State of California
AIR RESOURCES BOARD

Executive Order AB-15-02

Relating to ARB Approval of Control Efficiencies for Alternative Control Technologies used for Compliance with the Airborne Toxic Control Measure for Auxiliary Diesel Engines Operated on Ocean-going Vessels At-Berth in a California Port

Advanced Cleanup Technologies, Inc.
Advanced Marine Emissions Control System (AMECS)

WHEREAS, the Air Resources Board (ARB) has adopted the "Airborne Toxic Control Measure for Auxiliary Diesel Engines Operated on Ocean-going Vessels At-Berth in a California Port" (the "ATCM;" title 17, California Code of Regulations, section 93118.3), which establishes requirements for ocean-going vessels that reduce oxides of nitrogen (NOx) and diesel particulate matter (PM) emissions;

WHEREAS, section 93118.3 (d)(2) and 93118.3 (e) of the ATCM establishes requirements for alternative control technologies that can be used to reduce emissions from ocean-going vessel auxiliary engines while at-berth in a California port;

WHEREAS, no alternative control technologies shall be used to comply with the requirements of the ATCM unless they fulfill the requirements specified in the ATCM;

WHEREAS, the ATCM requires the control efficiency for alternative control technologies to be calculated based on an emission test protocol that is approved by the Executive Officer prior to conducting the emission measurements, and that emission measurements are conducted using the test methods specified in section 93118.3(e)(4)(B)(3);

WHEREAS, Advanced Cleanup Technologies, Inc. (ACTI or the applicant) has developed a barge based capture and control system to treat emissions from auxiliary engines on ocean-going vessels called the Advanced Marine Emission Control System (AMECS);

WHEREAS, AMECS consists of the following components and subcomponents as specified in the AMECS Equipment List in Confidential Appendix A to this Executive Order including: a direct connect capture duct, and an emission control system comprising of a particulate filter, Selective Catalytic Reduction (SCR) unit, and an packed tower absorber to reduce NOx, PM with a diameter of 2.5 micrometers or less ($PM_{2.5}$) and oxides of sulfur (SOx) and two 120kW tier 4F generator sets;

WHEREAS, ACTI submitted its Emission Test Protocol to ARB on December 30, 2014;

WHEREAS, on January 10, 2015, ARB approved ACTI's Emission Test Protocol;

WHEREAS, ACTI submitted its Test Report on May 20, 2015, and additional testing data on September 15, 2015;

WHEREAS, ARB reviewed and evaluated the Test Report and additional data for the AMECS based on the requirements specified in the ATCM;

WHEREAS, the Executive Officer finds it is appropriate to approve the results of the emission measurements and to issue this Executive Order that identifies the approved control efficiencies, operating conditions, and recordkeeping and monitoring requirements for AMECS to allow its use for compliance with the ATCM; and

WHEREAS, this approval does not constitute an air pollution permit or eliminate the responsibility of ACTI and any owner(s), operator(s), or other user(s) of AMECS to comply with all federal, State, and local laws, rules, and regulations.

NOW, THEREFORE, IT IS ORDERED that the control efficiencies described below are approved for use in demonstrating compliance with the ATCM when the AMECS is used as intended by ACTI or any owner or operator of the AMECS (the End User), in accordance with the following terms and conditions, and in accordance with all other applicable requirements in the ATCM:

SYSTEM PARAMETERS

The equipment and system parameters will be consistent with the AMECS described in the approved Emission Test Protocol.

CONTROL EFFICIENCIES/EMISSIONS CALCULATIONS

1. Capture Efficiency
    a. 90% when connected to one auxiliary engine exhaust port
    b. 80% when connected to two auxiliary engine exhaust ports

2. $PM_{2.5}$ Control Efficiency of 95%

3. NOx Control Efficiency of 90%

4. Emissions from the AMECS diesel generators during operation are not routed to or treated by the AMECS, and the Emission Rate is estimated to be 0.085 pounds per hour NOx (Uncontrolled AMECS NOx Emission Rate) and 0.002 pounds per hour $PM_{2.5}$ (Uncontrolled AMECS $PM_{2.5}$ Emission Rate)

Provided the approved operating conditions are met, the emissions reduced by AMECS shall be calculated for each visit as follows:

NOx reductions =

[(AMECS Capture Efficiency) x (AMECS NOx Control Efficiency) x (Vessel Auxiliary Engine NOx Emission Rate) x (Controlled Berthing Time) x (Power Requirement)] - [(Uncontrolled AMECS NOx Emission Rate) x (Controlled Berthing Time + AMECS Start-up Time + AMECS Shutdown Time)]

$PM_{2.5}$ reductions =

[(AMECS Capture Efficiency) x (AMECS $PM_{2.5}$ Control Efficiency) x (Vessel Auxiliary Engine $PM_{2.5}$ Emission Rate) x (Controlled Berthing Time) x (Power Requirement)] - [(Uncontrolled AMECS $PM_{2.5}$ Emission Rate) x (Controlled Berthing Time + AMECS Start-up Time + AMECS Shutdown Time)]

Where:

AMECS Capture Efficiency, NOx Control Efficiency and $PM_{2.5}$ Control Efficiency, Uncontrolled AMECS $PM_{2.5}$ Emission Rate, and Uncontrolled AMECS NOx Emission Rate are listed above,

AMECS Shutdown Time is the actual time the AMECS operates after emissions from vessel are controlled,

AMECS Start-up Time is the actual time the AMECS operates before emissions from vessel are controlled,

Controlled Berthing Time is the actual time between when the vessel auxiliary engines are connected to the AMECS and emissions are being controlled, and subsequently when the auxiliary engine emissions stop being controlled by the AMECS,

NOx and $PM_{2.5}$ Emission Rates for the vessel auxiliary engine are determined pursuant to subsection 93118.3 (e)(3) of the ATCM,

Power Requirement is the electrical power requirement for each vessel as determined pursuant to subsection 93118.3 (e)(1)(C) of the ATCM;

If the AMECS disconnects during a single visit, and reconnects during the same visit, the reductions from both connections are calculated separately, and totaled at the end of the visit.

APPROVED OPERATING CONDITIONS

Parameter	Value
Ocean-going Vessel type	Container vessels
Ocean-going Vessel Engine type	One or two auxiliary engines only per visit
Fuel composition limitations	Marine distillate fuel with ≤ 0.1% sulfur content
Maximum SCR Inlet Temperature	650^0F
Static Pressure	Minimum of -2 inches of water at the emission control system
Connection	Direct connect system with seal per specifications in AMECS Operations and Maintenance Manual[1] Section 3.1
Maximum engine MCR (kilowatt (kW)) for each engine type	3,700 kW
Allowable operating range (kW)	500-1700 kW
Exhaust flow rate that can be treated (standard cubic feet per minute (scfm))	1400 to 6500 scfm of engine exhaust; up to two engines may be simultaneously controlled per AMECS system
Maintenance Requirements	Per AMECS Operations & Maintenance Manual
SOx filter operation	Required
Ammonia slip emissions	Not to exceed 5 ppmdv, averaged over 60 minutes

[1]AMECS Operations and Maintenance Manual is included as Confidential Appendix B to this Executive Order.

MONITORING REQUIREMENTS

The End User shall submit summary data to the Executive Officer from the continuous emission monitoring system (CEMS), including emission levels of NOx, ammonia, and capture efficiency, after every 1000 hours of operation, and at a minimum annually, to verify that the emission reduction levels are maintained.

The End User shall maintain the AMECS in accordance with ACTI's AMECS Operations & Maintenance Manual, which is included in Confidential Appendix B to this Executive Order.

The End User shall continue to use the CEMS data collection methods specified in Section 7: Continuous Emissions Monitoring in the Emission Test Protocol unless prior approval from the Executive Officer is given.

The Executive Officer may request that the AMECS be tested annually using the test methods specified in the ATCM to demonstrate the overall percentage of the emission reduction being achieved, and the results of such testing shall be provided to the Executive Officer within 30 days of the testing.

RECORDKEEPING AND REPORTING REQUIREMENTS

The End User must notify any Fleet that uses the AMECS for compliance with the At-Berth Regulation, that the Fleet should keep the following records for a period of five years, in addition to the requirements of Section 93118.3 (g)(1)(B) and (g)(2)(B), and that these records shall be supplied to the Executive Officer within 30 days of a request from ARB staff, at the address provided in ARB staff's request:

1. Dates and times when the AMECS initially ties to the vessel and subsequently when the AMECS system unties from the vessel.

2. Dates and times when the vessel auxiliary engines are connected to the AMECS and emissions are being controlled, and subsequently when the auxiliary engine emissions stop being controlled by the AMECS.

3. The number of exhaust ports on the vessel that the AMECS controlled.

4. The load in kW of all running auxiliary engines, averaged every hour, for each running auxiliary engine.

The End User must keep the following records for a period of five years on the use of the AMECS. These records shall be supplied to the Executive Officer within 30 days of a request from ARB staff, at the address provided in ARB staff's request:

1. Record of each vessel that controlled auxiliary engine emissions with the AMECS while the vessel was docked at berth:

    a. Name of vessel,
    b. Port and terminal where vessel is at-berth, and
    c. The number of exhaust ports on the vessel that the AMECS controlled.

2. Dates and times when the AMECS initially ties to the vessel and subsequently when the AMECS system unties from the vessel.

3. Date and times when the vessel auxiliary engines are connected to the AMECS and emissions are being controlled, and subsequently when the auxiliary engine emissions stop being controlled by the AMECS.

4. CEMS data and AMECS Vessel Call Data Form as shown in the AMECS Operations & Maintenance Manual for each vessel visit where AMECS is used to reduce emissions for compliance with the ACTM.

5. Date, time, and description of any equipment failure with the AMECS that affected the ability of the vessel to control auxiliary engine emissions.

The End User shall notify the Fleet, as defined in Section 93118.3 (c)(16), within 5 business days after any visit where the reductions from AMECS are less than the approved capture and control efficiencies in this Executive Order.

The End User shall submit CEMS data and AMECS Vessel Call Data Form as shown in the AMECS Operations & Maintenance Manual to the Executive Officer within 5 business days after any visit where the reductions from AMECS are less than the approved capture and control efficiencies in this Executive Order.

ACTI shall provide a copy of the AMECS Operations & Maintenance Manual to each End User, and each End User shall provide a copy of the Manual to any fleet operator that utilizes AMECS emission control technology prior to such use.

BE IT FURTHER ORDERED, Executive Officer may request periodic emissions testing or other types of monitoring to verify the proper operation of the AMECS and may modify the testing frequency as he/she deems appropriate.

BE IT FURTHER ORDERED, no changes are permitted to AMECS design or approved operating parameters unless ARB is notified in advance, and ARB evaluates the changes and determines that AMECS will continue to meet the capture and control efficiencies specified in this Executive Order. The changes must be approved in writing by the Executive Officer before the modified AMECS or modified operating parameters may be used for compliance with the ATCM. The Executive Officer may revoke this Executive Order if the AMECS design or approved operating parameters are changed without prior notification and approval by the Executive Officer.

BE IT FURTHER ORDERED, this Executive Order shall be voided if the Executive Officer determines that AMECS does not comply with any of the specifications in this Executive Order.

Executed at Sacramento, California, this 17th day of October 2015.

Richard W. Corey
Executive Officer

By:

Cynthia Marvin, Chief
Transportation and Toxics Division