Verified by
Environmental Technology Verification Program

M.A.R.S. AmalgamBOSS

Technology Fact Sheet for M.A.R.S. AmalgamBOSS.

Performance Claim

The ARU10 was tested in accordance with the **ETV Protocol for Mercury Amalgam Removal Technologies Appendix A (March 2004).**[a] *In composite effluent samples collected upstream of and not diluted by additional water ingested for operation of a wet vacuum pump, and with installation of 0.7 mm chair-side trap, the following Verified Performance Statements 1 & 2 below are made in the context of this test plan and the three units*[b] *tested:*

(1) The ARU10 and the AmalgamBOSS can with 95% confidence remove at least 95% of the mercury amalgam in a dental operative waste-stream (meeting the Canada-Wide Standard on Mercury for Dental Amalgam Waste, the performance standards defined by ISO 11143 and the Canada Wide Standard target of 95 % national reduction in mercury from dental amalgam waste by 2005 from a base year of 2000)

(2) In accordance with the loadings in the ARU10 test plan of October 23 2003, the three[b] *ARU10 technologies produced effluents with Hg concentration below 31, 28 and 51 ppb, with at least 95% confidence.*

Technology Application

This technology is designed and engineered to control the discharge of mercury from dental operatives and produce concentration levels that conform to the Canada Wide Standard (2005) target for Dental Amalgam Waste releases to the environment.

The unit can treat flows of up to 9 imperial gallons/min (34 L/min) which gives it the capability of effectively treating multi-chair dental operatives. The design incorporates scientific principles to control both particulate and soluble fractions of mercury from chair side dental practices. It has a relatively infrequent maintenance cycle, with minimum downtime.

Performance Conditions

The ARU10 was tested in accordance with the **ETV Protocol for Mercury Amalgam Removal Technologies Appendix A (March 2004).**[a] Operating conditions including flow and separator effluent discharge volumes were measured during testing. The primary sampling points were the effluent from the separator and the discharge from the wet-vacuum pump. The total discharge from the separator during a test-run was collected.

It should be noted that the dilution effect provided by the wet vacuum system would result in lower measurable mercury concentrations (than those reported in (2) above) in the dental office effluent.

[a] Amalgam Removal Unit ARU 10 Test Plan (October, 2003) – A Technology Specific Test Plan derived from the protocol.

[b] Units 1,2 and 4.

Technology Description

The M.A.R.S. Bio-Med Processes Inc. AmalgamBOSS and Hygenitek ARU-10 units incorporate three (3) physical separation unit operations: Gravity separation, Adsorption and, Filtration. Gravity separation is achieved by flowing the waste stream through a baffled chamber that significantly reduces the flow rate and turbulence thereby maximizing the opportunity for amalgam particles to settle.

Adsorption is a process that removes soluble (ions) and colloidal charged particles from a waste stream. The adsorption bed generally is made of solid particles, having sites that are electrically charged with polarities that are opposite to those of the targeted species in the waste stream. Ionized (soluble) mercury and positively charged colloidal species of mercury will attach to the adsorption media through ionic bonding and thus be effectively removed from the waste stream.

Filtration in this application refers to the physical removal of non-soluble (particulates) material from the waste stream by flowing it through a material of defined porosity.

The AmalgamBOSS unit operates on the same principles and process flow as the ARU 10 but with greater capacity and ease of servicing. The ARU 10/AmalgamBOSS units are designed to treat flows of up to 9 imperial gallons per minute.

The AmalgamBOSS separator was evaluated by the American Dental Association at their research facility in Chicago IL. in October 2004. The testing was done according to ISO 11143:1999-12 protocol at a flow-rate of 750 mL/ Minute. The results show that the AmalgamBOSS separator is clearly capable of meeting the ISO performance requirement of 95% amalgam removal efficiency. Testing and evaluation of the AmalgamBOSS separator was completed on 16/11/04 at RWTUV in Germany by "Dipl.Ing. Hilgers". The AmalgamBOSS unit was certified as being compliant according to ISO 11143:2002-12 performance standards.

Verification

The test site chosen by ETV Canada was the Department of Biomaterials, Faculty of Dentistry at the University of Toronto. Three (3) ARU 10 dental amalgam separators were used in the testing. Five (5) test runs each representing 40 dental amalgam removals were performed by each separator that resulted in 200 data points generated for each unit. In addition the units were assessed as to their design features with respect to ISO requirements, and their potential reliability. The verification was completed by Pursol Inc. (Hamilton, Ontario) using ETV Canada's General Verification Protocol (March, 2000) and the Environmental Technology Testing and Verification Protocol for Mercury Amalgam Removal Technologies (March, 2004).

What is the ETV Program?

The Environmental Technology Verification (ETV) Program is a joint Environment Canada - Industry Canada initiative delivered by ETV Canada. The ETV Program is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

For more information on the M.A.R.S. AmalgamBOSS please contact:

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Printed February 2006 Expires February 2009