COMPLIANCE

THERMATRIX, INC. FLAMELESS THERMAL OXIDATION TECHNOLOGY

LEAD ACTIVITY
Naval Air Station (NAS) North Island

STATUS
Completed

MISSION
Control air emissions

DESCRIPTION
The Thermatrix flameless thermal oxidation technology is an advanced treatment process for the destruction of VOC emissions. Under the Southwest Division, Naval Facilities Engineering Command (SWDIV) New Technology (NT) innovative technologies solicitation, the technology was demonstrated for the control of VOCs from a JP-5 transfer pump at the NAS North Island Fuel Farm. While traditional flame-based thermal oxidation relies on the flame for both fume mixing and reaction, the Thermatrix process completely decouples fume mixing from the oxidation reaction. The patented technology involves oxidation of VOCs to carbon dioxide (CO_2) and Water (H_2O) in a ceramic matrix, "packed bed" reactor.

The three primary attributes of this destruction matrix are interstitial geometry which enhances mixing, thermal inertia that promotes stability, and surface characteristics that augment heat transfer. As an alternative to incineration, this treatment process achieves high destruction and removal efficiencies, while avoiding the thermal formation of nitrogen oxides and the products of incomplete combustion that are common with incineration. Thermatrix claims that the technology is applicable to fugitive emissions from paint spray booths and fuel transfer pumps.

During the demonstration, total hydrocarbon and gaseous emissions were measured on a flameless thermal oxidizer that processed a portion of the vent stream from a fuel tank (gases venting during the tank filling process). The test involved three separate measurements over the course of three tank filling events and was completed in July 1995. The demonstration documented removal efficiencies that were equal to or greater than 99.99 percent, and corresponding emissions of both carbon monoxide (CO) and nitrogen oxide (NOx) are below currently accepted standards; CO emissions averaged 2.0 parts per million (ppm) with a maximum of 2.2 ppm, and NOx emissions averaged

0.65 parts per million (ppm) with a maximum of 0.72 ppm. The results indicate that the demonstration was a success.

Thermatrix estimated that, depending on VOC loading, the cost per ton of VOC treated for a 10,000 cubic foot per minute (cfm) system can range from $122 to $2,983 depending on the VOC concentration of the emissions. The cost savings to NAS North Island has not been calculated, but Thermatrix project experience indicates that significant cost savings may be realized.

The Thermatrix technology has been chosen for off-gas treatment of the EG&G NoVOCs™ in-well air stripping technology for groundwater contamination at NAS North Island Site 9.

BIBLIOGRAPHY

- Fact Sheet: Thermatrix Flameless Thermal Oxidizer Technology (NELPFS-8.PDF, 175 KB)
- NELP Demonstration Report - Thermatrix (THERMTRX.PDF, 253KB)
- Thermatrix, Inc. Demonstration Work Plan, Quality Control Plan, Site Health and Safety Plan. December, 1994.
- Radian Corporation. Source Test Results for Flameless Thermal Oxidizer. August 7, 1995.
- NAS North Island. Thermatrix NELP Technology Demonstration Report. San Diego, California. February 1996.

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