LT2 Round 1 *Cryptosporidium* Occurrence and Binning Estimates

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Objective

- Provide update on *Cryptosporidium* occurrence and binning estimates since December 2011 Meeting
- Address the following questions:
  - How representative are the Round 1 monitoring data?
  - To what extent has the *Cryptosporidium* occurrence changed over time?
  - What's the status of system bin classification?

Outline

- Objective
- Data Source
- *Cryptosporidium* Occurrence
- Binning Results
- Summary

Data Source

- Data Collection and Tracking System (DCTS)
  - Round 1 monitoring data
  - Round 1 binning report
  - List of systems intent to grandfather and grandfathered data
  - List of systems intent to provide treatment instead of monitoring
- Information from Regions and States
  - List of systems in Bin 2 or above
  - List of systems intent to provide treatment instead of monitoring

What's New in Round 1 Data?

- April 2012 data pull from DCTS is most up-to-date
  - 2,000 more records than July 2011 data pull (44,944 vs. 42,910)
- Developed a "cleaned up" dataset after QA review by EPA and others
  - Removed redundant and EPA contested records
  - Flagged data with quality concerns
  - Removed unnecessary data fields; added a few new ones to clarify some potential data quality issues
- Posted original and "cleaned-up" datasets on the EPA website

Grandfathered Data

- About 900 facilities submitted Intent to Grandfather to DCTS
  - 640 or 70% are systems serving ≥10K people
  - 169 or 19% are systems serving <10K people
  - 97 or 11% had zero grandfathered data
  - Some had partial Round 1 data and partial grandfathered data
- Grandfathered data were not used for occurrence analysis because:
  - They are mostly in pdf files which is hard to process
  - Sample collection and analysis may be different from Round 1 monitoring
- Information from regions and states was used to estimate bin classification of grandfathered systems and the "missing" systems

Cryptosporidium Occurrence from Round 1 Monitoring Data

Characteristics of Round 1 Monitoring Data

- By filtration status
  - 95% of records are filtered systems
  - 5% of records are unfiltered or unknown
- By size for filtered systems
  - Systems serving ≥10K: represents 80% of monitoring baseline for this system size in LT2 Economic Analysis
  - Systems serving <10K: represents 3.4% of monitoring baseline for this system size in LT2 Economic Analysis, because:
    - Small systems are not required to submit data to DCTS,
    - Use of *E. coli* trigger has excluded low-occurrence systems

Cryptosporidium Occurrence Summary Statistics

Schedule	Systems	Facilities	Records	Field	Matrix Spikes
1	284	403	11,459	10,634	825
2	167	219	6,134	5,679	455
3	686	759	20,164	18,641	1,523
4	186	191	4,832	4,486	346
Total	1,323	1,572	42,589	39,440	3,149

* Includes only facilities having at least 6 field measurements.

Cryptosporidium Field Summary Statistics

Schedule	Mean*	% Non Detect
1	0.00962	94.6% (10,064 of 10,634)
2	0.0127	93.5% (5,308 of 5,679)
3	0.0165	93.1% (17,346 of 18,641)
4**	0.0239	88.3% (3,959 of 4,486)
All	**0.0149**	**93.0%** (36,677 of 39,440)

* Arithmetic mean using zero for non detects.

** Not including systems that met *E. coli* trigger level and avoided Crypto monitoring.

Cryptosporidium Summary Statistics by FACILITY*

Schedule	Number Facilities	No. With All-Non detects (%)	No. at or Above 0.075** (%)
1	403	240 (60%)	12 (3.0%)
2	219	108 (49%)	5 (2.3%)
3	759	388 (51%)	32 (4.2%)
4	191	84 (44%)	13 (6.8%)
All	1,572	820 (52%)	62 (3.9%)

* Includes only facilities having at least 6 field measurements.
** Based on plant mean, not running annual average (RAA).

Cryptosporidium Summary Statistics by WATER TYPE

Water Type NA = not available	Number of Facilities	No. with All-Non detects (%)	No. At or Above 0.075 (%)
Lake/Reservoir (LR)	709	458(65%)	8 (1%)
River/Stream (FS)	610	211 (35%)	46 (8%)
Both (LR & FS)	47	23 (49%)	3 (6%)
GWUDI*-LR	33	24 (73%)	1 (3%)
GWUDI*-FS	70	51 (73%)	2 (3%)
NA**	103	53 (51%)	2 (2%)
All	1,572	820 (**52%**)	62 (**3.9%**)

*GWUDI = ground water under direct influence
**NA = not available. Water Type was not specified.

Historic Summary Occurrence Statistics

- ICR Supplemental Survey (ICR SS)
  - Consisted of 47 systems serving ≥100K and 40 systems serving 10K to 100K
  - All 87 systems sampled twice per month for 12 months using method 1622/1623
- ICR SS Results
  - 2,086 source water measurements
  - 86% non detects
  - Average measured *Cryptosporidium* concentration = 0.053/ L
  - 18 plants (21%) had all non detects
  - 12 of 87 plants (14%) had means of at least 0.075/L

Comparison of Occurrence Data

- Overall occurrence is considerably lower than the ICR SS used for LT2 prediction:
  - More non detects (**93%** vs. **86%**) → Fewer detects (**7%** vs. **14%**)
  - More plants with all-non detects (**52%** vs. **21%**)
  - Lower overall average concentration (**0.015** vs. **0.053**)
  - Smaller % of source waters with mean concentrations of at least 0.075/L (**3.9%** vs. **14%**)

Blue = Round 1 **Red = ICR SS**

Binning Results

- DCTS binning report
  - Retrieved from DCTS which was calculated based on Round 1 monitoring data
- Non-DCTS binning result
  - Provided by regions and states which included grandfathered and “missing” system information
- Systems providing treatment instead of monitoring

DCTS Binning Report*

Population Served (LT2 Schedule)	Bin 2	Bin 3	Bin 4	Percent in Action Bin
≥10,000 (S1 to S3)	80	1	0	5.9% (81 of 1,381)
<10,000 (S4)	13	0	0	6.8% (13 of 191**)
Total	93	1	0	6.0% (94 of 1,572)

* Based on number of facilities. Calculated based on running annual averages.
**Not including systems that met *E. coli* trigger level and avoided Crypto monitoring.

Non-DCTS Binning Result

Population Served (LT2 Schedule)	Bin 2	Bin 3	Bin 4	Percent in Action Bin
≥10,000 (S1 to S3)	41	1	0	NA*
<10,000 (S4)	45	1	1	NA*
Total	86	2	1	NA*

NA* = not available. Total number of systems used for bin determination was unknown.

Binning Results of Filtered Systems ≥10,000 People

Data Source	Bin 2	Bin 3	Bin 4	Percent in Action Bin
DCTS	80	1	0	5.9% (81 of 1,381)
Non-DCTS	41	1	0	11.9% (42 of 352*)
Total	121	2	0	7.1% (123 of 1,733**)

* Assuming that the difference between 1,733 and 1,381 is the basis for non-DCTS bin determination.

** Based on monitoring baseline for filtered plants in LT2 Economic Analysis (EPA, 2006).

Systems Providing Treatment Instead of Monitoring

- 204 filtered systems submitted Intent to Provide 5.5-Log of Treatment Instead of Monitoring (equivalent to Bin 4)
  - 21 systems serving ≥10K
  - 183 systems serving <10K
- 15 unfiltered systems submitted Intent to Provide 3-Log of Treatment Instead of Monitoring
  - 2 systems serving ≥10K
  - 13 systems serving <10K
- 51 systems had unknown filtration status
- Actual *Cryptosporidium* concentrations are unknown

Summary

- *Cryptosporidium* occurrence from Round 1 data
  - Round 1 monitoring data represents 80% of filtered facilities (≥10K)
  - Overall *Cryptosporidium* occurrence can change considerably over time
  - River/stream source waters have a much higher level of *Cryptosporidium* occurrence than lake/reservoir waters
- Binning estimates from DCTS and non-DCTS data
  - Percent of filtered systems (≥10K) in Bin 2&3 based on non-DCTS data is twice as high as that based on DCTS data (11.9% vs. 5.9%)
  - Total number of filtered systems (≥10K) in non-DCTS is 25% of that in DCTS (352 vs. 1,381)

If you have any data and other information on source water *Cryptosporidium* occurrence and bin outcome please send it to:

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Appendix

Filtered Systems Account for 95% of Round 1 Data

Filtration Status	Systems (% of Total)	Facilities (% of Total)	Records (% of Total)
Filtered	1,365 (94.5%)	1,636 (94.9%)	42,897 (95.4%)
Unfiltered (Filtration Avoidance)	52 (3.6%)	56 (3.3%)	1,216 (2.7%)
Blank	28 (1.9%)	32 (1.8%)	831 (1.9%)
Total	1,445	1,724	44,944

How Representative is Round 1 Data? – Filtered Systems

Population Served	Round 1 Crypto Data*	Monitoring Baseline**	SDWIS Sept 2011 Pull	Percent of Monitoring Baseline	Percent of SDWIS Sept 2011 Pull
≥10,000	1,137 (1,381)	1,464 (1,733)	1,475	77.7% (79.7%)	79.9%
<10,000	186 (191)	5,476 (5,578)	5,001	2.5% (3.4)	2.7%
Total	1,323 (1,572)	6,940 (7,311)	6,476		

* Includes only facilities having at least 6 field measurements.
** LT2 Economic Analysis (EPA, 2006)
Data in parentheses are number of facilities

Facilities Intent to Grandfather

Population Served (LT2 Schedule)	Facilities Intent to Grandfather*	Facilities with Partial Round 1 Data and Partial GF Data	Facilities with GF Data Only**
≥10,000 (S1 to S3)	640	279	361
<10,000 (S4)	169	30	139
Total	809	309	500

* Includes facilities having at least 1 grandfathered sample.

** Includes facilities having at least 1 grandfathered sample and zero Round 1 sample.

Historical Occurrence Data

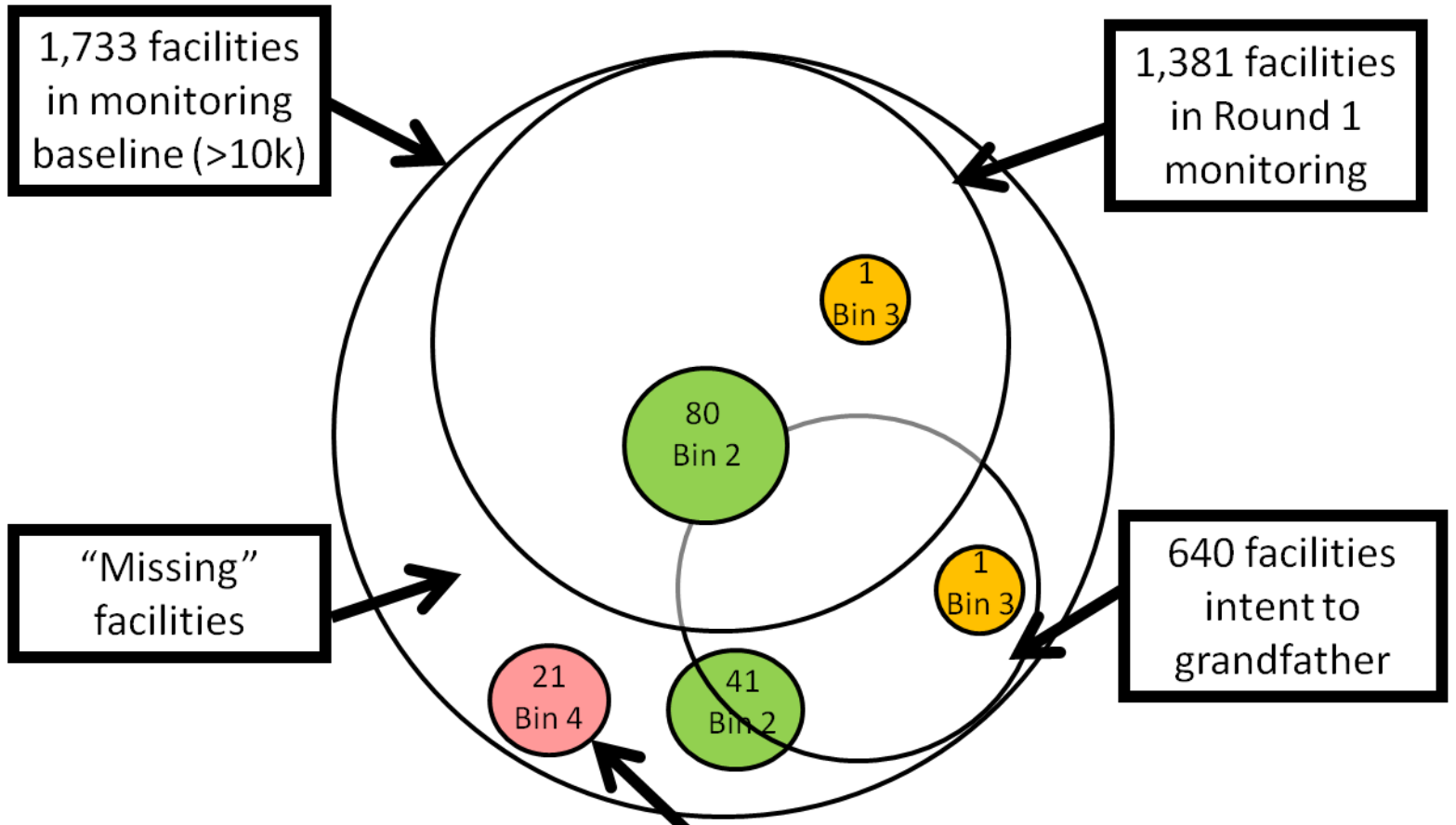
- *Cryptosporidium* occurrence data used to develop the LT2 Rule and its Economic Analysis
- **ICR –** All SW and GWUDI systems serving ≥ 100K people tested sources monthly for 18 months using the ICR method
- **SS Large –** The seven largest ICR systems plus a sample of 40 additional ICR systems tested twice per month for 12 months using method 1622/1623
- **SS Medium –** A sample of 40 systems serving 10K to 100K tested twice per month for 12 months using method 1622/1623

Summary Occurrence Statistics

- ICR
  - 5838 source water measurements
  - 93% zeros (non detects)
  - Average measured Crypto concentration = 0.067/L
  - Average recovery was about 1/3 that for methods 1622 & 1623
- ICR
  - 64 of 350 plants (18%) had means of at least 0.075/ L
  - 196 plants (56%) had all-zeros

Facilities Providing Treatment Instead of Monitoring

Population Served (LT2 Schedule)	Filtration Status			
	Filtered	Unfiltered	Unknown	Total
≥10,000 (S1 to S3)	21	2	0	23
<10,000 (S4)	183	13	51	247
Total	204	15	51	270



Not to Scale

Diagram of Bin Classification of Filtered Systems (>10k people)