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**Investigation of an *Escherichia coli* O157:H7 Outbreak
Associated with Consumption of Dole Brand Pre-Packaged Salads
Date: 10/1/2005 – 11/21/2005**

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Investigators

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United States Food and Drug Administration (FDA): Daniel Geffin, Ingrid Zambrana

Background Information / Epidemiology

On September 30, 2005, the Minnesota Department of Health (MDH) issued a press release warning residents to discard Dole pre-packaged lettuce mixes purchased with a 'Best if Used by 09/23/05' date, citing eleven cases of *Escherichia coli* O157:H7 disease in Minnesota residents attributed to consumption of pre-packaged Dole lettuce purchased between September 13 and 16, 2005.

In September 2005, MDH detected a cluster of *E. coli* O157:H7 illnesses with matching Pulsed Field Gel Electrophoresis (PFGE) patterns (PulseNet pattern EXHX01.0238) in 11 people residing in seven counties in the Minneapolis-St. Paul area. Age of the cases ranged from three to 68 years with a median of 23 years. Onset of illness for all cases was September 16–19, 2005. Two cases were hospitalized; no deaths were reported. To determine the outbreak vehicle, MDH conducted a case-control study in September that implicated pre-packaged salad (9 of 10 cases vs. 7 of 20 controls, matched OR=9.9, p=0.035). Among persons who ate pre-packaged salad, illness was associated with consumption of Dole brand lettuce mixes purchased from a single grocery store chain (8 of 9 cases, 0 of 7 controls. OR=undefined; p=0.0001). In this initial investigation, three varieties of pre-packaged salad were implicated (Classic Romaine, Greener Selection and American Blend varieties), and the ingredients in common to these varieties were romaine lettuce, red cabbage and shredded carrots. Remaining packages of leftover Dole brand pre-packaged salad in case households showed a 'best if used by' (BIUB) date of September 23, 2005 and production codes beginning with "B250". The Dole facility that packaged the salads was located in Soledad, California. The outbreak strain of O157 was isolated from two opened bags of Dole Classic Romaine pre-packaged salad associated with three case-patients.

An epidemiological summary of the investigation submitted on October 12, 2005 by MDH indicated that there were a total of 32 cases identified in three states: MN (23 confirmed cases, 7 epidemiologically linked cases), Oregon (1 confirmed case), and Wisconsin (1 confirmed case). Illness onset occurred from September 16 to September 30, 2005. The median age was 39.5 years with a range in age of 3–84 years. Twelve persons were hospitalized, 2 with hemolytic uremic syndrome. A second confirmed case was identified in Wisconsin subsequent to the summary and was matched by two-enzyme PFGE analysis to the primary subtype pattern.

Summary

On Friday, September 30, 2005, the California Department of Health Services (CDHS) was notified by the U.S. Food and Drug Administration (FDA) of an outbreak of *E. coli* O157:H7 illnesses in Minnesota. Subsequent to calls with MDH and FDA, CDHS and FDA investigators, participating in a joint California Food Emergency Response Team (CALFERT), initiated an investigation at Dole Fresh Vegetables located in Soledad, California in response to the *E. coli* O157:H7 outbreak. As part of this investigation, CDHS and FDA conducted finished product (n=24), raw materials (n=30), and environmental sampling (n=9) at a processing facility where the product originated. All samples were negative for *E. coli* O157:H7. The company issued a voluntary recall of implicated lots associated with the cases on Saturday, October 1, 2005. The implicated lots were produced on September 7, 2005. Approximately 244,866 bags of three implicated pre-packaged lettuce varieties (Classic Romaine, American Blend, and Greener Selection) were distributed to 34 states including California. The common ingredients of these 3 varieties were romaine lettuce, red cabbage and carrots. CDHS and FDA followed up with an investigation of the romaine lettuce, red cabbage and carrots. The romaine lettuce and red cabbage were processed by Dole in Soledad, California. The carrots were supplied by Grimmway Farms in Bakersfield, California. CDHS worked with FDA in an extensive investigation at the processing facility, raw material suppliers, and growing fields in an attempt to determine a source of the contamination. No source of contamination was found; however results of the investigation indicated that several areas such as traceability, documentation, and record keeping were lacking. Three of the fields reported using compost containing manure. The compost was from a single supplier, who was registered and met county and state composting regulations and requirements (Attachment 42).

Dole Processing Facility Environmental Investigation

Dole Fresh Vegetables, Inc.

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Contacts:

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Seth Goldsmith, Ph.D., Director of Research and Development
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Thea Eubanks, Quality Assurance Manager, Value Added Products
Andy Olson, Materials Manager, Value Added Products
Todd Schrieber, Production Manager, Value Added Products
Deborah Pace, Operations Manager

Processing Facility

The Dole Fresh Vegetables plant in Soledad produces a variety of pre-packaged salads for ready-to-eat consumption. The facility was in production Sunday through Friday, from approximately 7:00 am through 3:00 am of the following day. There was a short cleaning shift (approximately four hours) between production days, and a more extensive sanitation shift each Saturday. The entire production facility was refrigerated, with a target temperature of ■■■°F measured via real-time monitoring at the return coils. The firm has a continuous recording chart that logs the temperature in four areas (the cold room, the case packing areas, the dock, and an average temperature of the trim line and dry room) (Attachment 1). Processing and storage temperatures were not identified as a critical control point in the firm's Hazard Analysis and Critical Control Points (HACCP) plan. Temperature recording charts for the period of September 6 to September 8 showed that the temperature was consistently maintained at or below ■■■°F. The dry room operated under positive pressure and air was HEPA filtered. The plant had ■■■ romaine trim lines, ■■■ packaging lines, and ■■■ baggers (weighing and packaging).

Process Flow

Iceberg blends were processed on one side of the plant and romaine blends on the other. Carrot and cabbage "coloring" are processed together and fed to both the iceberg and romaine lines. Our investigation focused on processing of romaine blends, epidemiologically implicated in the Minnesota *E. coli* O157:H7 outbreak.

As romaine was received at the Soledad facility, a sample (■■■ heads for whole head and ■■■ lbs for field trim) was taken from each load. This product sample was evaluated for specific physical and/or structural defects such as the presence of insects, windburn, and dehydration. This information was documented on the "Dole Value Added" log (Attachment 2). The Value Added logs also contained information on the grower, ranch, crew, arrival time and temperature, as well as the time of harvest, and the time and temperature when the product was removed from the vacuum cooler. For the logs dated September 5 through 7, 2005, incoming temperatures ranged from ■■■°F to ■■■°F. The maximum elapsed time between the recorded harvest time and the post cool temperature time was six hours and forty-five minutes (field trimmed romaine harvested on September 7 at 9:30 am, arrival temperature was 59°F, and post cool time was 4:15 pm).

The firm cooled incoming raw romaine using a vacuum cooler. Romaine was cooled to no colder than ■■■°F. For romaine field packed without a liner (whole head romaine), a water shower was used to replace water lost by the produce in the process. For the product transported in a lined bin (field-cut romaine), the water shower was not used. The water used in the vacuum cooler was from the same source as the process water. No additional chlorination was done. The vacuum cooler reservoir was drained after each use. Some raw produce was cooled at the Marina facility and shipped to a Dole processing facility in Ohio. On May 25, 2006, Dole informed the investigation team that some raw product used at the Soledad facility during the period under investigation had been cooled at the Marina, CA distribution center. This was not brought to the team's attention during the initial investigation, although the team had asked if raw product was ever shipped to the Dole Soledad facility from the Dole Marina facility.

Cabbage was received in unlined bins from the field and was vacuum cooled (no water added) in the firm's vacuum tubes. All the carrots received during the subject time period were from Grimmway Farms, Bakersfield, California (Attachment 3). Carrots were received in plastic lined bins, pre-cut and peeled into two-inch chunks.

Romaine was staged in Dole's refrigerated warehouse in a 'first-in, first-out' sequence. The product to be used first was staged towards the front of the warehouse, closest to the processing lines. Incoming product was stacked in the back of the warehouse and was moved forward as space allowed, in accordance with requirements of the day's production schedule. According to the firm, field trimmed romaine was used within 24 hours of harvest, and whole romaine was used within 48 hours of harvest. The time and date of harvest were documented on the bin tag. Both field trimmed and whole romaine could have been incorporated in the Classic Romaine Blend but it proved impossible to determine which type went into the product with the previously identified lot codes (please see the section titled "Traceback Investigation" for details on product tracking through the facility). Carrots were received in lined bins directly into the warehouse, and were staged along with the cabbage near the carrots and cabbage processing line (towards the center of the facility).

It was the responsibility of the warehouse foreman to direct the staging and usage of product. The warehouse foreman wore a radio headset that allowed him to communicate with the production foreman. When it was time

to change the type of product going to a trim line, this was communicated to the warehouse foreman over the headset. The forklift driver moved the product from the row of raw material to a central area. Another group of employees then prepared each bin for dumping. This involved opening the bin liner (if one was used), peeling the liner back over the sides of the bin and taping it in place. The forklift driver then moved the product onto a bin dumper as needed. Another employee stood on a platform and monitored the progress of the inspection line. This employee was responsible for dumping bins onto the line as needed and recording the information from the harvest information from bin tag onto the "Dumper – Raw Material Tracking Form" (Attachment 4).

Carrots and cabbage were processed in the facility for mixing with a variety of blends; these ingredients were referred to as "color". This line was not operating at time of the team's investigation. The firm provided the following information. Carrot bins were dumped onto an inspection conveyor and the carrots were grated in a commercial cutter. Grated carrots were sprayed with re-circulated process water (this water did not get additional chlorination beyond what the firm added to its drinking water), and were then transported in a hydroloop to an elevated dewatering shaker and into a holding tank. Cabbage was dumped onto a conveyor where employees peeled the outer leaves off before going through the scalper. In the scalper, the cabbage was cored and chopped. A mechanical screen sorter removed large core pieces. The carrots were metered out of the holding tank onto a conveyor with the cabbage. This conveyor dumped into a mixing flume and the product was transported in a hydroloop to an elevated dewatering shaker where it was sprayed with fresh water prior to dumping into an elevated holding tank. The holding tank could feed the iceberg hydroloops directly or the product was put into bins and metered onto the romaine lines.

Bins of romaine were dumped onto a trim line where employees (up to [REDACTED] per line) wearing disposable rubber gloves stood at a cutting board and hand trimmed the top and bottom of the head with a knife and manually removed the outer leaves. After the trim line, field-trimmed romaine was added to the line and then the product went through a chopper. For products with both iceberg and romaine (including Greener Selection and American Blend), the proportion of iceberg to romaine was determined by the number of employees per trim line (more employees means more product was trimmed and placed onto the production line feeding the chopper). At the end of each trim line the product was chopped, and then the two trim lines ran together. Carrots, red cabbage and other components were metered onto the line per product specifications. The mixed product then went through a three-stage wash/sanitation treatment.

Wash water in the three-stage wash moved in the opposite direction of process flow. The first two stages of the wash consisted of turbulent water flumes with re-circulated water. The third stage was a chlorinated water spray with an operating limit of [REDACTED] ppm free chlorine and a critical limit of [REDACTED] ppm free chlorine. The final spray water came from a dedicated chlorinated source water line. Water draining from the spray wash was recycled back into the second turbulent water flume. Water draining from the second flume was recycled back into the first flume. The water in both of the turbulent water flumes was continually re-circulated, with a small amount of make-up water added from the fully chlorinated source water line (the water used in the final spray) to maintain the balance between the incoming water from the upstream wash and the outgoing water (to the downstream flume or the drain). This resulted in a wash system with an increasing chlorine gradient.

The free chlorine level in the chlorinated water line, used for the final rinse, was monitored on a continual recording chart (Attachment 5). Free chlorine levels shown on the in-line monitoring logs ranged from [REDACTED] to [REDACTED] ppm during the hours of production on September 7, 2005. The free chlorine level shown on the in-line meter for the chlorinated source water line was logged manually every half-hour by the line supervisor. At the start of each shift, a [REDACTED] test kit was used to verify the accuracy of the in-line meter. Both in-line readings and [REDACTED] verification checks were documented on a log (Attachment 6). If the readings vary by more than [REDACTED] ppm, the supervisor was notified and corrective action was taken. Total chlorine levels were not monitored. FDA investigators tested the pH and free chlorine content of each stage of the wash during our investigation. The first stage contained between 0.1 and 0.5 ppm free chlorine at a pH of 6, the second flume contained 25 ppm free chlorine at a pH of 6, and the final spray contained 100–200 ppm free chlorine at a pH of 5.

After washing, the product went over a dewatering shaker and was then placed in wire baskets that were centrifuged to remove excess water. After the basket was removed from the centrifuge, it went to one of the [REDACTED] packing lines. There was not a direct relationship between a bank of centrifuges and a packing line. Romaine from any centrifuge was used to feed any packing line running the same product. No effort was made to segregate work-in-process by source/identity of raw ingredient.

Product moved down the packing line to a vibrating conveyor that fed a computerized, combination scale that filled a form-fill-seal plastic bag. The formed and filled bags received [REDACTED] to slow product respiration and

corresponding degradation. Bags were automatically sealed and coded. The bags were fabricated from a selective gas exchange barrier polymer. Bags of finished product passed through a metal detector and were then placed in a box that was sealed and palletized. Pallets were loaded onto trucks and shipped under refrigeration to the firm's distribution center in Marina, California. On occasion, finished product was shipped direct from the Soledad facility to other Dole distribution centers.

Product Coding

The breakdown of the production code used on romaine salad blends was as follows: "B250215A"; B= plant code for Soledad facility; 250 = Julian Date of production (in this case, 9/7/05); 2 = shift code (there were two shifts per production day); 15= bagging line used (there were a total of ■ bagging lines); A = relates exclusively to bagging line #15 since it's the only equipment in this facility that has a double chute and "A" or "B" designates the side. Product was also given a "Best if Used By" (BIUB) date. On average, the expiration date for romaine containing products was 14 days from the date manufactured; for other leafy greens, it was 16 days. At the start of the morning shift, the date code (Julian date) and BIUB date were set. At the start of the second shift, the BIUB date was advanced one day, as these products won't be shipped until the following day. However, the date code remained the same for the whole production date (it did not advance at midnight).

Traceback Investigation

Twenty of the twenty-six confirmed case patients reported eating the Classic Romaine blend. The remaining cases reported their consumption history as follows: Caesar Salad (one case patient), American Blend (reported for a three year old who didn't eat salad but whose family did), European Blend (one case reported by a case who also ate other varieties), either Greener Selection or Classic Romaine (one case patient), either Greener Selection or American Blend (one case patient), and one unknown (one case patient who did not recall what he/she ate).

A total of 14 packages were recovered from case patients' homes, all but one of which had been opened. Eight of these packages were identified as a second package, purchased at the same time as the implicated product. Three were identified as the package implicated in the outbreak. Thirteen of the packages had a BIUB date of September 23, 2005 (the lot code and BIUB date had been cut off of the fourteenth). With the exception of the case patient who recalled eating multiple varieties (but had a package of European Blend on hand), the recovered products were all Classic Romaine and had production codes beginning B250 (September 7) and ending 214, 215A, or 215B. Bagging machines 14 and 15(A/B) both fill from the production line 10. During the first shift on September 7, 2005, Dole packed Greener Selections and Classic Romaine on bagging machines 14 and 15. In the second shift, packaging continued with Classic Romaine, and finished with Very Veggie. Classic Romaine contained three ingredients, romaine, carrots, and red cabbage. The investigation team focused on these ingredients since a majority of cases ate Classic Romaine blend.

Based on the lot code and use-by date of the products recovered from the homes of case-patients, Dole was able to determine that implicated products were packaged during the second shift on September 7, 2005, and had been packed on line ten, which fed baggers 14 and 15. Tracking finished product back through the facility to implicate specific raw ingredients proved impossible for a number of reasons.

First, Dole could not specifically trace product packed on line ten any farther back than the packaging line as they do not maintain a linear relationship between centrifuge banks and packing lines. It was possible that product from one centrifuge might be incorporated into finished product from every packing line (at least those packing the same mix).

Secondly, Dole was unable to provide a schedule for product run on each trim line. The only available written documentation that could be used to determine the schedule of product running on a line was the "Trim Line Downtime Log" (Attachment 7) that was filled in each time a trim line stops for any reason. The Trim Line Downtime Log shows the name of the mix on the line at the time of the delay. Unfortunately, it did not show the start and stop times for different blends.

Finally, we discovered that at the time Dole processed the implicated product, the firm failed to fill out their internal record titled "Dumper – Raw Material Tracking Form" (Attachment 3) for some of their trim lines. For the second shift on September 7, 2005, Dole could only provide the dump records for trim lines one through six (trim lines primarily used for iceberg blends). The Trim Line Downtime Logs for the same shift indicated that trim lines five through nine were running at the time. When investigators requested dump logs for trim lines five through nine they were told by Dr. Kunduru that the firm did not consistently keep the Dumper – Raw Material Tracking Form. Further, Dr. Kunduru stated that the information on the logs that were maintained should not be

relied upon. Had these forms been consistently and accurately maintained, it may have been possible to narrow the scope of the farm investigation.

The firm kept a daily inventory of raw ingredients but the inventory only lists the product type and harvest date, it did not list the farm source. Dole did have a policy to use the field-trimmed romaine within 24 hours of harvest and whole romaine within 48 hours of harvest. Consequently, farm investigations were conducted at the fields where field-trimmed romaine was harvested on September sixth and seventh, as well as every field where whole romaine was harvested on September fifth, sixth, and seventh. This information was compiled based on harvest records. The farms identified by this method along with their overall harvest dates were:

- Manabe Ranch 4Q-Farms Field 12001 (V27), 9/2 – 8;
- Growers Vegetable Express American Farms Petersen Ranch 2 Field 19 south (GVEROM 001), 9/5-6;
- Merrill Airport Ranch Field 12 (V42), 9/7;
- Merrill Home Ranch Field 6 (V40), 9/3 – 6;
- Pisoni Farms Breshini Ranch Field 8 (V18), 9/5;
- RC Farms Williams Ranch Field 51 (V76), 9/2 – 7;
- RC Farms Williams Ranch Field 59 (V77), 9/6 – 8;
- Willoughby Farm Hackman Ranch Field 1 (V51), 9/5 - 9 and 9/11

Belinda Platts, the Agricultural Manager, explained that the Manabe Ranch 4Q-Farms V 27 was harvested over an extended period because it had 3 plantings and 2 varieties all in the same contiguous field. Ms. Platts added that the Willoughby Farm Hackman Ranch 51 was harvested early because Dole was in short supply, and the harvest was prolonged in order to increase the field yield.

Dole Documentation

Facility Water Source/Testing Wells and Water Treatment

The firm had three wells, referred to by number. Well number one served the facility fire suppression system. Well number two served as a backup drinking water/process water well. Well number three was the primary well in use. The firm said well number two was rarely used. Well number two was used during system tests and in the case of a failure by well number three as the firm's water requirements were very close to its total capacity. Water from wells two and three was piped into a water storage tank and treated by chlorination to primary drinking water standards. The plant's water system was monitored by Monterey County as a community water system.

Records of the firm's microbiological water quality testing were collected (Attachment 8). A routine sample collected from the Dole water system on August 22, 2005 detected the presence of total coliforms (sample source – lab, present/absent test). The firm collected four repeat samples on August 24, 2005. Total coliforms were detected in the sample collected from well number three. According to Don Clifford, VP of Operations, the firm treated their well with nine pounds of calcium hypochlorite (68%) following the second positive retest. On August 31, 2005, they collected another sample from well number three and no coliforms were detected (no chlorine residuals were reported).

Microbiological Monitoring

Copies of Dole's routine microbiological testing of raw romaine, carrots, and cabbage as well as romaine containing finished products for the period of August 3, 2005 to September 9, 2005 were collected (Attachment 9). The team reviewed all microbiological testing records in this date range to verify that we had received all pertinent tests. The firm tests a raw material sample approximately once per week for *E. coli*, total coliform, and psychrotrophic plate count. The product type for this sample varies on a weekly basis. Dole tries to match a finished product sample to the raw material sample and test both for total coliforms and psychrotrophic plate count (Attachment 8).

The firm takes environmental swabs weekly at ten locations through the facility, and sends them to the [REDACTED] for *Listeria monocytogenes* testing (Attachment 10). *Listeria monocytogenes* tests for August and September were all negative. No other pathogen testing was done.

Sanitation Operating Procedures and Environmental Sampling

Standard Sanitation Operating Procedures (SSOPs) were reviewed by CALFERT members. Written procedures exist for each piece of equipment, processing area, or type of surface in the Dole facility although there was no routine washing procedure for field bins used to transport romaine. Food contact surfaces were cleaned daily with a soap-chlorine foaming cleaner (pH [REDACTED]), rinsed, and sanitized with [REDACTED] ppm [REDACTED] compound. The foaming cleaner was left on the surface for [REDACTED] to [REDACTED] minutes. Scouring pads and long-handled brushes were used for stubborn areas or product build-up. The [REDACTED] sanitizer was not rinsed off. Once a week an acid foamer (pH [REDACTED]) was used for cleaning instead of the alkaline foaming cleaner.

The hydroloop that conveyed the carrot-cabbage mixture utilizes a [REDACTED] process and was cleaned twice a week with a commercial [REDACTED] cleaner by circulating for [REDACTED] minutes, checking the pH (must be [REDACTED]), adding more [REDACTED] cleaner if the pH was below [REDACTED], and continuing circulating for [REDACTED] additional minutes. The solution was drained, and the system filled with clean un-chlorinated water. The system was run until a pH of 6.5–7.5 was reached.

Foot and hand dip stations were maintained every [REDACTED] hours by testing concentration and replenishing the sanitizer. Foot dips/mats contain [REDACTED] ppm [REDACTED]. This solution was prepared by adding [REDACTED] ounce of [REDACTED] to one gallon of water (calculated concentration [REDACTED] ppm). Hand dips contain [REDACTED] ppm [REDACTED], prepared by adding [REDACTED] ounce of [REDACTED] per 4 gallons of water (calculated concentration [REDACTED] ppm). Dip stations were drained, cleaned of organic matter, and re-filled on a prescribed maintenance schedule, and a written log was kept.

A supply of knives was maintained by the shift supervisor or foreman, and the knives were issued at the work stations. When not in use, the knives were stored in a [REDACTED] ppm [REDACTED] solution. The knife dip station solution was replaced every [REDACTED] hours.

Dr. Goldsmith stated that after the sanitation cycle, a pre-operation inspection was conducted by a Quality Assurance person and sanitation person. The firm monitored sanitation effectiveness on a daily basis using ATP swabs. In addition, the firm monitored the concentration of chlorine in cleaning compounds. The Sanitation records for August and September show results of ATP swabs and the concentration of cleaning solutions. Review of the sanitation records revealed several of the ATP swabs exceeded acceptable levels and equipment had to be re-cleaned and retested.

In addition to SSOPs, the firm had SOPs for oxygen permeability of packaging, bag integrity check, temperature check on the finished product, shelf life testing, critical limit monitoring/corrective actions taken, weight check (manual), graphics, coding on package, and finished case coding.

Dr. Kunduru informed us that there had not been any recent labor disputes at the plant.

Grimmway Farms Environmental Investigation

Grimmway Farms

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Phone 661-854-6260

Date of site visit: November 9-10, 2005

Investigators: Mary Palumbo, Ph.D., CDHS, and Ingrid Zambrana, FDA, Megan Henry, CDHS Division of Communicable Disease (DCDC), observer.

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Patrick Kelly, Director of Quality Assurance

Cynthia Klein, Quality Assurance Manager

Firm Description

Grimmway Farms was a family owned business producing and processing organic and nonorganic carrots and other vegetable crops. Owners were Robert Grimm and Barbara Grimm (widow of Rod Grimm). The General Manager of Grimmway Farms was Gary Giragosian. The firm had about 1700 employees, and processing facilities in Arvin, California, and Zinzer, Colorado. The firm packed retail product under the Grimmway name

plus about 70 other private labels, and also sold wholesale product in bulk. Grimmway Farms owned about half of the farms which supplied its produce; the remainder of the farms were contracted. Grimmway carrots were grown in Kern County (October through February) and Imperial County (February to August), California, and in Rio Grande County, Colorado (high elevation, first week in August to last week in September). Approximately 5–6% of the carrots processed annually came from Colorado. Grimmway crews planted and harvested the carrot crop (using Grimmway-owned harvesting equipment) on both owned and contracted farms. The seeds used for Grimmway carrots were proprietary varieties. The product sold to Dole Fresh Vegetables for further processing in bagged salads was 1300 pound bins of peeled two inch chunks. The carrot shipments used in the implicated Dole brand salads were produced on September 2 and 3, and shipped to Dole's Soledad facility on September 3 and 5.

Process

Outside of building D, trucks pulled up from the field into the wash-out area. A sample (█ g) of carrot with adhering soil was taken from one trailer for each field harvested. This sample was analyzed in-house for generic *E. coli* (Attachment 11). Wash-out water was recycled through two large settling ponds (in series) about 200 yards from the plant. Chlorine was injected as the water was pumped out of the second settling pond and also at the point of entry into the trough that received the carrots and associated dirt from the truck. Chlorine level in the wash-out water was monitored every █ to █ minutes. The target level was █ to █ ppm; the most frequently observed reading was approximately █ ppm. Carrots passed over a rock remover before entering the processing area in building D. Building D processing area was kept at ambient temperature. The building was cooled in summer sufficiently to keep the employees comfortable.

Carrots passed through a "cornhusker" for removal of green tops, then through a washer and brush washer. The water in this system was recycled, and emptied █ times per week. Sediment was removed and the system was cleaned, sanitized, and refilled with fresh water. The volume in this system was █ gallons. Gaseous chlorine (buffered to pH █) controlled by a flowmeter was injected continuously into the recycle tank. The target chlorine concentration for this loop was █ ppm free chlorine. Quality Assurance staff monitored the concentration every █ minutes using a drop titration kit supplied by █, and recorded readings in a log. This chlorine level in this application has been verified to give an ORP reading █, according to the Director of Quality Assurance. The concentration measured by the investigators with low level test strips was 0.5 to 1.0 ppm free chlorine. The Quality Assurance staff sampled the water and tested with their drop titration method and obtained a reading of █ ppm. The system was not operating at the time of measurement because of a shift change. The carrots were then rinsed with fresh water (█ ppm free chlorine). A sizer separated carrots into those with a diameter greater than 1 inch, which go to foodservice coins, and those less than 1 inch, which were used for chunks. A second sizer removed larger pieces.

Two types of cutters (proprietary design) were used to cut carrots into 2 inch chunks. A flume (█ ppm free chlorine) carried the cut pieces to a small piece remover (small pieces went into cattle feed). The concentration of chlorine in this flume was monitored every █ minutes, and recorded in a log. Another sizer separated the carrot pieces into small diameter pieces, which went into retail pack baby carrots, and larger diameter pieces, which went into chunks. Next a █ color sorter removed anything that was not orange. This was followed by hand sorting. Workers on the hand sorting line were observed wearing gloves and protective sleeves. Carrots then entered a hydrocooler, where the water temperature was █°F and chlorine concentration was maintained at approximately █ ppm free chlorine (target concentration). This chlorine concentration was maintained by injecting █ into the manifold at the bottom of the hydrocooler, then pumping it up to the top. The chlorine concentration was a critical control point (CCP), and was monitored every █ minutes. The critical limits were █ ppm free chlorine. If the chlorine concentration dropped below █ ppm (lower operating limit) or the temperature exceeded █°F, the product flow was stopped until the parameters were back within these limits. CDHS staff measured the temperature at 33.4°F and the chlorine concentration at 20–30 ppm free chlorine, using free chlorine test strips. Carrots passed through the hydrocooler in approximately 10 minutes. They were then flumed to building A. The flume water was recycled, and was part of the same loop as the hydrocooler. Quality assurance staff were observed monitoring oxidation-reduction potential (ORP), chlorine, and temperature at the hydrocooler. A hydrocooler temperature and chlorine test log for the time period of interest is shown in Attachment 12.

Building A was maintained at refrigeration temperatures. Air temperature was measured at 33.2°F by CDHS staff. The carrots were dewatered and passed through a █ (CCP). They were binned as two inch chunk unpeeled, and transferred to the snack plant. The snack plant temperature was measured at 36.4°F. In

this area, the carrots went through an abrasion peeler, which was continuously supplied with fresh single pass water (about █ ppm chlorine) for removal of the peel. Carrot pieces then passed through a hand sorting table and a second hydrocooler. The hydrocooler water was filtered, recycled, and maintained at approximately █ ppm free chlorine, ORP=█ mV, and a temperature of approximately █°F. The chlorine concentration (CCP) and temperature were monitored every █ minutes, and a log was kept. Procedures for this hydrocooler were the same as for the hydrocooler in Building D (see above). CDHS staff measured the chlorine concentration at this hydrocooler at 30 ppm free chlorine with test strips. Carrots pass through a █, followed by binning. Dole product went into a plastic-lined plastic bin. The temperature of the shipping area, as measured by CDHS staff, was 37°F or lower, depending on the exact location.

A recent change cited by the Director of Quality Assurance was the increase in the number of inspection belts from one to four. This occurred about 4 months prior to the date of the investigation. Additionally, building D water loops were converted from using sodium hypochlorite for chlorination to buffered chlorine gas in 2004.

The water source for the processing plant was three deep wells. The water was chlorinated at the wellhead at 1 to 3 ppm free chlorine. A tap water sample was taken in the laboratory daily and analyzed for chlorine concentration, total plate count, total coliform, and *E. coli*. █ conducted monthly coliform analysis (total coliform and *E. coli* presence/absence) of two samples from each well. Results for samples collected August 30, 2005, showed "absent" for all analytes (Attachment 13).

Sanitation was conducted nightly from 10 pm until 5:00 am. The plant normally ran Monday through Friday, with more intensive cleaning done on the weekends.

Shipping of finished product to Dole was by a contract trucker, Juarez Trucking. There were no data loggers on shipments to Dole. Dole records incoming product temperature at receiving on the Dole Value Added carrot evaluation log.

Process for carrots grown in Colorado

In Colorado, each truck was sampled and the samples were analyzed by an outside lab for total plate count (TPC), coliforms, and *E. coli*. Carrots harvested in Colorado were washed, sized, cut, small pieces removed, hydrocooled, and loaded into a truck with an aluminum bed. The truck was pressure washed, sprayed with █ compound, and lined with plastic sheeting before the product was loaded. Trucks were supplied under contract through four brokers (Cargo Master, CH Robinson, Alta Mesa Truck Brokers, and Bill Watson Trucks). Grimmway did not control previous use of trucks, but did specify that trucks should not have been used for transport of meat. The transport time varied from 20 to 48 hours to reach the Grimmway plant in Arvin. Upon arrival, the product was hydrocooled and placed in cold storage at █°F. The carrots entered the process line at the █ color sorter in building D, and the remainder of the process was the same as that for carrots harvested locally. The carrots that were processed on September 2 and shipped to Dole on September 3 had been shipped from Colorado on August 30 and received at the Malaga plant in Arvin on September 1 at 4:48 AM.

HACCP Program

Grimmway participated in the United States Department of Agriculture (USDA) Qualified Through Verification (QTV) program. The HACCP program was developed under guidelines from this program, and USDA personnel review all HACCP records as part of this program. The CCPs in the HACCP program were:

1. █
2. █
3. █
4. █
5. █
6. █
7. █

Microbiological Testing Program

Grimmway has a laboratory facility in a separate location where testing was conducted. Carrots arriving at the plant from the field were sampled with adhering soil. The firm believed that testing incoming product with adhering soil effectively samples the soil and irrigation water. Sampling was not aseptic. Sample size was [REDACTED] grams from each field. The Quality Assurance Director believed that this small sample size was adequate because of the large number of samples taken (about 5000 tests have been run in the last 5 years). Samples were tested for TPC, coliforms, and generic *E. coli*. Generic *E. coli* tests were done with [REDACTED]TM. Each lot of [REDACTED]TM was tested with a positive control. Results were reviewed for the period from August 25 to September 5. No positive results for *E. coli* were found (Attachment 11). According to the Quality Assurance Director, they have never had a positive *E. coli* result, but if one were received he would immediately initiate a farm investigation.

Ninety environmental swabs were taken at start-up daily and tested for TPC (Attachment 14). Water loops were tested for TPC and some for coliform (those closer to the start of the process). The data were used to create a trend line. If an upward trend was detected, the equipment and procedures were reviewed and modified as needed to correct the problem. Sample water was spread directly onto [REDACTED]TM without dilution. In-process product samples and brush washer water samples were tested for TPC, total coliform, and *E. coli* (Attachment 15). *Listeria* (genus) testing was conducted monthly, using an ELISA test. About 100 swabs were taken each month in cold storage and in the plant. Swabs were done on floors and in some flumes. Finished product samples were tested at least once per shift for TPC, coliform, generic *E. coli*, and yeast and mold (Attachment 16). [REDACTED]TM was used for all tests, including product samples. Product samples were blended with sterile diluent (Stomacher), and the resulting liquid was transferred to [REDACTED] by pipet.

Employee Training

New employees working on the production floor received approximately 30 minutes of Good Manufacturing Practices (GMP) and HACCP training. HACCP training included instruction on what CCPs were and how this applied to the employee's job. This training was repeated annually for all line employees. The Quality Assurance Manager conducted weekly food safety meetings with 25 managers. Over the course of the month these meetings covered the whole plant. Pictures were taken and shown at the meeting and HACCP procedures were reviewed. Customer complaints were also reviewed. No illness complaints have been received in recent months, according to the firm.

Farm Environmental Investigations

Dole Fresh Vegetables (Romaine Lettuce)

Investigators:

CDHS: Carol Myers, Mary Palumbo PhD, James Sigl

FDA: Daniel Geffin

Belinda Platts, Agricultural Manager for Dole Fresh Vegetables, Inc. (Dole), identified seven farms (eight fields) where the implicated romaine had been harvested between September 4–7, 2005. The methodology used to identify these farms and fields was described in the "Traceback Investigation" section of this report. The farms were located in Watsonville and the Salinas Valley, California. An environmental investigation was conducted at each of the fields. These fields had already been prepared for the next planting at the time of the investigation. Preparation of the field involved deep plowing or ripping the soil (to 18 inches depth), then disking soil 5 to 11 times, followed by plane or laser grading and a fertilizer application (compost containing manure and/or inorganic fertilizers).

Dole contracted with independent growers for romaine. Dole had two different contracts for romaine, either "by-the-pound" or "by-the-acre." By-the-acre crops were grown under the supervision and oversight of Dole employees. By-the-acre crops represented the majority of the romaine implicated in this outbreak. On a weekly basis, agriculture managers from Dole conducted food safety audits for by-the-acre fields until harvest at which time a Dole harvest manager was responsible for the crop. The romaine seed varieties grown on the farms implicated in this outbreak were Sunbelt (SB), Paris Island Cos (PIC), 454, Sturgis, Avalanche, and Dominator.

Dole employees did not directly oversee romaine crops grown under a by-the-pound contract. Dole food safety audits were not conducted on these fields. This type of contract stipulated to the grower that Good Agricultural Practices (GAPs) must be followed. The grower was responsible for the harvest of by-the-pound romaine.

Growers for each type of contract described above agreed to follow the GAPs, and provide required records to Dole which included soil amendment documents. Ms. Platts stated that Dole was not under obligation to harvest crops when there had been significant violations. Ms. Platts stated that during the 2005 growing season, growers identified in this outbreak had met Dole contractual GAPs. Ms. Platts stated she would provide farm soil amendment records and daily harvest logs to the investigative team. However, at the time of this report, amendment records had not been provided. Water Quality Logs were provided for five of the seven identified lettuce fields (Attachment 17A).

Although some wells were tested for total coliforms, none were tested for generic *E. coli* or fecal coliforms. Growers generally identified each field on a ranch map with a number, however, Dole used the letter "V" followed by a number to identify harvested fields. For example, William Ranch Field 51 was identified by Dole as V76. The Dole "Planting Information" sheet identified the grower, ranch, and lot (Dole's ranch number) (Attachment 20). The "Dole Value Added" sheet listed the grower, ranch, and Dole field number (Lot/Load) (Attachment 2). The "Dole Value Added" documents were generated when the harvest load arrived at the processing plant at which time the load was inspected. CALFERT investigators noted discrepancies on the Dole Value Added sheets in that the identified "Ranch" did not always match a corresponding ranch number on the "Planting Information" sheet. For example, the September 6, 2005 Value Added sheet with "Wil" (Williams) as the grower, shows the Ranch as V56. However, the "Planting Information" sheet did not show a ranch V56 (Attachment 20). In a correspondence dated May 25, 2006, Dr. Kunduru explained these discrepancies as "transcription errors" from either the harvesting crews or upon receipt (Attachment 21).

RC Farms – Williams Ranch (By Acre) Fields 51, 59 (V76, V77)

Brian Caprara, Partner
30380 Lanini Road
Gonzales, CA 93926

On October 4, 2005 CALFERT investigators met with Belinda Platts and Brian Caprara at the Williams Ranch located on the west side of the Gloria Road exit off of Hwy 101 south (Attachment 22). Field trimmed romaine (SB variety) was harvested September 6–7, 2005 by RC Packing, Gonzales, California.

The Salinas River bordered the west side of the Williams Ranch with fields 51 and 59 approximately one-half mile to the east of the river. RC Farms has leased the Williams Ranch since 1989 and did not sublease to other growers. Mr. Caprara stated that neither domestic nor wild animals have ever presented a problem on the ranch.

The romaine fields were sprinkler irrigated. Three wells supplied water for the ranch. Mr. Caprara stated that the wells were tested twice a year. Ms. Platts identified wells W-2, W-4, and W-5 as having supplied water for fields 51 and 59. June 3, 2005, well test results for wells 4 and 5 were positive for total coliform and absent for *E. coli* (Attachment 23). Mr. Caprara stated that generally, well water was not used for fertilizer application. The company applying the fertilizer supplied the mix water.

Mr. Caprara stated that the last time compost or composted manure had been applied to the Williams Ranch was October 2004, at which time Keith Day Compost was applied (see section below entitled "Keith Day Composting"). Biosolids had never been applied to the ranch. A portable restroom was observed at the maintenance building on the ranch and was supplied with soap, water, and single use towels.

Pisoni Farms - Breshini Ranch (By Acre) Field 8 (V18)

Mark Pisoni, Farm Foreman
116 7th Street
Gonzales, CA 93926

On October 4, 2005, CALFERT investigators met with Belinda Platts and Mark Pisoni at the Breshini Ranch located on the west side of the Gloria Road exit off of Hwy 101 south (Attachment 24). Field trimmed romaine (PIC, 454, and SB varieties) was harvested on September 5, 2005, by RC Packing.

Pisoni Farms had been farming the Breshini Ranch for 30 years and did not sublease it to other growers. The ranch was bordered by farmland, Hwy 101, and city streets. A house was located on the north corner of Field 8. Mr. Pisoni stated that he did not see any animals on the ranch other than the occasional small birds.

Mr. Pisoni identified two wells (shown on the ranch map) that were used to sprinkler irrigate the romaine fields (Attachment 24 farm map showing two wells). The wells were tested annually. Ms. Platts provided the CALFERT team with June 14, 2004, well test results for only one of the wells, which tested positive for total coliform and absent for *E. coli* (Attachment 25). In a May 25, 2006, correspondence Dr. Kunduru stated that there was only one well on the Breshini Ranch and that is the reason only one well result was provided (Attachment 21). The company applying the chemical fertilizer supplied the mix water.

Mr. Pisoni stated that it has been more than ten years since composted manure had been applied to the ranch and that grape pomace and biosolids had never been used on the ranch. A portable restroom was located at the farmhouse adjacent to Hwy. 101 and was found to be adequately supplied. Mr. Pisoni stated that employee illness records were not kept.

Merrill Farms – Airport Ranch (By Acre) Field 12 (V42)

Alan Clark

1067 Merrill Street

Salinas, CA 93901

On October 4, 2005, CALFERT investigators met with Belinda Platts and Alan Clark at the Airport Ranch located on the east side Hwy 101 south of Airport Boulevard exit (Attachment 26). Field trimmed romaine (PIC and 454 varieties) was harvested on September 7, 2005, by BC Harvesting.

Merrill Farms had farmed the Airport Ranch for three years. The ranch was bordered by farmland and Hwy 101. Mr. Clark stated that he had not observed animals on the ranch. It was not unusual for farm equipment to be shared with other Merrill ranches. A reservoir was located on the northeast corner of Field 13 and its water was used only for unplanted fields. At the time of this investigation field 12 was under a plastic cover for fumigation in preparation for strawberry planting.

The romaine crop was sprinkler irrigated with well water. The ranch had three wells, P3 L6, P2 L4, and P1 L18. All three wells tested negative for total coliforms and absent for *E. coli* as shown on the June 2, 2005, well test results (Attachment 27). Both compost and chemical fertilizers were used. Keith Day compost was applied to the ranch in October 2004. The company applying the chemical fertilizer supplied the mix water.

Merrill Farms – Home Ranch (By Acre) Field 6 (V40)

Alan Clark

1067 Merrill Street

Salinas, CA 93901

On October 4, 2005 CALFERT investigators met with Belinda Platts and Alan Clark at the Home Ranch located off of Reservation Road (Attachment 28). Field trimmed romaine (PIC and Strugis varieties) was harvested on September 5, 2005, by BC Harvesting, and on September 6, 2005, by RC Packing.

Merrill Farms had farmed and owned Home Ranch for twenty years. Reservation Road, Bureau of Land Management (BLM) property, farmland, and foothills bordered the ranch. Cattle were observed on the hills to the west of the ranch. Farming equipment was shared with Jack's Ranch, another Merrill Farm ranch. Toilet facilities were located on Jack's Ranch approximately one-quarter of a mile from Home Ranch Field 6.

The romaine crop was sprinkler irrigated with well water. Three wells were located on the ranch, but Mr. Clark stated that a well from Jack's Ranch was used to irrigate Field 6. June 1, 2005, well water test results for Jack's Ranch well P4 L20 were absent for total coliform and *E. coli* (Attachment 29). June 16, 2005, well water test results for Jack's Ranch well P6 L5 were absent for total coliform and *E. coli* (Attachment 30). Keith Day compost was applied to the ranch in October 2004. The company applying the fertilizer supplied the mix water.

American Farms – Peterson Ranch 2 Field 19 S (GVEROM 001)

Robert Thorp, Grower's Express, Harvest Coordinator
24825 Chualar River Road
Chualar, CA 93525

Gilbert Rodriguez, Farm Manager, American Farms
310 John Street
Salinas, CA 93901

On October 4, 2005, CALFERT investigators met with Belinda Platts, Gilbert Rodriguez, and Robert Thorp at Ranch 2 located on the west side of Hwy 101 off of Chualar River Road (Attachment 31). Whole head romaine (Avalanche, Dominator, and SB varieties) was harvested on September 5, 2005, by Secco Packing, King City, California.

American Farms had leased Ranch 2 for more than seven years and did not sublease to other growers. Ranch 2 was bordered by roads on two sides and farmland on the other two sides. The Salinas River was approximately one-half mile to the west of Ranch 2. Ranch 2 was bordered by organic fields. Farm equipment was shared with other farms, some of which were organic. Mr. Thorp stated that all farm equipment was washed with warm water before entering organic fields. Farm equipment was not routinely washed when moving from an organic field to a non-organic field. Mr. Thorp stated that he had not observed any animals other than an occasional rodent on the ranch.

The romaine crop was sprinkler irrigated with well water. Three wells were located on Ranch 2. Well water test results for June 29, 2005, were less than one MPN/100 ml for total coliform and *E. coli* for all three wells (Attachment 32). The company applying the chemical fertilizer supplied the mix water.

Compost was applied to both conventional and organic fields. Mr. Rodriguez stated that compost was last applied to Ranch 2 field 19 in September 2003. Keith Day Trucking Company, Gonzales, California supplied the compost. Investigator James Sigl conducted an investigation of Keith Day Composting on December 6, 2005, (see section below, titled "Keith Day Composting").

Manabe Ranch – 4 Q Farm Field (By Acre) 12001 (V27)

Marty Vukasovich, Farm Manager
19045 Portola Dr.
Salinas, CA 93908

On October 5, 2005 CDHS Investigator Carol Myers met with Belinda Platts and Marty Vukasovich at the Manabe Ranch located in Watsonville, California east of Hwy 101 off of Ohlone Road (Attachment 33). The ranch was approximately one mile from Harken Slough, a habitat for many different types of birds. Field trimmed romaine (PIC and 454 varieties) was harvested on September 5, 2005, by RC Packing.

4Q-Farms had leased Manabe Ranch for one year at the time of this investigation. Previously, the ranch was leased to Vec Farms in which Mr. Vukasovich was also the farm manager. The ranch was bordered by industrial buildings, residential housing, and strawberry fields. At the time of the farm visit Mr. Vukasovich stated that the only animals he had observed on the farm were squirrels that ate the young romaine leaves. However, during a subsequent phone conversation, Mr. Vukasovich stated that large numbers of geese also grazed on the young romaine leaves. Mr. Vukasovich said that a hunting guide who lived nearby had contacted him requesting permission to allow the guide's clients to shoot geese. Mr. Vukasovich did not allow hunting on the ranch. Farming equipment was not shared with other ranches or growers.

The romaine crop was sprinkler irrigated with well water. Well water test results for July 12, 2005, were present for total coliforms and absent for *E. coli* (Attachment 34). Mr. Vukasovich stated that water from the Beach Ranch was used for all application mixes. Beach Ranch well tests for July 12, 2005, were absent for total coliforms and *E. coli*.

Mr. Vukasovich stated that no type of manure or green compost had been applied to the ranch in the past four years and that biosolids had never been applied to the ranch. Mr. Vukasovich stated that he did not keep employee illness records.

Willoughby Farms – Hackman Ranch Field 1 (V51)

Mark McCarter, General Manager
PO Box 82
Watsonville, CA 95077

On October 5, 2005, CDHS Investigator Carol Myers met with Belinda Platts and Mark McCarter at the Hackman Ranch located adjacent to Beach Street near Lee Road in Watsonville, California (Attachment 35). Field trimmed romaine (PIC and 454 varieties) was harvested on September 7, 2005, by BC Harvesting.

Willoughby Farms had farmed the Hackman Ranch for more than six years. The ranch was located adjacent to Beach Road near Lee Road in Watsonville, California. Three sides of Field 1 were adjacent to farmland and one side was adjacent to Beach Road. The Watsonville wastewater treatment plant was approximately one-half mile from the ranch. The Pajaro River was approximately one mile to the south. Hackman Ranch was periodically subleased to Coastal Berries for strawberry crops. There were no toilet facilities at the time of this investigation as the field was fallow and no employees were present. Mr. McCarter stated that he “never” sees wild or domestic animals on the ranch. Equipment used for the Hackman Ranch was also shared with other Willoughby ranches.

The romaine crop was sprinkler irrigated with well water. The Beach Ranch well was used to irrigate the Hackman Ranch romaine crop. September 28, 2005, well water test results were absent for total coliform and *E. coli* (Attachment 36).

Willoughby Farms-Prescott 4+6 Ranch (Red Cabbage)

Mark McCarter, General Manager
PO Box 82
Watsonville, CA 95077
Investigators: CDHS - James Sigl, FDA - Daniel Geffin

On November 7, 2005, CALFERT investigators met with Mark McCarter and Belinda Platts at the Willoughby Farms, Prescott 4+6 Ranch, located at the corner of Prescott Road and San Justo Road in San Juan Bautista (Attachment 37). Red cabbage was harvested on September 1, 2005, by BC Harvesting (Attachment 2).

The San Benito River borders the field to the northeast. The riverbed was significantly below the level of the field and was dry at the time of the visit. Ms. Platts stated that the San Benito River runs subsurface much of the year. Across the river from the field, cattle were observed grazing on a hill. Mr. McCarter said that they occasionally see birds around the field but not geese. Some animal tracks were noted between the river and an adjacent field (not owned by the same farming company). Mr. McCarter stated that in the past year, they got above average rainfall but it was distributed temporally so that there wasn't flooding. He added that the Willoughby-Prescott 4+6 was the highest block on the property.

The cabbage field was drip irrigated. Water used to irrigate the field was purchased from the San Benito County Water District. According to Mr. McCarter, the water was surface water that San Benito County gets from the San Justo Project. The water was piped from a turnout on the edge of San Justo Road and filtered through a trailer-mounted sand filter prior to irrigation. Water was tested for total and fecal coliforms by San Benito County on September 26, 2005. Fecal coliforms were reported as less than 1.1 MPN/100mL and total coliforms were reported as 5.1 MPN/100mL (Attachment 38). Mr. McCarter said that the water used for fertilizer application was not the same as the irrigation water. Chemical fertilizers were received pre-diluted from Boyer Fertilizers.

Mr. McCarter stated that no manure, compost or biosolids had been used on the field since Willoughby Farms started farming them over ten years ago.

Grimmway Farming Operations

Fred Jamison, Field Quality Assurance Manager (Grower Group)
Dale Jackson, Farm Manager (Cuyama Valley)

Fields used for product processed at Grimmway for Dole on September 2 and 3 (identified as carrots that could have been used in implicated salads) were located in Cuyama Valley (Santa Barbara and San Luis Obispo

Counties) and in south central Colorado (Rio Grande County). The CALFERT team visited four fields in the Cuyama Valley. Grimmway later confirmed that two of the fields were not used for the product under investigation, and only two fields will be discussed in this report. The CALFERT team was not able to visit the field in Colorado harvested by Grimmway for product sent to Dole but interviewed Grimmway Farming Operations staff and reviewed records. According to maps provided by the firm, the Colorado field, designated H108, was located on the southwest side of the junction of Three Mile Lane and Hwy 6, near the town of Zinzer (Attachment 18).

Grimmway Farms had a Good Agricultural Practices audit form that was completed by the farm manager for each field used for growing carrots. This form addressed such issues as raw manure or municipal biosolids applications, nearby dairies or pastures, prior use for pasture, irrigation water source, and toilet facilities during harvest (Attachment 19). On this form, the farm managers stated that these fields had not had raw manure applied within 6 months of harvest and had not been used for pasture within 8 months of harvest. The time from planting to harvest was 120 to 160 days, depending on the size desired. Crop rotations for these fields include carrots, barley, and other vegetables such as green beans and parsnips.

The Cuyama fields were watered by sprinkler irrigation with water obtained from wells. These wells were not tested. Chemical fertilizers were applied through the sprinkler irrigation system. Composted dairy cow manure, supplied by Earthwise Organics, was applied before planting (Attachment 19). The farm manager for the Cuyama area ranches stated that grazing animals on the fields after harvest was a common practice. When this occurred, carrots were not planted to be harvested less than 8 months later. He stated that generally it would be a year between grazing and harvest of a carrot crop. For carrots, general practice was to allow the field to lie fallow once every three years. He was not aware of any illnesses among the workers. The Cuyama River, which was within 0.25 mile of fields 980 and 989, appeared dry at the time of our visit. Reportedly it runs water when it rains, but had not flooded the fields. No livestock or domestic animals were seen in the vicinity of the fields.

Sanitation training was provided for farm workers in their own language during safety meetings, which occur annually. Supervisors provided oversight for worker hygiene. Portapotties were provided when workers were present in the field (no workers were present during our visit). Contract labor was used for hand weeding during the growing season. Farm equipment was stored in shops nearby and was cleaned monthly by high pressure washing. Rainfall in the area was higher than usual last winter, but did not cause flooding. Wildlife in the area include deer, bear, cougar, coyotes, and birds.

Hub Russell 11W (field number 980) was located on the north side of the Cuyama River, south of The Wash, off of Highway 166 near the town of Old Cuyama (Attachment 18). Grimmway had been farming for 10 years at this site. Parsnips were planted on this field prior to the carrot crop. No grazing occurred following parsnip harvest (sheep do not eat parsnips). Compost (composted dairy cow manure, supplied by Earthwise Organics) was applied to field 980 on March 28, 2005. The compost was dumped at the edge of the field prior to spreading. The first water date was April 12, 2005. Harvest dates were August 31 through September 3, 2005. The well supplying irrigation water for this field was on a concrete pad which was free of cracks. There were some gopher holes around the pad. The field was located approximately 0.25 mile from the Cuyama River, and there was a ridge between the river and the field.

Serrano 1 (field number 989) was located in Santa Barbara County, south of Hwy 166 near Hwy 33 and Ballinger Canyon Road, just west of the Cuyama River (Attachment 18). This field had been farmed by Grimmway for 15 years. Prior to planting carrots, the field was fallow for one year. Compost (composted dairy cow manure, supplied by Earthwise Organics) was applied on May 2, 2005, and the first water date was May 19, 2005. This field was harvested September 1 and 2. Coyote droppings were observed near the field. Because of impending darkness, the well was not observed.

No compost was applied to the Colorado field H108 between May 14, 2005, and harvest on August 31, 2005. This field was planted (water date) on May 19, 2005.

██████████ was contracted to conduct a quarterly audit of the GAPs. The auditor's report appeared to verify the farm manager's input. CDHS staff reviewed the report dated September 27, 2005, and no problems were noted. Random field checks were conducted annually.

Harvesting Operations

Ms. Platts told CALFERT investigators that Dole arranged for the harvest for all by-the-acre romaine growers and that the grower arranged for the harvest for all by-the-pound growers. Dole contracted BC Harvesting, Salinas, California and RC Packing, Gonzales, California for all by-the-acre fields identified in this investigation. American Farms Ranch 2 a by-the-pound field was harvested through Growers Express, Salinas, California.

B.C. Harvesting

21 W. Laurel Dr. STE# 73
Salinas, CA

Investigators:

CDHS: Mary Palumbo Ph.D., Carol Myers

FDA: Dan Geffin

B.C. Harvesting was contracted by Dole to harvest romaine on "by-the-acre" contract fields. Jose Luis Mendoza, Dole Superintendent Mixed Vegetables, inspected romaine crops for quality and monitored harvest crews for the 2005 crops. B.C. crew supervisors were responsible for overseeing the harvesters and harvest operations. All romaine harvested by B.C. related to this investigation was cut and cored in the field. B.C. Harvesting supplied all harvesting equipment. BC Harvest crews were responsible for harvesting Hackman Ranch V51 and Airport Ranch V42. Dole provided Water Quality Logs and GAP audit checklists for these ranches (Attachment 39).

On October 5, 2005 CALFERT team members, along with Jose Luis Mendoza, and Belinda Platts, observed a B.C. harvest crew in Watsonville, California. Mr. Mendoza stated that he visited each harvest crew approximately twice a day during the 2005 season. Field equipment included a harvest table (conveyor belt) pulled by a tractor, elevator belt, portable restrooms, and a bin trailer (Attachment 43-A). Portable restrooms were supplied by B.C. and were observed to be clean and adequately supplied at the time of this investigation.

Manuel Daniel, Crew Foreman, and Lorenzo Garcia, Harvest Crew Supervisor, were present at the harvest site visited by the CALFERT team on October 5, 2005. Mr. Daniel stated that workers used a hand sanitizer ([REDACTED], active ingredient [REDACTED] ethanol) at the beginning of their shift. The hand sanitizer dispenser, located on a piece of harvest equipment, was adequately supplied at the time of this investigation (Attachment 43-B). B.C. provided rubber gloves, aprons, sleeve protectors, knives, and hairnets for workers. All workers were observed wearing rubber gloves and some type of hair cover (hats, hoods, or hairnets). All workers on the trim and core table were also observed wearing sleeve protectors and aprons. A knife with a stainless steel blade and a plastic handle was used to cut romaine. Workers carried a leather knife sheath. Mr. Daniels stated that workers turned in their equipment at the end of each day.

Mr. Daniels stated that during breaks workers placed their knives into a metal box containing a sodium hypochlorite solution (Attachment 43-C). Mr. Daniel stated that he measured the chlorine concentration of this solution each morning after it was mixed. The target level was [REDACTED] ppm total chlorine. Using Hydriion total chlorine test strips, CALFERT members measured the knife chlorine solution and found it to be greater than 200 ppm total chlorine. Municipal water was used to fill 1,000-gallon nurse tanks, which were transported to the field. Smaller, plastic water tanks, attached to the harvest tractor were filled from the nurse tank (Attachment 43-D). Mr. Daniels stated that sodium hypochlorite was stored in 50 gallon barrels at the maintenance yard and transferred to the field in one-gallon jugs. An unlabeled one-gallon jug of chlorine was observed at the harvest site and was used to mix chlorine solutions for the tractor tanks.

The harvest began with a worker grabbing a head of romaine with one hand and cutting it at the base of the stem (Attachment 43-E). The cut head was thrown onto the nearby table where another worker trimmed the top leaves and then, using the coring end of the knife, removed the core (Attachment 43-F). The cored and trimmed head of romaine was placed onto the conveyor belt where it passed under a series of spray nozzles (Attachment 43-G). A plastic 300-gallon water tank was carried on the harvest tractor and was used for the spray injector lines that sprayed the lettuce as it was carried along the harvest belt to the elevator belt. On October 5, 2005, the CALFERT team observed one set of spray nozzles not working. After this was brought to the supervisor's attention, a worker, using his harvest knife, removed the debris blocking the nozzle orifice. The CALFERT team made the observation that the pump supplying water to the nozzles nearest the bin trailer was turned off and therefore these nozzles were not working. The spray water from the nozzles at the far end of the conveyor belt measured 50 ppm total chlorine using chlorine test strips. Of the three nozzles where this

measurement was taken one nozzle was working properly, one had inadequate spray, and one was not working. Mr. Daniel stated that the 300-gallon tank of chlorinated water used for the harvest spray nozzles lasted about 45 minutes. On May 25, 2005, Dr. Kunduru provided FDB with GAP audit logs and "Dole Fresh Vegetables-Water Quality Log" for BC Harvest crews for Dole fields V51 and V42 (Attachment 39). The water quality logs did not identify what the water use was and only shows one measurement for each day. Both logs documented that all chlorine levels were below Dole's target level of [REDACTED] ppm.

Once on the conveyor belt, romaine was transported to the elevator belt and then dropped into plastic-lined bins (Attachment 43-H). The bin trailer typically carried 14 plastic bins (Attachment 43-I). Most field trucks pulled two trailers, thus carrying 28 bins at a time to the processor. The full bins were covered with a mesh tarp and transported to the Dole processing facility (Attachment 43-J). The CALFERT investigative team arrived at the harvest operations at 9:30 am, at which time harvest had already begun and bins were being loaded. The bin trailer left the field for the processing plant at 10:45 am.

Mr. Daniel and Mr. Garcia supplied the following information with regard to harvest cleaning and sanitation practices. During breaks, harvest knives were placed in a chlorine solution. In the morning, Mr. Daniel measured and recorded the chlorine levels of this solution. A log was not maintained to record total chlorine levels for the knife sanitation solution. As stated above, CALFERT members measured this solution and found it to be greater than 200 ppm total chlorine. At the end of the day the knives were collected from the workers and remained in a chlorine solution until the next day's use. Mr. Daniel stated that the target level for chlorine solutions was [REDACTED] ppm using total chlorine test strips. Workers took their knife sheaths home. Aprons and sleeve protectors were collected at the end of the day and dipped in a soap and chlorine solution, rinsed, dried, and folded before the next use. During breaks, workers hung their aprons on racks located on the backside of the harvest table and gloves were laid on top of field lettuce during breaks. Mr. Daniel stated that during every break, the harvest equipment table was driven to a field road where it was hosed off with water and chlorine. At the end of the day the tables were brushed down with soap, water, and chlorine and then rinsed with water. Due to the time of day of this investigation, the CALFERT team did not observe any of the above practices.

B.C. Harvesting - Cabbage Harvest

CALFERT investigators James Sigl (CDHS) and Daniel Geffin (FDA) observed a BC crew harvesting green cabbage on November 7, 2005, in San Juan Bautista, California. Jose Pacheco, Crew Supervisor, Sylvester Coranado Tractor Supervisor, and Belinda Platts were present.

Hygienic procedures for the cabbage harvesting were observed to be similar as those described for the romaine harvesting. All employees wore hairnets and employees who touched food wore gloves. The employees on the harvest line and monitoring the bins on the trailer wore sleeve protectors and aprons. Mr. Pacheco said that he took these back to the shop daily and cleaned them with chlorinated water and a brush. Mr. Pacheco said that employees took their gloves home every day. These gloves were replaced every second day or sooner if they were damaged.

Mr. Pacheco said that during breaks employees placed their knives in a metal box containing a solution of chlorine. The chlorine solution in the metal box was tested by CALFERT members and found to be greater than 200 ppm total chlorine. At night, Mr. Pacheco said he took the knives back to the shop and cleaned them with a chlorinated water solution.

Mr. Pacheco said that at the end of each day, the harvest machine was sprayed down with a pressure washer, then foamed with [REDACTED] (a foaming degreaser/cleaner), brushed, and rinsed with chlorinated water. Mr. Pacheco said that the belts of the harvesting machine were cleaned again in the road at the edge of the field with a pressure washer in the morning before they started. During breaks, the harvest machine was sprayed off with chlorinated water from the tanks on the tractor. The water in the tanks was filled from the Watsonville municipal water supply and chlorinated with sodium hypochlorite ([REDACTED] sodium hypochlorite) using [REDACTED] ounces in each 100 gallons of water. The supervisor used [REDACTED] chlorine test strips to make sure it was between [REDACTED] ppm total chlorine. The water was tested by CALFERT members and found to contain 150 ppm total chlorine and 25 ppm free chlorine.

The harvest procedure began with an employee cutting cabbage off at the base, then pulling off the outer leaves and dropping them in the field. The employee then placed the cabbage on a conveyer belt that moved the

cabbage up and into a bin on an adjacent trailer. The cabbage was not sprayed with water. Employees on the trailer monitored the filling and closing of the bins.

Growers Express (GE) (formally GVE)

1219 Abbott Street
Salinas, CA 93901

Investigators:

CDHS: Mary Palumbo Ph.D., Carol Myers

FDA: Daniel Geffin

Growers Express (GE) contracted with Secco Packing for the harvesting of Dole "by-the-pound" growers. Ms. Platts identified American Farms Ranch 2 field 19S as the only supplier of by-the-pound romaine for the time period of interest. Robert Thorp, Harvest Supervisor, GE, was responsible for overseeing the romaine fields as they related to harvest readiness and quality. Secco Packing, Salinas, California supplied harvest crews for Ranch 2 field 19S. Secco harvested whole head (conventional romaine) using their harvest equipment for GV. Dole did not provide harvest documents for Secco harvest crews.

On October 5, 2005 CALFERT team members, Robert Thorp, and Belinda Platts observed a Secco harvest crew in Aromas, California. Victor Sordia, Secco Crew Foreman, was also present. Field equipment included a harvest table (with a conveyor belt) pulled by a tractor, elevator belt, portable restrooms, and a bin trailer. A harvest crew was composed of approximately 10 workers. Two portable restrooms were supplied by Secco and were observed to be inadequately maintained. The door was opened on one of the stalls, the push button water spigots were observed to be excessively dirty, and one of the two soap dispensers was empty (Attachment 44-A). A strong foul odor was coming from the restrooms. Mr. Sordia stated the restrooms were serviced every other day by A & G Pumping, however, cleaning logs were not on site.

Victor Sordia, Secco Crew Foreman, and Mr. Thorpe described the harvest process and practices to the investigative team. Mr. Sordia stated that he checked the romaine for tip burn and other quality issues before beginning the harvest. The harvest began with Mr. Sordia handing out hairnets and gloves to the workers. Employees were issued three aprons and two sets of sleeve protectors and were responsible for keeping these clean. Employees brought aprons and sleeve protectors to work with them. Mr. Sordia checked workers to make sure they were appropriately dressed before beginning the harvest. Workers were observed wearing sleeve protectors, rubber gloves, aprons, and some type of hair cover (Attachment 44-B). Romaine was cut with a steel bladed knife with a plastic handle. Workers took their knives home each day and were responsible for keeping the knives sharp. Workers carried a knife sheath and generally some sort of sharpening tool.

Mr. Sordia stated that during breaks workers placed their gloves, aprons, sleeve protectors, and knives on the tractor floor or back of the harvest table. The CALFERT team did not observe worker breaks on the day of this investigation. Mr. Sordia also stated that workers place their knives into a plastic bucket containing a chlorine solution during breaks. This bucket was on the tractor with a lid on it and contained what appeared to be chlorine bleach solution. Due to the location of this bucket a worker would have to remove the bucket from the tractor, place the knife into the bucket, and then replace the bucket back on the moving tractor. The unlabeled bucket appeared to contain chlorine bleach, however, the exact type of chlorine solution was unknown. A five-gallon jug contained an unlabeled chlorine solution that was used to chlorinate water in the 300-gallon tank on the tractor pulling the harvest table (Attachment 44-C). The knife bucket did not contain enough chlorine solution for the knife to be completely submerged. Rusted knives were observed being used (Attachment 44-D). Workers were responsible for their knives and therefore regular cleaning, scrubbing, and sanitization of the knives was not monitored.

Well water was used for the harvest operations. Chlorine was added to a plastic 1,000- gallon nurse tank before filling it with well water. Chlorine was kept in an unlabeled five-gallon plastic jug and stored in one of the portable restrooms (Attachment 44-E). CALFERT investigators measured the chlorine level to be less than 50-ppm total chlorine for the nurse tank. Mr. Sordia stated that there was not an SOP for the chlorine level of this tank and chlorine was not added with the intent to sanitize the water.

The nurse tank was hauled to the harvest area and used to fill the 300-gallon tractor tank (Attachment 44-F). This water was used to spray the lettuce on the harvest conveyor belt. Mr. Sordia stated that the chlorine target

level used for the lettuce spray was [REDACTED] ppm for both total and free chlorine. Chlorine was added to the tractor tank before it was filled with water from the nurse tank. Mr. Sordia used [REDACTED] with a maximum detection of [REDACTED] ppm for both free and total chlorine. CALFERT members measured the tractor tank chlorine levels as greater than 200 ppm total chlorine and greater than 300 ppm free chlorine using LaMotte chlorine test paper. Mr. Sordia stated that he checked the chlorine level in the morning after filling the tank. A daily log for October 5, 2005 showed that 16 ounces of bleach was added at 5 and 11 AM and "ok" was entered for "chlorine check". Approximately two 300-gallon tanks of water were used each day per harvest crew. An hourly log accompanied the harvest tractor, which Mr. Sordia maintained. The log entry-headings were hour, chlorine added, chlorine check, and check belt.

Dole supplied CALFERT investigators with GE's Standard Operating Procedures (SOPs) (Attachment 41). The harvest procedures observed by investigators were not following the SOPs in that chlorine sanitation solutions used in the field were measured with test strips instead of an ORP meter, and readings were not recorded every half hour.

The harvest began with a worker grabbing a head of romaine with one hand and cutting it at the base of the stem. The harvester then tossed the lettuce onto the harvest table where a conveyor belt carried it to the elevator belt before it was dropped into a lined plastic bin. A set of nozzles sprayed chlorinated water onto the lettuce before it was transferred to the elevator. Once the bins on the trailer were full, they were covered with a plastic tarp and taken to the processor (Attachment 44-G).

At the end of the day chlorine was poured onto the conveyor belt and scrubbed with a cotton work glove. The belt was then sprayed with a pressure washer hooked to the tractor tank. Mr. Sordia stated that the cleaning of the harvest equipment took two workers approximately one hour to complete. Equipment cleaning was not observed by the investigative team.

RC Packing

30380 Lanani Road
Gonzales, California 93926

On November 7, 2005, CALFERT team members James Sigl (CDHS) and Daniel Geffin (FDA) observed a RC Packing crew harvesting field trim romaine. CALFERT team members were accompanied by Belinda Platts, and met with Juan Torez, the Dole Supervisor for RC Packing, Ruben Guzman, the RC Field supervisor, and Rafael Ibara, the RC Field Foreman. RC Packing was responsible for harvesting Manabe 4Q-Farms V27, Breschini Ranch V18, Williams Ranch V76 and V77, and Home Ranch V40. Dole provided Water Quality Logs and GAP audit checklists for these ranches (Attachment 40).

The harvest began with a worker grabbing a head of romaine with one hand and cutting it at the base of the stem (Attachment 45-A). The cut head was thrown onto the nearby table where another worker trimmed the top leaves (Attachment 45-B). The trimmed head of romaine was placed onto the conveyor belt where it passed under a series of spray nozzles. A plastic 300-gallon water tank was carried on the harvest tractor and was used for the spray injector lines that sprayed the lettuce as it was carried along the harvest belt to the elevator belt. Mr. Guzman said that the water spray had a target chlorine level of [REDACTED] ppm total chlorine. CALFERT team members tested the spray and found it contained 50 ppm free chlorine. Mr. Guzman said that water for the spray was supplied from a 2000 gallon tank that was filled at the RC Packing shop. Mr. Ibara said he added [REDACTED] mL of [REDACTED] to the 2000 gallons. Mr. Guzman said they maintained a log of the daily chlorine concentration in the tank but he did not have a copy of the log on the day of the CALFERT investigation

Knives were stored in a chlorine solution during breaks and overnight. The chlorine solution used was from the 2000-gallon tank. At the time of our review, the crew was still working. Several knives were observed in the bin used to hold knives but there was no chlorine solution. Mr. Guzman explained that they replace the solution at every break. There were spots of rust visible on the stainless steel knives in the bin.

The employees observed all wore gloves, sleeve guards, hairnets, and long plastic aprons. The firm maintained two sets of aprons and sleeve guards for the crew and used them on alternating days. Mr. Ibara said that he collected the aprons, knives, and sleeve guards at the end of each day and on the following day an employee would clean them with chlorinated water ([REDACTED] ppm total chlorine from the 2000 gallon tank).

According to Mr. Guzman, the harvest line was washed at the firm's shop every night, using a pressure washer and degreaser, then at the start of the day and during breaks, the harvest line was sprayed with chlorinated water ([REDACTED] ppm total chlorine from the 2000-gallon tank).

There was a portable toilet trailer on the edge of the field on the day of our visit. The trailer had three restrooms, two for men and the third for women. Handwashing facilities on the trailer included water with a foot pump, soap, paper towels and a garbage container. Wastewater was collected into a catch basin.

Grimmway Farms Harvesting Operations

Grimmway harvest was not observed. The firm provided a verbal description of the procedure. No hand contact with the carrots occurred during normal operations. The carrots were dug from the ground using a mechanical harvester that also removes the green top, and fed into a tractor-pulled trailer for transport to the plant. The trailers were owned by Grimmway, and were not used for other purposes. At the plant, the carrots were washed out of the trailer with a high pressure, high volume chlorinated ([REDACTED] ppm) wash-out water. No further washing of the trailer was done prior to return to the field.

Keith Day Composting

Keith Day Composting - Gonzales Pit

Short Road at Gonzales River Road

Gonzales, CA 93926

Investigator: James Sigl, CDHS

Firm Representatives: Keith Day (owner of Keith Day Composting); Bob Day (employee at the Gonzales Pit); Manual Perea (owner of Manual Perea Trucking)

The Keith Day Composting – The Gonzales Pit was located on Short Road at Gonzales River Road, between the Salinas River and the Gonzales sewage treatment percolation ponds. Mr. Day operates three separate composting sites, the Gonzales Pit, Gabilan Fertilizer (also called Moonglow Dairy or Moonglow Site, located at 234 Dolan Road, Moss Landing), and the Blair Ranch (formerly Clifton Composting, located at 441 El Camino Real in Greenfield). Mr. Perea's firm spreads the majority of the compost from the Keith Day Gonzales Pit. According to Mr. Perea, the Chicken Manure Blend was spread at both the Merrill Farms and American Farms ranches. This blend contained chicken manure, mushroom mulch, and grape pomace. Mr. Perea said that he had spread compost on American Farm, Ranch 2 Field 19 on both July 5, 2004 and December 2, 2004. Mr. Perea could not find a record of a 2004 or 2005 compost application for the Merrill Home Ranch Field 6 but thought that he had spread compost on the ranch in 2003. Mr. Perea was unable to verify this, as he no longer had records for compost application done in 2003.

The firm was not actively composting at the time of the visit but Mr. Day described the process. Much of the compost ingredients that came into the Gonzales pit was premixed at one of the other sites. Compost was started in windrows about ten feet high. Once the compost began to heat up, the rows were reduced to about five feet high. The temperatures of these rows were monitored daily and water was added as needed. Once a windrow attained a temperature of about 150°F, it was then turned every three days for 15 days and the temperature was monitored on a log (Attachment 42). The windrows were turned eight to ten times in the course of the composting process with an HLC turner pulled by a tractor. After composting was finished, the product was run through a Trummel Screener, and then was left in large static finishing piles. The temperature in the static piles was monitored, and the piles were turned occasionally with a front loader. The temperatures of the windrows and static piles were taken by Mr. Keith Day and recorded on a log sheet that included the date and temperature when each windrow was turned (Attachment 42).

The equipment used at the Gonzales site included a front loader, Trummel Screener, water truck, Scarab, tractor, and an HLC turner. The front loader, Trummel Screener, and tractor stayed at the Gonzales pit. The remaining equipment was used at various sites. This equipment was not routinely cleaned and sanitized. It was occasionally washed down with water from the well. The same equipment was used to handle both raw materials and finished compost.

Water Source

Water at the site came from an agricultural well located on the adjacent ranch owned by Carchione farming. Mr. Day did not have access to any microbiological testing on the well.

Product Testing

Mr. Day provided the results of tests collected on May 17, 2005 (micro and chemical)(Attachment 42). The results for the May 2005 testing showed Fecal Coliform levels at less than 2 MPN/gram and *Salmonella* at less than 3 MPN /4grams. California Code of Regulations, Title 14 state that the density of fecal coliforms in actively composted manure shall be less than 1000 MPN/g total solids (dry weight basis), or the density of *Salmonella* shall be less than 3 MPN/4 g (dry weight basis).

Compost Ingredients

With the exception of grape pomace, compost ingredients were screened prior to use with a Trummel screener to remove pieces larger than 3/8". These included green waste, chicken manure, mushroom compost, and grape pomace. No preliminary microbial testing was done on any of the compost ingredients.

Grape pomace was picked up by the firm in side-dump trailers from [REDACTED] and [REDACTED]. Annually, they use about 5000 tons between Greenfield and Gonzales sites. Grape pomace was used in all three blends made at the Gonzales site (chicken compost blend, cow compost blend, and topsoil blend for commercial landscaping).

Chicken manure was picked up at [REDACTED] and transported in dedicated side-dump trailers that were sealed on the bottom. Mr. Day stated that the dedicated trailer was sealed to prevent leakage due to the wet nature of the chicken manure. The chicken manure was taken to a yard in Chualar (on River Road) where it was blended with green waste so that it would heat up and dry more quickly. Keith Day composting purchased between 1500–2000 tons of chicken manure annually. The chicken manure was used in the chicken compost blend and sometimes in the topsoil blend.

Spent mushroom substrate was picked up from [REDACTED] in side-dump trailers and brought to the Gonzales site. Between all of the Keith Day compost sites, they use 10,000 to 15,000 tons of spent mushroom substrate per year. It was used primarily in the chicken manure blend.

Green waste was picked up from the [REDACTED] and [REDACTED] landfills. It was transported in side-dump trailers and either brought directly to the Gonzales site or taken to the Gabilan Fertilizer site in Moss Landing where it was blended. Pre-blended product was sometimes transported to the Gonzales site for incorporation into other blends. Green waste was incorporated in all three blends produced. Finished compost was transported to growing fields via Manual Perea trucks.

Earthwise Organics (EO)

CDHS staff conducted a site visit at Earthwise Organics dairy manure composting operation in Chino, CA, in October 2002. The following description pertains to that investigation. The EO compost, which was 100% dairy cow manure, was processed according to EPA regulations, according to EO personnel. The manure was windrowed (6 feet high by 6 feet wide) for a minimum of 90 days (usually 120 days). Water was applied and the rows were turned 3 to 4 times per week. The temperature was taken daily at multiple locations. Temperatures reach 131-160°F in the early stages. Testing was done for Earthwise Organics by [REDACTED], and for Grimmway Farms by [REDACTED]. Test results for fecal coliform and *Salmonella* on EO compost, performed monthly by [REDACTED], show <3 MPN/g fecal coliform and "negative" *Salmonella* test for January through July 2002. Test results on 3 samples of EO compost performed for GF on August 8, 2002, show <1 MPN/g of both *E. coli* and *Salmonella*.

Recommendations

Growing

- Compost should be adequately processed to ensure the safety of product for use on fields for growing ready-to-eat produce.
- During composting, steps should be taken to prevent potential cross contamination by use of the same equipment to handle finished compost and raw materials.
- Farm equipment should be cleaned after use in fields where manure or manure-containing compost has been used.

- Grazing livestock on harvested fields should be re-evaluated if such fields will be used subsequently to grow ready-to-eat crops.
- Fields supplying produce should have passed a thorough GAP audit.
- Growers should consider microbial testing for wells used for sprinkler irrigation of ready-to-eat foods.

Harvesting

- All harvesting food contact surfaces should be clean and of adequate sanitary quality.
 - Knives should not be left in chlorine solutions for prolonged time periods because this promotes rust, making the knife impossible to properly clean and sanitize.
 - Knives should not be taken home with employees but stored in a clean and sanitary manner when not in use.
 - Knives should be cleaned and sanitized each time a different ranch is harvested.
 - Knives should not be carried in employees' pockets or in non-cleanable sheaths such as leather
- Harvest belts, tables, and other food contact surfaces should be scrubbed with brushes during the cleaning step.
- All sanitation solutions should be measured frequently and adjusted to meet target range.
- Maintain cleaning logs for the cleaning and sanitizing of equipment.
- Field bins that do not utilize liners should be cleaned and sanitized before using.
- Hand sanitizers must be easily accessible for employees.
- Spray water that comes into contact with food should be of adequate sanitary quality.
- Chlorine solutions should be in labeled containers.
- Written SOPs should be in place and readily available at appropriate operating locations. For example, SOPs should be posted where all chlorine solutions were mixed and measured.
- All contained water (i.e. nurse tanks) used for harvesting operations should be adequately sanitized for its intended purpose.

Cooling

- Minimize time from harvesting to cooling for bins of romaine.
- Clean and sanitize the vacuum (dry and/or wet) tube as frequently as needed and maintain logs to document these activities.

Processing

- Improve traceability of raw materials to specific fields.
- Records/ documents pertaining to movement of products from field, to process, to final packaging should be accurately maintained.
- Monitoring records should be maintained and verified.
- Thorough investigation should be conducted for any positive well test result on facility water.
 - Corrective actions and findings should be documented.
- Water derived from agricultural wells used for a food processing facility should meet the water quality standards under the California Code of Regulations, Title 22.
- Local water enforcement agencies should follow up on any positive well test results required by Title 22
 - This includes notification to CDHS-FDB, if the results were from a CDHS registered facility.

Contributing Factors

- Contaminated produce eaten raw

Attachments

1. Dole Air Temperature Log 9/6/05-9/8/05
2. Dole "Value Added" Log
3. Dole Carrot Receipts from Grimmway Farms
4. Dole "Dumper Operator- Raw Material Tracking Form"
5. Dole Flume Process-water Chlorine Recording Chart
6. Dole "Daily Chlorine Log (CCP-1)" for September 7, 2005
7. Dole "Trim Line Downtime Log"
8. Dole Processing Facility Well Test Results (microbiological)
9. Dole Routine Microbiological Testing Results
10. Dole Listeria monocytogenes Test Results
11. Grimmway Farms Incoming Carrot E. coli Test Results
12. Grimmway Farms Hydrocooler Temperature and Chlorine Test Log
13. Grimmway Farms Processing Facility Well Water Test Results (microbiological)
14. Grimmway Farms Microbiological Testing; Daily Sanitation Swabs

Attachments (continued)

15. Grimmway Farms Microbiological Testing, Water Loop and In-line Product Samples
16. Grimmway Farms Microbiological Testing, Finished Product Samples
17. Field Identification for Carrots Shipped to Dole on 9/3/05 and 9/5/05
18. Farm Maps, Grimmway Enterprises for Carrots Shipped to Dole on 9/3/05 and 9/5/05
19. Grimmway Farms GAP, Planting, Application, and Harvest Records
20. Dole "Planting Information" Sheet
21. Dole Correspondence dated 5/25/05
22. RC Farms – Williams Ranch Farm Map
23. RC Farms – Williams Ranch Well Test Results
24. Pisoni Farms – Breshini Ranch Farm Map
25. Pisoni Farms – Breshini Ranch Well Test Results
26. Merrill Farms – Airport Ranch Farm Map
27. Merrill Farms – Airport Ranch Well Test Results
28. Merrill Farms – Home Ranch Farm Map
29. Merrill Farms – Jack's Ranch Well Test Results, dated 6/1/05
30. Merrill Farms – Jack's Ranch Well Test Results, dated 6/16/05
31. American Farms – Ranch 2 Field 19 S Farm Map
32. American Farms – Ranch 2 Field 19 S Well Test Results
33. Manabe Ranch – 4Q Farms Field 12001 (V27) Farm Map
34. Manabe Ranch – 4Q Farms Field 12001 (V27) Well Test Result
35. Willoughby Farms – Hackman Ranch Field 1 (V51) Farm Map
36. Willoughby Farms – Hackman Ranch Field 1 (V51) Well Test Result (Beach Well)
37. Willoughby Farms - Prescott 4+6 Farm Map
38. Willoughby Farms – Prescott 4+6 Well Test Results
39. Dole Harvest Records – BC Harvesting
40. Dole Harvest Records – RC Packing
41. Grower's Express Standard Operating Procedures
42. Keith Day Compost Records
43. Photographs – BC Harvest
44. Photographs – Growers Express
45. Photographs – RC Packing