

BOARD MEETING DATE: February 1, 2019

AGENDA NO. 6

PROPOSAL: Amend Contract to Demonstrate Low NOx Combustion Technology on Refinery Boiler

SYNOPSIS: In September 2017, the Board awarded a contract to ClearSign Combustion Corporation to demonstrate their Duplex™ low NOx combustion technology on a refinery boiler in an amount not to exceed \$320,000 from the Rule 1118 Mitigation Fund (54). Torrance Refining Company was identified as the host site for the demonstration, but they are no longer able to act as the host site due to operational schedule changes and higher than anticipated project costs. However, ClearSign has identified an alternate in-basin refinery to serve as the host site using a smaller-sized heater for the demonstration. This action is to amend the contract with ClearSign, changing the host site to Lunday-Thagard Company dba World Oil Refining and reducing the contract value to an amount not to exceed \$220,000 from the Rule 1118 Mitigation Fund (54). This action is to also authorize the Executive Officer to execute additional no-cost amendments to this contract, as needed.

COMMITTEE: Technology, January 18, 2019; Recommended for Approval

RECOMMENDED ACTIONS:

1. Authorize the Chairman to amend the contract with ClearSign Combustion Corporation changing the host site to Lunday-Thagard Company dba World Oil Refining for conducting the demonstration of their Duplex™ low NOx combustion technology on a refinery heater and reducing the contract value to an amount not to exceed \$220,000 from the Rule 1118 Mitigation Fund (54).
2. Authorize the Executive Officer to execute additional no-cost amendments to this contract, as needed.

Wayne Natri
Executive Officer

Background

In September 2017, the Board approved a contract with ClearSign Combustion Corporation, which partnered with Torrance Refining Company (TRC) to act as host site, to conduct a demonstration project using their Duplex™ Technology on a low NOx burner. The Duplex™ Technology burner incorporates a high-temperature porous ceramic tile matrix on which combustion is sustained after the tile has been heated using a conventional burner. Once the proper tile temperature and system parameters have been achieved, transition from conventional burner to Duplex™ mode is done where combustion is fully sustained on the tile matrix. In addition to very low NOx levels without the use of reagents, such as ammonia or urea, the Duplex™ Technology is expected to provide other benefits such as enhanced CO oxidation, enhanced radiation heat transfer and noise reduction.

TRC was initially identified as the host site for the demonstration, but they are no longer able to act as the host site due to operational schedule changes and higher than anticipated project costs. ClearSign has identified Lunday-Thagard Company dba World Oil Refining (World Oil) as an alternate in-basin refinery willing to demonstrate the Duplex™ Technology.

Proposal

ClearSign proposes to partner with World Oil to conduct a one-year demonstration by retrofitting a 39 million Btu per hour natural gas-fired heater with their Duplex™ Technology burner. Previous studies of ClearSign's Duplex™ Technology installed on a small refinery heater demonstrated NOx emissions between 2.5 ppm and 4.5 ppm. For the proposed project, the goal will be to optimize the burner for this application and validate 3 ppm NOx emissions using a third-party source testing firm. Source testing will also include PM, CO and toxics. This action is to amend the contract with ClearSign, changing the host site to World Oil and reducing the contract value from \$320,000 to an amount not to exceed \$220,000 from the Rule 1118 Mitigation Fund (54). While no further changes to this project are anticipated, to prevent further delays, this action is to also authorize the Executive Officer to execute additional no-cost amendments to this contract, as needed.

Benefits to SCAQMD

The proposed project supports SCAQMD's priorities to reduce both NOx and PM emissions from stationary sources to achieve national ambient air quality standards and protect public health. In addition, the proposed demonstration of ClearSign's Duplex™ Technology burner will help support the 2016 AQMP policy objective, which calls for investing in strategies and technologies that meet multiple objectives regarding air quality and reducing emissions impacts on local neighborhoods and disadvantaged communities. This includes supporting control measure CMB-05 to identify approaches in implementing Best Available Retrofit Control Technologies (BARCT) and generating further NOx emissions reductions at RECLAIM facilities.

Resource Impacts

The total cost for this demonstration project is \$660,000, with cost-share of \$220,000 from the host refinery, \$220,000 in-kind from ClearSign, and up to \$220,000 from SCAQMD's Rule 1118 Mitigation Fund (54).