

FOODBORNE, WATERBORNE, ENTERIC ILLNESS REPORT

Form A

Complaint no. *

Complaint received from	Address	Phone Home Work
Person to contact for more information	Address	Phone Home Work
Complaint Type of complaint: * ☐ Illness ☐ Contaminated/spoiled/adulterated food ☐ Poor quality drinking water ☐ Poor quality recreational water ☐ Unsanitary establishment ☐ Complaint related to media publicity ☐ Other (specify) _____		
Illness: ☐ Yes, ^{1,2} ☐ No Number ill* _____ Number exposed _____ Time first symptom: Date* _____ Hour _____ Predominant symptoms: * ☐ Vomiting ☐ Diarrhea ☐ Fever ☐ Neurological ☐ Skin ☐ Other (specify) _____		
Physician consulted: ☐ Yes ☐ No If yes, Name _____	Address _____	Phone _____
Hospitalized: ☐ Yes ☐ No Emergency Room visit: ☐ Yes ☐ No If yes, Hospital name _____ Address _____ Phone _____ Physician's name _____ Phone _____		
Laboratory examination of specimen: Type specimen _____ Organism/Toxin detected* _____		
Suspect food/water* _____ Brand identification† _____		Source of food/water† _____ Code/Lot no.† _____
Suspect meal, event or place: * _____ Date _____ Time _____ Address _____ Phone _____		
NAME	STATUS	ADDRESS
1.	☐ ill ☐ well	
2.	☐ ill ☐ well	
3.	☐ ill ☐ well	
4.	☐ ill ☐ well	
Domestic water source: ☐ Community ☐ Non-community ☐ Bottled water ☐ Stream/lake ☐ Other (specify) _____		
Names and locations where foods eaten past 72 hours, other than home* ³	Place and locations where water ingested past 2 weeks, other than home* ³	Place and locations where recreation water contacted past 2 weeks* ³
History of exposures within past six weeks: * ☐ Domestic travel (Place) _____ ☐ International travel (Place) _____ ☐ Day care ☐ Contact with ill person outside household or ill person visited household ☐ Ill animal _____		
Received by	Date of complaint/alert	Time
Investigator's name		Disposition
Comments		

¹If yes, public health professional staff member should obtain information about patient which should be put on Form C.

²Ask person to collect vomitus and/or stool in a clean jar, wrap, identify, and refrigerate; hold until health official makes further arrangements.

³Ask person to refrigerate all available food eaten during the 72 hours before onset of illness; save or retrieve original containers or packages; sample should be properly identified; hold until health official makes further arrangements. Save any water in refrigerator and trays of ice cubes in freezer; collect water sample from suspect supply in clean jar; put on lid and refrigerate.

*Enter onto complaint log (Form B).

†Enter onto complaint log (Form B) under comments. USE REVERSE SIDE OR ATTACHED SHEET IF MORE SPACE REQUIRED FOR ANY ENTRY

Form B

[illegible]

Legend:

¹Type complaint -- I = illness; CF = contaminated/adulterated/spoiled food; UE = unsanitary food establishment; DW = poor quality drinking water; RW = poor quality recreational water; MP = complaint related to media publicity; D = disaster.

²Water source -- C = community; NC = non-community; IV = individual; W = well; B = bottled; S/L = stream/lake.

³History of exposure (specify by name) -- DT = domestic travel (out of town but within country); IT = international travel; DC = day care; CI = contact with ill person outside household or visitor to household; AN = exposure to ill animal.

*Enter each place or source on separate line under the complaint number.

CASE HISTORY: CLINICAL DATA

Form C1

Source or place of outbreak, if known

Complaint number

Case identification no.

Name		Address		Place of work		Ethnic group, special dietary habits, immunocompromised or other pertinent personal or health data		Phone: Home Work	
Age	Sex	Occupation							

Signs and Symptoms† (Check appropriate signs and symptoms and circle those that occurred first)

INTOXICATIONS (Acute and chronic) ☐ Nausea ☐ Vomiting ☐ Anemia ☐ Bloating ☐ Burning sensation (mouth) ☐ Cyanosis ☐ Dehydration ☐ Excessive salivation ☐ Flushing ☐ Foot/wrist drop ☐ Insomnia ☐ Metallic taste		☐ Pallor ☐ Pigmentation ☐ Prostration ☐ Scaling of skin ☐ Soapy/Salty taste ☐ Thirst ☐ Weight loss ☐ White bands on fingernails ☐ Others (specify) _____		ENTERIC INFECTIONS ☐ Abdominal cramps ☐ Diarrhea ☐ bloody # ☐ greasy ☐ mucoid ☐ watery No./day _____ ☐ Chills ☐ Constipation ☐ Fever _____ °C/°F ☐ Tenesmus		GENERALIZED INFECTIONS ☐ Cough ☐ Edema ☐ Headache ☐ Jaundice ☐ Lack of appetite ☐ Malaise ☐ Muscular aching ☐ Perspiration ☐ Stiff neck joints ☐ Swollen lymph nodes ☐ Weakness ☐ Decrease urine output ☐ Pain in back/kidney		LOCALIZED INFECTIONS ☐ Ear ☐ Eye ☐ Itching ☐ Mouth ☐ Rash ☐ Skin lesion ☐ Pneumonia Describe: _____ _____ _____		NEUROLOGICAL ILLNESSES ☐ Blurred vision ☐ Coma ☐ Delirium Difficulty in: ☐ speaking ☐ swallowing ☐ breathing ☐ Dizziness ☐ Double vision ☐ Irritability ☐ Numbness ☐ Paralysis Pupils ☐ dilated, ☐ fixed, or ☐ constricted ☐ Tingling	
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Other symptoms _____

Time of onset Date Hour	Incubation period	Duration of illness	Residual symptoms	Fatal Yes ☐ No ☐
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Known allergies	Medications taken for illness	Amount	Dates	Medications/inoculations prior to illness
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Physician consulted	Address	Phone	Hospital attended	Address	Phone
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Contacts with known cases before illness (names)		Address	Phone
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Cases in household occurring subsequently (names)		Dates of onset	Day care exposure (place)
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Type of specimens obtained	Date collected	Specimen number	Laboratory results
1.			
2.			
3.			

Case ☐ Confirmed ☐ Presumptive ☐ Suspect
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† Signs and symptoms are listed in columns to suggest classification of the disease; their occurrence is not necessarily limited to the category in which they appear on this form.
 • Ask if these symptoms occurred, even if they were not mentioned in the interview.
 # Ask whether there was decreased urine output.

CASE HISTORY: FOOD/WATER HISTORY AND COMMON SOURCES

Form C2

		☐ Ill		☐ Well	
Day of illness outbreak¹ Breakfast² Date _____ Place _____ Hour _____ Item ³ _____ Companions ⁴ _____		Day before illness outbreak Breakfast² Date _____ Place _____ Hour _____ Item ³ _____ Companions ⁴ _____		Two days before illness Breakfast² Date _____ Place _____ Hour _____ Item ³ _____ Companions ⁴ _____	
Lunch² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____		Lunch² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____		Lunch² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____	
Dinner² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____		Dinner² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____		Dinner² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____	
Non-meal snacks/water ingested² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____		Non-meal snacks/water ingested² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____		Non-meal snacks/water ingested² Place _____ Hour _____ Item ³ _____ Companions ⁴ _____	
History of ingesting suspect food or water or contact with water from suspect source Item _____ Time of eating, drinking or contact _____ Date _____		Source Address _____			
Common events or gatherings Date _____		Persons attending⁴		Well ☐ ill ☐ Addresses _____ Phone _____	
Nonroutine travel past month (international or domestic)/locations		Water supply⁵		Sewage disposal⁵ _____ Pet/Animals (kind and number of each) _____	
Water contacted during recreation or work in last 2 weeks		Unusual water supplies ingested in last 2 weeks			
Investigator _____		Title _____		Agency _____ Date _____	

¹If ill before all meals eaten, complete column for three days before illness and so indicate to obtain 72-hour history.
²If water suspected, number of glasses of water, number of cold beverages made with water, number of beverages with ice ingested per day.
³Include all foods, ice, water, and other beverages.
⁴Record names of persons eating same meal and whether or not ill.
⁵Specify C for community, SP for semipublic, U for untreated, and B for bottled water.

Form D1

(fold mark)

NOTE: Line up with appropriate identification number of Form D1
(see fold notations above and below)

[illegible]

CLINICAL SPECIMEN COLLECTION REPORT

Form E

				Complaint no.		Specimen no.				
Place of outbreak			Address			Case I.D. no.		Type of specimen		
Person from whom specimen obtained				Address				Phone		
Reason for collecting specimen										
☐ Victim of outbreak ☐ Person at risk but not ill ☐ Handler of suspect food or water ☐ Suspected carrier ☐ Animal ☐ Other (specify)										
Physician				Address				Phone		
Symptoms: ☐ Nausea ☐ Vomiting ☐ Diarrhea ☐ Fever ☐ Other (specify)										
Time of ingesting/contacting suspect food, meal, or water Day Hour		Time of onset Day Hour		Incubation period		Duration of illness		Medications Type Amount Dates		
Method of collecting specimen			Method of preservation				Method of shipment			
Other Information										
Investigator collecting specimen			Title		Agency			Date Hour collected/submitted		
Test requested			Presence/Absence		Count/Titer/Concentration			Definitive type		
Comments and interpretations										
Laboratory analyst		Agency			Date/Hour received		Date started		Date completed Etiologic agent	

FOOD SAMPLE COLLECTION REPORT Form F

No. of sample units taken

No. of units in lot

Sample no.

Complaint no.

Place collected

Address

Phone

Person-in-charge

Description of sample or area swabbed

Date/Hour collected

Code/Lot
number

Product name and description

Brand

Type of container

Name of manufacturer, buyer, seller, importer (as appropriate)

Address

Container
size

Production
date

Weight/Size

Other types of identification

Origin of shipment

Date of shipment

Arrival date

Bill of lading or contract number

Destination

Reason for collecting sample: ☐ Food from alleged outbreak ☐ Ingredient of outbreak food ☐ HACCP analysis ☐ HACCP verification
☐ Special survey ☐ Similar food prepared in similar manner to that involved in outbreak ☐ Port of entry ☐ Other (specify) _____

Method of collecting and shipping sample

Collection utensil

Method of sampling

☐ Judgment

☐ Random throughout lot

☐ Random throughout accessible units

☐ Other

Method of sterilizing container

Point of Operation Sample Taken

Temperature:
Food

Temperature:
Storage unit

Time between serving and sampling

Shipped:

☐ Refrigerated ☐ Frozen ☐ Ambient

Carrier

I.D. marks

Cost of sample

Investigator/Sampler

Title

Agency

Signature of sampler

Signature of representative of party concerned

Test requested on basis of epidemiologic data

Presence/Absence

Count/Concentration

Definitive type

Condition of food when received

pH

a_w

Temperature when
received

Comments and interpretations

Laboratory analyst

Laboratory

Date/Hour:
Received

Started

Completed

FLOW PROCESS OF IMPLICATED FOOD

Form G

Complaint No.

Name of Establishment	Person in Charge at Time of Analysis	Title		
Address		Date and time of Analysis		
Product(s) Evaluated (Include brand, code, date received)		Physical Appearance	pH	a_w

Diagram flow process of operation (Insert temperatures and time of processes or delays and make appropriate symbol at exact point in operation.)

Symbols to use in diagram:

+ Growth

○ Survive

Raw Product
ContaminatedEquipment/Utensils
Contaminated

— No growth

✕ Killed

Worker/Person
Contaminated

Investigator	Title	Date
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FOOD PROCESSING/PREPARATION HISTORY AND HAZARD ANALYSIS REPORT
Form H

Complaint no. _____

Place under investigation _____ Address _____
 Owner _____ Plant/Store manager _____ Phone _____
 Food being investigated _____ Operation(s) being investigated _____
 Date _____ and time _____ of suspect meal Date _____ and time _____ of food preparation, as applicable
 Food source/brand _____ Manufacturer _____ Distributor _____
 Significant/suspect ingredients _____
 Date of delivery _____ Lot code _____ Addresses of source(s) _____

Food characteristics:	Upon arrival	Before heating	After heating	During holding	Final product	Time of measurements
Temp F/C					/////	
pH			/////	/////		/////
a_w						/////
Redox	/////	/////	/////	/////		/////

SOURCES OF CONTAMINATION (cite or select operations of concern from flow diagram)

	Operation/ source	Potential (code) ^a	Observed yes/no	Laboratory confirmed (list pathogen: enter count)
Raw product/Significant ingredient				
Other ingredients of concern				
Condiments/Spices/Additives				
Cross contamination (raw to cooked)				
Workers				
Equipment/Utensils				
Cleaning cloths				
Workers:				

Diarrhea or other gastrointestinal sign/symptom or absence from work prior to or during outbreak

Worker's name	Date/time of illness/absence	Illness lab confirmed	Ate suspect food	Job assignment
	/			
	/			
	/			

	Observed	Reported	Name of worker(s)
Touching foods that are not subsequently heated			
Disposable gloves not worn			
Skin infections			
Poor personal hygiene			

Equipment cleaning and sanitizing methods for operation of concern:

Operation _____ Methods _____
 Operation _____ Methods _____
 Operation _____ Methods _____

Describe other modes of contamination:

^aPotential codes: 1 — Potential but unlikely; 2 — Potential and sometimes observed or related; 3 — Potential and commonly observed or related; 4 — Potential and almost always observed/found/related

FOOD PROCESSING/PREPARATION HISTORY AND HAZARD ANALYSIS REPORT (continued)

SURVIVAL	Name, model, location, settings volume, dimensions (as applicable)	Date and time of operation	Time/Temperature exposure records (chart/log data) reported	Time/temperature exposures during investigation (enter data)
Retorting				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used/can size	_____/____		____/____/____	____/____/____
Food/can	_____		____/____/____	____/____/____
Heat process/Cooking				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
Reheating				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
Other (specify)	_____	____/____/____	____/____/____	____/____/____
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
PROLIFERATION				
During refrigerated/frozen transport/delivery/storage				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
After thawing				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
While outdoors				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
While in kitchen				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
During hot/warm holding				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____

FOOD PROCESSING/PREPARATION HISTORY AND HAZARD ANALYSIS REPORT (continued)

PROLIFERATION (continued)	Name, model, location, settings volume, dimensions (as applicable)	Date and time of operation	Time/Temperature exposure records (chart/log data) reported	Time/temperature exposures during investigation (enter data)
During chilling				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
During cold storage				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food	_____		____/____/____	____/____/____
While on cold display				
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food exposure	_____		____/____/____	____/____/____
Other contributory situations (specify)	_____	____/____/____	____/____/____	____/____/____
Responsible person(s)	_____	____/____/____	____/____/____	____/____/____
Equipment used	_____		____/____/____	____/____/____
Food exposure	_____		____/____/____	____/____/____

Verification of calibration of establishment time-temperature measuring devices (if temperatures vary from 32°F/0°C, calibrate)

Item _____

Temperature in ice bath _____

Item _____

Temperature in ice bath _____

Item _____

Temperature in ice bath _____

Other calibration procedures _____

FACTORS CONTRIBUTING TO OUTBREAK (Check all appropriate boxes and describe on back of form)

CONTAMINATION

- ☐ Toxic substance part of tissue
- ☐ Poisonous substance intentionally added
- ☐ Poisonous or physical substance accidentally/incidentally added
- ☐ Addition of excess quantities of ingredients under these situations are toxic
- ☐ Toxic container or pipelines
- ☐ Raw product/ingredient contaminated by pathogens from animal or environment
- ☐ Contaminated raw products eaten
- ☐ Obtaining foods from polluted sources
- ☐ Cross contamination from raw Ingredient of animal origin
- ☐ Bare-hand contact by handler/worker/preparer
- ☐ Handling by intestinal carrier
- ☐ Inadequate cleaning or processing/preparation equipment/utensils
- ☐ Storage in contaminated environment
- ☐ Other source of contamination (Specify) _____

PROLIFERATION/AMPLIFICATION

- ☐ Allowing foods to remain at room/warm outdoor temperature _____ for _____ (several) hours
- ☐ Slow cooling; depth _____
- ☐ Inadequate cold-holding temperature _____
- ☐ Preparing foods a half day or more before serving; _____ hours
- ☐ Prolonged cold storage for several weeks
- ☐ Insufficient time and/or temperature during hot holding _____ time _____ temp
- ☐ Insufficient acidification; pH _____
- ☐ Insufficiently low water activity; a_w _____
- ☐ Inadequate thawing of frozen products
- ☐ Anaerobic packing/modified atmosphere
- ☐ Inadequate fermentation
- ☐ Other situations that promoted or allowed microbial growth or toxin production (specify) _____

SURVIVAL (lack of inactivation)

- ☐ Insufficient time _____ and/or temperature _____ during cooking/heat processing
- ☐ Insufficient time _____ and/or temperature during reheating
- ☐ Inadequate acidification; pH _____
- ☐ Insufficient thawing procedure followed by insufficient cooking
- ☐ Other process failure (specify) _____

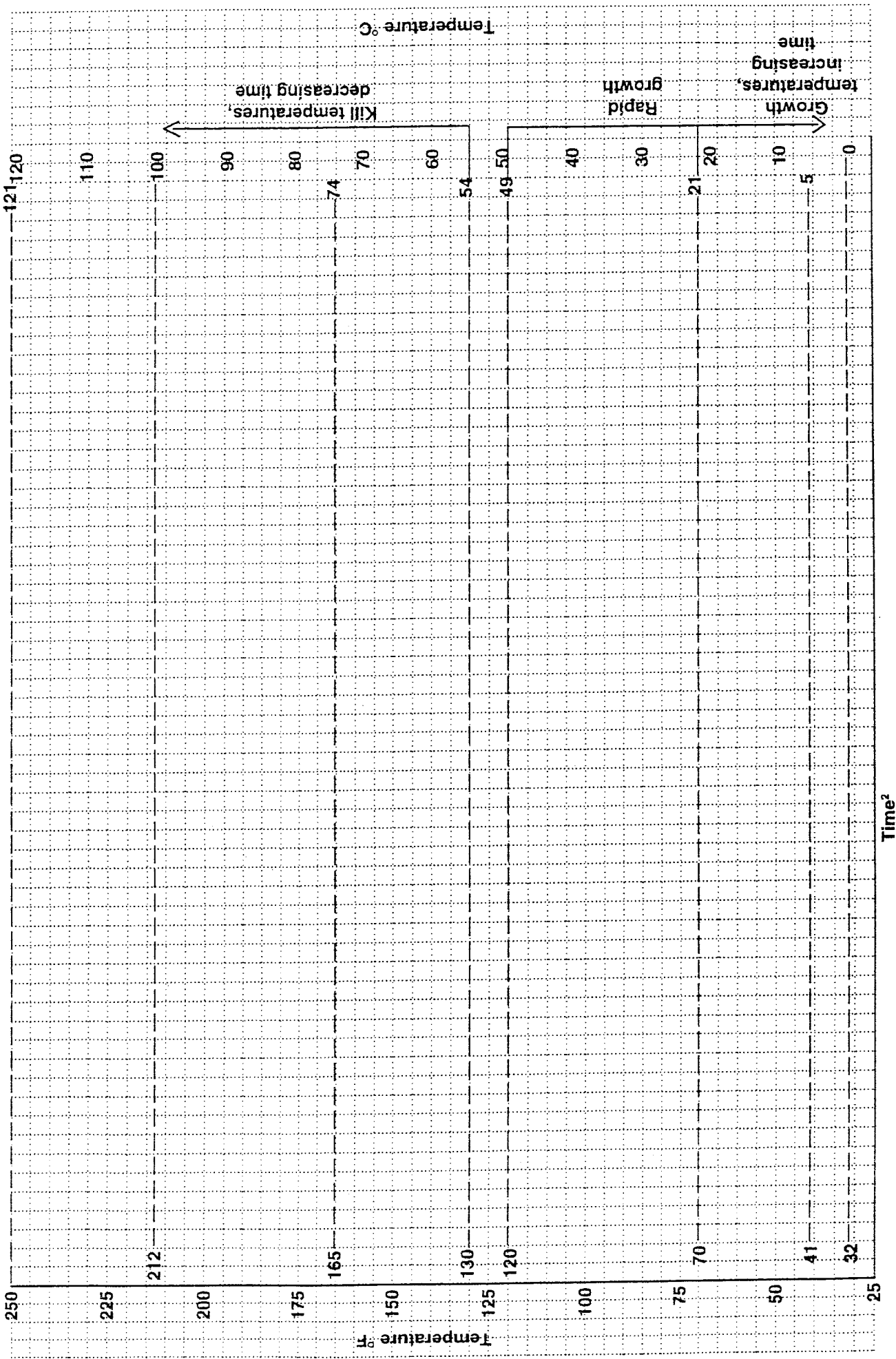
GRAPH OF TIME-TEMPERATURE MEASUREMENTS ^{1,2}

Form I

Food

Complaint No. _____

Process _____



Title: _____

¹Enlarge area of concern so as to focus attention on operation(s) (e.g., heat processing, cooking, reheating, hot holding, cooling, and cold storage), temperature range or time span of concern, as appropriate. Fill in time intervals at bottom.

²Indicate whether seconds, minutes, hours, days, weeks or other time intervals or time of day.

FOOD TRACEBACK REPORT: PLACES OF SERVICE AND PREPARATION

Form J1

PLACE OF SERVICE INVESTIGATION					Complaint/Event no.	
Food/ingredient under investigation			Agent		Type/Markers	
Place of service ¹			Address			
Owner/Operator			Person interviewed		Phone/Fax	
Suspect meal		Date / /	Time	Preparation Date / /		Time
Other meals at which suspect food/ingredient was served (list meals)			Dates served		Known illness	No. cases
			/ /			
			/ /			
Other dishes/products in which suspect food/ingredient was served/incorporated (list dishes or product)			Dates served/processed			
			/ /			
			/ /			
Operations being investigated (e.g., cooking, slicing)			Factors contributing to outbreak			

PLACE OF PREPARATION (If different than place of serving)

Place prepared/purchased ¹		Address			
Owner/Operator		Person interviewed		Phone/Fax	
Label name		Product characteristics (e.g., color, grade, grind size, % fat, size)			
Other meals at which suspect food/ingredient was served (list meals)		Dates served		Known illness	No. cases
		/ /			
		/ /			
Other dishes/products in which suspect food/ingredient was served/incorporated (list dishes or product)		Dates served/processed			
		/ /			
		/ /			
Operations being investigated (e.g., cooking, slicing)		Factors contributing to outbreak at place of service			

PLACE OF PURCHASE OF SUSPECT FOOD OR INGREDIENT

Supplier ¹		Address		Phone/Fax	
Date suspect food/ingredient (lot) received by preparer ²	Quantity received	Lot number	Other product codes/bills of lading numbers		
Manufacturer/Brand		Condition when received (e.g., packaged, loose)			
Product characteristics (e.g., package/container, size/weight/volume, grade)					
Investigator	Title	Agency		Date	

¹ Show initials or code used in boxes on flow diagram, Form J3² Attach documentation (e.g., copies of freight bills, air bills, receipts (receiving and sales), signed sworn statements, labels)

FOOD TRACEBACK REPORT: SUPPLIER TO SOURCES OF IMPLICATED¹
FOOD/INGREDIENT Form J2

Complaint/Event no.

SUPPLIER INVESTIGATION^{2,3}

Date

Food/ingredient under investigation	Lot code	Agent		Type/Markers	
Supplier name	Address		Person interviewed	Phone/Fax	
Other shipments of lot of suspect food that could have been present when suspect meal was prepared:					
Brand ²	Quantity	Lot code	Date received	How used/menu item	Characteristics
1			/ /		
2			/ /		
3			/ /		
4			/ /		
Other consignees to whom the suspect lot was shipped		Address		Phone/Fax	No. persons ill
1					
2					
3					
4					
Factors contributing to contamination, if any		Factors contributing to propagation, if any			
Investigator	Title		Agency		Date

DISTRIBUTOR INVESTIGATION^{2,3}

(Other middlemen, stops, wholesalers between source and place of service:
List in time sequence)

Date

Distributor/wholesale/shipper name	Address		Person interviewed	Phone/Fax	
Shipments received of suspect products	Quantity	Date	Address		Phone/Fax
1		/ /			
2		/ /			
3		/ /			
4		/ /			
Other consignees to whom the suspect lot was shipped		Address		Phone/Fax	No. persons ill
1					
2					
3					
4					
Factors contributing to contamination, if any		Factors contributing to propagation, if any			
Investigator	Title		Agency		Date

SOURCE INVESTIGATION^{2,3}

Name	Location	Person interviewed	Phone	Date(s) of harvest/production
Factors contributing to contamination, if any		Factors contributing to propagation, if any		
Investigator	Title	Agency	Date	

¹ Use additional forms as needed

² Attach documentation/identification of contamination or temperature abuse during forward tracing and record on Form H

³ Laboratory results of samples collected (Attach copy of Form M)

FLOW DIAGRAM OF PRODUCT SOURCE AND DISTRIBUTION
Form J3

Complaint/event no.
Date

Food Product	Lot(s) no.	Place of Serving	Number of cases
Illustrate distribution of implicated food/ingredient. Start with place of service, traceback the product flow to its source. Show all suppliers and means of distribution to the source of contamination/survival/propagation or harvester¹. Also show other consignees that received the contaminated lot(s). Indicate the supplier, distributor, and consignees by a firm code inside a box with arrows showing sequential flow of the food/ingredient. Indicate date of lot movement along side each entry. If additional cases have been identified with serving the implicated food or foods in which the implicated ingredients was or were used, enter these either in or aside the appropriate box.			
Investigator	Title	Agency	Phone/Fax

¹Record complete data (including names of all suppliers, distributors, consignees and the source of the food product; their addresses and phone numbers; and the initials used on this form) on Forms J1 and J2

Form K1

Prepared by:

[illegible]

[illegible]

CALCULATION OF CHI SQUARE TEST, RELATIVE RISK AND ODDS RATIO

Form L1

Complaint no.

Place of outbreak

Vehicle

Outbreak table (Step 1)				Expected table (Step 2)			
	Ill	Well	Total		Ill	Well	Total
Ate/drank	a	b	a+b	Ate/drank	a _e	b _e	a _e +b _e
Did not eat/drink	c	d	c+d	Did not eat/drink	c _e	d _e	c _e +d _e
Total	a+c	b+d	n	Total	a _e +c _e	b _e +d _e	n _e

Explanation	Calculation																		
<u>Step 1</u> Fill in the outbreak table and calculate the marginal totals (a+b, c+d, a+c, b+d) and the sum of these totals (n) from Form K1 or K2. If any of the marginal totals are less than 10, skip steps 2 through 4 and use Fisher's exact test (Form L2).	<u>Step 1</u> i)† a + b = _____ † ii)† c + d = _____ † iii) a + c = _____ iv) b + d = _____ v) n = _____																		
<u>Step 2</u> Fill in the marginal totals in the expected table; copy from those in outbreak table. Calculate the expected frequencies a_e, b_e, c_e, and d_e and fill in the cells of the expected table. If a_e, b_e, c_e, or d_e are less than 5, skip steps 3 and 4 and use Fisher's exact test (Form L2).	<u>Step 2</u> vi) a_e = i x iii/v = _____ vii) b_e = i - vi = _____ viii) c_e = iii - vi = _____ ix) d_e = ii - viii = _____																		
<u>Step 3</u> If vi, vii, viii, and ix are greater than 5, calculate the chi-square statistic $\chi^2 = \frac{n(axd-cxb -n/2)^2}{(a+b)(c+d)(a+c)(b+d)}$	<u>Step 3</u> x)* a x d = _____ * xi)* b x c = _____ * xii) x - xi = _____ xiii) n/2 = _____ xiv) xii - xiii = _____ xv) xiv x xiv = _____ xvi) xv x n = _____ xvii) i x ii x iii x iv = _____ xviii) $\chi^2 = \text{xvi} / \text{xvii}$ = _____																		
<u>Step 4</u> Compare χ^2 to probability (p-value) critical values for the chi square distribution: <table border="1"> <thead> <tr> <th>χ^2 - values ^{1,2}</th><th>p - values</th></tr> </thead> <tbody> <tr><td>2.71</td><td>0.1</td></tr> <tr><td>3.84</td><td>0.05</td></tr> <tr><td>6.64</td><td>0.01</td></tr> <tr><td>7.88</td><td>0.005</td></tr> <tr><td>10.83</td><td>0.001</td></tr> <tr><td>15.14</td><td>0.0001</td></tr> <tr><td>19.51</td><td>0.00001</td></tr> <tr><td>23.93</td><td>0.000001</td></tr> </tbody> </table>	χ^2 - values ^{1,2}	p - values	2.71	0.1	3.84	0.05	6.64	0.01	7.88	0.005	10.83	0.001	15.14	0.0001	19.51	0.00001	23.93	0.000001	<u>Step 4</u> (xviii) = χ^2 = _____ (xix) p-value = _____ Calculate relative risk †RR = a/i / c/ii RR = _____ Calculate odds ratio *OR = x / xi OR = _____
χ^2 - values ^{1,2}	p - values																		
2.71	0.1																		
3.84	0.05																		
6.64	0.01																		
7.88	0.005																		
10.83	0.001																		
15.14	0.0001																		
19.51	0.00001																		
23.93	0.000001																		

¹ χ^2 value of 3.84 or greater (p<0.05) indicates that there is evidence to suggest a difference between the outbreak table and the expected table, and thus the exposure food/beverage under investigation is related to the observed illness.

² χ^2 value of 7.88 or greater (p<0.005) indicates that there is strong evidence to suggest a difference between the outbreak table and the expected table, and thus the exposure food/beverage under investigation is related to the observed illness.

**CALCULATION OF FISHER'S
EXACT TEST**
Form L2

Complaint number

Place of outbreak

Vehicle

Step 5 (Consider only if steps 3 and 4 are not performed on Form L1)

Formula for calculation
$$\frac{(a+b)! (c+d)! (a+c)! (b+d)!}{(n!) (a!) (b!) (c!) (d!)}$$

One-tailed test

p1.1 Observed table

vi
$$p1.1 = \frac{(\quad)! (\quad)! (\quad)! (\quad)!}{(\quad)! (\quad)! (\quad)! (\quad)! (\quad)!}$$

vii Cancel any possible factorial (!) values
List individual values from factorials

viii Cancel any possible remaining values

ix Calculate p1.1 from the remaining values

Exposure	Ill	Well	Total	Attack Rate
Ate/drunk	a	b	a+b(i)	
Did not eat/drink	c	d	c+d(ii)	
Total	a+c(iii)	b+d(iv)	n(v)	

p1.2 Table

vi
$$p1.2 = \frac{(\quad)! (\quad)! (\quad)! (\quad)!}{(\quad)! (\quad)! (\quad)! (\quad)! (\quad)!}$$

vii Cancel any possible factorial (!) values
List individual values from factorials

viii Cancel any possible remaining values

ix Calculate p1.2 from the remaining values

Exposure	Ill	Well	Total	Attack Rate
Ate/drunk	a+1	b-1	a+b(i)	
Did not eat/drink	c-1	d+1	c+d(ii)	
Total	a+c(iii)	b+d(iv)	n(v)	

p1.3 Table

vi
$$p1.3 = \frac{(\quad)! (\quad)! (\quad)! (\quad)!}{(\quad)! (\quad)! (\quad)! (\quad)! (\quad)!}$$

vii Cancel any possible factorial (!) values
List individual values from factorials

viii Cancel any possible remaining values

ix Calculate p1.3 from the remaining values

Exposure	Ill	Well	Total	Attack Rate
Ate/drunk	a+2	b-2	a+b(i)	
Did not eat/drink	c-2	d+2	c+d(ii)	
Total	a+c(iii)	b+d(iv)	n(v)	

Etc. continue for all other p-values needed

x $p1\text{-value} = p1.1 + p1.2 + p1.3 + p1.x$ for one-tailed test

Interpretation: If the p-value is less than or equal to 0.05, then there is evidence to suggest that the food/beverage under investigation is related to the observed illness; if it is 0.005 or less, there is strong evidence for this relationship.

CALCULATION OF FISHER'S EXACT TEST continued

Two-tailed test
p2.1 Table

Exposure	Ill	Well	Total	Attack Rate
Ate/drunk	a'	b=a+b	a+b(i)	
Did not eat/drink	c=a+b	d'	c+d(ii)	
Total	a+c(iii)	b+d(iv)	n(v)	

$$vi \quad p2.1 = \frac{(\quad)! (\quad)! (\quad)! (\quad)!}{(\quad)! (\quad)! (\quad)! (\quad)! (\quad)!}$$

vii Cancel any possible factorial (!) values
List individual values from factorials

viii Cancel any possible remaining values

ix Calculate p2.1 from the remaining values

p2.2 Table

Exposure	Ill	Well	Total	Attack Rate
Ate/drunk	a'	b=a+b-1	a+b(i)	
Did not eat/drink	c=a+c-1	d'	c+d(ii)	
Total	a+c(iii)	b+d(iv)	n(v)	

$$vi \quad p2.2 = \frac{(\quad)! (\quad)! (\quad)! (\quad)!}{(\quad)! (\quad)! (\quad)! (\quad)! (\quad)!}$$

vii Cancel any possible factorial (!) values
List individual values from factorials

viii Cancel any possible remaining values

ix Calculate p2.2 and others from the remaining values

Etc. for all other p-values

xi p2-value = p1 + p2.1 + p2.2 + p2.x for two-tailed test

Interpretation: If the p-value is less than or equal to 0.05, then there is evidence to suggest that the food/beverage under investigation is related to the observed illness; if it is 0.005 or less, there is strong evidence for this relationship.

Complaint no.	Outbreak	Dates of outbreaks
---------------	----------	--------------------

Case/Control (Data from Forms B, C, D, and/or E)

I.D. No.	Case No.	Specimen	Organism/Test result	Marker (serotype, phage pattern, colicin type, toxin type)

Food/Environment (Data from Form F)

[illegible]

Food Handler (Data from Forms C, D, and/or E)

[illegible]

Interpretations and Remarks	

Etiologic Agent	Vehicle	Source of Contamination

CONTROL ACTIONS TAKEN AND PREVENTIVE MEASURES RECOMMENDED

Form N

Control actions taken:

Exclusion of infected persons _____ Cases _____ Carriers _____ Contacts of cases _____
(Infected food workers are usually excluded from work when they have signs or symptoms. Occasionally, microbiological tests of specimens are made over a duration of several days or weeks before permission is given to work with foods again. Workers can usually return to work without such testing after they have recovered if there is assurance that they practice good personal hygiene and are effectively supervised.)

Announce the outbreak in the mass media so that the public who purchased the food can be alerted to return it to the place of purchase or other designated location _____; heat or otherwise prepare implicated food safely _____; seek medical consultation/treatment _____; or acquire vaccines; take prophylactic or drugs _____.
(The latter two decisions should be made with consultation from supervisors and medical personnel.)

Seizure of food _____ (Detention [embargo] until tested _____; Removal/destruction _____; Reprocessed _____; Converted to feed _____; Denatured _____; Buried _____; Other _____)
Reject product _____ Recall of lot _____

(Seizure action may take various forms depending upon the type and degree of contamination and the estimated extent of the contamination and food distributed. Such foods may be held in locked facilities until tested and either released or removed; removed from the premises and reprocessed under supervision, converted to animal feed, denatured, buried, or otherwise destroyed; rejected by processor/preparer or place of use or at port of entry; or recalled (all units of the implicated lots which would be handled as those otherwise removed). The majority of processors/caterers whose foods are under suspicion of being a vehicle voluntarily recall their products despite the associated financial losses and embarrassment.)

Cease preparation of the implicated food until corrections are made _____.

(When a vehicle has been identified, the contributing factors should be corrected before that food is prepared again. The process should be modified so as to avoid or minimize contamination, kill pathogens or inactivate toxins, and prevent or significantly slow growth of pathogenic bacteria so that a recurrence is prevented. Control criteria must be established or followed and the process monitored with sufficient frequency to ensure prevention of the events that lead to the outbreak. The implementation of a hazard analysis critical control point system should be considered for that food and associated operations and perhaps all foods prepared/process/stored in the establishment.)

Closure of premises/establishment _____.

(When imminent risk to health exists if the operations continue, or when contributing factors that cannot be corrected or are continuing, the establishment may be closed. Reopening is considered when the contributing factors are identified and corrected or the operation is brought up to industry standard. Consultation with supervisors is advisable because of legal ramifications, but the prime consideration must be protection of the public health. The majority of operators whose establishment are implicated usually wish to cooperate and may voluntarily offer to close.)

Other control actions taken _____ (describe):

Recommendations for prevention of recurrences:

Comments on effectiveness of control actions and preventive measures taken:

Person interviewed _____ Title _____

Investigator _____ Title _____ Date _____

ECONOMIC EVALUATION OF A FOODBORNE DISEASE OUTBREAK

Form O

Complaint no.

Disease

DIRECT COSTS							
	Unit cost	No.	Total cost		Unit cost	No.	Total cost
Medical				Investigation of illness			
1. Physicians' fees				1. Epidemiological team			
2. Nurses' visits				a. salaries ¹			
3. Hospitalization				b. administration			
a. bed and board				c. other			
b. emergency dept.				2. Laboratory team			
c. acute care				a. salaries ¹			
d. surgery				b. material/equipment			
4. Medication				c. shipping			
5. Ambulance				d. other			
6. Other							
SUBTOTAL				SUBTOTAL			
Loss to food supplier				Loss of productivity			
1. Recall of food				1. Days off work ¹			
2. Storage of food				a. ill person			
3. Destruction/reprocessing				b. enteric pathogen carrier			
4. Laboratory testing, consultant				c. care of ill person			
5. Purchase of new equipment/ modification of premises				d. Other personal care			
6. Legal action				2. Workers' compensation payments			
7. Loss of sales				3. Travel to visit sick persons			
8. Increase in insurance premium/ bankruptcy				4. Cost of preventive actions			
8. Promotional campaign				5. Other			
9. Other							
SUBTOTAL				SUBTOTAL			
TOTAL DIRECT COSTS							
INDIRECT COSTS							
1. Pain, grief, and suffering ² =				4. School/study time ² =			
2. Death ³ =				5. Inability to work at previous occupation ⁵ =			
3. Leisure time ⁴ =				6. Other =			
TOTAL INDIRECT COSTS							
TOTAL COSTS =		NUMBER OF CASES			COSTS PER CASE		

¹Salaries or wages, if not known, can be estimated from the type of occupation reported by ill persons. Daily income can be determined by dividing an annual salary by 365 less days for weekends, holidays and other paid leave; overtime is an extra cost.

²Not usually calculated but may be given as a result of a legal settlement.

³Calculated on the basis of adjusted willingness-to-pay/human capital estimates (page 67).

⁴Assumed to be equivalent to worth of income.

⁵Calculated on the difference of the incomes before and after illness.

FOODBORNE ILLNESS SUMMARY REPORT

Form P

Complaint no.

Agent and definitive type

Disease

Agency

City

State/Province

Date of onset of first case

Number ill

Number at risk

Number hospitalized

Fatalities

Symptoms/signs (percentages)

Nausea ___ Vomiting ___ Abdominal Cramps ___ Diarrhea ___ Fever ___

Sore/burning mouth/throat ___ Neurological ___ Flushing/itching ___

Other significant (specify) _____

Incubation period

Shortest _____

Longest _____

Median _____

Duration

Shortest _____

Longest _____

Median _____

Vehicle (Responsible food)

Significant ingredient

Method of processing/preparation

Case definition

PLACE FOOD

ACQUIRED
(Check one)

- ☐ Farm
- ☐ Aquatic source
- ☐ Woods/lands
- ☐ Food processing
 - ☐ Bakery
 - ☐ Canning
 - ☐ Egg processing
 - ☐ Frozen food
 - ☐ Meat
 - ☐ Poultry
 - ☐ Seafood
 - ☐ Other (specify)
- ☐ Retail outlet
- ☐ Food service
- ☐ Banquet
- ☐ Cafeteria
- ☐ Camp
 - ☐ Day
 - ☐ Military
 - ☐ Overnight
 - ☐ Recreation
- ☐ Catering
 - ☐ Airline/Transport
 - ☐ Banquet
 - ☐ Central kitchen
 - ☐ Church/fraternal
 - ☐ Party/social event
 - ☐ Picnic
 - ☐ Street/office
 - ☐ Vending machine
- ☐ Delicatessen
- ☐ Fast food
- ☐ Ice cream parlor
- ☐ Industry/office
- ☐ Institution
 - ☐ Hospital
 - ☐ School
 - ☐ Day care
 - ☐ Nursing home
 - ☐ Jail/prison
 - ☐ Mental care
- ☐ Mobile/itinerant
- ☐ Rooming/tourist home
- ☐ Smorgasbord
- ☐ Ship
- ☐ Street vending
- ☐ Table service
- ☐ Take out
- ☐ Tavern/bar
- ☐ Temporary
- ☐ Train
- ☐ Other (specify)

SITE OF

CONTAMINATION

(Check all applicable)

- ☐ Farm
- ☐ Aquatic source
- ☐ Woods/lands
- ☐ Food processing
 - ☐ Bakery
 - ☐ Canning
 - ☐ Egg processing
 - ☐ Frozen food
 - ☐ Meat
 - ☐ Poultry
 - ☐ Seafood
 - ☐ Other (specify)
- ☐ Retail outlet
- ☐ Food service
- ☐ Banquet
- ☐ Cafeteria
- ☐ Camp
 - ☐ Day
 - ☐ Military
 - ☐ Overnight
 - ☐ Recreation
- ☐ Catering
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 - ☐ Picnic
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 - ☐ Vending machine
- ☐ Delicatessen
- ☐ Fast food
- ☐ Ice cream parlor
- ☐ Industry/Office
- ☐ Institution
 - ☐ Hospital
 - ☐ School
 - ☐ Day care
 - ☐ Nursing home
 - ☐ Jail/prison
 - ☐ Mental care
- ☐ Mobile/Itinerant
- ☐ Rooming/tourist home
- ☐ Smorgasbord
- ☐ Ship
- ☐ Street vending
- ☐ Table service
- ☐ Take out
- ☐ Tavern/Bar
- ☐ Temporary
- ☐ Train
- ☐ Other (specify)

SITE OF SURVIVAL

(Check all applicable)

- ☐ Farm
- ☐ Aquatic source
- ☐ Woods/lands
- ☐ Food processing
 - ☐ Bakery
 - ☐ Canning
 - ☐ Egg processing
 - ☐ Frozen food
 - ☐ Meat
 - ☐ Poultry
 - ☐ Seafood
 - ☐ Other (specify)
- ☐ Retail outlet
- ☐ Food service
- ☐ Banquet
- ☐ Cafeteria
- ☐ Camp
 - ☐ Day
 - ☐ Military
 - ☐ Overnight
 - ☐ Recreation
- ☐ Catering
 - ☐ Airline/transport
 - ☐ Banquet
 - ☐ Central kitchen
 - ☐ Church/fraternal
 - ☐ Party/social event
 - ☐ Picnic
 - ☐ Street/office
 - ☐ Vending machine
- ☐ Delicatessen
- ☐ Fast food
- ☐ Ice cream parlor
- ☐ Industry/office
- ☐ Institution
 - ☐ Hospital
 - ☐ School
 - ☐ Day care
 - ☐ Nursing home
 - ☐ Jail/prison
 - ☐ Mental care
- ☐ Mobile/itinerant
- ☐ Rooming/tourist home
- ☐ Smorgasbord
- ☐ Ship
- ☐ Street vending
- ☐ Table service
- ☐ Take out
- ☐ Tavern/bar
- ☐ Temporary
- ☐ Train
- ☐ Other (specify)

SITE OF PROPAGATION

(Check all applicable)

- ☐ Farm
- ☐ Aquatic source
- ☐ Woods/lands
- ☐ Food processing
 - ☐ Bakery
 - ☐ Canning
 - ☐ Egg processing
 - ☐ Frozen food
 - ☐ Meat
 - ☐ Poultry
 - ☐ Seafood
 - ☐ Other (specify)
- ☐ Retail outlet
- ☐ Food service
- ☐ Banquet
- ☐ Cafeteria
- ☐ Camp
 - ☐ Day
 - ☐ Military
 - ☐ Overnight
 - ☐ Recreation
- ☐ Catering
 - ☐ Airline/transport
 - ☐ Banquet
 - ☐ Central kitchen
 - ☐ Church/fraternal
 - ☐ Party/social event
 - ☐ Picnic
 - ☐ Street/office
 - ☐ Vending machine
- ☐ Delicatessen
- ☐ Fast food
- ☐ Ice cream parlor
- ☐ Industry/office
- ☐ Institution
 - ☐ Hospital
 - ☐ School
 - ☐ Day care
 - ☐ Nursing home
 - ☐ Jail/prison
 - ☐ Mental care
- ☐ Mobile/itinerant
- ☐ Rooming/tourist home
- ☐ Smorgasbord
- ☐ Ship
- ☐ Street vending
- ☐ Table service
- ☐ Take out
- ☐ Tavern/bar
- ☐ Temporary
- ☐ Train
- ☐ Other (specify)

METHOD OF PROCESSING/ PREPARATION

(Check all applicable)

- ☐ Raw
 - ☐ Harvest
 - ☐ Clean/sort/wash
 - ☐ Slaughter/cut
 - ☐ Grind/blend
- ☐ Refrigerated
- ☐ Frozen
- ☐ Retorted
- ☐ Pasteurized
- ☐ Cooked/Heated
- ☐ Smoked
- ☐ Dried
- ☐ Salted
- ☐ Cured
- ☐ Acidified
- ☐ Fermented
- ☐ Chemically preserved
- ☐ Vacuum/anaerobic pack
- ☐ Mixed/blended
- ☐ Food service
 - ☐ Assemble serve
 - ☐ Cook serve
 - ☐ Cook hold (ambient)
 - ☐ Cook hold hot
 - ☐ Cook chill serve
 - ☐ Cook chill reheate
 - ☐ Acidify serve
- ☐ Other (specify)

COMMENTS:

FOODBORNE ILLNESS SUMMARY REPORT (continued)

Form P

FACTORS CONTRIBUTING TO OUTBREAK (Check all appropriate)**CONTAMINATION**

- ☐ Toxic substance part of tissue
- ☐ Poisonous substance intentionally added
- ☐ Poisonous or physical substance accidentally/ incidentally added
- ☐ Addition of excessive quantities of ingredients that under these situations are toxic
- ☐ Toxic container or pipelines
- ☐ Raw product/ingredient contaminated by pathogens from animal or environment
- ☐ Ingestion of contaminated raw products
- ☐ Obtaining foods from polluted sources
- ☐ Cross contamination from raw ingredient of animal origin
- ☐ Bare-hand contact by handler/worker/preparer
- ☐ Handling by intestinal carrier
- ☐ Inadequate cleaning of processing/preparation of equipment/utensils
- ☐ Storage in contaminated environment
- ☐ Other source of contamination (specify) _____

SURVIVAL (lack of inactivation)

- ☐ Insufficient time and/or temperature during cooking/heat processing
- ☐ Insufficient time and/or temperature during reheating
- ☐ Inadequate acidification
- ☐ Insufficient thawing (followed by insufficient cooking)
- ☐ Other process failures (specify) _____

PROLIFERATION/AMPLIFICATION

- ☐ Allowing foods to remain at room/warm outdoor temperature for several hours
- ☐ Slow cooling
- ☐ Inadequate cold-holding temperature
- ☐ Preparing foods a half day or more before serving
- ☐ Prolonged cold storage for several weeks
- ☐ Insufficient time and/or temperature during hot holding
- ☐ Insufficient acidification
- ☐ Insufficiently low water activity
- ☐ Inadequate thawing of frozen products
- ☐ Anaerobic packaging/modified atmosphere
- ☐ Inadequate fermentation
- ☐ Other situations that promoted or allowed microbial growth or toxin production (specify) _____

Narrative: (Use additional pages as necessary to give complete story of outbreak)

Attachments with the report:

- ☐ Case histories Summary (Form D2) ☐ Epidemic curve ☐ Laboratory results (Form M) ☐ Food specific attack rate table (Form K1)
- ☐ Case-control vehicle exposure/dosage (Form K2) ☐ Flow process of implicated food (Form G) ☐ Traceback (Form J)
- ☐ Food Processing/preparation history and hazard analysis report (Form H) ☐ Graph of time-temperature measurements (Form I) ☐

Control Actions, recommended for prevention (Form N) ☐ Additional narrative ☐ Other (specify) _____

Investigator

Reporting agency

Date

Key A. Situations that likely contributed to outbreaks of foodborne diseases when meat products were implicated as vehicles.

Legend				
- Principal contributory factor - Contributory factor - Potential contributory factor	- Source of contamination, but likely to be destroyed during subsequent processing - Toxin survives heat processes - Cooling water source of contamination - Contamination - Survival - Growth			
Process	Etiologic agent of concern or microbe that produces it			
Raw, heated lightly	<i>Salmonella</i>	Colonized//infected animal (C)	Raw product/ingredient/ pre-processing	Processing or preparation (contamination, survival, proliferation) in food processing plant, foodservice establishment or home
	<i>Escherichia coli</i> O157	Animal feces/manure (C)		
	<i>Campylobacter jejuni</i>	Animal access to human sewage (C)		
	<i>Bacillus anthracis</i>	Soil contamination (C)		
	<i>Toxoplasma gondii</i>	Contamination by worker (C)		
	<i>Trichinella spiralis</i>	Inadequate cooling (G)		
	Tapeworm	Feed contaminated (C)		
	<i>Clostridium botulinum</i>	Water contaminated (C)		
	<i>Salmonella</i>	Excessive amount of additive (C)		
	<i>Staphylococcus aureus</i>	Insufficient concentration of additive (S)		
Reforted	<i>Salmonella</i>	Improper pH adjustment (S/G)		
	<i>Staphylococcus aureus</i>	Improper a _w adjustment (salt conc.) (G)		
	<i>Campylobacter jejuni</i>	Cross contamination (C)		
	<i>Yersinia enterocolitica</i>	Contamination by food worker (C)		
	<i>Clostridium botulinum</i>	Improper cleaning of equipment (C)		
	<i>Clostridium perfringens</i>	Environmental contamination (C)		
	<i>Staphylococcus aureus</i>	Organism/toxin survives process (S)		
	<i>Bacillus cereus</i>	Heat process failure (S)		
	<i>Escherichia coli</i>	Manipulation/spread during process (G)		
	<i>Listeria monocytogenes</i>	Improper hot holding (G)		
Cooked, pasteurized, hot smoked and other heat processes	<i>Yersinia enterocolitica</i>	Room-temperature holding (G)		
	<i>Clostridium botulinum</i>	Improper cooling (G)		
	<i>Clostridium perfringens</i>	Inadequate refrigeration (G)		
	<i>Staphylococcus aureus</i>	Contamination during cooling (C)		
	<i>Bacillus cereus</i>	Improper or defective packaging (C/G)		
	<i>Escherichia coli</i>	Selective packaging environment (G)		
	<i>Listeria monocytogenes</i>	Inadequate reheating (S)		
	<i>Hepatitis A virus</i>	Contamination during reconstitution (C)		
	<i>Trichinella spiralis</i>	Cross contamination (C)		
	<i>Nitrites</i>	Contamination by person (C)		
Dried	<i>Salmonella</i>	Improper cleaning of equipment (C)		
	<i>Staphylococcus aureus</i>	Improper cooling (G)		
		Inadequate refrigeration (G)		
		Improper hot-holding (S/G)		
		Room-temperature holding (G)		
		Inadequate reheating (S)		

Key B. Situations that likely contributed to outbreaks of foodborne diseases when poultry, poultry products, or eggs were implicated as vehicles.

Legend																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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C	Contamination	Processing or preparation (contamination, survival, proliferation) in food processing plant, foodservice establishment or home																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Food product (Vehicle)	Process	Etiologic agent of concern or microbe that produces it																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Poultry	Raw, heated lightly	<i>Campylobacter jejuni</i>	Colonized//infected animal (C)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

Key C. Situations that likely contributed to outbreaks of foodborne diseases when milk or milk products were implicated as vehicles.

Legend			Raw product/ingredient/ pre-processing	Processing or preparation (contamination, survival, proliferation) in food processing plant, foodservice establishment or home	Post-processing/ preparing abuse at homes or social events or during transport
Principal contributory factor	Contributory factor	Potential contributory factor			
—	Source of contamination, but likely to be destroyed during subsequent processing				
M	Multiplication during process				
T	Toxin survives heat processes				
C	Contamination				
S	Survival				
G	Growth				

Food product (Vehicle)	Process	Etiologic agent of concern or microbe that produces it	Colonized/infected animal (C)	Animal feces/manure (C)	Animal access to human sewage (C)	Soil Contamination (C)	Contamination by worker (C)	Inadequate cooling (G)	Feed contaminated (C)	Water contaminated (C)	Improper pH adjustment (S/G)	Improper a _w adjustment (salt conc.) (G)	Cross contamination (C)	Contamination by food worker (C)	Improper cleaning of equipment (C)	Environmental contamination (C)	Organism/toxin survives process (S)	Heat process failure (S)	Manipulation/spread during process (G)	Room-outdoor-temperature holding (G)	Improper cooling (G)	Inadequate refrigeration (G)	Contamination during cooling (C)	Improper or defective packaging (C/G)	Contamination during reconstitution (C)	Contamination by person (C)	Improper cleaning of equipment (C)	Improper cooling (G)	Inadequate refrigeration (G)	Room-temperature holding (G)	
Milk	Raw	<i>Salmonella</i>																													
		<i>Campylobacter jejuni</i>																													
		<i>Yersinia enterocolitica</i>																													
		<i>Staphylococcus aureus</i>																													
		<i>Streptococcus pyogenes</i>																													
		<i>Escherichia coli</i>																													
		<i>Brucella</i>																													
		<i>Listeria monocytogenes</i>																													
		<i>Salmonella</i>																													
		<i>Yersinia enterocolitica</i>																													
Cheese	Fermented	<i>Staphylococcus aureus</i>																													
		<i>Salmonella</i>																													
		<i>Staphylococcus aureus</i>																													
		<i>Clostridium botulinum</i>																													
		<i>Brucella</i>																													
		<i>Escherichia coli</i>																													
		<i>Listeria monocytogenes</i>																													
		<i>Yersinia enterocolitica</i>																													
		<i>Staphylococcus aureus</i>																													
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Butter	Whipped	<i>Staphylococcus aureus</i>																													
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Ice cream	Frozen	<i>Staphylococcus aureus</i>																													
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Key E. Situations that likely contributed to outbreaks of foodborne diseases when shellfish, crustaceans or marine mammals were implicated as vehicles.

Legend			Raw product/ingredient/ pre-processing	Processing or preparation (contami- nation, survival, proliferation) in food processing plant, foodservice establishment or home	Post-processing/preparing abuse at homes or social events or during transport				
Principal contributory factor	Contributory factor	Potential contributory factor							
—	Source of contamination, but likely to be destroyed during subsequent processing	T Toxin survives heat processes							
C Contamination	S Survival	G Growth							
Food product (Vehicle)	Process	Etiologic agent of concern or microbe that produces it							
Shellfish	Raw	<i>Salmonella typhi</i>				Environment/climate (G)			
		<i>Salmonella</i>				Sewage pollution (C)			
		<i>Vibrio cholerae O1</i>				Infected/toxigenic animal (C)			
		<i>Vibrio cholerae non-O1</i>				Soil/mud contamination (C)			
		<i>Vibrio parahaemolyticus</i>				Water source of contamination (C)			
		<i>Vibrio vulnificus</i>				Industrial waste (C)			
		Hepatitis A virus				Contamination by worker (C)			
		Norwalk-like viruses				Improper cooling (G)			
		Paralytic shellfish poison				Contamination during storage (C)			
		Domoic acid				Improper pH adjustment (S/G)			
		Mercury				Improper a _w adjustment (salt conc.) (G)			
	Heated	<i>Salmonella</i>				Cross contamination (C)			
		<i>Staphylococcus aureus</i>				Contamination by worker (C)			
		<i>Vibrio parahaemolyticus</i>				Improper cleaning of equipment (C)			
		<i>Vibrio parahaemolyticus</i>				Organism/toxin survives process (S)			
Crustaceans	Heated	<i>Vibrio parahaemolyticus</i>				Heat process failure (S)			
	Dried	<i>Vibrio parahaemolyticus</i>				Improper hot holding (S/G)			
		<i>Staphylococcus aureus</i>				Room-outdoor-temperature holding (G)			
		<i>Salmonella</i>				Improper cooling (G)			
		<i>Clostridium botulinum</i>				Inadequate refrigeration (G)			
Marine mammals	Raw	<i>Salmonella</i>				Inadequate reheating (S)			
	Fermented	<i>Clostridium botulinum</i>				Contamination during reconstitution (C)			

Key F. Situations that likely contributed to outbreaks of foodborne diseases when vegetables were implicated as vehicles.

Legend																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Food product (Vehicle)	Process	Etiologic agent of concern or microbe that produces it	Raw product/ingredient/pre-processing					Processing or preparation (contamination, survival, proliferation) in food processing plant, foodservice establishment or home										Post-processing/preparing abuse at homes or social events or during transport																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Leafy green (including raw-vegetable salads)	Raw	<i>Salmonella typhi</i>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

*Only affects sensitized persons

Key G. Situations that likely contributed to outbreaks of foodborne diseases when fruits, nuts, spices, grains or mushrooms were implicated as vehicles.

Legend			Food product (Vehicle)	Process	Etiologic agent of concern or microbe that produces it	Raw product/ingredient/pre-processing										Processing or preparation (contamination, survival, proliferation) in food processing plant, foodservice establishment or home										Post-processing/preparing abuse at homes or social events or during transport				
Principal contributory factor	Contributory factor	Potential contributory factor				Source of contamination, but likely to be destroyed during subsequent processing	C Contamination	S Survival	G Growth	Improper a _w adjustment (salt conc.) (G)	Use of polluted water (C)	Contamination by worker (C)	Improper cleaning of equipment (C)	Organism/toxin survives process (S)	Heat process failure (S)	Manipulation/spread during process (G)	Room-temperature holding (G)	Improper cooling (G)	Inadequate refrigeration (G)	Contamination during cooling (C)	Prolonged storage (G)	Contamination during reconstitution (C)	Contamination by person (C)	Improper cleaning of equipment (C)	Improper cooling (G)	Inadequate refrigeration (G)	Prolonged storage (G)	Room-temperature holding (G)		
Apple cider	Raw	<i>Escherichia coli</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Berries	Raw	<i>Cryptosporidium</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Melons	Raw	<i>Hepatitis A virus</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Cyclospora cayentanensis</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Salmonella</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Escherichia coli</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Aldicarb</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Pineapple juice	Retorted	<i>Tin</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Orange juice	Raw	<i>Salmonella typhi</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Salmonella</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Hepatitis A virus</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Other fruits		<i>Salmonella</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Shigella</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Hepatitis A virus</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Clostridium botulinum</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Ground/tree nuts	Retorted	<i>Mycotoxins</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Coconuts	Dried	<i>Salmonella typhi</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Salmonella</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Spices	Dried/fermented	<i>Salmonella</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Rice	Heated	<i>Bacillus cereus</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Other grains	Dried	<i>Mycotoxins</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Mushrooms	Raw	<i>Salmonella</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
	Retorted	<i>Clostridium botulinum</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
		<i>Staphylococcus aureus</i>	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				

Key H. Situations that likely contributed to outbreaks of foodborne diseases when formulated or mixed foods were implicated as vehicles.

[illegible]

*Examples of meat/vegetable/cereal mixtures are pot pies, stuffings, stews, chilies, casseroles, lasagna, pizza.

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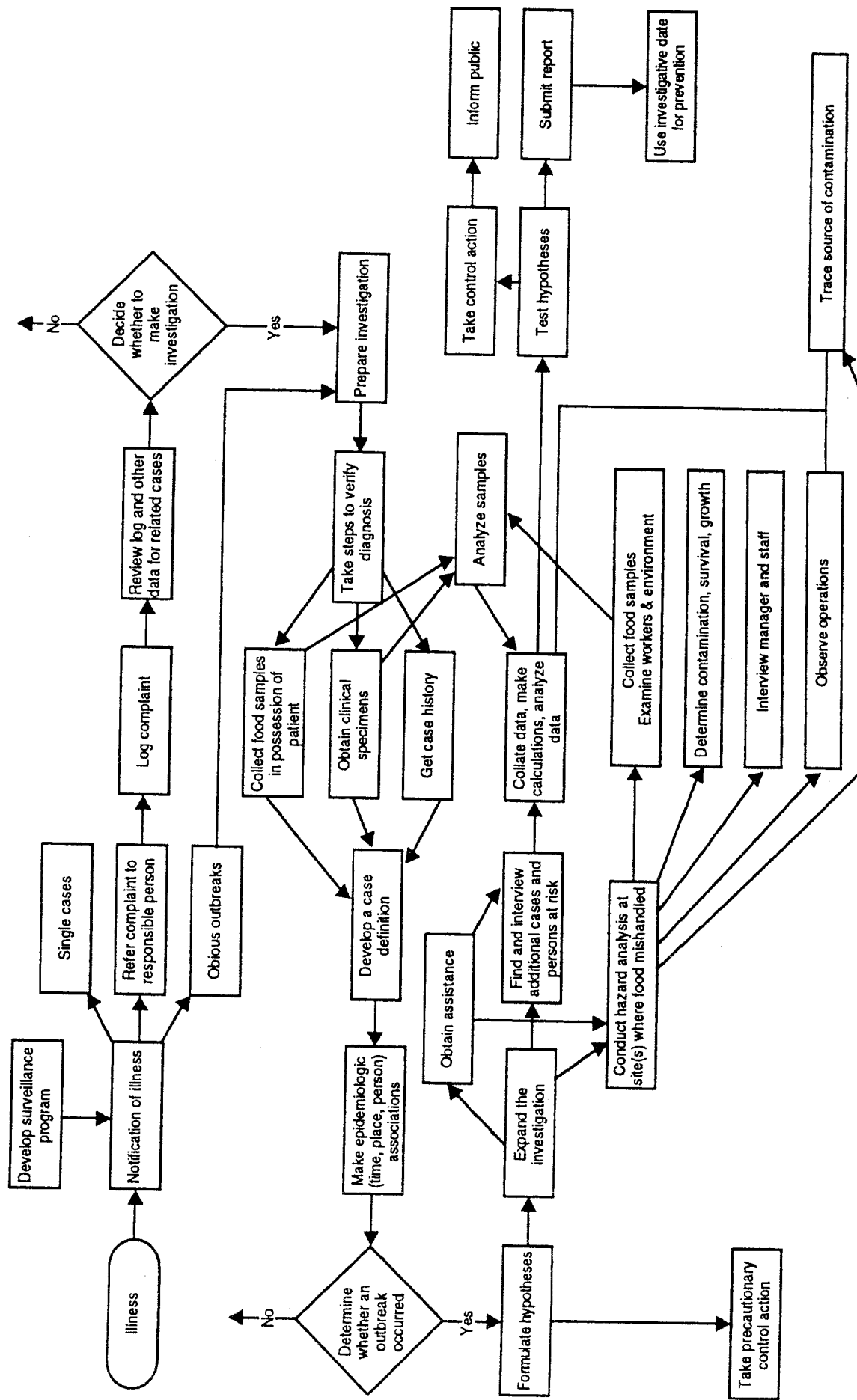


Figure A. Sequence of events in investigating a typical outbreak of foodborne illness.