

**BIOSOLIDS AS AN INDICATOR OF THE EFFECTIVENESS OF MERCURY
REDUCTION PROGRAMS**

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PURPOSE

To compile and discuss information relating to apparent reductions in the mercury content of the biosolids produced at wastewater treatment facilities serving municipalities which have initiated various levels of mercury reduction programs.

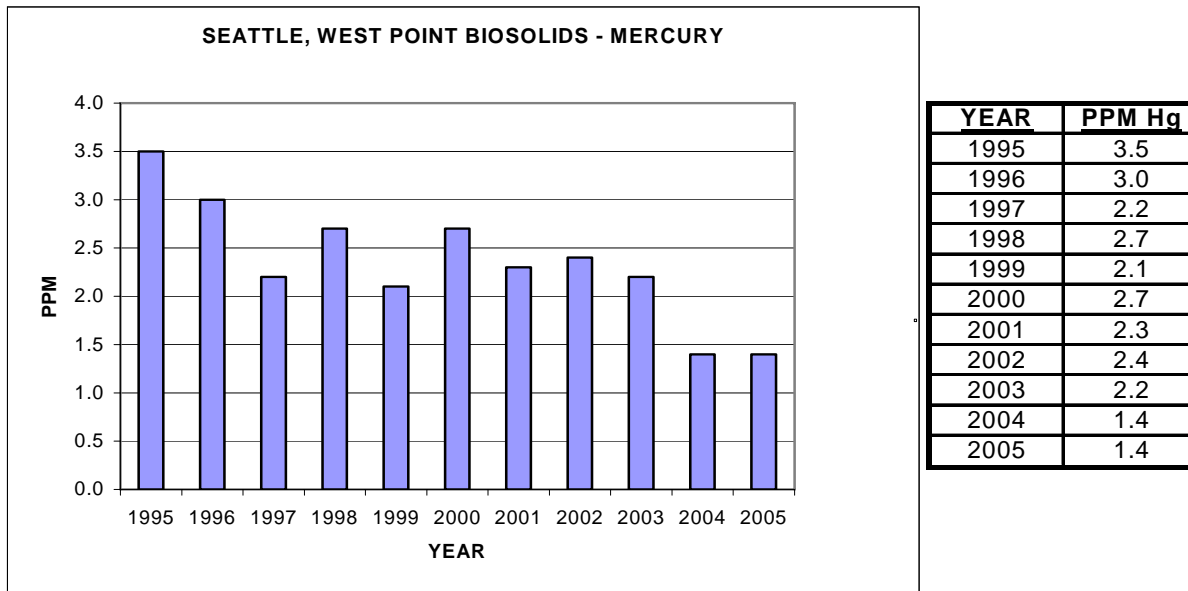
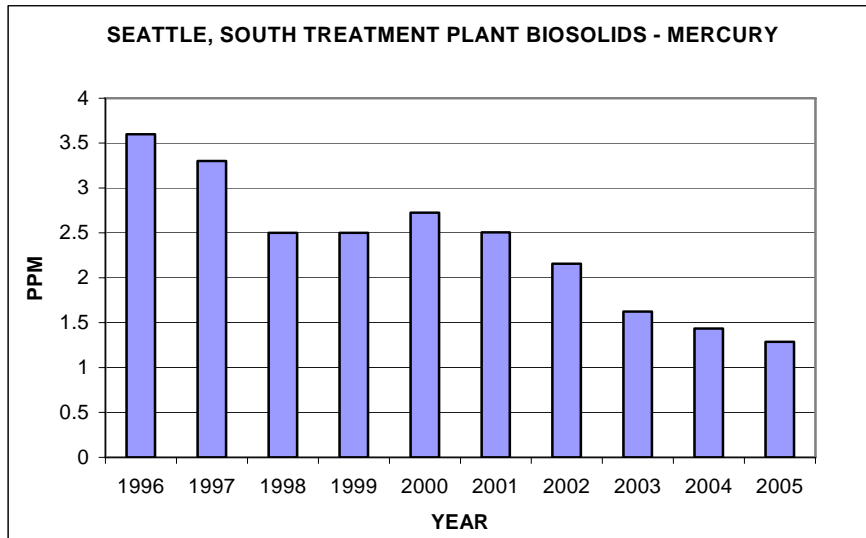
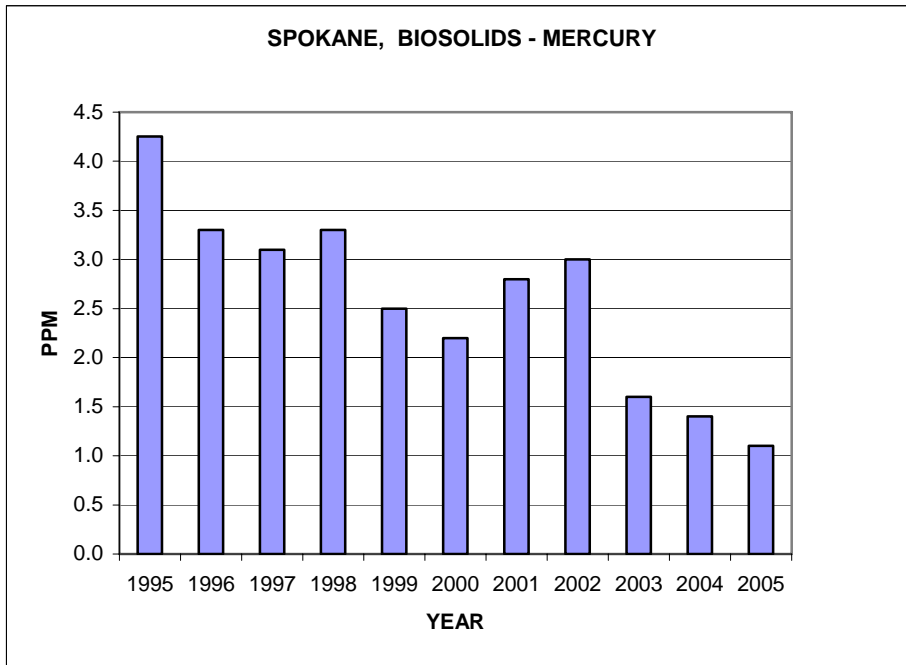


Figure 1. West Point Biosolids (Seattle). Mercury Reduction Program in Effect Since 2003.



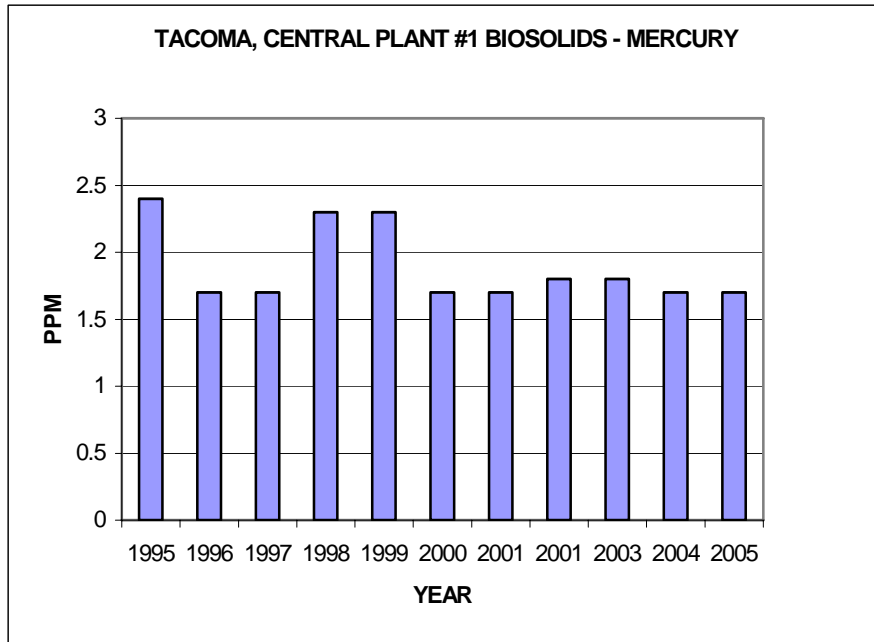
YEAR	PPM Hg
1996	3.6
1997	3.3
1998	2.5
1999	2.5
2000	2.7
2001	2.5
2002	2.2
2003	1.6
2004	1.4
2005	1.3

Figure 2. South Treatment Plant Biosolids (Seattle). Mercury Reduction Program in Effect Since 2003.



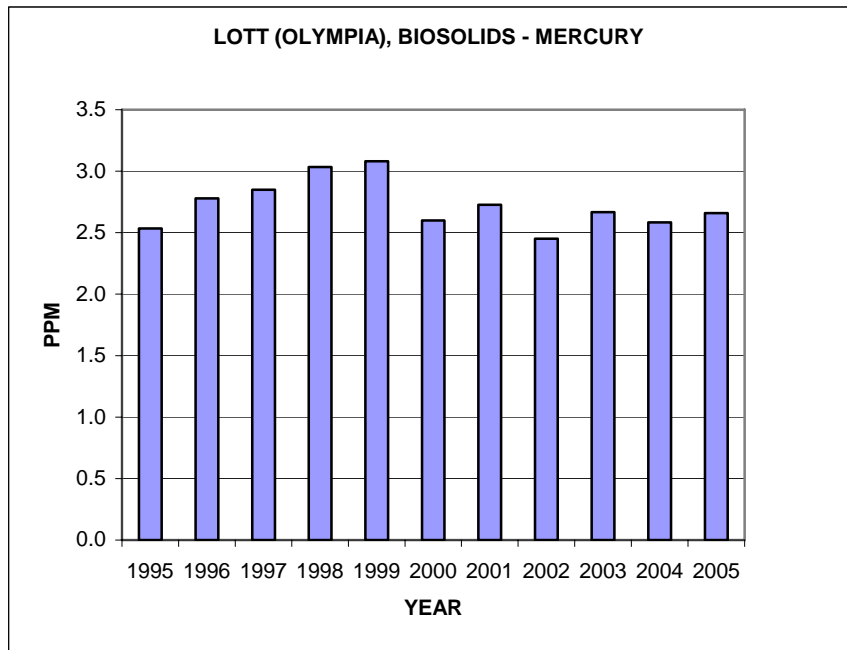
YEAR	PPM Hg
1995	4.3
1996	3.3
1997	3.1
1998	3.3
1999	2.5
2000	2.2
2001	2.8
2002	3.0
2003	1.6
2004	1.4
2005	1.1

Figure 3. Spokane Biosolids. Mercury Reduction Program in Effect for Several Years.



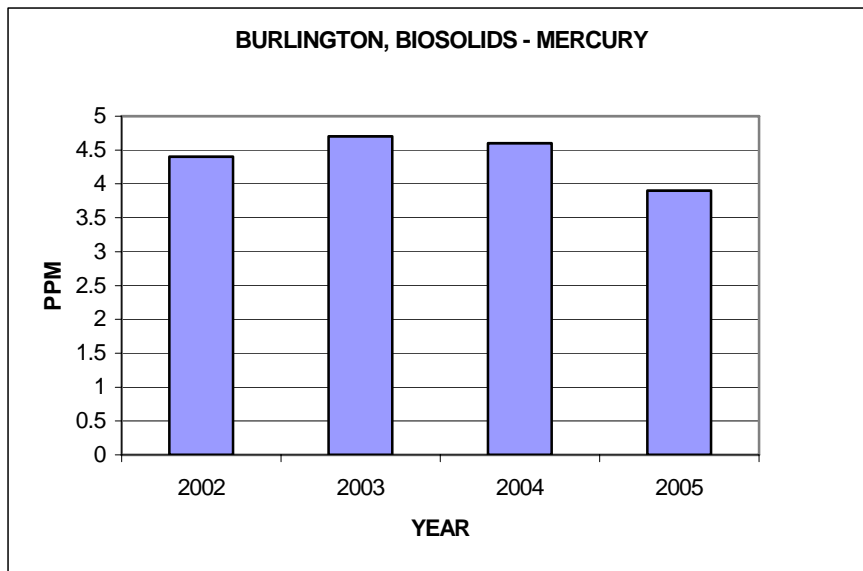
YEAR	PPM Hg
1995	2.4
1996	1.7
1997	1.7
1998	2.3
1999	2.3
2000	1.7
2001	1.7
2001	1.8
2003	1.8
2004	1.7
2005	1.7

Figure 4. Tacoma Central Plant #1 Biosolids. Long Term Mercury Reduction Program in Effect.



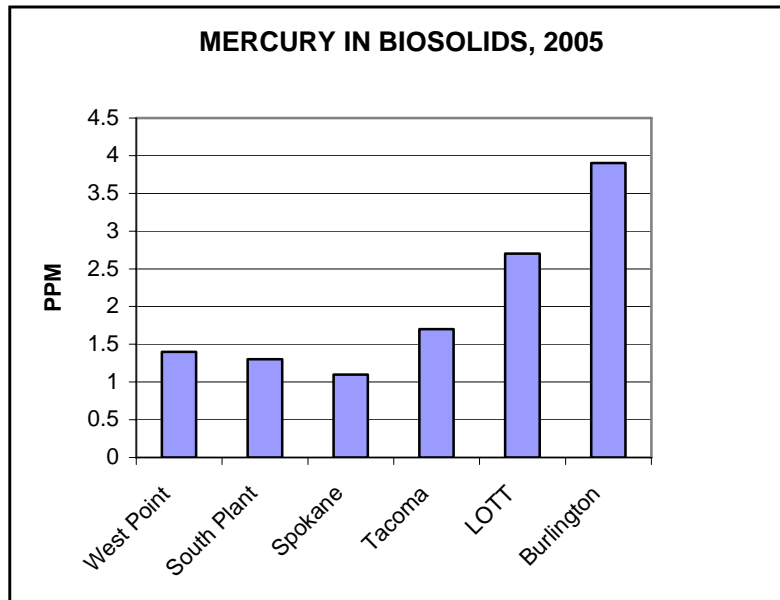
<u>YEAR</u>	<u>PPM Hg</u>
1995	2.5
1996	2.8
1997	2.9
1998	3.0
1999	3.1
2000	2.6
2001	2.7
2002	2.5
2003	2.7
2004	2.6
2005	2.7

Figure 5. LOTT (Olympia) Biosolids. Mercury Reduction Program with Major Emphasis Beginning September 2005.



YEAR	PPM Hg
2002	4.4
2003	4.7
2004	4.6
2005	3.9

Figure 6. Burlington Biosolids. Mercury Reduction Plan in Effect Early 2006.



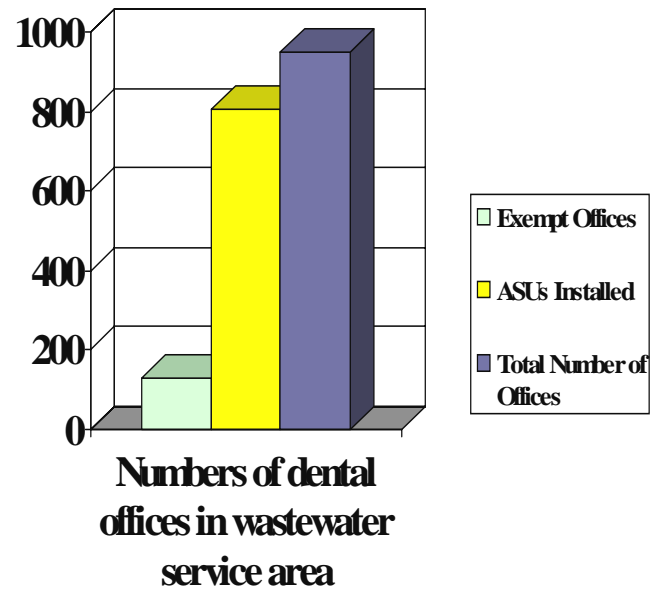
Year 2005	PPM Hg
West Point	1.4
South Plant	1.3
Spokane	1.1
Tacoma	1.7
LOTT	2.7
Burlington	3.9

Figure 7. Mercury in Biosolids, 2005. Mercury Reduction Programs in Effect in Seattle, Spokane and Tacoma. Not in Effect at LOTT (before September) and Burlington.

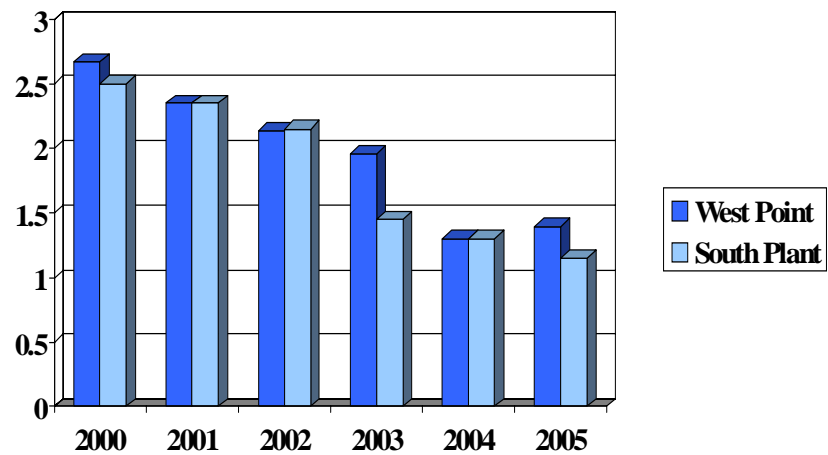
Additional Data

The following graphs were sent courtesy of the West Point and Renton (South Plant) Treatment Facilities in Seattle.

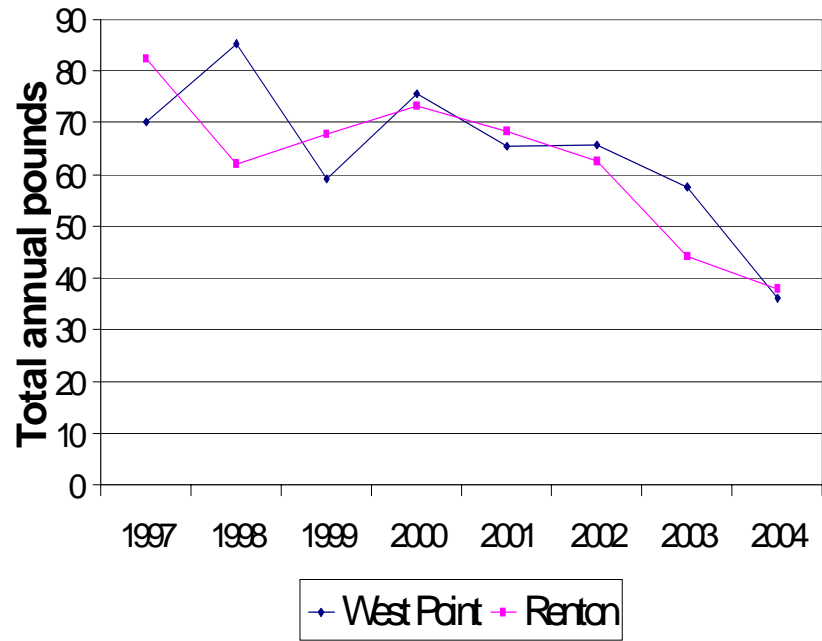
Compliance rate in 2005



Annual Median Mercury Concentration in Biosolids



Mercury, Pounds per year in Biosolids



Possible Reasons for the Decline of Mercury in Biosolids (not all reasons are applicable in all areas)

1. Amalgam Separator Units (ASU) in dental offices
2. Mercury thermometer exchange programs
3. Removal of all mercury from schools
4. Replacement of mercury manometers in hospitals, etc.
5. Additional attempts to replace mercury with other components

Conclusions

1. Data show a clear trend of decreasing mercury content of biosolids where a mercury reduction program is in effect.
2. The decrease is about one to one and a half parts per million since the beginning of the program .
3. While not significant from a toxicological standpoint, this decrease is still a good indicator of the effectiveness of these programs.

Future Efforts

- Continue collecting mercury data from wastewater treatment plants.
- Plot data on a monthly, rather than a yearly basis where possible, to detect trends.
- Gather data on other contaminants as indicators of reduction programs, such as silver, flame retardants, etc. (Ecology may have to pick up the costs for some tests.)

QUALIFIERS

1. Conclusions are based on only a few years data.
2. Possible changes in analytical procedures can give varying results.
3. Possible errors in sampling, non-representative samples, too few samples, and data transcription errors can cause discrepancies.
4. Nevertheless, the general conclusion is that this is a real effect which should continue as the number of mercury reduction programs increases.