STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

**STAFF REPORT FOR REGULAR MEETING OF FEBRUARY 9, 2007**
Prepared on January 16, 2007

**ITEM NO: 19**

**SUBJECT: Status Report on *E. coli* 0157:H7 and Food Safety**

## INTRODUCTION

Spinach and other leafy greens grown and processed in the Central Coast Region have been implicated in a number of outbreaks of *Escherichia coli O157:H7* (*EcO157:H7*) infections over the past several years. The most recent outbreak occurred in August 2006 and affected more than 200 people nationwide. The Food and Drug Administration (FDA) continues to investigate the outbreak, but has reported no definitive conclusions about the mode of contamination at this time.

In December 2006, Water Board staff reported to the Board on steps taken to investigate the occurrence of *Escherichia coli* (*Ecoli*) in the Salinas Valley and measures staff has taken or will take to address the problem. The purpose of this update is to give the Board current information on modifications to the Central Coast Ambient Monitoring Program (CCAMP) implemented as a result of the outbreak, the results of a recent *Ecoli* study in the Salinas watershed, efforts to address impacts from cattle (a significant source of *Ec*0157:H7), and efforts to ensure that water quality is protected as well as public health.

### Water Quality Monitoring

The Water Board's Central Coast Ambient Monitoring Program has added screening-level tests for *Ec*O157:H7 to the suite of analytical tests used monthly at watershed and coastal confluence sites. Staff has submitted a request for $95,000 from the State Water Resources Control Board Cleanup and Abatement Account to pay for this added sampling effort, and we are optimistic that the State Board will approve our request. In order to get the sampling underway as soon as possible, we are using our existing laboratory contract and amending it the maximum extent allowed (30%). The amount we requested provides sufficient funding to add this sampling to our monthly suite, using two different methods that detect presence/absence. Should we find areas through our sampling where this strain of *Ecoli* is routinely present, we will submit another request to the Cleanup and Abatement Account to fund more detailed follow-up studies, using more sophisticated tests, in coordination with the Department of Health Services and university researchers.

Also, in October 2005, Water Board staff began a monitoring collaboration in the lower Salinas watershed with the United States Department of Agriculture-Agriculture Research Center (USDA-ARS) and the California Department of Health Services (DHS), as part of the source investigation for the Salinas River Watershed Fecal Coliform Total Maximum Daily Load (TMDL). A total of 21 stream sampling sites were chosen by staff for regular sampling to determine the prevalence of *EcO157:H7* and the concentration of generic *Ecoli* in the project area.

USDA-ARS conducted the *EcO157* analysis. They looked for the occurrence of *EcO157:H7* in water samples, as well as the genetic similarity between the isolated *O157:H7* organisms. Genetic similarity is

described by Multilocus Variable-Number Tandem Repeat Analysis (MLVA) typing; *EcO157:H7* organisms with identical or similar MLVA types indicate genetic similarity. DHS also conducted analyses for generic *Ecoli* concentrations.

The following are highlights of monitoring results:

- USDA-ARS compared the MLVA types of the *EcO157:H7* found in the water samples with the MLVA types associated with the recent spinach outbreak and there were no matches. USDA-ARS also did MLVA comparisons between *EcO157:H7* found in the water samples and strains associated with historic *EcO157:H7* outbreaks in California and again there were no matches.

- Generic *Ecoli* concentration in the water samples ranged from 10 to 30,440 MPN/100mL. USEPA recommends that *Ecoli* concentration not exceed 409 MPN/100mL in areas that are lightly used for water contact recreation. All but one of the monitoring sites exceeded the 409 MPN/100mL level at some time. Average concentration was higher following rain events by a factor of 5.4. The increase in concentration following rain events may be due to increased surface runoff, entrainment of microbes residing in stream sediment, or both.

- There was a higher incidence of *EcO157:H7* recovery from samples drawn during or following rain events. However, *EcO157:H7* was also recovered from samples during dry months, including July and August.

- *EcO157:H7* contamination may be highly dynamic. *EcO157:H7* was often found in one sample, but not in a duplicate sample drawn seconds later at the same monitoring site.

- *EcO157:H7* may be transported hydrologically, and survive in cold water, over relatively long distances in the environment. Samples collected 18.5 miles apart carried *EcO157:H7* with identical MLVA types during a rain event.

- An MLVA type of *EcO157:H7* isolated from cattle feces was also found in water samples collected several months later; the feces sample was collected near the water sample monitoring site.

- There was a strong tendency for similar MLVA types to occur in a shared geographic area, although some exceptions occurred.

The results of the analysis do not yield definitive answers regarding sources of *EcO157:H7* in the Salinas River, or other stream systems. However, the results do indicate that:

1. *EcO157:H7* contamination is highly dynamic.
2. Higher levels of contamination are more likely after rainfall.
3. *EcO157:H7* can be transported long distances downstream, and can remain viable in the environment for several months.
4. The fact that similar MLVA types occur in the same geographic area might prove useful if this phenomenon can be verified, and holds true for other watersheds.

**Consideration of Region-wide Water Quality Regulations for Grazing and Livestock Operators**

Central Coast Water Board staff initiated a project to evaluate whether or not region-wide water quality regulations are appropriate at this time for grazing and livestock operations. This project is in response to recent findings that coliform bacteria found on food crops and in rivers and creeks on the Central Coast may be linked to grazing and livestock operations.

Staff sent a letter to Grazing and Livestock Interested Parties on November 28, 2006. This letter informed interested parties that staff was considering region-wide regulations and encouraged proper use of management practices at facilities to control bacterial discharges to creeks and rivers.

Staff has just begun to review and analyze available data and information to gain an understanding of the relationship between bacteria indicators in creeks and rivers and areas with grazing and livestock operations. Available data include water quality monitoring results from the Central Coast Ambient Monitoring Program, water quality monitoring results from Total Maximum Daily Load (TMDL) investigations conducted by staff or contractors, results of field investigations conducted by staff or contractors associated with TMDL source investigations, and data and information from other agencies or organizations. Staff plans to conduct GIS-based analyses relating locations of grazing lands and other land uses in the region to locations where bacteria indicators have been found in rivers and streams.

Based on preliminary analysis of land use information and water quality data, staff observed that grazing land areas have lower levels of bacteria indicators than other land uses. In this analysis, the land use information was from the California Division of Land Resources, Farmland Mapping and Monitoring Program (FMMP) land use data representing 2004. The bacteria indicator data was from the Central Coast Ambient Monitoring Program. Staff will continue to design and perform additional analyses to evaluate the relationships between bacteria indicators and grazing land areas. For example, staff is considering the use of higher quality land use data, aerial and satellite imagery, and a more advanced statistical approach to evaluate land use and water quality relationships.

Staff will evaluate regulatory approaches being used in other programs in some watersheds in the Central Coast Region (e.g. waivers of waste discharges, prohibitions on discharges) and by other Water Boards in California.

Staff will meet with groups from the Cattlemen's Associations, Farm Bureaus and other interested parties throughout the region to explain the project and staff plans. Staff is currently scheduled to attend a meeting of the Monterey County Cattleman's Association on February 9, 2007, and of the San Luis Obispo County Cattleman's Association on February 20, 2007. Staff is also tentatively scheduled to attend a meeting of the San Luis Obispo Farm Bureau, North Coast Center, on April 9, 2007.

Staff will ask interested parties to suggest preferred methods to maintain on-going communication and insure appropriate stakeholder input (e.g., newsletters, email, established advisory committees, general presentations at meetings), for sources of data and information, and for input on regulatory approaches, if warranted.

Staff has not yet determined the specific time-frame or completion date of this project but expects the above activities will occur for approximately one year prior to development of a recommendation.

**Agricultural Management Practices**

In response to past *Ecoli* outbreaks, food safety guidelines were established by the Food and Drug Administration (FDA) and also published by the lettuce industry at the request of FDA. These food safety guidelines are collectively known as Good Agricultural Practices (GAPs). Some guidelines focus on reducing the perceived threat from wildlife. Although the guidelines are stated cautiously, they have been interpreted by local growers and crop buyers to require removal of all wildlife habitat and vegetation anywhere in the vicinity of the crop. Removal of vegetation and habitat has the potential to cause violations of several surface water quality objectives in our Basin Plan and contradict our efforts to ensure healthy watersheds and riparian vegetation.

As a result of the recent outbreak in spinach, FDA and others have indicated that they believe GAPs are not being systematically implemented. However, in our experience, most, if not all, growers have been complying with the GAPs, because they are unable to sell their crops if they don't. Nonetheless, there is increasing pressure to ensure that GAPs are mandatory and are implemented in a consistent manner.

The California Department of Food and Agriculture (CDFA) is currently considering developing a marketing agreement for handlers of leafy greens in California. A marketing agreement is a mechanism that would allow CDFA to establish a food safety certification process. The marketing agreement would establish an industry Board, which would adopt mandatory GAPs. However, the marketing agreement does not include any public process for providing input on such certified food safety practices, which are developed by the agricultural industry, not CDFA. Staff is concerned that mandatory GAPs may explicitly require removal of all vegetation and habitat in the vicinity of the crop. Even if the mandatory GAPs don't explicitly require removal of vegetation, they will be subject to interpretation and there will be pressure from inspectors to remove all perceived risk of contamination. This could result in widespread removal of practices such as filter and buffer strips, grassed roadways and ditches and riparian habitat. At the very least, it is likely to have a significant dampening effect on growers' efforts to implement any vegetated water quality protection practices.

On December 5, 2007, staff participated in a conference call and subsequently reviewed and provided comments on a draft set of revised "Good Agricultural Practices" being developed by the agricultural industry as part of the proposed marketing agreement. The comment letter, dated December 10, 2007, is included as Attachment 1. The draft mandatory GAPs currently proposed require buffer areas between crops and potential sources of contamination, including cattle and wildlife. However, there is considerable uncertainty about the science behind the GAPs. Based on the Monterey County RCD literature review (provided with the December staff report), wildlife poses a relatively low risk for crop contamination, yet considerable areas could be cleared of vegetation and wildlife habitat. From a watershed health perspective, vegetation is an effective means of filtering pollutants, including pathogens. Removal of vegetation therefore could have the opposite of the intended effect. Staff is concerned that mandatory GAPs requiring or resulting in removal of vegetation may increase the likelihood of *Ec*O157:H7 outbreaks and would very likely exacerbate water quality problems.

CDFA held a hearing on the proposed marketing agreement on January 12, 2007, in Monterey. Staff provided written comments (Attachment 2). Board Vice-Chair Russ Jeffries and Assistant Executive Officer Michael Thomas provided oral comments at the hearing to raise concerns about some of the proposed food safety practices and the process for establishing them. Several other organizations, including California Coast Keepers, USEPA, and the US Department of Agriculture's Natural Resources Conservation Service (NRCS) also raised concerns about impacts of proposed practices on habitat and water quality, and emphasized the need to have a more open process for developing the GAPs.

Staff will continue to urge CDFA, FDA, and the agricultural industry to provide a more inclusive approach to developing food safety practices. Cal/EPA has committed to setting up a meeting with CDFA and Water Board staff. Staff is also working with NRCS to set up a meeting with the

industry representatives working on the GAPs. Staff is also supporting a food safety and water quality conference, to be held in April 2007 in Monterey. The conference will bring together food safety researchers and water quality experts. The forum will help clarify the science needed to develop good agricultural practices that will protect both human health and the environment.

## ATTACHMENTS

Attachment 1 – December 12, 2006 letter to Cindy Tuck, Cal/EPA
Attachment 2 – January 10, 2007 letter to Lynn Morgan, CDFA

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