



Report on LDAR to M/s. MCC PTA India Corporation, Haldia

Report

on

LEAK DETECTION AND REPAIR PROGRAMME (LDAR)



To



MCC PTA INDIA CORPORATION LTD
HALDIA



Submitted by:
SGS INDIA PVT LTD.,
Environment Division



Conducted by SGS India Pvt Ltd., Environment Division



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1.0 INTRODUCTION

1.1 About Industry

Mitsubishi Chemical Corporation (MCC), a Fortune 500 giant, is Japan's largest diversified chemical company. It is among the top 10 Chemical Companies of the world. MCC has its operations in around 50 countries and leads about 282 affiliate companies across the globe. It is also the world's second largest producer of Purified Terephthalic Acid (PTA) and began selling the imported chemical in India in the early 90's.

Seeing the vast growth potential for polyester products in the country, MCC decided to set up its own PTA manufacturing facility in Haldia in 1997. It entered into a shareholders' agreement with the Government of West Bengal, setting up an affiliate company, MCC PTA India Corp. Private Limited (MCPI), headquartered in Kolkata.

With an initial investment of Rs. 1,475 crore (US\$ 380 million at the then prevailing rate), MCPI emerged as Japan's largest Foreign Direct Investment (FDI) in India and began construction of a 350,000 tonne PTA plant at Haldia, West Bengal.

Completed on schedule by the end of 1999, the plant commenced commercial production of PTA in April, 2000, equipped with the highest safety and environment standards. Consistently achieving over 100% capacity utilisation year after year, MCPI enhanced its capacity to 470,000 tonnes in December 2003. Today, it has a turnover of around Rs. 1845 crore (US\$ 409 million) (2009-2010 fiscal).

The location of MCPI's PTA manufacturing facilities on the eastern coast of India at Haldia proved to be most suitable due to its excellent port facilities, abundant land and availability of skilled human resources.

To meet the needs of Regulatory requirement and Social Environmental concerns, SGS India Pvt Ltd has developed leading edge expertise to run turnkey LDAR projects (Leak Detection And Repair) and report the gathered Fugitive Emission monitoring data.

A fugitive emission monitoring project is typically conducted in following phases:



About LDAR : Leak Detection and Repair (LDAR) is a program implemented to comply with environmental regulations for reducing the fugitive emissions of targeted chemicals into the environment. Several standards such as *Maximum Achievable Control Technology (MACT)* standards, *New Source Performance Standards (NSPS)*, *National Emissions Standards for Hazardous Air Pollutants (NESHAP)* and Central Pollution Control Board (CPCB) require the monitoring and reporting of these fugitive emissions from process equipment.

Process components of about 3115 points are monitored as LDAR and covered all the components in the process plant.

A typical chemical unit can emit some tons per year of VOCs from leaking equipment, such as valves, connectors, pumps, sampling connections, compressors, pressure relief devices and open ended lines.

The environmental regulations are prescribed LDAR programs as a means of reducing emissions have very specific standards and applied to a monitoring and repair program. The LDAR study included the following protocols:

- Chemical streams that must be monitored
- Types of components (pumps, valves, connectors, etc.) to be monitored
- Measured concentration in PPM that indicates a leak
- Frequency of monitoring
- Method of monitoring
- Actions to be taken if a leak is discovered
- Length of time in which an initial attempt to repair the leak must be performed
- Length of time in which an effective repair of the leak must be made
- Actions that must be taken if a leak cannot be repaired within guidelines
- Record-keeping and reporting requirements

VOCs are contributed to the formation of ground level ozone. Many of the areas where Refineries are located do not meet the NAAQ standards for ozone. Ozone can be transported in the atmosphere and contribute to nonattainment in downwind areas.

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Affected Sources: Each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, flange and connector that contains or contacts a fluid or gas. that is exceeding more than 5000ppm of pump and compressor seals and 3000 ppm other components is an affected source.

Equipment Leak: A leak is defined as greater than or equal to 3,000 & 5000 ppmv as methane, for organic compounds, as determined by EPA Reference Method 21. Most of the emissions are from valves and connectors because these are most prevalent components and can number in the thousands. The major cause of emissions from valves and connectors is seal or gasket failure due to normal wear or improper maintenance. More than 90% of emissions from the leaking equipment with valves are being the most significant source. The open ended lines and sampling connections account for as much as 5 - 10% of total VOC emissions from equipment leaks.

Minimum Requirements for an Acceptable Organic LDAR Program:

- Each affected source is screened initially using Method 21. Sources that are unsafe to monitor is not screened, but documentation is provided to substantiate the unsafe nature.
- Monthly visual inspections has to be performed by industry on each affected source for signs of leakage (e.g. dripping liquid, spraying, misting, clouding, ice formation, distinctive odors, etc.).
- Monitoring of each affected source is to be conducting quarterly using Method 21.

All potential leak points associated with a component must be identified and screened for leaks. The detected leaks by Method 21 test was tagged and repaired. The leak sources are measured after repair and the same is recorded.

METHODOLOGY OF THE STUDY :

EPA has found significant widespread noncompliance with Leak Detection and Repair regulations and more specifically non compliance with Method 21 requirements.



**Step 1: Preparation of LDAR project**

- Information exchange meeting
- Project introduction
- Project scoping
- Coding & naming conventions
- Prepare technical information (medium, stream, drawings, ...)
- Stream composition
- YTD production time per stream
- Leak definition, repair definition and tag definition per stream
- Detection equipment to use

Step 2: Database preparation:

- Build site structure (unit - sections - drawings - streams)
- Prepare Basic data
- Prepare Customer data

Step 3: Source inventory:

- Project kick-off meeting
- Safety training
- Site visit
- Define monitoring routes
- Start inventory program
- Prepare monitoring phase

Step 4: Unit monitoring phase

- Prepare detection devices and gather relevant information
- Start monitoring program
- Regular status meetings
- Database update

Step 5: First repair attempt

- Prepare tightening lists (sources with leak-rate > repair definition)
- Guide mechanical/operator to leaking sources
- Perform on-line reparation
- Re-monitoring after repair attempt



**Step 6: Reporting**

- Consolidate all gathered data
- Prepare lessons learned
- Create LDAR report
- Detail list of all leaking sources
- Repair orders
- Equipment overview per EPA source
- Top leakers (in costs and losses)
- Sort on most leaking equipment (EPA sources)

Sampling Methodology :

Initial Screening: Screening tests must be conducted initially and include:

1. The type of affected source (e.g. pump, compressor, etc.).
2. Site specific ID of each affected source.
3. Date of the Method 21 test.
4. Type of Method 21 detector.
5. Calibration results of Method 21 detector.
6. Screening results in ppmv.

CALCULATION:

Component Type	Default Zero Factor [Kg/hr]	Correlation Equation [Kg/hr]
Valves	[7.8E-06]	[2.27E-06(SV) ^{0.747}]
Pump Seals	[1.9E-05]	[5.07E-05(SV) ^{0.622}]
Others	[4.0E-06]	[8.69E-06(SV) ^{0.642}]
Connectors	[7.5E-06]	[1.53E-06(SV) ^{0.736}]
Flanges	[3.1E-07]	[4.53E-06(SV) ^{0.706}]
Open-ended Lines	[2.0E-06]	[1.90E-06(SV) ^{0.724}]

The default zero factors apply only when the screening value(SV) corrected for background equals 0 ppmv.

The correlation equations apply for actual screening values, corrected for background.





The "other" component type includes instruments, loading arms, pressure relief valves, vents, compressors, dump lever arms, diaphragms, drains, hatches, meters and polished rods stuffing boxes. This "other" component type should be applied for any component type other than connectors, flanges, open-ended lines, pumps or valves.

For example:

The screening value (SV) concentration in Valves is 2600 ppm

$$= \text{RF}(\% \text{ of VOC Flow}/100) * 0.0000023 * \text{SV}^{0.746}$$

$$\text{RF} = \text{Response Factor} = 1$$

Response Factors of Different Volatiles:	
Gasoline Vapours	1.05
Naphta	1.0
Heavy Oil	1.1
Petrol & Diesel	0.8
Gasoline Vapours 2	0.7
Light Oil	1.0

% of VOC Flow = material passing on that particular pipe line.

0.00000227 = Correlation factor

SV = Screening Value in ppm

If we will apply all the values in the below formula

$$= \text{RF}(\% \text{ of VOC Flow}/100) * 0.0000023 * \text{SV}^{0.746}$$

$$= 1 (100/100) * 0.0000023 * 2600^{0.746}$$

$$= 0.000815 \text{ kg/hr}$$

Total hours of operation per year are 8760 (24 hours x 365 days)

The volatile emission = 7.109 Kgs/year.

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CONCLUSION: The results are submitted component wise in the enclosed Annexure-I (Report No:CA:GL:2120005676 dated 04.05.2011). As per CPCB guidelines no components are detected more than the standard values of 3000ppmv and 5000ppmv.

Based on the calculation and concentrations of VOC in the equipment, we took default value 1 for Response Factor (RF). MCCPTA has a yearly emission of 3115 points is 1924 kgs/year before repair which includes of zero factor values.