

**Outbreaks of Methomyl Poisoning Caused by the Intentional Contamination of Salsa at the
Mi Ranchito Restaurant in Lenexa, KS -- August 2009**



Background

On August 11, 2009, Johnson County Environmental Department (JCED) notified the Bureau of Epidemiology and Public Health Informatics at the Kansas Department of Health and Environment (KDHE) of a possible foodborne illness outbreak associated with Mi Ranchito Restaurant located at 13000 West 95th St., Lenexa, KS. Five patrons developed a rapid, acute onset of vomiting, dizziness, nausea, and diaphoresis while still at the restaurant. KDHE, JCED, Kansas Department of Agriculture (KDA), and Johnson County Health Department (JCHD) initiated an outbreak investigation to determine the cause of illness and to implement prevention and control measures. On August 30th, JCED notified KDHE of a second incident at Mi Ranchito Restaurant in which 28 patrons once again developed a rapid, acute onset of vomiting, diaphoresis, nausea, and dizziness. KDHE, JCED, KDA, and JCHD continued the outbreak investigation. KDA initiated an emergency suspension order and closed the restaurant pending the outcome of this investigation.

Methods

Epidemiologic Investigation

KDHE and JCHD conducted interviews with patrons reporting illness after eating at the restaurant on August 11th. KDHE also consulted experts in toxicology at the Centers for Disease Control and Prevention (CDC), the University of Kansas Hospital Poison Control Center in Kansas City, KS, and Children's Mercy Hospital in Kansas City, MO about possible causative agents.

To determine if illness was associated with a specific food or drink item, credit card receipts from restaurant patrons who had eaten on August 11th were collected. However, due to the limited identifying information on the receipts, a list of patrons could not be compiled and a case-control study was not conducted.

KDHE and JCHD were notified of a second incident at the restaurant on August 30th. Interviews were conducted with the persons who reported illness after eating at the restaurant on August 30th.

For both incidents, a case was defined as an individual who experienced vomiting, diarrhea, abdominal pain, or diaphoresis (profuse sweating) within 2 hours of eating at Mi Ranchito.

Follow-up interviews were conducted beginning on September 9th to assess case-patient illness status, to provide information on laboratory results, and to provide clinical information about the exposure.

Environmental Assessment

Inspections of the restaurant were conducted on August 11th, August 12th, August 30th, August 31st, and September 23rd by JCED. Samples of refried beans, black beans, shredded beef, pork, tortilla chips, cream cheese, taco meat, rice, and salsa were collected on August 11th. Five salsa samples, four tortilla chip samples, and samples from all ingredients used to make the salsa (salt, onion, canned tomato strips, garlic, jalapenos, oregano, cilantro, and cumin) were collected on August 30th.

On August 31st, the Water One Distribution Water Quality and New Service Department in Johnson County inspected the plumbing fixtures and piping within the restaurant. Ice, water, and two samples of soda were collected on August 31st.

On September 4th, staff from JCED, JCHD, KDA, and Lenexa Police department conducted an inspection of the restaurant to inventory all chemicals used.

Laboratory Analysis

Clinical specimens were collected from five case-patients who ate at the restaurant on August 11th and six case-patients who ate at the restaurant on August 30th. In addition, samples of vomitus at the restaurant were collected, although the sources of the vomitus were unknown.

Because the quick onset and characteristics of the symptoms were indicative of a bacterial toxin, clinical specimens were sent to the Minnesota Department of Health (MDH) Laboratories for bacterial toxin testing. Stool specimens were sent on August 17th and 18th. Vomitus specimens were sent on August 17th and September 2nd. Urine, plasma, serum, and vomitus specimens were sent to the CDC for testing on September 2nd and forwarded to the California Animal Health and Food Safety Toxicology Laboratory at the University of California (CAHFS) for additional testing on September 10th.

The food samples collected on August 30th and the ice, water, and two samples of soda collected on August 31st were forwarded to the Food and Drug Administration (FDA) Kansas City District Laboratory for chemical analysis on September 1st. The food samples collected on August 11th were forwarded to the FDA Kansas City District Laboratory for chemical analysis on September 4th. Some of the salsa samples collected was also sent to the MDH Laboratories for bacterial toxin testing on September 2nd.

Results

Epidemiologic Investigation

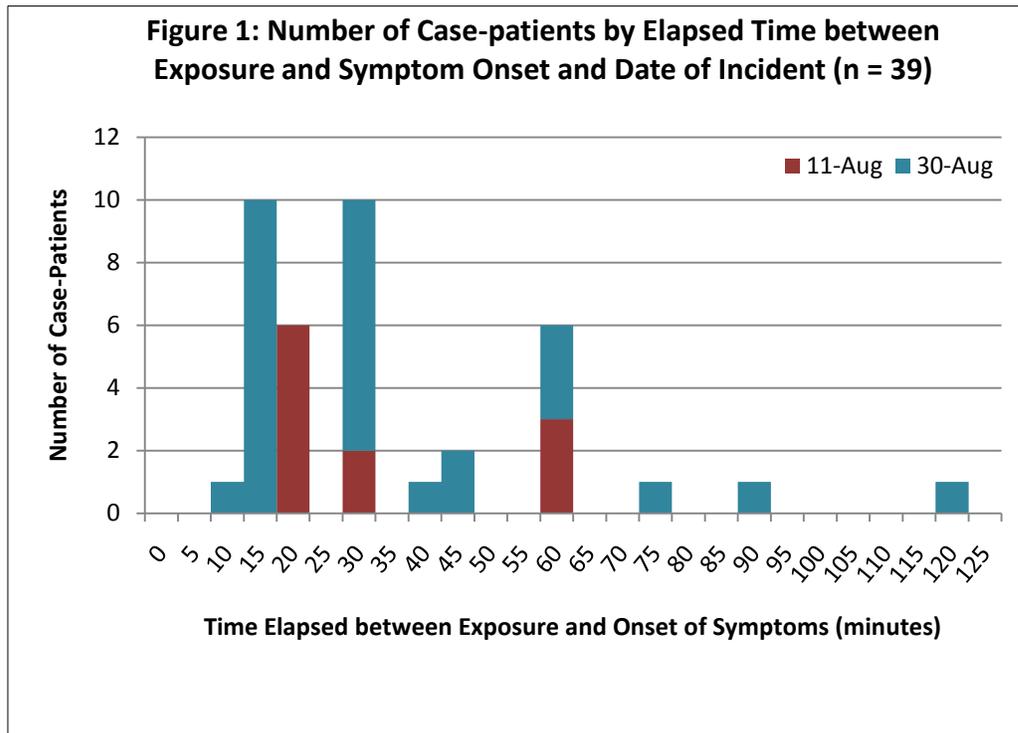
Forty-eight individuals reported illness: 12 from the August 11th incident and 36 from the August 30th incident. Of those, 39 were available to be interviewed, and all 39 met the case definition. The most commonly reported symptoms among the case-patients were nausea, dizziness, diaphoresis (profuse sweating), vomiting, chills, and abdominal pain (Table 1). Six individuals who ate at the restaurant on August 11th and 19 individuals who ate on August 30th sought medical treatment at an emergency department. One individual from the August 30th incident was hospitalized overnight.

Table 1: Clinical Information (n=39)
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Symptoms / Condition	August 11	August 30	Both Dates
	Number/Total*	Number/Total*	Number/Total*
Nausea	11/11	26/27	37/38
Dizziness	7/9	24/26	31/35
Diaphoresis (profuse sweating)	6/9	24/28	30/37
Vomiting	8/11	20/28	28/39
Chills	9/10	18/27	27/37
Abdominal Pain	9/11	15/27	24/38
Headache	2/5	13/26	15/31
Blurry Vision	1/8	14 /27	15/35
Muscle Aches	6/9	7/22	13/31
Diarrhea	5/11	6/28	11/39
Treated in emergency room	6/11	19/28	25/39
Hospitalized	0/11	1/ 28	1/39
	Time	Time	Time
	(Minutes)	(Minutes)	(Minutes)
Median time to onset (range)	20 (20-60)	30 (10 – 120)	30 (10-120)

*"Total" represents the total number of persons for whom a response to the interview question was obtained.

The reported time between consuming food and onset of symptoms for case-patients from the August 11th incident ranged from 20 to 60 minutes with a median of 20 minutes. The reported time between consuming food and onset of symptoms for case-patients from the August 30th incident ranged from 10 to 120 minutes with a median of 30 minutes (Figure 1).



Date of recovery was reported by 26 case-patients, and duration of illness ranged from 1 hour to 13 days with a median of 31 hours. Thirteen (33%) individuals reported they had not yet recovered as of September 9th.

Ages of case-patients ranged from 2 years to 78 years (median = 40 years), and there were 22 (56%) males.

Food and beverage consumption information was collected for 10 of the 11 ill patrons interviewed who ate at the restaurant on August 11th and for all 28 ill patrons who ate at the restaurant on August 30th. On August 11th, seven (70%) ill patrons reported consuming most or all of their meal and three (30%) reported consuming part of their meal, whereas on August 30th, 14 (50%) ill patrons reported becoming ill prior to the service of their meal or within taking a few bites of their meal, Table 2.

Table 2 Reported consumption of their meal among ill patrons from 8/11/2009 and 8/30/2009

Meal Consumption	Incident Date	
	08/11/2009 Number (%)	08/30/2009 Number (%)
Did not eat any of their meal	0 (0%)	6 (21%)
Ate 1-3 bites of their meal	0 (0%)	8 (29%)
Ate part of their meal	3 (30%)	4 (14%)
Ate most or all of their meal	7 (70%)	10 (36%)

Thirty-seven (97%) of ill patrons from both incidents had a beverage with ice. Eighteen (47%) consumed water, ten (26%) consumed a soda, and five (13%) drank ice tea, Table 3.

Table 3 Ice and beverage consumption of ill patrons by date of incident

Beverages	Incident Date	
	08/11/2009 Number (%)	08/30/2009 Number (%)
Ice	10 (100)	27 (96)
Water	5 (50)	13 (46)
Soda	4 (40)	6 (21)
Margarita	1 (10)	1 (4)
Beer	1 (10)	3 (11)
Ice Tea	1 (10)	4 (14)
Lemonade	0 (0)	1 (4)
Horochata	0 (0)	2 (7)

Commonly consumed foods for ill patrons that ate at the restaurant on August 11th were chips, salsa, cheese, rice, and corn tortillas, Table 3. Commonly consumed foods for ill patrons that ate at the restaurant on August 30th were chips, salsa, cheese, espinaca dip (a cheese spinach dip), cheese, rice, flour tortillas, and refried beans, Table 4. All 38 (100%) reported eating the tortilla chips and salsa that are served prior to the meal. Also, two (18%) ill patrons from August 11th and nine (32%) ill patrons from August 30th reported that the salsa had an unusual taste.

Table 4 Types of foods consumed among ill patrons on 8/11/2009 and 8/30/2009

Foods Consumed	Incident Date	
	08/11/2009 Number (%)	08/30/2009 Number (%)
Chips	10 (100)	28 (100)
Salsa	10 (100)	28 (100)
Espinaca Dip	0 (0)	18 (64)
Ground Beef	4 (40)	3 (11)
Chicken	2 (20)	9 (32)
Beef	2 (20)	8 (29)
Pork	1 (10)	2 (7)
Bacon	2 (20)	1 (4)
Fish	0 (0)	1 (4)
Shrimp	0 (0)	1 (4)
Eggs	0 (0)	1 (4)
Cheese	9 (90)	19 (68)
Avocado or Guacamole	1 (10)	4 (14)
Corn Tortilla	5 (50)	9 (32)
Flour Tortilla	4 (40)	15 (54)
Refried Beans	3 (30)	14 (50)
Black Beans	2 (20)	5 (18)
Rice	7 (70)	16 (57)

Environmental Assessment

Three critical violations were observed during the inspection by JCED on August 11th: 1) inadequate cold holding temperatures; 2) refrigeration units not holding proper cold hold temperatures; and 3) toxic substances improperly stored. All foods that were above proper temperature were destroyed, and all other violations were corrected at the time of the inspection. The establishment was voluntarily closed due to lack of cooler capacity. A re-inspection of the restaurant was conducted on August 12th. All refrigeration units had been repaired and no critical violations were observed during this inspection. The establishment reopened on August 12th.

Following the second incident on August 30th, the restaurant was inspected by JCED. One critical violation was observed: improper cold holding temperatures. All prepared foods were destroyed, and the restaurant voluntarily closed. On August 31st, KDA issued an emergency suspension order closing the restaurant temporarily.

During the inspection of the restaurant on August 31st by the Water One Distribution Water Quality and New Service Department no backflow prevention assembly was installed on the water line leading to the carbonator or on the water line leading into the restaurant.

On September 4th an inventory of all chemicals used in the restaurant was compiled.

All restaurant employees were educated on food defense and were required to pass a food safety knowledge test administered by JCED and KDA. The restaurant was inspected, KDA lifted the suspension order, and the restaurant reopened for business on September 23rd.

Laboratory Analysis

Four stool specimens from case-patients from the August 11th incident tested negative for *S. aureus* and *B. cereus*. Two stool specimens tested positive for *C. perfringens* enterotoxin A, but *C. perfringens* was not isolated from either of those specimens. Two vomitus specimens collected at the restaurant on August 11th tested negative for *S. aureus*, *B. cereus*, and *C. perfringens* and one vomitus specimen collected at the restaurant on August 30th tested negative for *S. aureus* and *B. cereus*.

Based on the lack of backflow prevention assemblies, which could have resulted in copper leaching into water supplies used for drinking water, food preparation, and soft drinks, specimens were tested for copper at the CDC. Four urine and two plasma specimens collected from the August 11th incident and five plasma specimens and one serum specimen collected from the August 30th incident were all within normal limits for copper (Table 5). The median copper levels in the urine specimens was 1.03 with a range of 0.8-1.2 µg/dl and the median copper levels in the plasma and serum specimens was 95.1 with a range of 79.4-173.0 µg/dl.

Table 5 Copper Levels in Clinical Specimens

Incident Date	Patient	Specimen	Copper Results (µg/dl)*
08/11/2009	1	Urine	1.20
	3	Urine	0.94
	3	Plasma	79.4
	4	Urine	0.80
	4	Plasma	105
	5	Urine	1.12
08/30/2009	6	Plasma	83.7
	7	Plasma	105
	7	Serum	112
	8	Plasma	173
	9	Plasma	95.1
	10	Plasma	88.2
	11	Plasma	94.5

*Reference range: 60-249 µg/dl for plasma and serum
0.2-8.0 µg/dl for urine

The five salsa samples collected on August 30th tested negative for *S. aureus* enterotoxin and no bacteria were isolated from these samples. The tortilla chips collected from August 11th and August 30th tested negative for vomitoxin. The refried beans, black beans, shredded beef, pork, tortilla chips, cream cheese, taco meat, and rice collected on August 11th tested negative for any chemical contaminant. The water, ice, and two soda samples tested negative for any metal or chemical contaminant, including copper.

Analyses of the food samples conducted at the FDA Kansas City District Laboratory detected methomyl in the salsa sample collected on August 11th and the five salsa samples collected on August 30th. The sample locations and concentrations are listed in Table 6.

Table 6 Methomyl Concentrations in Salsa Samples

Samples	Date Collected	Methomyl (ppm)
Salsa – Walk in Cooler	08/11/2009	528
Salsa – Wait Station	08/30/2009	192
Salsa – Online Carafe	08/30/2009	270
Salsa – Guest Table	08/30/2009	349
Salsa – Walk in Cooler	08/30/2009	925
Salsa – Online Carafe	08/30/2009	1318

Further analysis of the clinical specimens at CAHFS also detected the presence of methomyl in four urine specimens, one vomitus specimen, and two plasma specimens collected from ill patrons from the August 11th incident. Methomyl was also detected in five plasma specimens, one serum specimen, and one vomitus specimen collected from ill patrons from the August 30th incident. The concentrations of methomyl detected in the vomitus and plasma specimens are shown in Table 7. Methodology is lacking for the quantification of methomyl in urine.

Table 7 Methomyl Concentration in Clinical Specimens

Incident Date	Patient	Specimen	Methomyl (ppb)
08/11/2009	2	Vomitus	12000
	3	Plasma	2.8
	4	Plasma	0.71
08/30/2009	6	Plasma	1.3
	7	Plasma	7.0
	7	Serum	5.2
	8	Plasma	19
	9	Plasma	28
	10	Plasma	2.1
	11	Plasma	<0.5
	Unknown	Vomitus	5700

Table 5 is a summary of clinical Specimens collected, analyses conducted, and results.

Table 5 Summary of Clinical Specimens Collected, Analyses Conducted, and Results

Incident Date	Patient	Specimen	Analysis Conducted	Lab	Results	
08/11/09	1	Urine	Copper	CDC	1.20 µg/dl	
		Urine	Methomyl	CAHFS	Positive	
		Stool	<i>C. perfringens</i> enterotoxin A	MDH	Positive	
			Stool	<i>C. perfringens</i>	MDH	Negative
			Stool	<i>S. aureus</i>	MDH	Negative
			Stool	<i>B. cereus</i>	MDH	Negative
		2	Vomitus	Methomyl	CAHFS	12 ppm
			Stool	<i>C. perfringens</i> enterotoxin A	MDH	Negative
			Stool	<i>C. perfringens</i>	MDH	Negative
			Stool	<i>S. aureus</i>	MDH	Negative
			Stool	<i>B. cereus</i>	MDH	Negative
		3	Urine	Copper	CDC	0.94 µg/dl
	Urine		Methomyl	CAHFS	Positive	
	Plasma		Copper	CDC	79.4 µg/dl	
		Plasma	Methomyl	CAHFS	2.5 ppb	
		Stool	<i>C. perfringens</i> enterotoxin A	MDH	Negative	
		Stool	<i>C. perfringens</i>	MDH	Negative	
		Stool	<i>S. aureus</i>	MDH	Negative	
		Stool	<i>B. cereus</i>	MDH	Negative	
	4	Urine	Copper	CDC	0.80 µg/dl	
		Urine	Methomyl	CAHFS	Positive	
		Stool	<i>C. perfringens</i> enterotoxin A	MDH	Positive	
		Stool	<i>C. perfringens</i>	MDH	Negative	
		Stool	<i>S. aureus</i>	MDH	Negative	
		Stool	<i>B. cereus</i>	MDH	Negative	
		Plasma	Copper	CDC	105 µg/dl	
		Plasma	Methomyl	CAHFS	0.71 ppb	
	5	Urine	Copper	CDC	1.12 µg/dl	
		Urine	Methomyl	CAHFS	Positive	
	Men's Restroom	Vomitus	<i>C. perfringens</i>	MDH	Negative	
		Vomitus	<i>S. aureus</i>	MDH	Negative	
		Vomitus	<i>B. cereus</i>	MDH	Negative	
	Guest Table	Vomitus	<i>C. perfringens</i>	MDH	Negative	
		Vomitus	<i>S. aureus</i>	MDH	Negative	
		Vomitus	<i>B. cereus</i>	MDH	Negative	
08/30/09	6	Plasma	Copper	CDC	83.7 µg/dl	
		Plasma	Methomyl	CAHFS	1.3 ppb	
	7	Plasma	Copper	CDC	105 µg/dl	
		Plasma	Methomyl	CAHFS	7.0 ppb	
		Serum	Copper	CDC	112 µg/dl	
		Serum	Methomyl	CAHFS	5.2 ppb	
	8	Plasma	Copper	CDC	173 µg/dl	
		Plasma	Methomyl	CAHFS	19 ppb	
	9	Plasma	Copper	CDC	95.1 µg/dl	
		Plasma	Methomyl	CAHFS	28 ppb	
	10	Plasma	Copper	CDC	88.2 µg/dl	
		Plasma	Methomyl	CAHFS	2.1 ppb	
	11	Plasma	Copper	CDC	94.5 µg/dl	
		Plasma	Methomyl	CAHFS	< 0.5 ppb	
		Guest Table	Vomitus	<i>S. aureus</i>	MDH	Negative
			Vomitus	<i>B. cereus</i>	MDH	Negative
			Vomitus	Methomyl	CAHFS	5.7 ppm

Discussion

Two outbreaks of rapid and acute onset of gastrointestinal and neurological symptoms were caused by methomyl poisoning associated with the consumption of salsa at the Mi Ranchito restaurant in Lenexa, KS. Ill patrons dined at the restaurant on August 11th and on August 30th. No other dates have been identified as associated with illness due to methomyl poisoning.

During the inspection after the initial outbreak on August 11th, many food items were found to be above the proper temperature. Because of the rapid onset of symptoms and the temperature violations identified, clinical specimens were initially tested for the most common bacterial toxins. Results from the initial laboratory testing were reported on Friday, August 28, which was two days prior to the second outbreak. Although two stool specimens tested positive for *C. perfringens* enterotoxin A, the clinical presentation noted during both the August 11th and August 30th incidents is not consistent with this causative agent, and *C. perfringens* was not cultured from either specimen. After these initial results were reported, a chemical etiology was suspected.

After the second outbreak occurred on August 30th, additional clinical specimens and food samples were collected. During the second outbreak, many individuals reported consuming only a beverage and the tortilla chips and salsa. Therefore, during the inspection on August 30th, five separate salsa and four tortilla chip samples were collected for testing. Additionally, all ingredients used to make the salsa were collected.

On August 31st, Water One Distribution Water Quality and New Service Department in Johnson County inspected the restaurant and found two deficiencies: the lack of backflow prevention valves for the carbonator on the soda machine and the main water supply line into the restaurant. On August 31st, water, ice, and two soda samples were collected and sent for testing.

All food and water samples tested negative for copper, and no clinical specimens from either outbreak contained elevated levels of copper. A chemical screen was conducted on the food samples collected on August 11th and August 30th and on the water, ice, and soda samples that were collected on August 31st. Only the salsa, collected on both dates, tested positive for methomyl. However, samples from all ingredients used to make the salsa tested negative for methomyl. This suggests that the contamination of the salsa most likely occurred after the salsa had been prepared at the restaurant. The varying concentrations found in the different salsa samples indicate that methomyl had not been uniformly distributed within the salsa and might explain why some individuals did not report illness even though they had consumed salsa.

Methomyl is a highly toxic carbamate insecticide compound. It is classified as Restricted Use Pesticide (RUP) by EPA because of its high acute toxicity to humansⁱ. Methomyl can induce acute cholinergic symptoms such as weakness, blurred vision, headache, nausea, abdominal cramps, chest discomfort, constriction of pupils, profuse sweating, muscle tremors, and decreased pulse. Acute gastrointestinal symptoms such as vomiting and diarrhea have also been reported with ingestion of methomylⁱⁱ. No long term health effects have been reported after acute methomyl poisoning as long as the exposure ceasesⁱ.

The circumstances surrounding this outbreak were unique and challenging. The rapid onset of symptoms in the absence of a bacterial toxin made identifying the cause of this outbreak difficult. The food was contaminated with an unusual agent that is only registered for use on field, vegetable, and orchard crops;

turf grass; livestock quarters; commercial premises; and refuse containersⁱⁱⁱ. Methomyl is not licensed for use indoors on any food contact surface, and no methomyl-containing product was found on the restaurant premises. Additionally, the salsa is prepared daily and at most served for two days; no salsa from August 11th would have been available to be served on August 30th. No illnesses consistent with methomyl poisoning were reported in patrons on any date except August 11th and August 30th, increasing the likelihood that contamination occurred on each individual day.

The clinical presentation of the two incidents, the proximity of their occurrences (19 days apart), and the unusual circumstances surrounding the outbreaks suggested the possibility of intentional contamination. As a result, the outbreak investigation required collaboration and cooperation with agencies not routinely involved with public health investigations. The public health investigators notified the Lenexa Kansas Police Department about both incidents at the restaurant. After food sample test results were reported the FDA - Office of Criminal Investigation, Johnson County Attorney's Office and the Department of Justice – District of Kansas joined the investigation.

On November 5, 2009, the U.S. Attorney for the District of Kansas issued a press release stating that two former employees had been charged with mixing methomyl into salsa that was served to patrons on August 11th and August 30th. On February 23, 2010, the US Attorney for the District of Kansas issued a second press release stating that one of the former employees indicted had pled guilty to a charge of conspiracy to tamper with a consumer product; on February 9, 2011 the U.S. Attorney announced she was sentenced to 87 months and ordered to pay more than \$478,000 in restitution. On March 23, 2011 the US Attorney for the District of Kansas issued a press release that the second former employee had pled guilty to a charge of conspiracy to tamper with a consumer product. Sentencing is set for June 28, 2011. This former employee faces a maximum penalty of 10 years in federal prison and a fine of up to \$250,000.

Publication of this report was withheld pending the conclusion of the criminal investigation.

Attachments:

- Timeline of the investigation
- Questionnaire used for the August 11th outbreak
- Questionnaire used for the August 30th outbreak

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Our Vision and Mission

As the state's environmental protection and public health agency, KDHE promotes responsible choices to protect the health and environment for all Kansans.

Through education, direct services, and the assessment of data and trends, coupled with policy development and enforcement, KDHE will improve health and quality of life. We prevent injuries, illness, and foster a safe and sustainable environment for the people of Kansas.

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ⁱExtension Toxicology Network [Exttoxnet Web Site]. Pesticide information profiles. Available at:

<http://pmep.cce.cornell.edu/profiles/exttoxnet/haloxfop-methylparathion/methomyl-ext.html>

Accessibility verified September 16, 2009.

ⁱⁱ Buchholz U, Mermin J, Rios J, Casagrande T, Galey F, Lee M, Quattrone A, Farrar J, Nagelkerke N, Bensen Werner S. An Outbreak of Food-Borne Illness Associated with Methomyl-Contaminated Salt. *JAMA*. 2002; 288:604-610.

ⁱⁱⁱ EPA Reregistration Eligibility Decision, Methomyl. Available at : <http://www.epa.gov/oppsrrd1/REDs/0028red.pdf>

Accessibility verified September 30, 2009.