



Laboratory Services Annual Report 2002 Statistical Appendix

Table 1 - Enteric Bacteriology
Frequency of Isolation from Stool Specimens
January 1, 2002 to December 31, 2002

Total Human Stool Specimens Processed = 3,530

Pathogens (Stool Specimens Cultured = 1,730)	# Positive	% Positive	Patients Positive	% Patients Positive
<i>Salmonella</i>	83	4.8	48	55.8
<i>Campylobacter</i>	18	1.0	14	16.3
<i>Yersinia</i>	13	0.8	12	14
<i>Shigella</i>	7	0.4	5	5.8
<i>Aeromonas</i>	6	0.4	6	6.9
<i>Plesiomonas</i>	1	0.1	1	1.2
Total	128	7.5%	86	100%
Verotoxin (Stool Specimens Tested = 1,800)	# Positive	% Positive	Patients Positive	% Patients Positive
Pathogenic <i>E. coli</i> of all types	62	3.4%	41	83.6%
Verotoxin detected but no causative organism isolated	8	0.4%	8	16.3%
Total	70	3.8%	49	100%

Table 2 - Enteric Bacteriology
Identifications - Isolates Submitted for Identification, Serotyping, Toxin Testing, Molecular Subtyping
January 1, 2002 to December 31, 2002

Pathogens identified	Human	Non Human
<i>Salmonella</i>	907	125
<i>Campylobacter</i>	114	0
<i>Shigella</i>	202	3
<i>Yersinia</i>	71	6
<i>Aeromonas</i>	107	20
Pathogenic <i>E. coli</i>	137	6
<i>Vibrio</i>	14	3
<i>Helicobacter</i> - from stool cultures referred from other laboratories	7	0
<i>Plesiomonas</i>	2	1
<i>Arcobacter</i>	2	0
Total Pathogens Identified	1,563	164
Total Non Pathogens Identified	200	122
Total Referred Isolates	1,748	286

Table 3 - Enteric Bacteriology
***E. coli* Serotypes**
 January 1, 2002 to December 31, 2002

Serotype	# of Isolates from Stools	# of Isolates from Referrals	Characteristic
<i>E. coli</i> O157:H7	37	124	Produces Verotoxin
<i>E. coli</i> O157:NM	2	1	Produces Verotoxin
<i>E. coli</i> O111:NM	4		Produces Verotoxin
<i>E. coli</i> O26:H11	8		Produces Verotoxin
<i>E. coli</i> O103:H2	2		Produces Verotoxin
<i>E. coli</i> O146:H21	2	1	Produces Verotoxin
<i>E. coli</i> O165:H25	1		Produces Verotoxin
<i>E. coli</i> O174:H28	1		Produces Verotoxin
<i>E. coli</i> O174:H8	1		Produces Verotoxin
<i>E. coli</i> O103:H25	1		Produces Verotoxin
<i>E. coli</i> O5:H non-motile	1		Produces Verotoxin
<i>E. coli</i> O6:H31	1		Produces Verotoxin
<i>E. coli</i> O117:H7		3	Produces Verotoxin
<i>E. coli</i> O153:H untypeable		1	Produces Verotoxin
<i>E. coli</i> O145:H nonmotile	1	1	Produces Verotoxin
<i>E. coli</i> O179:H8	1		Produces Verotoxin
<i>E. coli</i> O121:H19	1		Produces Verotoxin
Verotoxin positive stool specimen for which no organism could be isolated	8		
Total Positive Verotoxin	64	131	
<i>E. coli</i> O rough:H non-motile		1	Enteroinvasive <i>E. coli</i>
<i>E. coli</i> O28:H non-motile		1	Enteroinvasive <i>E. coli</i>
<i>E. coli</i> O28ac:H non-motile		1	Enteroinvasive <i>E. coli</i>
<i>E. coli</i> O untypeable:H non-motile		1	Enteroinvasive <i>E. coli</i>
<i>E. coli</i> O under investigation:H non-motile		1	Enteroinvasive <i>E. coli</i> O antigen is possibly a new serotype

Notes:

1. 39% of Total Verotoxin Producers isolated from stool in 2002 are not O157 (n=25).
2. Serotypes O165:H25 and O174:H28 were isolated from the same person.
3. Serotypes O145:H non-motile and O179:H8 were isolated from the same person.

**Table 4 - Enteric Bacteriology
Shigella Serotypes
January 1, 2002 to December 31, 2002**

Organism	Number
<i>Shigella boydii</i> 1	2
<i>Shigella boydii</i> 2	1
<i>Shigella boydii</i> 4	3
<i>Shigella boydii</i> 8	1
<i>Shigella boydii</i> 10	2
<i>Shigella boydii</i> 18	1
<i>Shigella boydii</i> 19	2
<i>Shigella boydii</i> 20 - formerly Provisional 108	2
<i>Shigella dysenteriae</i>	1
<i>Shigella dysenteriae</i> 9	1
<i>Shigella dysenteriae</i> 15	1
<i>Shigella dysenteriae</i> 16	1
<i>Shigella flexneri</i> 1	4
<i>Shigella flexneri</i> 2	17
<i>Shigella flexneri</i> 3	5
<i>Shigella flexneri</i> 3a	6
<i>Shigella flexneri</i> 4a	2
<i>Shigella flexneri</i> 6	3
<i>Shigella flexneri</i> Provisional 104	3
<i>Shigella sonnei</i>	123
Total	181

Note: In 2002 there were no *Shigella* isolates from non-human sources.

**Table 5 - Enteric Bacteriology
Other Organisms
January 1, 2002 - December 31, 2002**

Organism	Source of Positives		
	Human	Non-Human	Total
<i>Aeromonas</i> species	1		1
<i>Aeromonas caviae</i>	54	7	61
<i>Aeromonas hydrophila</i>	20	6	26
<i>Aeromonas hydrophila</i> group		2	2
<i>Aeromonas jandaei</i>		1	1
<i>Aeromonas trota</i>		2	2
<i>Aeromonas veronii</i>	37	2	39
<i>Aeromonas veronii</i> biovar <i>veronii</i>	1		1
Total Aeromonas	113	20	133
<i>Campylobacter</i> species	2		2
<i>Campylobacter coli</i>	13		13
<i>Campylobacter fetus</i>	1		1
<i>Campylobacter jejuni</i>	111		111
<i>Campylobacter laridis</i>	2		2
<i>Campylobacter upsaliensis</i>	3		3
<i>Helicobacter cinaedi</i>	1		1
<i>Helicobacter pullorum</i>	6		6
<i>Arcobacter cryaerophilus</i>	1		1
<i>Arcobacter butzleri</i>	1		1
Total Campylobacter, Helicobacter, Arcobacter	141		141
Total Plesiomonas shigelloides	3	1	4
<i>Vibrio alginolyticus</i>	1		1
<i>Vibrio cholerae</i> serotype O1	1		1
<i>Vibrio cholerae</i> non O1	4		4
<i>Vibrio fluvialis</i>		1	1
<i>Vibrio furnissii</i>	1		1
<i>Vibrio mimicus</i>	1		1
<i>Vibrio parahaemolyticus</i>	6		6
<i>Vibrio vulnificus</i>		1	1
Total Vibrio	13	3	16
<i>Yersinia enterocolitica</i>	53	2	55
<i>Yersinia frederiksenii</i>	10		10
<i>Yersinia intermedia</i>	7	1	8
<i>Yersinia kristensenii</i>	5		5
<i>Yersinia mollaretii</i>	2	2	2
<i>Yersinia pseudotuberculosis</i>	1	1	2
<i>Yersinia rohdei</i>	6		6
Total Yersinia	84	6	90

Table 6 - Enteric Bacteriology
Salmonella Serotypes
January 1, 2002 to December 31, 2002

	Organism	Source of Positives		
		Human	Non Human	Total
1	<i>Salmonella</i> Abaetetuba	2		2
2	<i>Salmonella</i> Adelaide	3		3
3	<i>Salmonella</i> Agona	27	1	28
4	<i>Salmonella</i> Ahuza	2		2
5	<i>Salmonella</i> Alachua	1		1
6	<i>Salmonella</i> Anatum	9	4	13
7	<i>Salmonella</i> Bardo	4		4
8	<i>Salmonella</i> Bareilly	3		3
9	<i>Salmonella</i> Berkeley	1		1
10	<i>Salmonella</i> Berta		2	2
11	<i>Salmonella</i> Blockley	4	1	5
12	<i>Salmonella</i> Bovismorbificans	1		1
13	<i>Salmonella</i> Brandenburg	5		5
14	<i>Salmonella</i> Bredeney	5		5
15	<i>Salmonella</i> Cerro		1	1
16	<i>Salmonella</i> Chester	7		7
17	<i>Salmonella</i> Cubana		1	1
18	<i>Salmonella</i> Derby	5	2	7
19	<i>Salmonella</i> Dublin	1	1	2
20	<i>Salmonella</i> Durban	1		1
21	<i>Salmonella</i> Emek	1		1
22	<i>Salmonella</i> Enteritidis	92	7	99
23	<i>Salmonella</i> Gaminara	1		1
24	<i>Salmonella</i> Give	3		3
25	<i>Salmonella</i> Haardt		1	1
26	<i>Salmonella</i> Hadar	49	4	53
27	<i>Salmonella</i> Haifa	2		2
28	<i>Salmonella</i> Havana	7		7
29	<i>Salmonella</i> Heidelberg	95	18	113
30	<i>Salmonella</i> Indiana	3	1	4
31	<i>Salmonella</i> Infantis	16	1	17

	Organism	Source of Positives		
		Human	Non Human	Total
32	<i>Salmonella</i> Inverness	1		1
33	<i>Salmonella</i> Itami	1		1
34	<i>Salmonella</i> Javiana	3		3
35	<i>Salmonella</i> Johannesburg		2	2
36	<i>Salmonella</i> Kentucky	4		4
37	<i>Salmonella</i> Kingabwa	2		2
38	<i>Salmonella</i> Litchfield	1		1
39	<i>Salmonella</i> Livingstone	5		5
40	<i>Salmonella</i> Manhattan	1		1
41	<i>Salmonella</i> Mbandaka	4	4	8
42	<i>Salmonella</i> Miami	1		1
43	<i>Salmonella</i> Minnesota	1		1
44	<i>Salmonella</i> Mississippi	2		2
45	<i>Salmonella</i> Monschau	1		1
46	<i>Salmonella</i> Montevideo	7	2	9
47	<i>Salmonella</i> Muenchen	9	1	10
48	<i>Salmonella</i> Muenster	2		2
49	<i>Salmonella</i> Newport	25		25
50	<i>Salmonella</i> Ohio	1	2	3
51	<i>Salmonella</i> Oranienburg	43		43
52	<i>Salmonella</i> Panama	2	1	3
53	<i>Salmonella</i> Paratyphi A	17		17
54	<i>Salmonella</i> Paratyphi B	18	2	20
55	<i>Salmonella</i> Poona	8		8
56	<i>Salmonella</i> Potsdam	1		1
57	<i>Salmonella</i> Reading	1		1
58	<i>Salmonella</i> Richmond	19		19
59	<i>Salmonella</i> Rubislaw	1		1
60	<i>Salmonella</i> Saintpaul	19		19
61	<i>Salmonella</i> Sandiego	8		8
62	<i>Salmonella</i> Saphra	1		1

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	Organism	Source of Positives		
		Human	Non Human	Total
63	<i>Salmonella</i> Schwarzengrund	4		4
64	<i>Salmonella</i> Senftenberg	5	2	7
65	<i>Salmonella</i> Stanley	17		17
66	<i>Salmonella</i> Tennessee	1		1
67	<i>Salmonella</i> Thompson	11		11
68	<i>Salmonella</i> Typhi	20		20
69	<i>Salmonella</i> Typhimurium	169	38	207
70	<i>Salmonella</i> Uganda	2	1	3
71	<i>Salmonella</i> Virchow	15		15
72	<i>Salmonella</i> Weltevrededn	7	2	9
73	<i>Salmonella</i> Yoruba		2	2
74	<i>Salmonella</i> SS I enterica 3,10:e,h:-	1		1
75	<i>Salmonella</i> SS I enterica 6,7:z10:-	1		1
76	<i>Salmonella</i> SS I enterica 9,12:non-motile	1		1
77	<i>Salmonella</i> SS I enterica O rough:non-motile	2		2
78	<i>Salmonella</i> SS I enterica 4,12:i:-	14	5	19
79	<i>Salmonella</i> SS I enterica 4,5,12:i:-	18	3	21
80	<i>Salmonella</i> SS II salamae 48:d:z6	2		2
81	<i>Salmonella</i> SS IIIa arizonae 41:z4,z23:-		1	1
82	<i>Salmonella</i> SS IIIb diarizonae 50:non-motile	1		1
83	<i>Salmonella</i> SS IIIb diarizonae 61:k:1,5,(7)	1		1
84	<i>Salmonella</i> SS IIIb diarizonae 47:k:z35	1		1
85	<i>Salmonella</i> SS IIIb diarizonae 50:k:z		1	1
86	<i>Salmonella</i> SSIIIb diarizonae 65:z10:e,n,x, z15		2	2
87	<i>Salmonella</i> SS IV houtenae 16:z4,z32:-	1	1	2
88	<i>Salmonella</i> SS IV houtenae 48:g,z51:-	1		1
	Total number of isolates	854	117	971
	Number of serotypes	79	32	88

Environmental Microbiology - Water

A total of 62,974 water samples were examined for public health and audit purposes in 2002. Most were examined by a membrane filter (MF) procedure and; some by multiple tube fermentation (MT) procedure. The distribution of samples by submitting agency is shown in Table 1. Fecal coliform testing was done on 57,004 samples of which 2,440 were from bathing beaches. 7,534 samples of drinking water, examined by MF procedure, were subjected to a verification procedure to exclude false positive coliform results. The heterotrophic plate count, performed on drinking water samples as a check on the quality of finished water in distribution systems and on treated swimming pool samples as the primary indicator of disinfecting efficiency, was done on over 3,000 samples. The number of water samples rejected for examination was 1990, up from 231 in 2001. The most common reason for rejection was that the sample was too long in transit when received at the laboratory. Prior to May 2002, the time limit used was 48 hours. Since May 1, 2002, it has been reduced to 30 hours, as recommended by the "Standard Methods for the Examination of Water and wastewater."

Of the 53,026 drinking water samples examined (Table 2), total coliforms were detected in 4,053 samples (7.6%) and fecal coliforms in 1,034 samples (1.9%). There is seasonal variation in the total/fecal coliforms, as shown in Table 3. Of the 5,682 swimming/whirl pool samples examined (Table 4), total coliforms were detected in 129 samples (2.3%) and *Pseudomonas aeruginosa* in 111 samples (2.0%). Heterotrophic plate count was also performed on 504 swimming/whirl pool samples and 65 samples (12.9%) were positive (>30 CFU/ml). Of the 2,440 bathing beach samples examined during the summer of 2002 (Table 5), 65 samples (2.7%) had fecal coliform counts of 200-400 per 100 ml of water and 44 samples (1.8%) had counts of >400 per 100 ml.

**Table 1 - Environmental Microbiology (Water)
Water Bacteriology Samples by Submitting Agency
January 1, 2002 to December 31, 2002**

Month	Health Units	Federal	Total Samples
January	4,670	520	5,190
February	4,355	335	4,690
March	4,192	463	4,655
April	4,741	252	4,993
May	5,581	401	5,982
June	5,719	329	6,048
July	6,377	467	6,844
August	5,637	302	5,939
September	4,623	328	4,951
October	4,997	303	5,300
November	4,344	257	4,601
December	3,565	216	3,781
Total	58,801	4,173	62,974

**Table 2 - Environmental Microbiology (Water)
Drinking Water Samples
January 1, 2002 to December 31, 2002**

Location/Submitter	Total Coliform		Fecal Coliform	
	Samples	+ve	Samples	+ve
Canadian Food Inspection Agency	272	27	202	5
Cariboo	1,359	163	1,352	39
Central Vancouver Island	5,037	278	5,025	56
CFB (Comox)	9	2	9	1
Coast Garibaldi	5,390	482	5,378	99
East Kootenay	6,264	830	6,257	287
Env. Health Dept.(Whitehorse)	161	3	156	2
Fraser Valley	7,821	499	7,817	70
Health Canada (Campbell River)	63	14	63	3
Health Canada (Chilliwack)	746	70	745	11
Health Canada (Kamloops)	571	114	571	41
Health Canada (Kelowna)	292	29	292	4
Health Canada (Merritt)	717	68	717	27
Health Canada (Nanaimo)	145	13	143	6
Health Canada (Salmon Arm)	220	22	219	4
Health Canada (Vancouver)	1,280	67	1,146	16
Health Canada (Victoria)	8	2	8	0
Kootenay Boundary	4,937	400	4,925	90
North Shore	1,763	120	1,759	52
North West	67	5	67	0
Northern Interior	3,988	298	3,977	90
Peace Liard	2,259	111	2,249	24
Richmond	184	3	182	0
Simon Fraser (Burnaby)	322	1	321	0
Simon Fraser (Coquitlam)	1,932	55	1,930	9
Simon Fraser (New Westminster)	189	0	185	1
South Fraser Valley	2,307	101	2,302	16
Thompson	14	4	14	2
Upper Island Central Coast	2,409	259	2,396	71
Unknown/Miscellaneous Location	17	2	17	0
Vancouver	2,283	11	2,282	7
Total	53,026	4,053	52,706	1,033

**Table 3 - Environmental Microbiology (Water)
Seasonal Variation of Coliforms in Drinking Water
January 1, 2002 to December 31, 2002**

Month	Total Coliform		Fecal Coliform	
	+ve	%+ve	+ve	%+ve
January	272	6.7	72	7.0
February	207	5.1	52	5.0
March	185	4.6	46	4.4
April	261	6.4	58	5.6
May	357	8.8	85	8.2
June	413	10.2	108	10.4
July	556	13.7	189	18.3
August	513	12.7	140	13.5
September	434	10.7	113	10.9
October	407	10.0	75	7.3
November	245	6.0	63	6.1
December	203	5.0	33	3.2
Total	4,053	100.0	1,034	100.0

**Table 4 - Environmental Microbiology (Water)
Swimming Pool/Whirl Pool/Hot Tub/Spa Samples
January 1, 2002 to December 31, 2002**

Location/Submitter	Total Coliform		Heterotrophic Plate Count		<i>Pseudomonas aeruginosa</i>	
	Samples	+ve	Samples	+ve	Samples	+ve
Cariboo	71	3	0	0	71	9
Central Vancouver Island	753	10	0	0	753	26
CFB (Comox)	1	0	0	0	1	0
Coast Garibaldi	1,392	34	0	0	1,392	48
East Kootenay	1,022	21	0	0	1,022	14
Env. Health Dept. (Whitehorse)	52	0	0	0	52	1
Fraser Valley	200	9	0	0	200	1
Health Canada (Chilliwack)	1	0	0	0	1	0
Health Canada (Kamloops)	15	1	0	0	15	0
Health Canada (Kelowna)	2	0	0	0	2	0
Health Canada (Salmon Arm)	11	2	0	0	11	0
Health Canada (Vancouver)	27	0	0	0	27	0
Kootenay Boundary	193	10	0	0	193	3
North Shore	202	4	163	14	202	0
Northern Interior	276	6	0	0	276	2
Peace Liard	344	2	0	0	344	2
Richmond	251	3	0	0	251	0
Simon Fraser (Burnaby)	227	8	220	37	227	1
Simon Fraser (Coquitlam)	132	2	2	0	132	1
Simon Fraser (New Westminster)	118	0	117	14	118	0
South Fraser Valley	227	6	0	0	227	2
Thompson	7	1	0	0	7	0
Upper Island/Central Coast	152	7	0	0	152	9
Unknown/Misc. Location	3	0	0	0	3	0
Vancouver	2	0	1	0	2	0
Total	5,682	129	504	65	5,682	111

**Table 5 - Environmental Microbiology (Water)
Bathing Beach Samples
January 1, 2002 to December 31, 2002**

Location/Submitter	Fecal Coliform		
	Samples	+ve 200 - 400	+ve > 400
Cariboo	176	1	0
Central Vancouver Island	658	15	5
Coast Garibaldi	120	1	6
East Kootenay	81	2	1
Fraser Valley	312	13	7
Health Canada (Chilliwack)	2	0	0
Health Canada (Nanaimo)	1	0	1
Kootenay Boundary	56	0	1
North Shore	7	0	1
Northern Interior	77	2	3
Peace Liard	125	4	1
Simon Fraser (Coquitlam)	460	10	9
South Fraser Valley	242	9	4
Upper Island/Central Coast	19	0	1
Vancouver	104	8	4
Total	2,440	65	44

Environmental Microbiology - Food

A total of 588 food samples from 19 food categories were submitted by health units for examination in 2002. Samples were tested for four indicator bacteria and sanitary quality of food was assessed using the following guidelines:

Aerobic plate count	< 100,000/g
Total coliform count	< 1,000/g
Fecal coliform count	< 3/g
<i>S. aureus</i> count	< 100/g

For cooked ready-to-eat food, five food categories: miscellaneous, salads, meat, Chinese foods and bakery foods accounted for 59.8% of all samples. Of the 555 samples examined, 385 samples (69.4%) were within the guidelines for all four indicator bacteria whereas 170 samples (30.6%) had exceeded one or more guidelines. Fecal coliform bacteria were detected in 31 samples (5.6%) indicative of possible fecal contamination. Other details are summarized in Table 1.

For raw ready-to-eat food, two categories, vegetables and salads accounted for 60.6% of all samples. Of the 33 samples examined, only 7 samples (21.2%) were within the guidelines for all four indicator bacteria whereas 26 samples (78.8%) had exceeded one or more guidelines. Fecal coliform bacteria were detected in 6 samples (18.2%). Other details are summarized in Table 2.

In addition to the testing of indicator bacteria, the Food Laboratory also examined 76 food samples for water activity and pH and 41 food samples for specific bacterial pathogens like *Yersinia enterocolitica*, *Bacillus cereus*, *Salmonella*, *Clostridium perfringens* and *E. coli* O157:H7.

**Table 1 - Environmental Microbiology (Food)
Confirmed Food Poisoning Incidents
January 1, 2002 to December 31, 2002**

Etiology	Specimen/Food Vehicle	No. Ill	Locality
<i>Bacillus cereus</i>	Chinese Food	2	West Vancouver
<i>Bacillus cereus</i> and <i>Staphylococcus aureus</i>	Chinese Food	2	Mission
<i>Campylobacter</i> spp.	Fondue (chicken)	6+	Kamloops
<i>Clostridium perfringens</i> enterotoxin	Stool / Banquet food	35	Surrey
<i>Clostridium perfringens</i> enterotoxin	Stool / Catered Christmas lunch	19	Vancouver
<i>Clostridium perfringens</i>	BBQ Chicken	14	Richmond
<i>Listeria monocytogenes</i> (serotype 1-2a)	Smoked salmon cream cheese	Costco recall (no illnesses)	Lower Mainland
<i>Listeria monocytogenes</i> (serotype 4b)	Cheese	28 (4 invasive)	Granville Island and BC
<i>Listeria monocytogenes</i> (serotype 4b)	Cheese	82	Vancouver Island and BC
<i>Salmonella</i> Heidelberg Group B	Chicken	8	North Vancouver
<i>Staphylococcus aureus</i> enterotoxin type A	Sponge Cake	1	Richmond
<i>Yersinia enterocolitica</i>	Cheese	2	Vancouver

**Table 2 - Environmental Microbiology (Food)
Confirmed Norovirus Food Poisoning Incidents
January 1, 2002 to December 31, 2002**

Norovirus Sequence (done by Molecular Services)	Suspect Food Vehicle (from stool or vomitus)	No. Ill	Locality
BCCDC02-010	Borscht and perogies	1	Chilliwack
	Hot-dog OR Church pot-luck	2 36	Surrey Burnaby
BCCDC01-022	Chinese Food	3	Chilliwack
BCCDC01-010	Cheese Whiz and Beef Jerky	2	Prince George
	Hamburger	3	North Vancouver
BCCDC02-003	Eggs (breakfast meal)	1	Surrey
	Crab Meat	1	New Westminster
BCCDC02-007	Smoked Turkey Meat	1	Vancouver
BCCDC02-021	Eggs (breakfast meal)	1	Hope
BCCDC02-013	Custard	1	Kelowna
BCCDC02-025	Pizza	3	Duncan
BCCDC02-024	Bakery sweets	5	Vancouver
BCCDC02-007	Caesar salad	2	Prince George
BCCDC02-024	Fried Chicken	2	Port Moody
BCCDC02-011	Milk	3	Richmond
BCCDC02-007	Hamburger	1	Kelowna
BCCDC02-006	Pizza	2	William's Lake

Table 3 - Environmental Microbiology (GI Outbreak Co-ordination)
Gastrointestinal Outbreak Investigations
January 1, 2002 to December 31, 2002

Health Authority	Region	Establishment	# Reported	Etiology of Laboratory Confirmed Outbreaks
Fraser (total = 44)	Simon	Hospital	3	3 - Norovirus
		LTCF	10	5 - Norovirus
		Restaurant	1	
	South	LTCF	15	13 - Norovirus
		Private Function	2	1 - Norovirus 1 - <i>Clostridium perfringens</i>
		Restaurant	1	1 - Norovirus
	Valley	Hospital	2	1 - Norovirus
		LTCF	8	7 - Norovirus
		School	2	1 - Norovirus
Health Canada (total = 9)		Cruise Ship	8	6 - Norovirus 1 - <i>Salmonella</i> Typhimurium
		Train	1	1 - Norovirus
Interior (total = 51)	East	Community	1	
		LTCF	4	2 - Norovirus
	Kootenay-Boundary	Camp	1	1 - Norovirus
		Hospital	2	1 - Norovirus
		LTCF	4	3 - Norovirus
	Okanagan	Restaurant	1	
		Community	1	1 - Norovirus
		Daycare	1	
		Hospital	2	2 - Norovirus
		LTCF	24	19 - Norovirus
		Other	1	
	Thompson-Cariboo	School	3	1 - Norovirus
		LTCF	4	3 - Norovirus
		Private Function	2	1 - <i>Campylobacter</i>
Provincial (total = 2)		Community	2	2 - <i>Listeria monocytogenes</i>
Northern (total = 17)	Interior	Camp	1	1 - Norovirus
		Daycare	1	1 - Norovirus
		Hospital	2	2 - Norovirus
		LTCF	3	3 - Norovirus
		Private	1	1 - Norovirus
		School	3	2 - Norovirus
	Peace Liard	LTCF	1	1 - Rotavirus
	Northwest	Community	4	
		LTCF	1	1 - Norovirus
Vancouver Coastal (total = 37)	Coast Garibaldi	Camp	1	1 - Norovirus
	North Shore	Community	1	
		LTCF	3	1 - Norovirus
		Private Function	1	1 - <i>Salmonella</i> Heidelberg
	Richmond	Daycare	2	
		LTCF	1	1 - Norovirus
	Vancouver	Private	2	
		Daycare	3	
		LTCF	18	11 - Norovirus 1 - Torovirus 1 - <i>Salmonella</i> Typhimurium
Restaurant		1	1 - Norovirus	
Vancouver Island (total = 28)	Capital	Restaurant	4	1 - Norovirus 1 - <i>Clostridium perfringens</i>
		Hospital	8	5 - Norovirus
		LTCF	7	5 - Norovirus
		Restaurant	2	2 - Norovirus
	Central/North Island	School	1	1 - Norovirus
		Camp	1	
Yukon (total = 1)		Hospital	1	
Total outbreaks = 189				

Table 4 - Environmental Microbiology (Food)
Food Quality Check Samples Exceeding Guidelines
January 1, 2002 to December 31, 2002

Food Category	Samples Tested	Exceeding One or More Guidelines		Aerobic Plate Count $\geq 100,000/g$		Total Coliform $\geq 1,000/g$		Fecal Coliform $\geq 3/g$		Staphylococcus aureus $\geq 100/g$	
		#	%	#	%	#	%	#	%	#	%
Meat	41	8	19.5%	8	19.5%	1	2.4%	1	2.4%	0	0.0%
Marine Foods	14	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Poultry	38	11	28.9%	10	26.3%	4	10.5%	1	2.6%	0	0.0%
Dairy Foods	42	17	40.5%	16	38.1%	1	2.4%	3	7.1%	0	0.0%
Bakery Foods	22	4	18.2%	2	9.1%	1	4.5%	2	9.1%	0	0.0%
Vegetables	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Chinese Foods	20	4	20.0%	3	15.0%	2	10.0%	2	10.0%	0	0.0%
Other Ethnic Foods	25	4	16.0%	4	16.0%	2	8.0%	1	4.0%	1	4.0%
Salads	66	33	50.0%	32	48.5%	9	13.6%	9	13.6%	0	0.0%
Salad Dressing	9	1	11.1%	1	11.1%	0	0.0%	0	0.0%	0	0.0%
Sandwiches	49	28	57.1%	27	55.1%	15	30.6%	1	2.0%	0	0.0%
Sausages	64	21	32.8%	21	32.8%	1	1.6%	3	4.7%	0	0.0%
Tofu	6	3	50.0%	3	50.0%	2	33.3%	0	0.0%	0	0.0%
Soups	10	2	20.0%	2	20.0%	1	10.0%	0	0.0%	0	0.0%
Beverage	14	5	35.7%	5	35.7%	1	7.1%	1	7.1%	0	0.0%
Fruit	2	1	50.0%	1	50.0%	0	0.0%	0	0.0%	0	0.0%
Miscellaneous	132	28	21.2%	24	18.2%	10	7.6%	7	5.3%	0	0.0%
Total	555	170	30.6%	159	28.6%	50	9.0%	31	5.6%	1	0.2%

Table 5 - Environmental Microbiology (Food)
Raw Ready-To-Eat Food
January 1, 2002 to December 31, 2002

Food Category	Samples Tested	Exceeding One or More Guidelines		Aerobic Plate Count $\geq 100,000/g$		Total Coliform $\geq 1,000/g$		Fecal Coliform $\geq 3/g$		Staphylococcus aureus $\geq 100/g$	
		#	%	#	%	#	%	#	%	#	%
Vegetables	10	10	100.0%	10	100.0%	6	60.0%	0	0.0%	0	0.0%
Sprouts	7	7	100.0%	7	100.0%	7	100.0%	3	42.9%	0	0.0%
Salads	10	6	60.0%	5	50.0%	3	30.0%	3	30.0%	0	0.0%
Sushi	6	3	50.0%	3	50.0%	1	16.7%	0	0.0%	0	0.0%
Total	33	26	78.8%	25	75.8%	17	51.5%	6	18.2%	0	0.0%

Figure 1 - Environmental Microbiology (Enhanced Water)
Percentage Positive Water Filters Tested
 January 1, 2002 to December 31, 2002

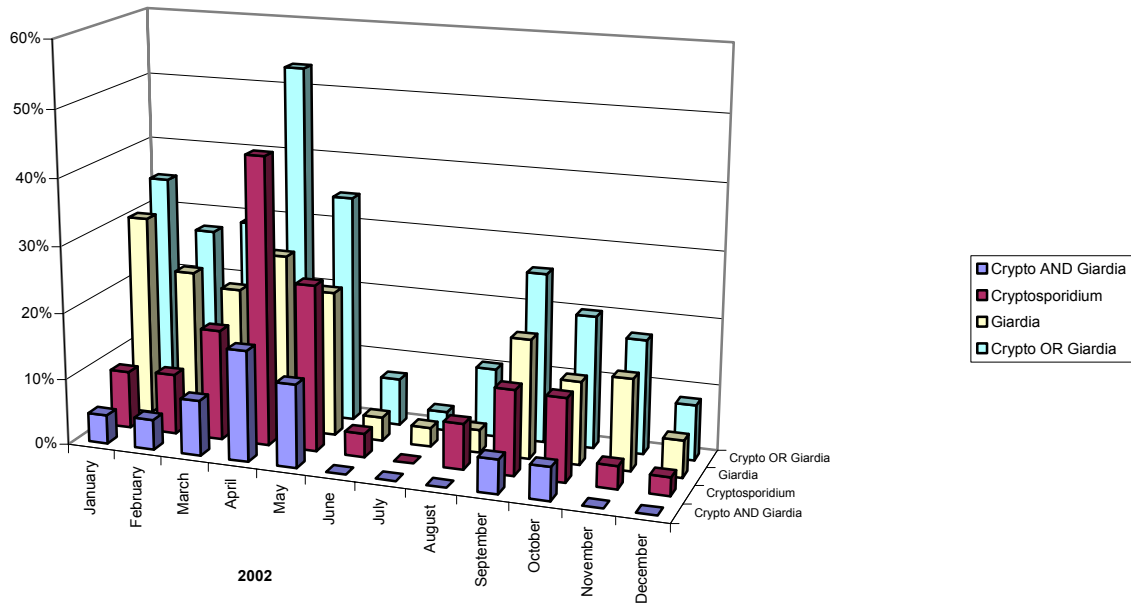
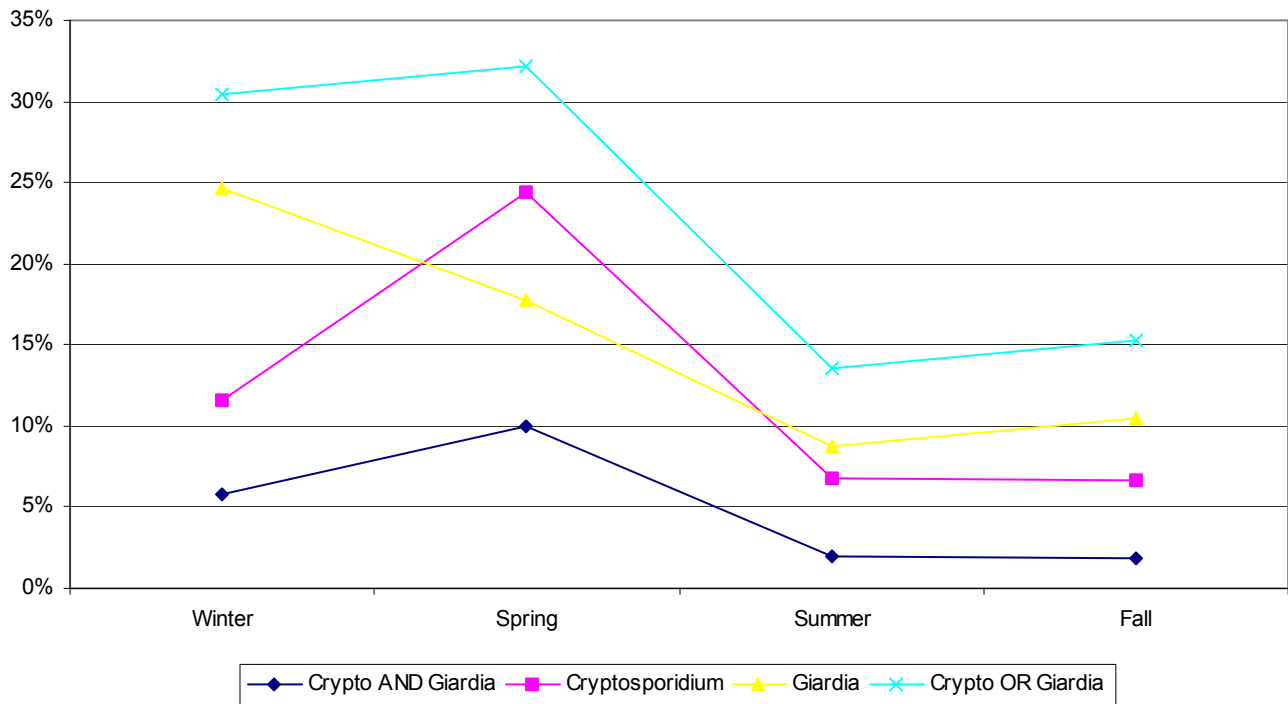


Figure 2 - Environmental Microbiology (Enhanced Water)
Seasonal Variation of Parasite Positive Water Filters
 January 1, 2002 to December 31, 2002



**Table 1 - General Bacteriology
Upper Respiratory Specimens
January 1, 2002 to December 31, 2002**

	Specimens			Patients		
	Total	+ve	%+ve	Total	+ve	%+ve
<i>Beta-hemolytic streptococci</i>						
Cultures (Primary)						
Group A		70	10.9		65	10.6
Group C		37	5.8		35	5.7
Group G		27	4.2		27	4.4
Total	642	134	20.9	614	126	20.5
<i>Bordetella pertussis</i>						
Cultures (Primary)	5,449	364	6.7	5,413	364	6.7
Cultures (Referred)	0	0	0	0	0	0
Total	5,449	364	6.7	5,413	364	6.7
Polymerase chain reaction test (PCR)	5,357	566	10.4	5,421	566	10.4
<i>Corynebacterium diphtheriae</i>						
Cultures (Primary)						
Toxigenic		0	0		0	0
Non-toxigenic		4	14.3		3	12.0
Not tested		0	0		0	0
Total	28	4	14.3	25	3	12.0
Cultures (Referred)						
Toxigenic		1	10.0		1	12.5
Non-toxigenic		8	80.0		6	75.0
Not tested		0	0.0			0.0
Total	10	9	90.0	8	7	87.5

Table 2 - General Bacteriology
***Bordetella pertussis* Tests**
 January 1, 2002 to December 31, 2002

Year	Number of Patients					
	Cultures		DFA Tests		Total*	
	# Tested	# (%) positive	# Tested	# (%) Positive	# Tested	# (%) Positive
1995-96	1,638	186 (11.4)	1,602	88 (5.5)	1,638	197 (12.0)
1996-97	3,254	339 (10.4)	3,044	128 (4.2)	3,254	358 (11.0)
1997-98	1,954	168 (8.6)	1,834	70 (3.8)	1,954	185 (9.5)
	Cultures		PCR Tests**		Total*	
	# Tested	# (%) Positive	# Tested	# (%) Positive	# Tested	# (%) Positive
1998	1,777	149 (8.4)	1,406	198 (14.1)	1,777	229 (12.9)
1999	3,034	209 (6.9)	3,076	346 (11.2)	3,076	356 (11.6)
2000	10,310	678 (6.6)	10,317	1,390 (11.2)	10,317	1,456 (14.1)
2001	4,646	226 (4.9)	4,652	498 (10.7)	4,652	504(10.8)
2002	5,413	364 (6.7)	5,421	566 (10.4)	5,421	612 (11.3)

*Total = Total number of patients tested or positive by either culture or DFA/PCR

** PCR Tests - PCR test introduced April 1, 1998 (DFA test discontinued at that time)

Table 3 - General Bacteriology
***Neisseria meningitidis* Serogroups**
 Blood and Cerebrospinal Fluid Isolates
 1990-91 to 2002

Year	Serogroup (number of isolates)							Total
	A	B	C	W135	Y	Z	NG*	
1990-91	1	7	9 (3)**		2	1	1	21
1991-92		14	15 (5)**		7	1		37
1992-93		9	12 (10)**		3	1		25
1993-94		16	32 (28)**	1	2		1	52
1994-95		14	25 (23)**	1	5	1		46
1995-96		9	19 (18)**		4			32
1996-97		18	16 (16)**	1	3			38
1997-98		8	10 (10)**	2	3			23
1998		7	5 (5)**	2	1			15
1999		13	10(8)**		2			25
2000		8	10(9)**	2	2			22
2001		13	21(21)**	2	3			39
2002		14	7 (7)**		6			27

* NG = non-groupable

** () = number of electrophoretic type (ET) 15 isolates

Table 4 - General Bacteriology
***Neisseria meningitidis* Antimicrobial Susceptibility**
 January 1, 2002 to December 31, 2002

MIC (µg/ml)	Number of isolates with MIC=s of:			
	Penicillin	Ceftriaxone	Ciprofloxacin	Rifampin
≤ 0.002		26	5	2
0.003			16	2
0.004			5	7
0.005				
0.006				2
0.007				
0.008				2
0.012				5
0.016				2
0.023	2			3
0.032	7			1
0.047	7			
0.064	7			
0.094	2			
0.125	1			
0.190				
0.250				
Total	26	26	26	26

Note: MIC testing was done on blood and CSF isolates only using the E-test on Mueller Hinton agar with 5% sheep blood. All isolates were susceptible to all drugs tested. For penicillin isolates with MIC=s <0.1 are considered susceptible; isolates with MIC=s 0.1-1.0 moderately susceptible. (Reference: Oppenheim, B. Antibiotic resistance in *Neisseria meningitidis*. Clinical Infectious Diseases 1997;24 (Suppl 1: 598-101).

Table 5 - General Bacteriology
Specimens for Sexually Transmitted Diseases
January 1, 2002 to December 31, 2002

	Patients											
	Specimens			Male			Female			All		
	Total	+ve	%+ve	Total	+ve	%+ve	Total	+ve	%+ve	Total	+ve	%+ve
<i>Neisseria gonorrhoeae</i>												
Cultures (Primary)												
STDC Clinic	8,026	188	2.3	3,213	160	5.0	1,884	11	0.6	5,111	171	3.3
Other	13,822	76	0.5	1,779	60	3.4	11,580	11	0.1	13,415	72	0.5
Total	21,848	264	1.2	4,992	220	4.4	13,464	22	0.2	18,526	243	1.3
Cultures (Referred)												
All Clients	144	137	95.1	106	101	95.3	29	27	93.1	141	134	95.0
Slides												
STDC Clinic	1,551	106	6.8	1,362	91	6.7	0	0	0.0	1,362	91	6.7
Other	538	16	3.0	511	13	2.5	0	0	0.0	511	13	2.5
Total	2,089	122	5.8	1,873	104	5.6	0	0	0.0	1,873	104	5.6
<i>Chlamydia trachomatis</i>												
PCR												
STDC Clinic	5,741	304	5.3	3,833	208	5.4	1,883	92	4.9	5,726	301	5.3
Other	25,629	1,433	5.6	4,073	408	10.0	21,233	999	4.7	25,437	1,419	5.6
Total	31,370	1,737	5.5	7,906	616	7.8	23,116	1,091	4.7	31,163	1,720	5.5
<i>Trichomonas vaginalis</i>												
Slides												
STDC Clinic	3,193	57	1.8	1,150	0	0.0	1,970	57	2.9	3,130	57	1.8
Other	7,546	82	1.1	18	1	5.6	7,502	79	1.1	7,541	81	1.1
Total	10,739	139	1.3	1,168	1	0.1	9,472	136	1.4	10,671	138	1.3
<i>Bacterial vaginosis</i>												
Slides												
STDC Clinic	1,641	536	32.7	0	0	0.0	1,636	535	32.7	1,636	535	32.7
Other	7,350	1,774	25.7	0	0	0.0	7,346	1,773	24.1	7,346	1,773	24.1
Total	8,991	2,310	25.7	0	0	0.0	8,982	2,308	25.7	8,982	2,308	25.7
Yeast												
Cultures												
	526	138	26.2	26	4	15.4	492	133	27.0	521	138	26.5
Slides												
STDC Clinic	2,061	263	12.8	64	3	4.7	1,966	258	13.1	2,036	262	12.9
Other	8,725	1,237	14.2	18	5	27.8	8,677	1,229	14.2	8,717	1,236	14.2
Total	10,786	1,500	13.9	82	8	9.8	10,643	1,487	14.0	10,753	1,498	13.9

Table 6 - General Bacteriology
Neisseria Gonorrhoeae Antimicrobial Susceptibility
 January 1, 2002 to December 31, 2002

	MIC µg/ml	Primary		Referred		Total	
Penicillin							
Susceptible	≤ .06	27	(10.3)	18	(13.6)	45	(11.5)
Moderately susceptible	0.12 - 1.0	206	(79.2)	89	(67.4)	295	(75.2)
Resistant (CMRNG)	≥ 2.0	17	(6.5)	9	(6.8)	26	(6.6)
Resistant (PPNG)	2.0 ≥ 8.0	10	(3.8)	16	(12.1)	26	(6.6)
Total		260		132		392	
Tetracycline							
Susceptible	≤ .25	23	(8.8)	18	(13.6)	41	(10.4)
Moderately susceptible	0.5 - 1.0	96	(3.7)	63	(47.7)	159	(40.6)
Resistant	2.0 - 8.0	140	(53.8)	41	(31.1)	181	(46.2)
Resistant (TRNG)	≥ 16	1	(0.4)	10	(7.6)	11	(2.8)
Total		260		132		392	
Ceftriaxone, Cefixime							
Susceptible	≤ .25	260	(100.0)	132	(100.0)	392	(100.0)
Ciprofloxacin							
Susceptible	≤ .06	208	(80.0)	102	(77.3)	310	(79.1)
Moderately susceptible	0.125 - 0.5	47	(18.1)	12	(9.1)	59	(15.1)
Resistant	1.0	1		1		2	
	2.0	1		5		6	
	4.0	0		1		1	
	8.0	2		8		10	
	16.0	1		2		3	
	≥32.0	0		1		1	
Subtotal		5	(1.9)	18	(13.6)	23	(5.9)
Total		260		132		392	

Susceptible:

patient has <5% likelihood of failing therapy

Moderately susceptible(Intermediate):

indicates predictable treatment failure rates of 5 - 15% if patient is treated with the tested antibiotic in the standard dosage (in most cases of moderate susceptibility, a higher dose or prolonged therapy results in >95% cure rates)

Resistant:

associated with clinical treatment failures of >15%

Table 7 - General Bacteriology
Susceptibility of *Neisseria gonorrhoeae* to Penicillin
1992-93 to 2002

Year	Number (%) of isolates				Total Isolates
	Susceptible	Mod. Susceptible	Resistant		
			CMRNG	PPNG	
92-93	162 (35.2)	253 (55.0)	7 (1.5)	38 (8.3)	460
93-94	82 (28.4)	180 (62.3)	15 (5.2)	12 (4.2)	289
94-95	52 (14.4)	276 (76.7)	15 (4.2)	17 (4.7)	360
95-96	30 (8.5)	307 (87.0)	3 (0.8)	13 (3.7)	353
96-97	45 (14.0)	230 (71.4)	22 (6.8)	25 (7.8)	322
97-98	20 (8.7)	169 (73.8)	27 (11.8)	13 (5.7)	229
1998	44 (17.2)	158 (61.7)	27 (10.5)	27 (10.5)	256
1999	83 (17.6)	353 (74.8)	23 (4.9)	13 (2.8)	472
2000	106 (24.8)	300 (70.1)	1 (0.2)	21 (4.0)	428
2001	68 (19.0)	257 (72.0)	16 (4.5)	16 (4.5)	357
2002	45 (11.5)	295 (75.2)	26 (6.6)	26 (6.6)	392

Susceptible: MIC \leq .06

Moderately susceptible (Intermediate): MIC 0.12 - 1.0

Resistant: MIC \geq 2.0

CMRNG: Chromosomally-mediated resistance

PPNG: Penicillinase-producing (plasmid-mediated)

Table 8 - General Bacteriology
Susceptibility of *Neisseria gonorrhoeae* to Tetracycline
1992-93 to 2002

Year	Number (%) of isolates				Total Isolates
	Susceptible	Mod. Susceptible	Resistant		
			CMRNG	TRNG	
92-93	254 (55.2)	156 (33.9)	38 (8.3)	12 (2.6)	460
93-94	123 (42.6)	118 (41.2)	38 (12.1)	10 (3.5)	289
94-95	142 (39.4)	145 (40.3)	46 (12.8)	27 (7.5)	360
95-96	96 (27.2)	193 (54.7)	41 (11.6)	23 (6.5)	353
96-97	70 (21.7)	143 (44.4)	91 (28.3)	18 (5.6)	322
97-98	38 (18.0)	93 (40.6)	86 (37.6)	12 (5.2)	229
1998	63 (24.6)	62 (24.2)	121 (47.3)	10 (3.9)	256
1999	71 (17.6)	181 (38.3)	208 (44.1)	12 (2.5)	472
2000	87 (20.3)	182 (42.5)	151 (35.3)	8 (1.9)	428
2001	94 (26.3)	177 (49.6)	78 (21.8)	8 (2.2)	357
2002	41 (10.4)	159 (40.6)	181 (46.2)	11 (2.8)	392

Susceptible: MIC \leq .25

Moderately susceptible (Intermediate): MIC 0.5 - 1.0

Resistant: MIC \geq 2.0

CMRNG: Chromosomally-mediated resistance

TRNG: High level resistance (plasmid-mediated)

Table 9 - General Bacteriology
Susceptibility of *Neisseria gonorrhoeae* to Ciprofloxacin
1992-93 to 2002

Year	Number(%) of isolates			Total isolates
	Susceptible	Mod. Susceptible	Resistant	
90-91	231 (100.0)			231
91-92	547 (99.8)	1 (0.2)		548
92-93	449 (97.6)	10 (2.2)	1 (0.2)	460
93-94	278 (96.2)	11 (3.8)		289
94-95	342 (95.0)	15 (4.2)	3 (0.8)	360
95-96	325 (92.1)	22 (6.2)	6 (1.7)	353
96-97	303 (94.1)	11 (3.4)	8 (2.5)	322
97-98	216 (94.3)	5 (2.2)	8 (3.5)	229
1998	231 (90.2)	5 (2.0)	20 (7.8)	256
1999	436 (92.4)	9 (1.9)	27 (5.7)	472
2000	401 (93.7)	14 (3.3)	13 (3.0)	428
2001	327 (91.5)	10 (2.8)	20 (5.6)	357
2002	310 (79.1)	59 (15.1)	23 (5.9)	392

Susceptible: MIC \leq .06

Moderately susceptible (Intermediate): MIC 0.125 - 0.5

Resistant: MIC \geq 1.0

Table 10 - General Bacteriology
Gram Negative Bacteria Identified
January 1, 2002 to December 31, 2002

<i>Achromobacter</i>	<i>piechaudii</i>	3	<i>Moraxella</i>	<i>nonliquefaciens</i>	9
	<i>xylosoxidans ss denitrificans</i>	1		<i>osloensis</i>	17
	<i>xylosoxidans ss xylosoxidans</i>	12	<i>Morganella</i>	<i>morganii</i>	1
<i>Acinetobacter</i>	<i>baumannii</i>	1	<i>Myroides</i>	<i>species</i>	2
	<i>junii</i>	1	<i>Neisseria</i>	<i>cinerea</i>	4
	<i>lwoffii</i>	15		<i>elongata ss glycolitica</i>	1
	<i>asaccharolytic strain</i>	7		<i>elongata ss nitroreducans</i>	4
	<i>saccharolytic strain</i>	1		<i>meningitidis:</i>	
<i>Actinobacillus</i>	<i>actinomycetemcomitans</i>	3		serogroup A	2
	<i>ureae</i>	2		serogroup B	17
<i>Aeromonas</i>	<i>hydrophila group</i>	2		serogroup C	10
<i>Agrobacterium</i>	<i>radiobacter</i>	1		serogroup Y	6
<i>Alcaligenes</i>	<i>faecalis</i>	2		nongroupable	6
	<i>like Group 1</i>	1		<i>mucosa</i>	2
<i>Brevundimonas</i>	<i>vesicularis</i>	1		<i>subflava ss perflava/sicca</i>	5
<i>Burkholderia</i>	<i>cepacia</i>	12		<i>weaveri</i>	2
	<i>mutivorans</i>	1	<i>Ochrobactrum</i>	<i>anthropi</i>	4
<i>Capnocytophaga</i>	<i>canimorsus</i>	4	<i>Oligella</i>	<i>urethralis</i>	1
	<i>haemolyticus</i>	1	<i>Pasteurella</i>	<i>canis</i>	2
	<i>species (CDC Group DF-1)</i>	3		<i>dagmatis</i>	1
<i>Cardiobacterium</i>	<i>hominis</i>	1		<i>haemolyticus</i>	1
CDC Group	DF-3	1		<i>multocida ss mutocida</i>	4
	EF-4b	1		<i>multocida ss septica</i>	2
	EO-2	1		<i>stomatis</i>	5
	EO-3	1	<i>Providencia</i>	<i>rettgeri</i>	1
	O-2	1		<i>stuartii</i>	3
<i>Chryseobacterium</i>	<i>indologenes</i>	1	<i>Pseudomonas</i>	<i>aeruginosa</i>	27
	<i>indologenes/gleum</i>	1		<i>fluorescens</i>	3
	<i>meningosepticum</i>	3		<i>oryzihabitans</i>	4
<i>Citrobacter</i>	<i>freundii</i>	5		<i>pseudoalcaligenes</i>	1
<i>Eikenella</i>	<i>corrodens</i>	8		<i>putida</i>	4
<i>Enterobacter</i>	<i>agglomerans</i>	3		<i>stutzeri</i>	4
	<i>amnigenus</i>	1		<i>thomasi</i>	2
	<i>cloacae</i>	7		<i>like Group 2</i>	1
<i>Escherichia</i>	<i>coli</i>	61	<i>Rahnella</i>	<i>aquatilis</i>	1
	<i>vulneris</i>	1	<i>Ralstonia</i>	<i>pickettii</i>	3
<i>Haemophilus</i>	<i>aphrophilus</i>	5	<i>Roseomonas</i>	<i>species</i>	2
	<i>influenzae</i>	28	<i>Salmonella</i>	<i>species</i>	2
	<i>parahaemolyticus</i>	1	<i>Serratia</i>	<i>liquefaciens</i>	2
	<i>parainfluenzae</i>	4		<i>marcescens</i>	5
	<i>paraphrophilus</i>	1	<i>Sphingobacterium</i>	<i>multivorum</i>	1
<i>Hafnia</i>	<i>alvei</i>	1		<i>paucimobilis</i>	1
<i>Klebsiella</i>	<i>oxytoca</i>	1	<i>Stenotrophomonas</i>	<i>maltophilia</i>	8
	<i>pneumoniae</i>	10	<i>Vibrio</i>	<i>parahaemolyticus</i>	1
<i>Methylobacterium</i>	<i>species</i>	1	<i>Weeksella</i>	<i>virosa</i>	1
<i>Moraxella</i>	<i>catarrhalis</i>	3			
Total (including proficiency tests)					411

Table 11 - General Bacteriology
Gram Positive Bacteria Identified
January 1, 2002 to December 31, 2002

<i>Abiotrophia</i>	<i>defectiva</i>	1	<i>Helcococcus</i>	<i>kunzii</i>	1	
	species	2	<i>Kocuria</i>	<i>kristinae</i>	3	
<i>Actinomyces</i>	<i>europaeus</i>	1	<i>Lactobacillus</i>	<i>acidophilus</i>	1	
	<i>gravenitzi</i>	5		<i>casei</i>	2	
	<i>luteus</i>	1		<i>casei subspecies rhamnosus</i>	3	
	<i>meyeri</i>	2		<i>fermentum</i>	1	
	<i>naeslundii</i>	1		<i>leichmannii</i>	2	
	<i>neuui subspecies anitratus</i>	3	<i>Lactococcus</i>	species	2	
	<i>odontolyticus</i>	7	<i>Leuconostoc</i>	<i>garviae</i>	1	
	<i>radingae</i>	1		<i>mesenteroides</i>	1	
	species	4	<i>Microbacterium</i>	<i>pseudomesenteroides</i>	1	
	<i>viscosus</i>	3		<i>flavescens</i>	1	
<i>Aerococcus</i>	<i>sanguicola</i>	2	<i>Micrococcus</i>	species	1	
	<i>urinae</i>	2	<i>Paenibacillus</i>	<i>luteus</i>	2	
	<i>urinaehominis</i>	5		<i>macerans</i>	1	
	species	7	<i>Propionibacterium</i>	species	2	
<i>Alloiococcus</i>	species	1		<i>avidum</i>	3	
<i>Arcanobacterium</i>	<i>haemolyticum</i>	1		<i>granulosum</i>	3	
<i>Arthrobacter</i>	species	2		<i>propionicus</i>	1	
<i>Aureobacterium</i>	species	1	<i>Rhodococcus</i>	species	2	
<i>Bacillus</i>	<i>cereus</i>	14	<i>Rothia</i>	<i>dentocariosa</i>	1	
	<i>circulans</i>	10	<i>Staphylococcus</i>	<i>aureus</i>	104	
	<i>circulans group</i>	4		<i>aureus subspecies aureus</i>	1	
	<i>coagulans</i>	1		<i>auricularis</i>	1	
	<i>licheniformis</i>	6		<i>coagulase negative</i>	1	
	<i>megaterium</i>	2		<i>cohnii</i>	1	
	<i>pumilus</i>	7		<i>epidermidis</i>	15	
	species	9		<i>haemolyticus</i>	4	
	<i>sphaericus</i>	2		<i>hominis</i>	4	
	<i>subtilis</i>	2		<i>hominis subspecies hominis</i>	3	
	<i>subtilis group</i>	1		<i>lugdunensis</i>	2	
	<i>thuringiensis</i>	1		<i>pasteuri</i>	1	
<i>Brevibacillus</i>	<i>brevis</i>	1		<i>saprophyticus</i>	1	
	species	2	<i>Stomatococcus</i>	species	1	
	<i>casei</i>	2	<i>Streptococcus</i>	<i>warneri</i>	5	
	species	3		<i>mucilaginosus</i>	2	
<i>Corynebacterium</i>	<i>accolens</i>	2	<i>Streptococcus</i>	<i>alpha haemolytic</i>	1	
	<i>afermentans subspecies afermentan</i>	2	<i>Streptococcus</i>	<i>anginosus</i>	16	
	<i>amycolatum</i>	13		<i>anginosus group C</i>	2	
	<i>aquaticum</i>	1		<i>anginosus group F</i>	1	
	<i>coyleae</i>	1		<i>anginosus Species/Group</i>	1	
	<i>diphtheriae</i>	10		<i>beta-haemolytic group B</i>	3	
	group F-1	3		<i>beta-haemolytic group C</i>	1	
	group G	10		<i>beta-haemolytic group G</i>	5	
	group G-2	1		<i>bovis</i>	2	
	<i>jeikeium</i>	2		<i>bovis variant</i>	9	
	<i>minutissimum</i>	6		<i>constellatus</i>	20	
	<i>mucifaciens</i>	2		<i>gordonii</i>	3	
	<i>neuui subspecies anitratus</i>	1		<i>infantrius</i>	1	
	<i>propinquum</i>	2		<i>intermedius</i>	14	
	<i>pseudodiphtheriticum</i>	13		<i>mitis</i>	1	
	species	3		<i>mitis species/group</i>	15	
	<i>striatum</i>	5		<i>mutans</i>	5	
	<i>ulcerans</i>	3		<i>ralis</i>	40	
	<i>urealyticum</i>	1		<i>parasanguis</i>	5	
<i>Dermabacter</i>	<i>hominis</i>	4		<i>pasteurianus</i>	1	
<i>Dolosigranulum</i>	<i>pigrum</i>	1		<i>pneumoniae</i>	294	
<i>Enterococcus</i>	<i>casseliflavus</i>	3		<i>pyogenes (Group A)</i>	216	
	<i>faecalis</i>	19		<i>salivarius</i>	19	
	<i>faecium</i>	19		<i>salivarius species/group</i>	1	
	<i>gallinarum</i>	4		<i>sanguis group</i>	5	
<i>Gardnerella</i>	<i>vaginalis</i>	1		<i>sanguis I</i>	4	
<i>Gemella</i>	<i>haemolysans</i>	2		<i>sanguis II</i>	1	
	species	1		<i>sanguis species/group</i>	19	
<i>Gordonia</i>	<i>sputi</i>	1		species	1	
<i>Granulicatella</i>	<i>adiacens</i>	1		<i>viridans</i>	24	
					Total	1,167

**Table 12 - General Bacteriology
Anaerobes Identified
January 1, 2002 to December 31, 2002**

<i>Actinomyces</i>	<i>israelii</i>	6	<i>Fusobacterium</i>	<i>necrophorum</i>	2
	<i>meyeri</i>	3		<i>nucleatum</i>	10
	<i>naeslundii</i>	1		<i>mortiferum</i>	1
	<i>odontolyticus</i>	2	<i>Leptotrichia</i>	<i>buccalis</i>	1
	<i>viscosus</i>	2	<i>Peptostreptococcus</i>	<i>asaccharolyticus</i>	1
<i>Bacteroides</i>	<i>distasonis</i>	1		<i>anaerobius</i>	2
	<i>fragilis</i>	2		<i>magnus</i>	4
	<i>ovatus</i>	1		<i>productus</i>	2
	<i>species</i>	1	<i>Prevotella</i>	<i>melaninogenica</i>	1
	<i>thetaitaomicron</i>	1	<i>Propionibacterium</i>	<i>acnes</i>	11
<i>Bifidobacterium</i>	<i>species</i>	1		<i>avidum</i>	1
<i>Clostridium</i>	<i>clostridioforme</i>	1		<i>productus</i>	1
	<i>glycolicum</i>	3		<i>propionicum</i>	2
	<i>perfringens</i>	9		<i>species</i>	3
	<i>septicum</i>	2	<i>Staphylococcus</i>	<i>saccharolyticus</i>	2
	<i>sphenoides</i>	2	<i>Veillonella</i>	<i>parvula</i>	1
	<i>sporogenes</i>	2			
<i>Eubacterium</i>	<i>lentum</i>	1			
Total					86

Figure 1 - *Neisseria gonorrhoeae* Penicillin MICs
January 1, 2002 to December 31 ,2002

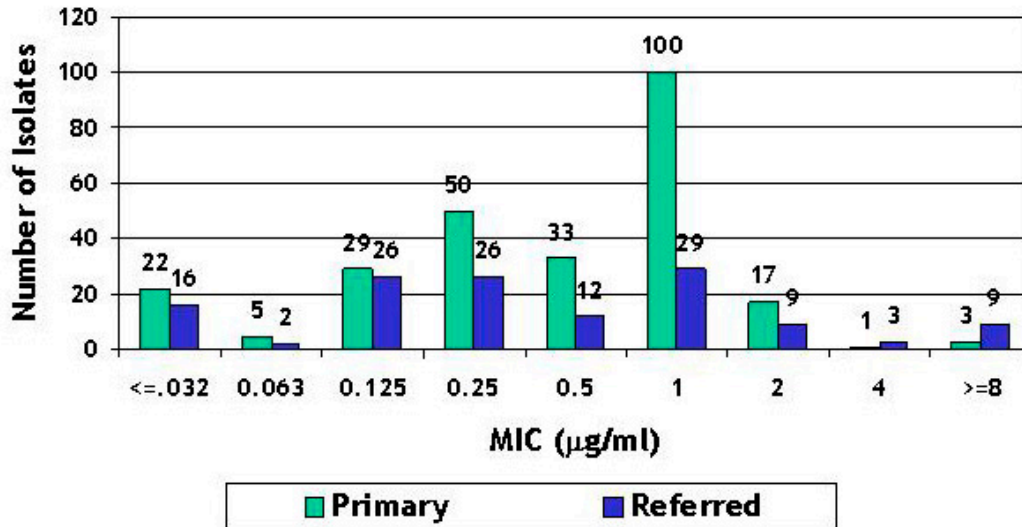


Figure 2 - *Neisseria gonorrhoeae* Tetracycline MICs
January 1, 2002 to December 31 ,2002

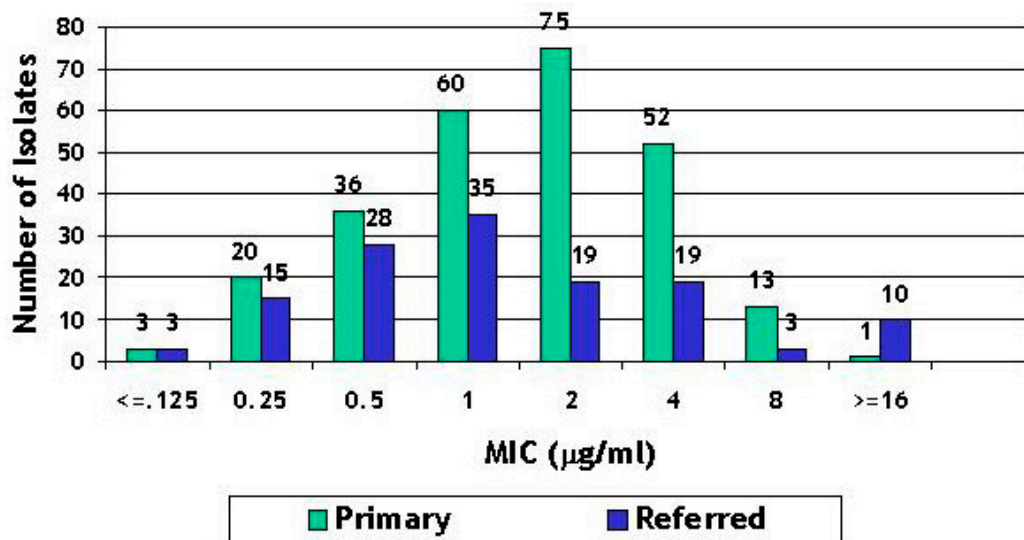


Figure 3 - *Neisseria gonorrhoeae* Ciprofloxacin MICs
January 2, 2001 to December 31 ,2002

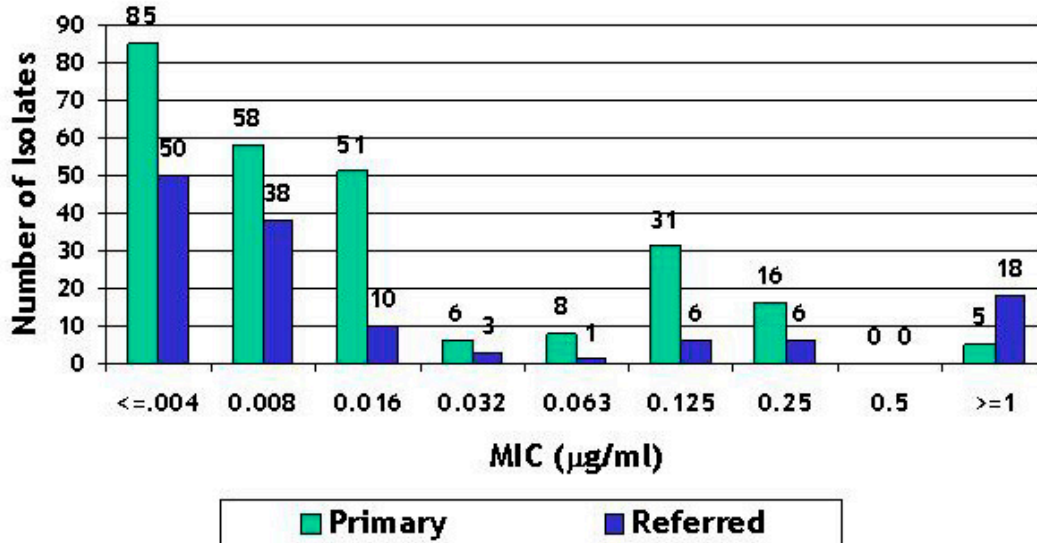


Figure 4 - *Neisseria gonorrhoeae* Ceftriaxone MICs
January 1, 2002 to December 31 ,2002

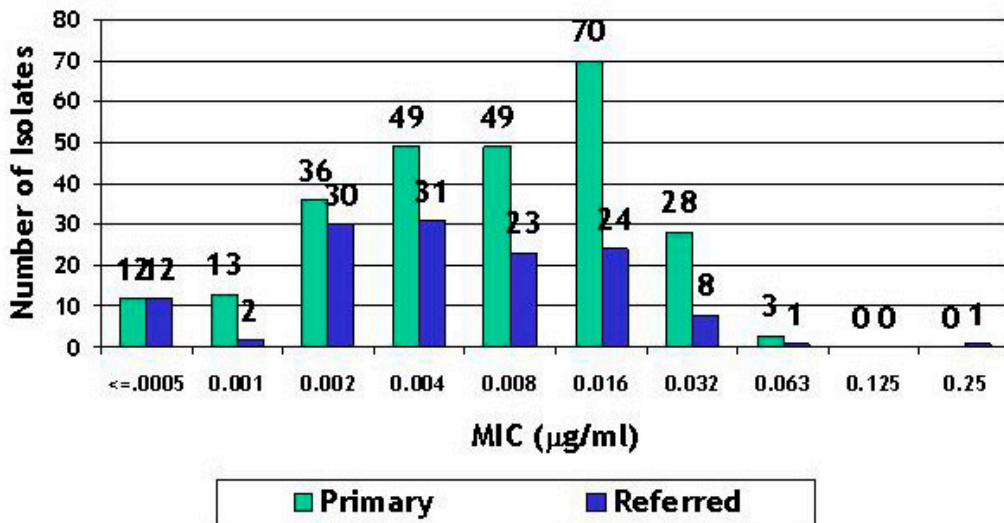


Figure 5 - *Neisseria gonorrhoeae* Cefixime MICs
January 1, 2002 to December 31 ,2002

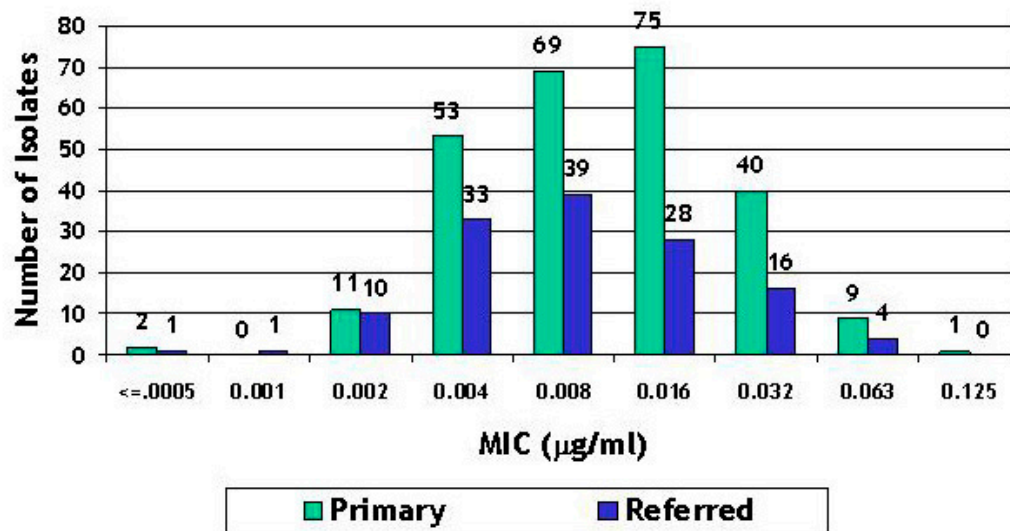


Table 1 - Mycology
Frequency of Isolation of Species from all Mycology Cultures Identified
January 1, 2002 to December 31, 2002

Group	Positive		Group	Positive	
	#	%		#	%
Yeast			Dermatophytes		
<i>Candida albicans</i>	908	54%	<i>Trichophyton rubrum</i>	136	62%
<i>Candida glabrata</i>	282	17%	<i>Trichophyton metagrophytes</i>	54	25%
<i>Candida parapsilosis</i>	152	9%	<i>Trichophyton tonsurans</i>	10	5%
<i>Candida species</i>	130	8%	<i>Microsporum canis</i>	5	2%
<i>Cryptococcus neoformans var gattii</i>	44	3%	<i>Trichophyton violaceum</i>	5	2%
<i>Candida tropicalis</i>	42	3%	<i>Epidermophyton floccosum</i>	2	1%
<i>Cryptococcus neoformans var neoformans</i>	35	2.10%	<i>Trichophyton verrucosum</i>	3	1%
<i>Saccharomyces cerevisiae</i>	22	1%	<i>Trichophyton krajdani</i>	1	0%
<i>Rhodotorula species</i>	15	1%	<i>Microsporum gypseum</i>	1	0%
<i>Cryptococcus species</i>	13	1%	<i>Trichophyton raubitschekii</i>	1	0%
<i>Trichosporon species</i>	11	1%	Total	218	
<i>Malassezia furfur</i>	7	0%			
<i>Candida dubliensis</i>	3	0%			
<i>Malassezia pachydermatis</i>	1	0%			
<i>Geotrichum penicillatum</i>	1	0%			
<i>Kloeckera species</i>	1	0%			
<i>Pichia ohmeri</i>	1	0%			
Total	1,668				
Aspergillus			Dimorphic Fungi		
<i>Aspergillus fumigatus</i>	274	73%	<i>Coccidioides immitis</i>	15	79%
<i>Aspergillus niger</i>	53	14%	<i>Histoplasma capsulatum</i>	2	11%
<i>Aspergillus species</i>	17	5%	<i>Sporothrix schenkii</i>	2	11%
<i>Aspergillus flavus</i>	21	6%			
<i>Aspergillus nidulans</i>	8	2%	Total	19	
Total	373				
Other Pathogens			Aerobic Actinomycetes		
Other non-pathogenic IDs	199	71%	<i>Nocardia asteroides complex</i>	8	22%
<i>Penicillium species</i>	29	10%	<i>Nocardia asteroides</i>	8	22%
<i>Pseudoallescheria boydii</i>	12	4%	<i>Nocardia farcinica</i>	8	22%
<i>Fusarium species</i>	10	4%	<i>Streptomyces species</i>	5	14%
<i>Chrysosporium species</i>	10	4%	<i>Nocardia species</i>	3	8%
<i>Acremonium species</i>	8	3%	<i>Nocardia nova</i>	2	5%
<i>Scopulariopsis species</i>	7	3%	<i>Nocardia brasiliensis</i>	2	5%
<i>Natrassia mangiferae</i>	4	1%	<i>Nocardia rhodochrous group</i>	1	3%
<i>Absidia corymbifera</i>	1	0%	Total	37	
Total	280				

Table 1 - Mycobacteriology
Frequency of Isolation by Species from 22,754 Specimens
January 1, 2002 to December 31, 2002

Groups	# Positive		% Positive	
	Specimens	Patients	Specimens	Patients
Tuberculosis complex (total = 705)				
<i>bovis (BCG)</i>	1	1	0.1%	0.1%
<i>tuberculosis</i>	704	271	39.9%	29.1%
Photochromogens (total = 24)				
<i>MCRO 33 similar to simiae</i>	1	1	0.1%	0.1%
<i>kansasii</i>	13	5	0.7%	0.5%
<i>marinum</i>	5	3	0.3%	0.3%
<i>simiae</i>	5	5	0.3%	0.5%
Non-photochromogen (total = 766)				
<i>avium-intracellulare</i>	731	421	41.4%	45.3%
<i>branderi</i>	3	2	0.2%	0.2%
<i>CF triplex isolate 23</i>	1	1	0.1%	0.1%
<i>goodii</i>	6	5	0.3%	0.5%
<i>interjectum</i>	4	4	0.2%	0.4%
<i>malmoense</i>	1	1	0.1%	0.1%
<i>terrae</i>	13	12	0.7%	1.3%
<i>terrae complex</i>	6	5	0.3%	0.5%
<i>triplex sub-species</i>	1	1	0.1%	0.1%
Skotochromogen (total = 125)				
<i>duvalii</i>	2	2	0.1%	0.2%
<i>gordonae</i>	96	88	5.4%	9.5%
<i>heckeshornense</i>	1	1	0.1%	0.1%
<i>lentiflavum</i>	1	1	0.1%	0.1%
<i>MCRO 19</i>	1	1	0.1%	0.1%
<i>szulgai</i>	7	3	0.4%	0.3%
<i>xenopi</i>	17	6	1.0%	0.6%
Rapid Grower (total = 144)				
<i>abscessus</i>	9	7	0.5%	0.8%
<i>chelonae</i>	75	37	4.3%	4.0%
<i>chelonae chemovar.niacinogenes</i>	3	3	0.2%	0.3%
<i>fortuitum</i>	37	29	2.1%	3.1%
<i>fortuitum complex</i>	4	3	0.2%	0.3%
<i>mucogenicum</i>	5	2	0.3%	0.2%
<i>neoaerum</i>	1	1	0.1%	0.1%
<i>obuense</i>	2	2	0.1%	0.2%
<i>peregrinum</i>	7	5	0.4%	0.5%
<i>Rapid Grower (Group IV)</i>	1	1	0.1%	0.1%
Total All Groups	1764	930	100.0%	100.0%

Table 2 - Mycobacteriology
Mycobacteria by Patient Age in BC
January 1, 2002 to December 31, 2002

Region	1 to 15	16 -25	25 to 65	> 65	Total
Capital			26	65	91
Cariboo		1	4	1	6
Central island		1	6	6	13
Coast Garibaldi			1	6	7
East Kootenay		1		2	3
Fraser Valley		1	13	18	32
Kootenay Boundary			2	2	4
North Okanagan			8	8	16
North Shore		1	11	15	27
North West			4	7	11
Northern Interior	2	1	8	9	20
Okanagan Similkameen			18	35	53
Peace Liard			4	2	6
Simon Fraser	4	8	54	48	114
Sourth Fraser	3	3	47	54	107
Thompson		1	5	7	13
Upper Island			4	11	15
Vancouver/Richmond	6	14	209	162	391
Yukon				1	1
Total	15	32	424	459	930

Table 3 - Mycobacteriology
Tuberculosis & Non-Tuberculosis Mycobacteria Positive Isolates
January 1, 2002 to December 31, 2002

Isolates from	<i>M. tuberculosis</i>		NTM	
	Count	Percentage	Count	Percentage
Clinical Specimens	585	83%	741	70%
Referred Cultures	120	17%	318	30%
Total	705		1,059	

Table 1 - Parasitology
Gastrointestinal Parasites Identified
January 1, 2002 to December 31, 2002

Protozoan Parasites		
+	<i>Blastocystis homini</i>	1,529
	<i>Endolimax nana</i>	779
	<i>Entamoeba coli</i>	607
	<i>Entamoeba hartmanni</i>	431
+	<i>Dientamoeba fragilis</i>	300
	<i>Iodamoeba bütschlii</i>	283
*	<i>Giardia lamblia</i>	216
*	<i>Entamoeba histolytica/dispar</i>	154
*	<i>Cryptosporidium</i> species	55
*	<i>Entamoeba</i> species, possibly <i>E. histolytica/dispar</i>	49
	<i>Chilomastix mesnili</i>	43
*	Microsporidia	26
	<i>Enteromonas hominis</i>	13
*	<i>Cyclospora cayetanensis</i>	3
	<i>Trichomonas hominis</i>	3
	<i>Entamoeba</i> species., undetermined	2
*	<i>Isospora belli</i>	1
	Total	4,494

Helminthic (Worm) Eggs	
<i>Trichuris trichiura</i>	119
Hookworm	69
<i>Ascaris lumbricoides</i>	67
<i>Hymenolepis nana</i>	37
<i>Schistosoma mansoni</i>	19
<i>Enterobius vermicularis</i>	14
Resembling <i>Clonorchis sinensis</i>	6
<i>Trichostrongylus</i> species	5
<i>Taenia</i> species	2
<i>Fasciola/Fasciolopsis</i> species	2
<i>Diphyllobothrium</i> species	1
Total	341

Helminth Larvae	
<i>Strongyloides stercoralis</i>	10

Worm or Worm Segments	
<i>Ascaris lumbricoides</i>	10
<i>Diphyllobothrium</i> species	8
<i>Taenia proglottids</i>	2
<i>Enterobius vermicularis</i>	1
Total	21

Table 2 - Parasitology
Ectoparasites & Insecta Identified
January 1, 2002 to December 31, 2002

Ticks	
<i>Ixodes pacificus</i>	383
<i>Dermacentor andersoni</i>	171
<i>Ixodes angustus</i>	45
<i>Rhipicephalus sanguineus</i>	11
<i>Amblyomma</i> species	4
<i>Ixodes</i> species	5
<i>Dermacentor albipictus</i>	2
Damaged tick	3
<i>Amblyomma americanum</i>	1
<i>Dermacentor</i> species	1
<i>Dermacentor variabilis</i>	1
<i>Hyalomma</i> species	1
<i>Rhipicephalus</i> species	3
Total	631

Lice	
<i>Phthirus pubis</i>	4
<i>Pediculus humanus</i>	2
Total	6

Nits	
<i>Pediculus humanus</i>	3
<i>Phthirus pubis</i>	1
Total	4

Fly/Fly Larva	
<i>Dermatobia hominis</i> (Bot fly)	4
Sheep Ked	1
Total	5

* Some ticks were from animal hosts

Bedbug	
<i>Cimex lectularius</i>	3
<i>Cimex</i> species	1
Total	4

Figure 1 - Specimen Analysis for Ova & Parasites
January 1, 2002 to December 31, 2002

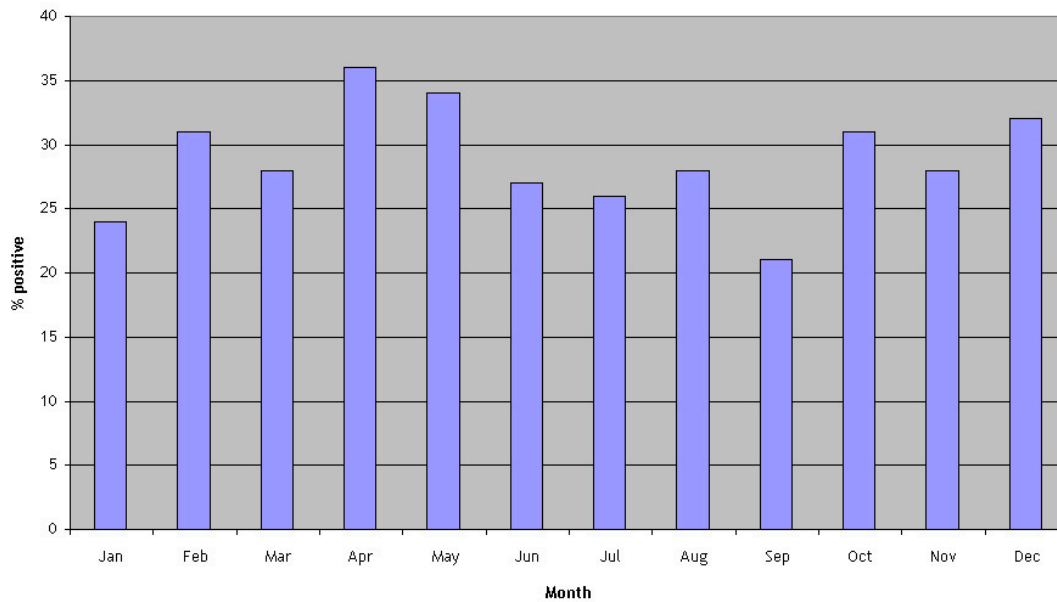


Figure 2 - Analysis of Helminth Groups Identified January 1, 2002 to December 31, 2002

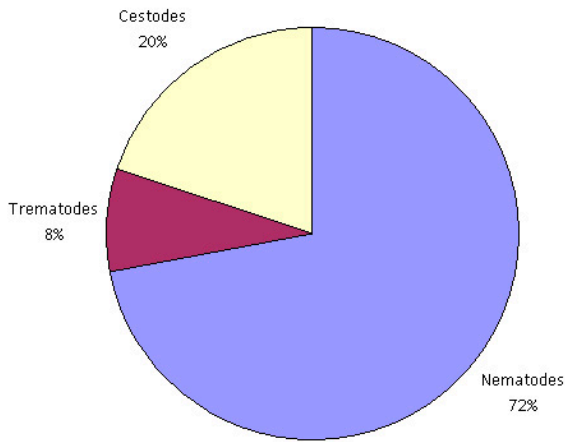


Figure 3 - Types of Nematodes (Roundworms) Identified January 1, 2002 to December 31, 2002

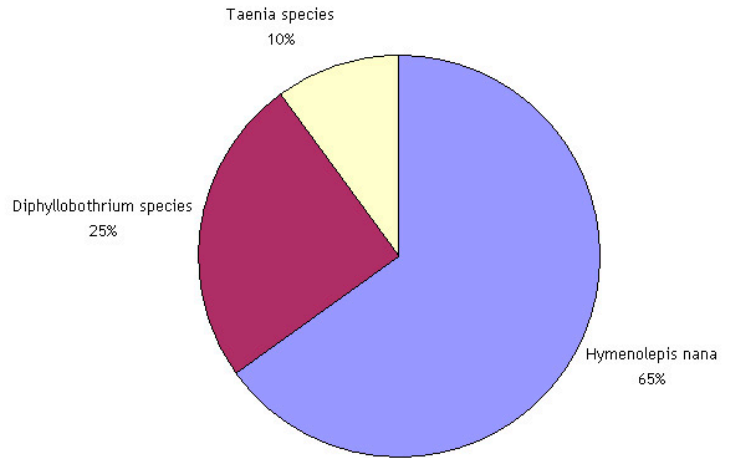


Figure 4 - Types of Trematodes (Flukes) Identified January 1, 2002 to December 31, 2002

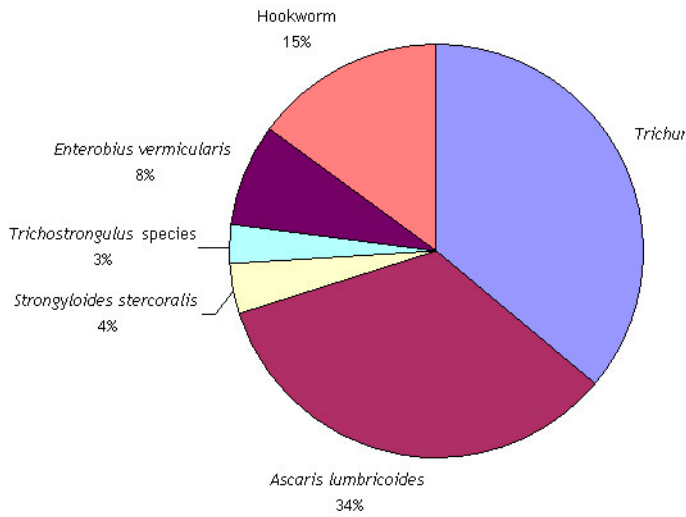
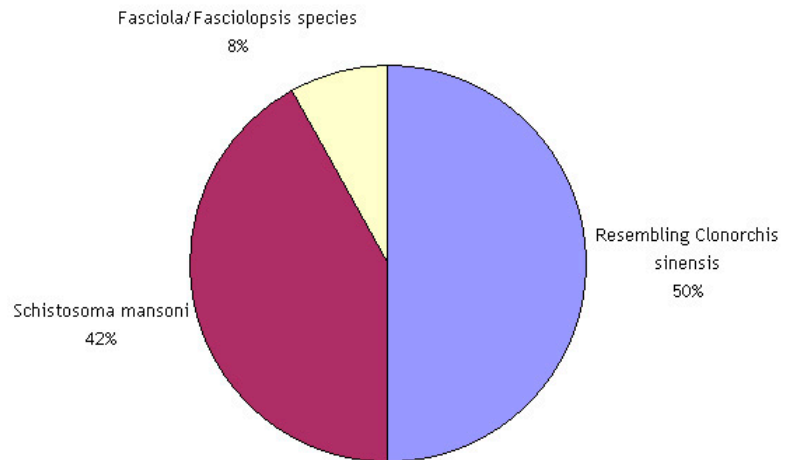


Figure 5 - Types of Cestodes (Tapeworms) Identified January 1, 2002 to December 31, 2002



**Table 1 – Virology
Specimens Received
January 1, 2002 to December 31, 2002**

	2002	2001
Virus Isolation		
Culture	22,567	22,757
Electron Microscopy	(2,278)	(1,625)
Light Microscopy	(5)	(13)
Fluorescence Microscopy	(2,235)	(1,050)
Virus Serology		
Rubella	53,413	47,461
Hepatitis	142,015	112,218
Other Serology	28,918	24,158
Occupational Exposure	11,196	1,722
Hepatitis C PCR, Genotyping	13,507	8,283
HIV		
HIV Serology	145,094	134,776
HIV PCR	335	234
HTLV Serology	1,062	788
Total	408,107	352,397

**Table 2 – Virology
Proficiency Testing Programs
January 1, 2001 to December 31, 2001**

Source	Survey Type	Frequency (per year)
CAP	Virology Culture	3
CAP	Virology Antigen Detection (IF)	3
CAP	Virology Antibody Detection	3
CAP	Nucleic Acid Amplification	3
CAP	AABB/CAP Viral Markers (Hepatitis, HIV, HTLV,CMV)	3
CAP	Rubella	3
CAP	HCV Viral Load	3
CDC (U.S.)	HIV Serology	2
CDC (U.S.)	HTLV Serology	1
CDC (U.S.)	HIV p24 Antigen	1
Health Canada	Measles/Rubella Serology	1
Health Canada	HIV Serology	3
Health Canada	Influenza (Identification)	1
Health Canada	Hepatitis Serology	1

Table 3 – Virology
Summary of Virus Identifications
January 1, 2001 to December 31, 2001

Virus/Agent	Isolation	Electron Microscopy	Light & Fluorescent Microscopy	PCR	Serology	Total
Adenovirus	31	29				60
Astrovirus			2			2
BK Virus				2		2
<i>Chlamydia pneumoniae</i>					29	29
<i>Chlamydia psittaci</i>					1	1
Cytomegalovirus	28				84	84
Dengue					17	17
Enterovirus (nt)	19					19
Enterovirus type 71	5					5
Epstein-Barr virus					209	209
Hepatitis A					49	49
Hepatitis B					873	873
Hepatitis C				4,842	4,870	9,712
Hepatitis E					3	3
Herpes group		1				1
Herpes simplex (nt)	27		3	19	36	85
Herpes simplex type 1	2,787					2,787
Herpes simplex type 2	2,887					2,887
Human herpesvirus 6					5	5
HIV-1					877	877
HTLV I					19	19
HTLV II					13	13
Influenza A (nt)	142		51		112	112
Influenza B	30				12	12
JC Virus					2	2
Measles					6	6
Mumps					5	5
<i>Mycoplasma pneumoniae</i>					381	381
Norovirus		23			5	28
Papovavirus		2				2
Parainfluenza 1	10					10
Parainfluenza 2	2					24
Parainfluenza 3	24		3			27
Parvovirus B19					87	87
Picornavirus	12					12
Poxvirus		1				1
Respiratory Syncytial	24		63		13	100
Rhinovirus	2					2
Rotavirus		80				80
Rubella					5	5
Sin Nombre (Muerto Canyon) Hantavirus	1					1
Torovirus		1				1
Varicella zoster	125		5		67	197
Yellow Fever					3	3
Total	6,155	140	125	4,863	7,784	19,066