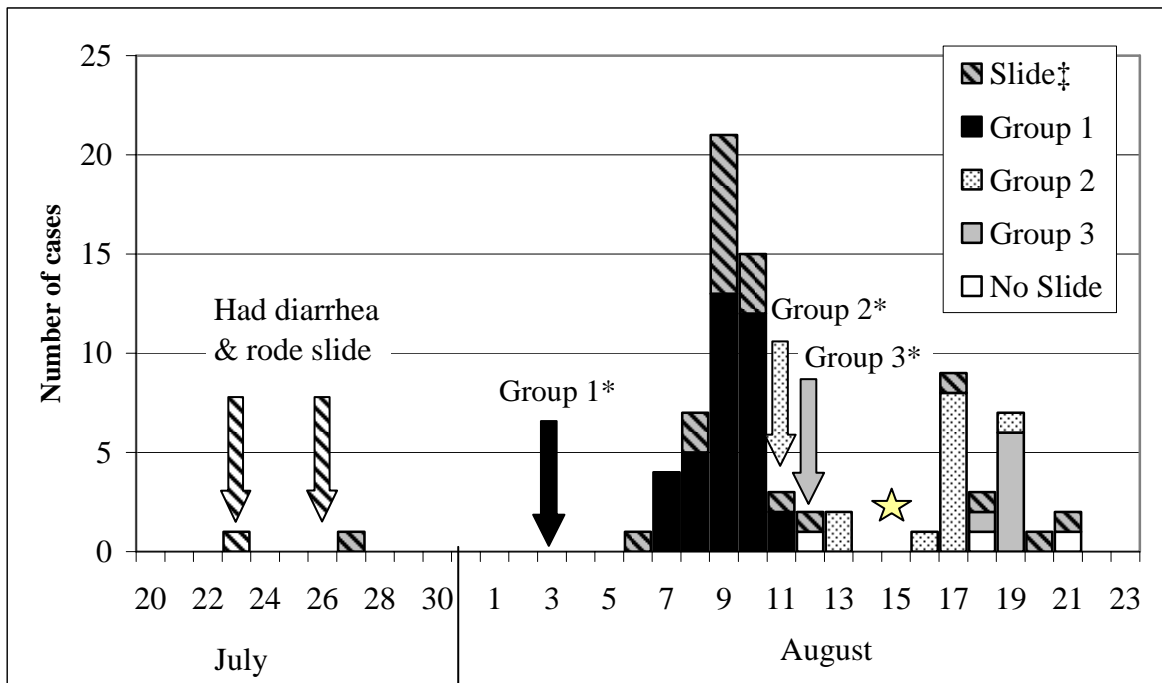
Individuals associated with this outbreak visited the recreational water facility between July 23 and August 12, 2005. No persons reported visiting the facility and developing diarrhea after the water was hyper-chlorinated on August 15, 2005.

During the outbreak investigation, 3 cohorts of individuals were identified. For analysis purposes, these cohorts were combined into one. Information was gathered for 90 individuals who went to recreational water facility. The attack rate was 81.1% (60 of the 74 persons who rode the slide became ill with diarrhea). Persons who rode the water slide were 11.35 times more likely to become ill with diarrhea compared to those who did not ride the water slide (relative risk, 95% CI: 11.35, 1.71 – 75.05).

### **Laboratory and Clinical**

All 7 specimens submitted to KDHE DHEL for testing were positive for cryptosporidium.

**Figure 1:** Number of persons meeting the case definition based on onset of symptoms, Ford County, July - August 2005.



\*Date respective groups visited recreational water facility

‡ This cases were not associated with any group but had exposure to the recreational water facility.

★ Recreational water facility hyperchlorinated.

### Environmental

From the site visit of the recreational water facility, the water and grounds appeared clean. Daily procedures for the recreational water facility were based on recommendations from a local retail pool outlet. These procedures included daily changing of the water and the addition of specific amount of chlorine at certain time of the day. Patrons used foam mats at the facility. Also, a horse corral was located only 20 to 25 feet from the pool.

In order to kill cryptosporidium, the water at the facility was hyperchlorinated. To hyperchlorinate, the chlorine levels must be raised to 10 parts per million (ppm) for 16 hours or 20 ppm for 8 hours. On the evening of the initial visit, the chlorine levels were increased to over 20 ppm and remained at these levels until the next morning. According to the environmental inspector for Ford County, the free chlorine levels were 20 mg/l or greater for more than 12 hours. The foam mats were soaked in a bleach solution for the time period that would kill cryptosporidium as well.

### DISCUSSION

The outbreak of cryptosporidium was associated with use of the recreational water facility in Ford County. The index case of the outbreak used the recreational water facility while

symptomatic with diarrhea and is a possible source of the outbreak. The average incubation period from use of recreational water facility to onset of symptoms is 6 days which is consistent with the incubation period of cryptosporidiosis. Seven persons who became symptomatic after use of the water facility tested positive for cryptosporidium.

## **RECOMMENDATIONS**

Halting the outbreak was the result of several factors including: prompt response and investigation of initial report to local health department, co-operation between the water facility staff, local health departments and KDHE, and frequent communication with all involved counties. Once the association between illness and use of recreational water facility was identified, the facility was hyperchlorinated. One week after this new prevention measure, no new cases were reported.

Several recommendations were made to reduce the chances of this situation reoccurring . These recommendations apply to all recreational water facilities:

- Good general hygiene
- Individuals with diarrhea should be excluded from use of recreational water facilities while symptomatic.
- Daily equipment sanitizing
- Sand filter must be in service, constantly. Frequent backwashing is a must.
- Install showers and have swimmers bathe before and after swimming
- Test for free chlorine residual each hour. Document the date, time, test results, and number of swimmers
- Expand tests done – pH, temperature, “M” alkalinity, chlorine (total and free), turbidity, and color
- Post warning signs before swimmers enter water. If a swimmer is sick, they should speak with manager before entering water.
- Document any abnormal happenings and all daily operations and maintenance

## **SUPPORTING DOCUMENTS**

Fecal Accident Response Recommendations for Aquatics Staff (CDC)

<http://www.cdc.gov/healthyswimming/fecalacc.htm>