

# Purves Environmental Inc.

Environmental Research and Consulting since 1993

## Dental Separator Study 3

### Purpose

To determine the effect of dissolved mercury on large volumes of water. The volumes selected are 1,000,000 liters and 1,000,000 gallons of water. The data comes from the analysis of discharges from dental offices into a municipal waste water treatment plant. The actual sampling points are at manholes in the street near the dental office and not from the actual separator.

### Assumptions

The assumption made is that the volume of water from the dental office is based upon a dry vacuum system in which no vacuum water is added. A wet vacuum system uses water to provide suction and can use up to 6 liters per minute of water which is mixed with the separator discharge, thus diluting the mercury concentration. It is assumed that the true volume of water from the chair to the discharge is 50 ml/minute. Thus a three chair office could be discharging 150 ml/minute. This low volume is used in the calculations below.

Table 1 below is a compilation of data from dental offices. (None of the data is theoretical)

Mercury Concentration from Dental Office	Number of Chairs	Liters of discharge per hour based upon 50ml/min per chair	Total Dissolved Mercury entering WWTP per hour in ng	Effect on 1,000,000 Liters (dilution effect)	Effect on 1,000,000 gallons (dilution effect)
1,570,000 ng/L	6	9	14,130,000	14.1 ng/L	54.7 ng/gal
255,000	3	9	2,295,000	2.30 ng/L	8.88 ng/gal
248,000	2	9	2,232,000	2.23 ng/L	8.63 ng/gal
94000	1	9	846,000	0.846 ng/L	3.27 ng/gal
303,000	5	9	2,727,000	2.73 ng/L	10.6 ng/gal
653,000	3	9	5,877,000	5.88 ng/L	22.7 ng/gal
47,500	1	9	427,500	0.428 ng/L	1.65 ng/gal
38,700	1	9	348,300	0.348 ng/L	1.34 ng/gal
556,000	5	9	5,004,000	5.00 ng/L	19.4 ng/gal
486,000 average	3	9	4,374,000	4.37 ng/L	16.9 ng/gal
National Limit				12 ng/L	46.4 ng/gal
Great Lakes Limit				1.3 ng/L	5.03 ng/gal
Average Residential Discharge			2,709,000 <sup>1</sup>	2.71 ng/L	10.5 ng/gal
Average Industrial Discharge			2,177,000 <sup>2</sup>	2.18 ng/L	8.42 ng/gal

1. Based upon half of the influent entering the WWTP is from residential and actual residential samples taken at manholes in the same manner as the manholes near dental offices.
2. Based upon half of the influent entering the WWTP is from industrial locations and actual industrial samples taken at manholes in the same manner as the manholes near dental offices.

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## **Impact on Waste Water Treatment Plants (POTWs)**

An exhaustive study was performed by the City of Elyria, Ohio that demonstrated a significant quantity of mercury is being discharged into their system by dental offices. When calculating the volume differences per hour the dental offices still generate more dissolved mercury entering the waste water treatment plant than both the residential and industrial influents. When complying with EPA discharge requirements, many POTWs are having difficulty meeting their limits. Based upon the data generated above, small POTWs may have mercury issues that are directly attributed to dental office discharges.

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