



**CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TOXIC SUBSTANCES CONTROL**

**Final Decision to Certify
Hazardous Waste Environmental Technologies**

The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) has made a final decision to certify the following company's hazardous waste environmental technology listed below:

Applicant: Smart Sonic Corporation, 2373 Teller Road, #107, Newbury Park, California 91320, a manufacturer of aqueous cleaning systems for printed circuit board stencils. Technology: Model 2000 and Model 4200 aqueous cleaning systems which combine Smart Sonic's proprietary 440-R SMT Detergent with ultrasonics (SMART SONIC⁷).

Chapter 412, Statutes of 1993, Section 25200.1.5., Health and Safety Code, enacted by Assembly Bill 2060 (AB 2060 by Assemblyman Ted Weggeland) authorizes DTSC to certify the performance of hazardous waste environmental technologies. Hazardous waste environmental technologies are certified pursuant to implementing regulations found in Title 22 of the California Code of Regulations (CCR 22), Chapter 46, Section 68000. Only technologies that are determined to not pose a significant potential hazard to the public health and safety or to the environment when used under specified operating conditions may be certified. Incineration technologies are explicitly excluded from the certification program.

The purpose of the certification program is to provide an in-depth, independent review of technologies at the manufacturers' level to facilitate regulatory and end-user acceptance. DTSC makes no express or implied warranties as to the performance of the manufacturer's product or equipment. The end-user is solely responsible for complying with the applicable federal, state, and local regulatory requirements. Certification does not limit DTSC's authority to require additional measures for protection of public health and the environment.

By accepting certification, the manufacturer assumes, for the duration of certification, responsibility for maintaining the quality of the manufactured equipment and materials at a level equal to or better than was provided to obtain certification and agrees to be subject to quality monitoring by DTSC as required by the statute under which certification is granted.

DTSC's proposed decision to certify was published on May 7, 1999, in the California Regulatory Notice Register 99, Volume No. 19-Z, pp. 960-964. No comments were received during the public review and comment period. DTSC's final certification shall become effective on July 19, 1999. Additional information supporting DTSC's final decision is available for review at:

California Environmental Protection Agency
Department of Toxic Substances Control
Office of Pollution Prevention and Technology Development
P.O. Box 806
1101 I St., 12th Floor
Sacramento, California 95812-0806

A description of the technology to be certified, the certification statement and the certification limitations for the technology of the company listed above follows.

**CERTIFICATION PROGRAM (AB 2060) FOR
HAZARDOUS WASTE ENVIRONMENTAL TECHNOLOGIES**

FINAL NOTICE OF TECHNOLOGY CERTIFICATION

TECHNOLOGY

SMART SONIC⁷ Aqueous Cleaning Systems, Model 2000 and Model 4200

APPLICANT

Manufacturer: Smart Sonic Corporation
2373 Teller Road, #107
Newbury Park, California 91320

Technology Description

Smart Sonic Corporation has developed and introduced to market the Model 2000 and Model 4200 ultrasonic aqueous cleaning systems. These systems replace 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113), 1,1,1-trichloroethane (1,1,1-TCA) and isopropyl alcohol (IPA) based systems for removing RMA (rosin mildly activated), no-clean, and water washable solder pastes from printed circuit board stencils. Stencils are used in the printed circuit board industry to apply a solder paste pattern onto surface mounted circuit boards (termed Aprinting[≡]). Electronic components are then mounted to the circuit board in the solder paste areas. Following the assembly of components, the circuit board is processed in the reflow oven in which the solder melts and forms the solder joint. Stencils may be cleaned up to several times during a printing operation to remove dried solder paste in apertures. In all cases, stencils are cleaned following a printing operation and prior to long-term storage. It is important to clean the stencil thoroughly so as to remove any residual solder paste in stencil apertures that could cause misprints in future printing operations.

Smart Sonic Corporation's stencil cleaning systems consist of Smart Sonic's 440-R SMT Detergent⁷, ultrasonic generator with 40 kHz piezoelectric transducers, stainless steel wash tank, rinse tank (included in the semi-automated system), and control devices. The aqueous cleaning systems are briefly described below; the associated literature is described in the U.S. Environmental Protection Agency evaluation report entitled *A Ultrasonic Aqueous Cleaning Systems, Smart Sonic Corporation, SMarTsonic⁷≡*. The Report can be viewed on the following websites:

U.S. EPA: <http://www.epa.gov/etv/library.htm>
Cal/EPA: <http://www.dtsc.ca.gov/sppt/opptd/etv/txppetvp.htm>

The semi-automated Model 2000 system is approximately 3 feet high with a 40 x 44 inch base. This system has a wash tank and a separate rinse station. System operations include preparing the initial wash bath, manually lowering the stencil in the wash tank, setting the wash cycle timer

(cleaning time) and pressing the start button, manually removing the stencil from the wash tank after completion of the wash cycle, rinsing the stencil in a separate rinse tank using a hand-held spray nozzle (supplied with system), and drying the stencil using dry compressed air or allowing to air dry.

The automated Model 4200 system is approximately 50 inches high with a 36 x 62 inch base. A pneumatic lift, used to raise and lower the stencil in the wash bath, extends 36 inches for a total system height of 86 inches. This system has one tank for washing with an automated rinse over the wash tank. The volume of rinsewater added to the wash tank is overflowed to an external collection vessel for further waste management. Detergent concentration levels can be maintained by manually adding detergent or by using the system's automatic detergent injection option. System operations include preparing the initial wash bath, loading the stencil into the pneumatic lift, setting the wash cycle timer (cleaning time) and pressing two start buttons (safety feature used to keep hands clear of pneumatic lift), and drying the stencil using dry compressed air or allowing to air dry. The automated functions include raising and lowering the stencil into the wash bath, cleaning the stencil to the preset wash time, and rinsing the stencil using an automated rinse over the wash bath. The volume of rinse water used is predetermined by the speed of the pneumatic lift during its opening cycle.

Both systems feature indicator lights and alarms to indicate either a low and/or high level of detergent solution in the wash tank. There are also several options for each system such as a power drain to pump the spent wash bath and rinses from the tanks for further waste management, a heater for cleaning applications requiring higher solution temperatures, and for the Model 4200 system, an optional auto fill button for filling the wash tank with water and detergent.

The combination of Smart Sonic's 440-R SMT Detergent and ultrasonics enables the removal of solder pastes from printed circuit board stencils. The detergent surfactants act as wetting agents to saturate the solder paste layer that is left on the stencil surface from the solder paste printing operation. The ultrasonics then produce an intense scrubbing action, through cavitation and implosion of microscopic bubbles, that enhances removal of the saturated solder paste layer. Ultrasonics are often more effective in cleaning hard-to-reach surfaces (i.e., small stencil apertures) than brushes and hand wipes. The cleaning bath is operated at room temperature, eliminating any potential adverse effects of higher temperatures on the stencil.

Basis for Certification

Technical data and information in support of the technology as an aqueous cleaning substitute for CFC-113, 1,1,1-TCA, and IPA-based cleaning systems were obtained from a variety of sources. These include data generated independently by California's South Coast Air Quality Management District (SCAQMD), DTSC generated data, end-user questionnaires, end-user on-site observations and inspections, and Smart Sonic supplied data and literature.

DTSC conducted on-site visits of end-users to evaluate cleaning performance of the Model 2000 and Model 4200 cleaning systems. Smart Sonic provided cleaning performance criteria since no

cleaning standards are set by the printed circuit board industry. DTSC conducted end-user phone questionnaires to gather information on technology process parameters, technology performance, and overall end-user satisfaction. DTSC reviewed laboratory data generated by SCAQMD to determine content of volatile organic compounds (VOC) and halogenated compounds in Smart Sonic's 440-R SMT Detergent. DTSC's industrial hygienist reviewed technology users manuals, 440-R SMT Detergent materials safety data sheet (MSDS), and visited end-users to determine whether conditions exist which may pose a hazard to worker safety. DTSC's toxicologist reviewed metal analysis conducted by DTSC's Hazardous Materials Laboratory (HML) and VOC analysis conducted by SCAQMD to determine whether characteristics or conditions exist from use of the 440-R SMT Detergent which may pose a hazard to the public health and the environment.

DTSC's Evaluation Team found the following:

X Cleaning Efficiency: In five facilities visited, no solder paste was observed in any of the stencil apertures at 10X magnification. The size of stencil apertures ranged from 12-50 mil (1 mil=.001 inch). All end-users removed excess solder paste from stencil prior to cleaning in the Smart Sonic aqueous cleaning systems. Cleaning times ranged from 60-90 seconds. Four of the five end-users visited were using a 10% concentration of Smart Sonic's 440-R SMT Detergent as recommended by Smart Sonic. The fifth end-user was using a 5% detergent concentration for removing water washable solder paste.

Eight additional end-users contacted by telephone were satisfied with the Smart Sonic stencil cleaning systems and stated that the systems clean consistently and as good, if not better, than the previously used cleaning systems. Previously used systems included CFC-113, 1,1,1-TCA and IPA.

X VOC Content: The 440-R SMT Detergent does not contain VOCs or halogenated compounds at a detection limit of 0.01% (v/v) using the SCAQMD's Clean Air Solvent Certification Protocol.

X Metals Content: Metals analyses conducted by DTSC's Hazardous Materials Laboratory indicate that samples of Smart Sonic's 440-R SMT Detergent concentrate showed no hazardous metals above U.S. EPA Test Method 6010/7470 detection limits.

X pH Measurement: DTSC's Hazardous Materials Laboratory determined the pH of the 440-R SMT Detergent concentrate to be 13 using U.S. EPA Test Method 9040. The pH measurements taken by DTSC's Evaluation Team during on-site visits (using pH indicator paper with pH range 0-14) showed cleaning bath pH of 11 when using 10% 440-R SMT Detergent concentration.

X Worker Health and Safety: While using Smart Sonic Aqueous Cleaning Systems, Model 2000 and 4200, end-users should follow Smart Sonic's recommended safety practices as outlined in the User's Manual and the Material Safety Data Sheet for the 440-R SMT Detergent. The only significant toxicity associated with the 440-R SMT Detergent

concentrate is acute toxicity due to its highly alkaline nature. DTSC's Industrial Hygienist recommends end-users have an eye wash station and an MSDS available within close proximity to the cleaning systems.

DTSC evaluated the SMART SONIC⁷ cleaning technology for certification as a solvent alternative cleaning technology based primarily on the SMART SONIC⁷ system's ability to reduce or eliminate VOC and halogenated air emissions while maintaining or improving cleaning efficiency. The Smart Sonic cleaning technology consists of the Model 2000 and Model 4200 system hardware, 440-R SMT Detergent, controls, and pertinent technology literature.

Certification Statement

Under the authority of Section 25200.1.5. of the California Health and Safety Code, the SMART SONIC⁷ aqueous cleaning systems, Model 2000 and Model 4200, are hereby certified as a Solvent Alternative Cleaning Technology subject to the conditions including the limitations/disclaimer set forth below. The Model 2000 and 4200 cleaning systems are capable of removing RMA (rosin mildly activated), no-clean, and water washable solder pastes from printed circuit board stencils such that no solder paste remains in stencil apertures at 10X magnification, provided that end-users follow Smart Sonic's cleaning guidelines. The 440-R SMT Detergent⁷ does not contain select volatile organic compounds or halogenated compounds above a detection limit of 0.01% (v/v) using the California South Coast Air Quality Management District's Clean Air Solvent Certification Protocol (April 1997).

Limitations of Certification

DTSC makes no express or implied warranties as to the performance of the SMART SONIC⁷ Aqueous Cleaning Systems. Nor does DTSC warrant that the SMART SONIC⁷ Aqueous Cleaning Systems are free from any defects in workmanship or materials caused by negligence, misuse, accident or other causes.

This certification is limited to use of the SMART SONIC⁷ Aqueous Cleaning Systems to replace 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113), 1,1,1-trichloroethane (1,1,1-TCA) and isopropyl alcohol (IPA) based systems for removing RMA (rosin mildly activated), no-clean, and water washable solder pastes from printed circuit board stencils.

Specific Conditions

1. Continuous Quality Control/Quality Assurance; Monitoring by DTSC

By accepting this certification the applicant assumes, for the duration of the certification, responsibility for maintaining the quality of the manufactured Model 2000 and Model 4200 aqueous cleaning systems, and instruction manuals and other documentation at a level equal to or better than that which was provided to obtain this certification. The applicant also agrees to be subject to quality monitoring by DTSC, as required by the law under which this certification is granted.

2. Revocation for Cause

DTSC may revoke this certification if it determines, on the basis of any reliable information, that the aqueous cleaning technology may pose a significant potential or actual hazard to human health and safety or to the environment, or that the technology does not perform as certified, or that any information submitted to DTSC related to the certification is inaccurate, has been misrepresented, or that any pertinent information was omitted.

3. Amendments at the Request of the Applicant

Amendments to this certification may be applied for by the applicant. Amendments will be processed as provided for in CCR 22, Chapter 46, Section 68050.

4. Certification Reference

The holder of a valid hazardous waste environmental technology certification is authorized to use the certification seal (California Registered Service Mark Number 046720) and shall cite the certification number and date of issuance in conjunction with the certification seal whenever it is used. When providing information on the certification to an interested party, the holder of a hazardous waste environmental technology certification shall at a minimum provide the full text of the final certification decision as published in the California Regulatory Notice Register.

5. Encouraging Proper Waste Management

Smart Sonic Corporation shall inform users that they must comply with applicable federal, state and local laws, regulations, or programs for managing wastes generated from the use of their aqueous cleaning technology. DTSC encourages users of the Smart Sonic aqueous cleaning technology to incorporate pollution prevention, reuse, and recycling whenever feasible to eliminate or further reduce the quantity of aqueous wastes generated.

Applications of the SMART SONIC⁷ Aqueous Cleaning Systems, Model 2000 and 4200

Business applications of the SMART SONIC⁷ Model 2000 and Model 4200 Aqueous Cleaning Systems include removal of RMA (rosin mildly activated), no-clean, and water washable solder pastes from printed circuit board stencils. These systems are also used for other applications which include cleaning adhesives from stencils and misprinted printed circuit boards, cleaning post solder flux residues from pallets, oven radiators, conveyor fingers and other tooling. These other cleaning applications, however, were not evaluated as part of this technology certification.

Regulatory Implications

DTSC's Certification is based on the technology's performance and by itself does not affect any regulatory requirements concerning the use of aqueous cleaning systems; it should, however,

facilitate and encourage the acceptance of this technology as a solvent alternative cleaning technology. Aqueous or solid wastes generated by the SMART SONIC⁷ Aqueous Cleaning Systems may be classified as hazardous wastes due to lead content or other contaminants and it is the responsibility of the generator to make this determination and to manage these wastes accordingly. If wastes are identified as hazardous wastes, these wastes must be managed in accordance to federal, state, and local regulations. On-site treatment of hazardous wastes may also require a permit, and generators must contact the appropriate regulatory authority prior to treating hazardous wastes. Transportation of hazardous wastes will generally require a licensed hazardous waste hauler.

Duration of Certification

Unless amended, this certification will remain in effect for three years from the date of issuance.