

Purves Environmental, Inc.

Real Solutions Since 1993

The Effect of Amalgam on POTWs

The introduction of 40CFR441 in the United States, called the Amalgam Rule has caused issues with both the POTW and the Dental Practice. The rule relies primarily on three initiatives. It requires the installation of Amalgam Separators, one-time registration with the POTW and the use of Best Management Practices (BMPs). All of which are being implemented in with many POTWs. The problem with the rule is three:

1. No discharge limits that allow the POTW to enforcement compliance.
2. No address of the dissolved mercury issue
3. No provision for adoption of Best Available Technology (BAT).

The examples being provided are the result of

1. Having a discharge limit that needed to be met (Unfortunately the POTW and not the dental practice.)
2. Addressing the **dissolved mercury** issue by using a separator that removes dissolve mercury
3. Developing advanced technology and combining it to produce Best Available Technology (BAT).

Example 1 Small Plant 0.5-1 MGD (1.9-3.8 MLD) 2017

City POTW is consistently violating their NPDES Discharge limit. Their limit is 2.97 ng/L. Their violations were approximately 4-5 ng/L. The primary source was one dental office generating an average of 320,000 ng/L at the manhole.

Solution: Clean Lines and adopt BMPs. Discharge reduced but not enough. Added MARS Bio-med LibertyBOSS separator. Discharge averaged 30,000 ng/L at the office. POTW just over their 2.97 ng/L limit. Not good enough. Added the Super Trap. Discharge reduced to 266 ng/L at the office. Less than 60 ng/L at the manhole. March 2018 POTW discharge 1.90 ng/L. Last test October 2019 POTW <1.3 ng/L.

Conclusion: Last discussion with city manager is that the plant is averaging < 2 ng/L. Has not had a result over 2 ng/L since March 2018.

MARS provided the Separator at \$1174 and guaranteed it for 3 years (it is now in year two and still working). The super trap cost is \$125 per year. Annualized cost \$516 per year.

Example 2:

Both city POTWs were in violation of their new permit limits. Plant 1 2.2-5 MGD (9.7-19 MLD) 2.4 ng/L Plant 2 0.5-1.0 MGD (1.9-3.8 MLD) 1.88 ng/L June 2019

Solution: Test all industries, medical and dental practices in the city. Dental practices were the greatest violators. Highest industry and medical practice were 98 ng/L. Dental Practices ranged 4,350 ng/L to 1,280,000 ng/L. City has a 10,000 ng/L limit for all businesses. Only dental practices caused violations. See Table 1 next page.

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Table 1 June 2019

Inspection	Discharge To	Condition	Amalgam Usage
June 2019	Street	of Separator/type	
Dental office 1	11,600 ng/L	No Separator	Places and removes Amalgam
Dental office 2	4,350 ng/L	New Cart/NXT	Removes Amalgam Only
Dental office 3	12,000 ng/L	Can't Inspect/ DRNA	Places and Removes Amalgam
Dental office 4	180,000 ng/L	No Separator	Places and Removes Amalgam
Dental office 5	10,900 ng/L	Nearly Full Leaking/NXT	Removes Amalgam Only
Dental office 6	1,280,000 ng/L	new cart 2 days old/NXT	Places and Removes Amalgam
Dental office 7	1,050,000 ng/L	Nearly Full/NXT	Places and Removes Amalgam
Dental office 8	168,000 ng/L	In Nearly Full/NXT	Places and Removes Amalgam
Dental office 9	15,300 ng/L	Unit Leaking/Syclone	Removes Amalgam Only
Dental office 10	49,600 ng/L	Unit Full/NXT	Removes Amalgam Only
Dental office 11	204,000 ng/L	In Bypass/NXT	Removes Amalgam Only

Offices that were in non-compliance were requested to make improvements. Four office made changes.

Table 2

Inspection	Discharge To	Condition	Amalgam Usage
October 2019	Street	of Separator/type	
Dental office 1	1800 ng/L	MARS LibertyBOSS And Super Traps	Places and removes Amalgam
Dental office 2	4,350 ng/L	No Change	Removes Amalgam Only
Dental office 3	12,000 ng/L	Can't Inspect/ DRNA No Change	Places and Removes Amalgam
Dental office 4	175 ng/L	Closed discharge	Places and Removes Amalgam
Dental office 5	457 ng/L	Replaced NXT with LibertyBOSS and super traps	Removes Amalgam Only
Dental office 6	2,490,000 ng/L	Same NXT Cartridge	Places and Removes Amalgam
Dental office 7	1,050,000 ng/L	Nearly Full/NXT	Places and Removes Amalgam
Dental office 8	3510 ng/L	Replaced NXT with Liberty BOSS No Super Filters	Places and Removes Amalgam
Dental office 9	6,311 ng/L	New Cartridge/Syclone	Removes Amalgam Only
Dental office 10	393 ng/L	Replaced NXT with LibertyBOSS and Super Traps	Removes Amalgam Only
Dental office 11	Unable to sample	In Bypass/NXT	Removes Amalgam Only

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Costs to each office that converted.

Office 1 \$1174 LibertyBOSS with 3-year guarantee plus super traps 2 \$125 per year. \$513 per year.

Office 5 \$1174 LibertyBOSS with 3-year guarantee plus Super Traps for 3 chairs per year \$768 per year. They were paying \$700 per year for cartridges and still in violation. They also like the no maintenance LibertyBOSS.

Office 8 \$1174 LibertyBOSS with 3-year guarantee no super traps. Three chairs. They were paying \$700 per year for cartridges and still in violation. They also like the no maintenance LibertyBOSS.

Office 10 \$1174 LibertyBOSS with 2-year guarantee. Super Traps for 6 chairs \$1337. They were paying \$1400 per year in cartridges and still in violation.

Both city plants have been in compliance of their discharge limits in September, October and November.

Another city has requested surveys and looking for corrective action with their dentists. Will start in December 6-10 MGD (23-38.7 MLD) Plant.

Other Items to consider:

Age of the practice and equipment, plumbing issues, and BMPs.

The BMP and plumbing are important. A specific protocol that has been most successful is the use of neutral line cleaners and super filters before installation of separator. This practice helps reduce biofilm and remove particulate in the lines before adding a amalgam separator. This was done at one office that started out at 1,020,000 ng/L. The last result without a separator was 121,000 ng/L. A separator will go in soon.

Conclusion:

The improvements to the environment in this case were developed by individuals that were self-motivated to make a difference. They examined the problem and attacked it in a logical manner. They decided a limit to be achieved and attacked the problem and developed a solution. Their concern for the environment produced a solution that could be applied today and into the future. Not all individuals, organizations or corporations think this way.

It is necessary to set goals that may seem impossible but achievable. For Our environment it is necessary to set limits that leave us, our children and grandchildren a better planet. It is necessary to look at innovative ways to solve difficult problems. It will encourage better technology for the future. We need:

1. To set limits on mercury in the dental environment.
2. Address the soluble mercury problem.
3. Encourage best available technology for improving our environment.

Without these, we remain in the past.