NETEL (INDIA) LIMITED
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& MoEF RECOGNISED LABORATORY

NEWSLETTER

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Leak Detection and Repair (LDAR) for Oil Refineries & Petrochemical Complexes (VOC & VHAP)

INTRODUCTION

It is known that leaking equipment, such as valves, pumps, and connectors, are the largest source of emissions of volatile organic compounds (VOCs) and volatile hazardous air pollutants (VHAPs) from petroleum refineries and chemical manufacturing facilities.

VOCs contribute to the formation of ground-level ozone. Ozone is a major component of smog, and causes or aggravates respiratory disease, particularly in children, asthmatics, and healthy adults who participate in moderate exercise.

Some species of VOCs are also classified as VHAPs. Some known or suspected effects of exposure to VHAPs include cancer, reproductive effects, and birth defects. The highest concentrations of VHAPs tend to be closest to the emission source, where the highest public exposure levels are also often detected. Some common VHAPs emitted from refineries and chemical plants include acetaldehyde, benzene, formaldehyde, methylene chloride, naphthalene, toluene, and xylene.

LDAR is a work practice designed to identify leaking equipment so that emissions can be reduced through repairs. A component that is subject to LDAR requirements must be monitored at specified, regular intervals to determine whether or not it is leaking. Any leaking component must then be repaired or replaced within a specified time frame.

These fugitive gas emissions cost companies in terms of products loss which can be avoided if these leaks are detected and addressed. The cost of these LDAR programmes are but a fraction of the actual value of products lost due to these type of emissions. Fugitive emissions typically account for about 50% of total hydrocarbon (THC) emissions from process plants. A study by the API found that over 90% of controllable fugitive emissions come from only about 0.13% of the components, and that these leaks are largely random. The majority of the mass emissions come from a small number of components with high leak rates.

PURPOSE

The purpose of LDAR investigation is to monitor regulated equipment in Benzene & volatile organic compound (VOC) service for determining any potential leaks.

BENEFITS OF AN LDAR PROGRAM

Emissions reductions from implementing an LDAR program potentially reduce product losses, increase safety for workers and operators, and decrease exposure of the surrounding community.

Reducing Product Losses:

In the petrochemical industry, saleable products are lost whenever emissions escape from process equipment. Lost product generally translates into lost revenue.

Increasing Safety for Facility Workers and Operators:

Many of the compounds emitted from refineries and chemical facilities may pose a hazard to exposed workers and operators. Reducing emissions from leaking equipment has the direct benefit of reducing occupational exposure to hazardous compounds.

Decreasing Exposure for the Surrounding Community:

In addition to workers and operators at a facility, the population of a surrounding community can be affected by severe, long-term exposure to toxic air pollutants as a result of leaking equipment. Although most of the community exposure may be episodic, chronic health effects can result from long-term exposure to emissions from leaking equipment that is either not identified as leaking or not repaired.

LDAR MONITORING

Equipment Used

A. VOC Leak Surveyor

The instrument measures the % of lower explosive limit or % vol. of butane in the sample gas. The instrument is calibrated on methane.

The instrument has a Semiconductor sensor and works on the principle of catalytic reaction and measures the heat developed by combustion of the flammable portion of the atmosphere under test. It is intrinsically safe for use in hazardous atmosphere.

B. Photoionisation Detection (PID)

Works on photoionisation detection (PID) technology that has been independently verified as best performing on the market for speed, accuracy, resistance to humidity and contamination, Gives accurate results in all environmental conditions, is intrinsically safe and meets ATEX, IECEx, UL and CSA standards. The instrument is generally calibrated on isobutylene, but is also has Custom calibration capability.

The Instrument has a wide measurement range, and is capable of accurately detecting gases down to ultra-low ppb levels up to 20,000 ppm.

PERSONNEL RESPONSIBILITIES / TRAINING

Personnel will be trained on the use of VOC instruments and Method 21 (40 CFR Part 60, Appendix A) prior to taking field measurements. The training includes reading USEPA Method 21 and the instrument manufacturer's manual. Personnel must demonstrate competency / proficiency by properly calibrating the instrument and by using it to measure unknown samples.

MAINTENANCE AND CALIBRATION

All instruments are maintained and operated in accordance with the manufacturer's instructions and NETEL's Standard Operating Procedure for Equipment Management. All instruments placed in service are

calibrated to ensure that they are operational before they are taken to the field. The instruments are calibrated periodically in the field before use by the procedure prescribed as per USEPA Method 21.

LEAK QUANTIFICATION

Leaks are detected according to the standard method, the data is analysed for the total number of points checked and the total number of leaks detected from all plants and from various components. The components with leaks are marked for repair and then rechecked after maintenance. The results are then expressed in kg per day as product savings.

Corporate Office & Laboratory
Navi Mumbai
W-303, Pipeline Road, MIDC Rabale Navi Mumbai – 400 701
Tel: 022 32018854/27606016 Fax: 022-27606015
Email: ems@netel-india.com Website: www.netel-india.com

Factory
Navi Mumbai
W-408, MIDC Rabale, TTC Industrial Area, Navi Mumbai – 400 701
Tel: 022 27607102 / 03
Fax: 022-27607100

Regional Office & Laboratory
Surat (Gujarat)
P-1, Jayraj Vasahat, 2nd floor near Icchapore Bus Stop no 3, Hazira Road, SURAT- 394515
Tel: 0261 3263804 Fax: 0261-2840121
Email: emssurat@netel-india.com

Bilaspur (Chhattisgarh)
H.I.G -1/D -29, Abhilasha Parisar, Behind Hi-Tech Bus Stand, BILASPUR (C.G.) 495 223
Tel: 07752-655505
Email: emsbilaspur@netel-india.com

Sales & Service Offices
New Delhi (011-32529165), Chennai (044-32927521), Kolkata (033-32596100), Hyderabad (040-32965214), Jamnagar (09328104459)