ATTACHMENT 1
Proposed LDAR Program

Leak Detection and Repair (LDAR) Monitoring Plan

TCEQ 28 VHP

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1.0 INTRODUCTION

1.1 Background

Various state and federal regulations require the control of fugitive emissions of volatile organic compounds (VOCs), volatile organic toxic air pollutants (VOTAPs), and organic hazardous air pollutants (OHAPs) from fugitive equipment. One of the techniques used to control these materials is the implementation of a leak detection and repair (LDAR) program.

The Leak Detection and Repair (LDAR) Program is intended to control emissions from equipment leaks known as fugitive emissions. LDAR is a work practice designed to identify leaking equipment so that emissions can be reduced through timely repairs. An equipment component must be monitored at regular intervals according to the applicable regulations. Once found leaking, the component must be repaired or replaced within a specified time frame. In addition to the monitoring and repair requirements described, facilities are required to prepare and maintain an equipment inventory to satisfy identification requirements.

1.2 Facility Overview

Stepan Company (Stepan) owns and operates the facility located at 951 Bankhead Highway, Winder, Georgia, 30680 (Stepan Company - Winder). Stepan Company – Winder has been the operator since the early 1980's and operates as a chemical manufacturing facility for surfactants with NAICS code 325611. Stepan Company – Winder is currently implementing an LDAR program with the monitoring and inspection requirements set forth in Texas Commission on Environmental Quality (TCEQ), Air Permits Division, New Source Review (NSR), 28 VHP.

1.3 Applicable LDAR Regulations

The TCEQ developed the fugitive emission conditions specified in 28 VHP to control emissions from equipment involved with new source chemicals.

For reference, ***Appendix A-1, Summary of Applicable LDAR Regulations, Document No. WN-SP-9.54A-1*** identifies the regulation applicable to each Stepan process unit. Also included for reference in ***Appendix A-2, Process Unit Applicability P&ID'S, Document No. WN-SP-9.54A-2.*** Color coded Process and Instrumentation Drawings (P&IDs) identifying process unit line applicability, process unit line material compositions, and predominant use determinations, see the EHS&S Department for documentation location in Stepan's files.

1.4 General Purpose and Goals of this LDAR Management Plan

This LDAR Management Plan (Plan) has been developed to provide direction on LDAR compliance management. The purpose of the Plan is to provide guidance and policy to consistently implement and maintain compliance with the applicable LDAR programs. The goals of the Plan are to:

1. Identify the Roles, Responsibilities, and Expectations for all personnel and contractors affected by and participating in the LDAR Program (see Section 4);

2. Facilitate training of Stakeholders to ensure overall LDAR program compliance (see Section 9);

3. Provide tools to produce consistent implementation throughout Stepan; and

4. Provide guidance for a QA/QC process and establish Best Management Practices (BMP's) for continuous improvement.

The primary tasks associated with the listed goals are:

1. Establish and maintain an inventory of affected fugitive emission source equipment;

2. Perform leak inspections in accordance with State and Federal Regulations;

3. Resolve detected leaks in accordance with State and Federal Regulations;

4. Maintain records demonstrating compliance with applicable LDAR rules and test methods; and

5. Submit periodic reports, to the applicable State or Federal Agency, demonstrating program performance.

1.5 LDAR Management Plan Sections

The Plan includes the following sections:

Section 2 – Definitions

Section 3 – Plan Revisions

Section 4 – Roles and Responsibilities;

Section 5 – LDAR Applicability Determination Process and Implementation;

Section 6 – Monitoring, Inspection, and Repair;

Section 7 – Recordkeeping;

Section 8 – Reporting; and

Section 9 – Training.

It is important to note that the Plan includes numerous Procedures that are referenced in each of the Plan Sections identified above. Each referenced Procedure is included in Appendix B and provides procedural guidelines, appropriate forms, and specific roles and responsibilities for various personnel.

2.0 DEFINITIONS

2.1 Introductory Information

The following definitions are derived from the applicable regulations, **30 Texas Administrative Code (TAC) Chapter 115, Subchapter A: Definitions, U.S. EPA Method 21.** In some cases, the provided definitions are paraphrased to simplify the requirements for training purposes. For

compliance determinations, please refer to the regulations for complete and exact wording of applicable definitions.

AVO Leak – Audio Visual or Olfactory Leak. Leak found by Sound, Sight or Smell.

Background -The ambient concentration of volatile organic compounds in the air, determined at least one meter upwind of the component to be monitored. Test Method 21 (40 Code of Federal Regulations Part 60, Appendix A) shall be used to determine the background.

Calibration Test – A calibration test required by Section 10.0 of Method 21 (see Appendix C) that measures the leak detector instrument's degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration to the known concentration.

Calibration-Precision Test – A calibration test required by Section 8.1.2 of Method 21 (see Appendix C) that measures the leak detector instrument's degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration to the known concentration.

Capital Expenditure (CapEx) – An expenditure for a physical or operational change to an existing facility which exceeds the product of the applicable "annual asset guideline repair allowance percentage" and existing equipment basis, this typically results in the applicability of NSPS LDAR requirements. The equipment basis is the cost of replacing "equipment" (i.e. valves, pumps, compressors, pressure relief devices, and connectors) within a process unit, in current dollars.

Closed-vent system--A system that:

(A) is not open to the atmosphere;

(B) is composed of piping, ductwork, connections, and, if necessary, flow-inducing devices; and

(C) transports gas or vapor from a piece or pieces of equipment directly to a control device.

Component--A piece of equipment, including, but not limited to, pumps, valves, compressors, agitators, connectors, and pressure relief valves, which has the potential to leak volatile organic compounds.

Connector--A flanged, screwed, or other joined fitting used to connect two pipe lines or a pipe line and a piece of equipment. The term connector does not include joined fittings welded completely around the circumference of the interface. A union connecting two pipes is considered to be one connector.

Continuous monitoring--Any monitoring device used to comply with a continuous monitoring requirement of this chapter will be considered continuous if it can be demonstrated that at least 95% of the required data is captured.

Delay of Repair (DOR) Equipment - Equipment determined to be "un-repairable" until a process unit or part of a process unit shutdown.

Delay of Repair (DOR) Tag – A tag applied to Equipment on DOR.

Drift Test – A calibration-precision test performed on the instrument using calibration gases to determine the degree of agreement between the measurements of known calibration gases and the corresponding meter readings compared to the initial calibration values. This is expressed as percentage of relative difference between the two-meter readings.

Electronic Database – Any software that stores LDAR monitoring information and allows such information to be queried and/or retrieved.

Equipment Leaks – Fugitive Emissions of VOC's from Equipment.

First Attempt at Repair – Means to take action for the purposes of stopping or reducing leakage of organic material to the atmospheric using best practices. An initial attempt to stop equipment leakage.

Fugitive emission--Any volatile organic compound entering the atmosphere that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening designed to direct or control its flow.

In Gas/Vapor Service – A piece of equipment in regulated material service containing a gas or vapor at operating conditions.

In Heavy Liquid Service (HL) – Volatile organic compounds that have a true vapor pressure equal to or less than 0.044 pounds per square inch absolute (0.3 kiloPascal) at 68 degrees Fahrenheit (20 degrees Celsius).

In Light Liquid Service (LL) – Volatile organic compounds that have a true vapor pressure greater than 0.044 pounds per square inch absolute (0.3 kiloPascal) at 68 degrees Fahrenheit (20 degrees Celsius), and are a liquid at operating conditions.

In VOC Service – A piece of equipment contains or contacts a process fluid that is at least 10 percent by weight Volatile Organic Compound (See 40 CFR §51.100(s) – Definition of "Volatile Organic Compound" for detail list of excluded hydrocarbons.)

Initial Calibration – Calibration of the leak detection instrument prior to the start of daily monitoring as required by Method 21 and the LDAR regulations.

Initial Startup – For the purposes of this chapter, the setting into operation of a piece of equipment or process unit for the purpose of production or waste management.

Inspection Interval(s) – A monitoring frequency including annual, semi-annual, quarterly, monthly, or even weekly inspections.

LDAR Personnel – All Stepan or contract personnel with job responsibilities related to scheduling, monitoring, and repair of regulated equipment components.

LDAR Applicability Determination Process – A systematic method of evaluating LDAR applicability, determining a compliance plan, and then documenting program changes. The method includes a series of forms and questionnaires designed to guide the Environmental Professional through the LDAR program applicability determination process, and adequately document the basis for applicability.

LDAR Identification Tag – A metal or plastic tag affixed on or near equipment with equipment leak inspection requirements to identify the piece of equipment in the LDAR program.

LDAR Regulations or Requirements – LDAR regulations or requirements refer to all the requirements relating to equipment in light liquid or gas/vapor service promulgated pursuant to TCEQ 28 VHP and any applicable federally-enforceable, state, regional, or local requirements enforceable by the governing State that implements, adopts, or incorporates the specific federal regulatory requirements identified above. State or local regulations may supersede these regulations.

Leak Definition – A leak is identified using Method 21 if instrument monitoring shows that the concentration (ppm) is greater than the leak threshold defined by the LDAR regulation. A leak is also identified using audio visual olfactory method (AVO) or some other means such as Optical Gas Imaging (OGI.)

Leak Tag – A tag applied to Equipment determined to be leaking.

Method 21 – 40 CFR Part 60, Appendix A EPA Reference Test Method 21 for VOC Instrument Monitoring.

Metal-to-metal seal--A connection formed by a swage ring that exerts an elastic, radial preload on narrow sealing lands, plastically deforming the pipe being connected, and maintaining sealing pressure indefinitely.

Modification – Any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies. According to 40 CFR 60.480(a), the addition or replacement of *equipment* for the purpose of *process improvement* that is accomplished without a *capital expenditure* shall not by itself be considered a modification under this subpart.

Monitoring Classifications – Identifies the LDAR monitoring protocol and frequency.

Open Ended Line (OEL) – Any valve, except pressure or safety relief valves, having one side of the valve seat in contact with process fluid and one side open to the atmosphere either directly or through open piping.

Pressure relief valve or pressure-vacuum relief valve--A safety device used to prevent operating pressures from exceeding the maximum and minimum allowable working pressure of the process equipment. A pressure relief valve or pressure-vacuum relief valve is automatically actuated by the static pressure upstream of the valve but does not include:

(A) a rupture disk; or

(B) a conservation vent or other device on an atmospheric storage tank that is actuated either by a vacuum or a pressure of no more than 2.5 pounds per square inch gauge.

Process unit--The smallest set of process equipment that can operate independently and includes all operations necessary to achieve its process objective.

Process Unit Leak Percentage (or Rate) – The percentage of leaking components in a given Process Unit, determined by dividing the number of components for which leaks are detected, including the number of unrepaired components, by the total number of LDAR components in a given Process Unit and then multiplying by 100. This can be done by component type, valve, connector, etc.

Process Unit Shutdown – Per §60.481 and §60.481a means a work practice or operational procedure that stops production from a process unit or part of a process unit during which it is technically feasible to clear process material from a process unit or part of a process unit consistent with safety constraints and during which repairs can be accomplished.

Quarter – Any three-month period. For the purpose of a new plant startup, the first quarter concludes on the last day of the last full month during the 180 days following initial startup.

Response Factor – The ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation. *Reference compound* means the VOC species selected as the instrument calibration basis for specification of the leak definition concentration. (For example, if a leak definition concentration is 10,000 ppm as methane, then any source emission that results in a local concentration that yields a meter reading of 10,000 on an instrument meter calibrated with methane would be classified as a leak. In this example, the leak definition concentration is 10,000 ppm and the reference compound is methane.)

Re-Monitor – A Method 21 inspection to verify a repair.

Reconstruction – The replacement of "equipment" (e.g. valves, pumps, etc.) of an existing affected facility to such an extent that the fixed capital cost of the new "equipment" exceeds 50 percent of the fixed capital cost of the "equipment" in the process unit, irrespective of any change in emission rate.

Regulated or Regulated Components – Equipment with fugitive emissions monitoring, recordkeeping and/or reporting requirements defined by applicable State, Federal, or agreed order rules (or equivalent.)

Regulatory Leak – A leaking component exceeding the leak definitions contained in federal or state equipment leak standards. Leaks detected by OGI and AVOs are regulatory leaks.

Repaired (AVO/OGI) – Leaks repaired by eliminating AVO or OGI indications of a leak (defined in accordance with §60.482–2a(b)(2)(ii) and (d)(6)(ii) and (d)(6)(iii), 60.482–3a(f), 60.482–10a(f)(1)(ii), and 60.482a(a)(2), or the corresponding NSPS VV section.) An AVO leak sheet should be completed to document the repair.

Repaired (Method 21) – Equipment is adjusted, or otherwise altered, to eliminate a leak and re-monitored with Method 21 to verify that emissions from the equipment are below the applicable leak definition. This does not include leaks identified by AVO or OGI (or some other method.)

Rupture disk--A diaphragm held between flanges for the purpose of isolating a volatile organic compound from the atmosphere or from a downstream pressure relief valve.

Shutdown or turnaround--For the purposes of this chapter, a work practice or operational procedure that stops production from a process unit or part of a unit during which time it is technically feasible to clear process material from a process unit or part of a unit consistent with safety constraints, and repairs can be accomplished.

(A) The term shutdown or turnaround does not include a work practice that would stop production from a process unit or part of a unit:

(i) for less than 24 hours; or

(ii) for a shorter period of time than would be required to clear the process unit or part of the unit and start up the unit.

(B) Operation of a process unit or part of a unit in recycle mode (i.e., process material is circulated, but production does not occur) is not considered shutdown.

Site LDAR Program – A program that defines activities, requirements and management that ensure LDAR compliance at a particular "affected facility". These are described in the Site LDAR Program Document.

Site LDAR Applicability Documentation – A book or data file system that describes the LDAR program applicability in an "affected facility".

Synthetic organic chemical manufacturing process--A process that produces, as intermediates or final products, one or more of the chemicals listed in 40 Code of Federal Regulations §60.489

Tank-truck tank--Any storage tank having a capacity greater than 1,000 gallons, mounted on a tank-truck or trailer. Vacuum trucks used exclusively for maintenance and spill response are not considered to be tank-truck tanks.

Temporarily Out of Service Status (TOS) – Removed from and not in VOC Service on a temporary basis with the intention of placing the component back in service at some point. Also called temporarily removed from service (TRFS.) As a Best Practice these should be tagged.

Transport vessel--Any land-based mode of transportation (truck or rail) equipped with a storage tank having a capacity greater than 1,000 gallons that is used to transport oil, gasoline, or other volatile organic liquid bulk cargo. Vacuum trucks used exclusively for maintenance and spill response are not considered to be transport vessels.

True partial pressure--The absolute aggregate partial pressure of all volatile organic compounds in a gas stream.

Type I Monitoring – Monitoring where leaks are determined based on measured VOC concentration according to Appendix A-7, Method 21, Section 8.3.1 (from NSPS Part 60.)

Type II Monitoring – Monitoring for Non-Detectible Emissions (NDE) according to Appendix A-7, Method 21, Section 8.3.2 (from NSPS Part 60.)

Vapor balance system--A system that provides for containment of hydrocarbon vapors by returning displaced vapors from the receiving vessel back to the originating vessel.

Vapor control system or vapor recovery system--Any control system that utilizes vapor collection equipment to route volatile organic compounds (VOC) to a control device that reduces VOC emissions.

Vapor-tight--Not capable of allowing the passage of gases at the pressures encountered except where other acceptable leak-tight conditions are prescribed in this chapter.

Volatile Hazardous Air Pollutant (VHAP) – Any VOC that is also listed in federal regulations as a volatile hazardous air pollutant.

Volatile Organic Compound (VOC) or Volatile Organic Material (VOM) – Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. (Methane and Ethane are not volatile organic compounds. See 40 CFR §51.100(s) – Definition of "Volatile Organic Compound" for detail list of excluded hydrocarbons.)

3.0 PLAN REVISIONS

As the LDAR Management Plan is an evergreen document, it is expected that revisions and/or updates will have to be made to the document from time to time to remain current. As such, this section of the LDAR Management Plan requires documentation in the Revisions Table, Table 3-1, of any revisions and/or updates made to the Plan. Note that all columns must be completed with details as appropriate.

Additionally, it is important to note that Stepan will review and revise as necessary, all aspects of the LDAR Management Plan. Note that the review requires but is not limited to the review of current LDAR applicability determinations, all procedures and forms, monitoring inspection and repair procedures, recordkeeping, reporting and training modules.

Table 3-1
LDAR Monitoring Plan Updates

Revision #	Document Section	Revision Description	Date of Revision	Initials
1	Entire Plan	Original LDAR Monitoring Plan	December 2019	TLJ

4.0 ROLES AND RESPONSIBILITIES

4.1 Background

LDAR programs require collaboration between Facility Operations, Maintenance, Engineering, and EHS&S Departments, as well as support from LDAR Contractors, to achieve compliance with the fugitive component regulations. Because of these aspects, this section of the Plan defines the roles and responsibilities for LDAR program execution.

4.2 Details Regarding Roles, Responsibilities, and Expectations

Table 4-1 provides a summary of Stepan Company - Winder LDAR Team responsibilities, by job title.

Table 4-1
LDAR Team Responsibilities

Job Title	Responsibility
Plant Manager	• Sign-off on all "Delays of Repair" designations or "Non-Repairable" equipment.
EHS&S Manager	• Oversees the entire LDAR program; • Prepares semi-annual reports • Prepares cover letters for reports & submits reports to regulatory agencies; • Reviews regulatory applicability and updates the Plan if required.
Maintenance Specialist – EHS&S	• Carries out or facilitates general program compliance management tasks; • Conducts progress meetings with the LDAR Team; • Reviews compliance database; • Daily on-site management of the LDAR program; • Prepares a report of "like-in-kind" changes for the LDAR Contractor; • Communications with the LDAR Contractor; • Maintains lists of all leaks found, leaks repaired, and leaks with Delay of Repair designations, and submits documentation to the EHS&S Manager semi-annually. • Maintain integrity of inventory through Management of Change (MOC); • Auditing of the equipment inventory; • Documentation of calibrations, monitoring/inspections & re-inspections; • Submit all data to contractor for review. • Prepares monitoring schedule and logs for monitoring tasks; • QA/QC review of data documented by LDAR Contractor; • Ensures all recordkeeping and reporting requirements are met semi-annually; • Prepares monthly progress/status reports and submits to the EHS&S Manager for review; and • Manages and maintains Process Leak Tracking and Retest Form and submits to the EHS&S Manager for report preparation.
Maintenance Manager	• Repair scheduling and tracking
LDAR Contractor (and Maintenance Specialist – EHS&S where necessary)	• Daily Method 21 measurement device calibrations; • Daily Method 21 leak monitoring/inspections; • Daily re-inspection of leaks; • Once every 3-months (or upon return from maintenance), perform calibration-precision test on measurement devices; • Upon return from maintenance or in the event of a flow change, perform response-time test on measurement devices; and • Uploads all documentation to the compliance database for the LDAR program; • Updates inventory as identified or notified by Stepan Winder

5.0 LDAR APPLICABILITY DETERMINATION PROCESS AND IMPLEMENTATION

5.1 General Description of LDAR Applicability Determination Process

The Applicability Determination Process is a systematic approach to identify the applicable LDAR rules. LDAR rules are often complex and difficult to interpret. Because of this, a systematic approach

to assessing and applying applicable LDAR rules is necessary. This section defines the elements of this process, associated policies, and supporting compliance tools to perform the Applicability Determination Process.

The Applicability Determination Process includes the following elements:

- Determination of Summary of Process Units
- New Startup, Modification or Reconstruction Evaluation
- LDAR Change Management Process
- Determination of Affected Materials
- Determination of Stream Phase
- Exemption Criteria from LDAR
- Implementation
- Master Equipment
- Recordkeeping or Work Products

Appendix B-1, Procedure for LDAR Regulatory Interpretation, Document No. WN-SP-9.54B-1, provides guidelines to outline the process for interpretation of LDAR regulations and obtain consensus and approval for required changes with respect to process unit LDAR applicability. Additionally, ***Appendix B-2, Applicability Determination and Program Development, Document No. WN-SP-9.54B-2,*** provides guidelines to determine the LDAR rules that apply to the facility, the regulatory applicability of process streams affected by the rules, and the determination of LDAR tasks and applicability parameters used to define compliance requirements of the program. Note that the Applicability Determination Process work products should be reviewed in accordance with the requirements of Section 3 of this Plan.

5.2 Determination of Summary Process Units

Stepan will document the basis of grouping fugitive emission sources to form a "process unit" for each process at the Plant. All of the process units need to be defined to accurately perform the applicability determination process. An incomplete understanding of the process units could result in an incomplete applicability determination.

5.2.1 Content of "Process Unit Summary"

Stepan must document LDAR rule applicability on a Process Unit basis and consider additional sources of fugitive emission standards. Operating permits or other agreements at an affected facility should be reviewed to see if they contain LDAR standards when the Process Unit Summary is developed. Additional LDAR standards are common in areas of ozone non-attainment. This documentation should comprise the "Summary of Process Units."

This "Summary of Process Units" should contain the following information:

- Affected Facility Name and associated number designation;
- Affected Facility discrete boundary definition, associated storage tanks, and/or loading areas (note that this includes predominant use determinations for shared equipment);
- Date of initial construction as found in available agency notices;
- Date(s) of most recent modification or reconstruction that resulted in regulatory applicability change;
- Applicable Federal LDAR standards by classification of HAP, VOC, HRVOC, GHG, or RCRA;
- Initial Start-Up Date;

- Applicable LDAR Regulation(s);
- Operating or construction permit numbers that contain LDAR regulations;
- Dates of NSPS and NESHAP Subpart A letters (optional).

The EHS&S Department will review the "Process Unit Summary" as part of the LDAR Management of Change Process (Section 5.4.) LDAR changes may affect applicable LDAR rules due to "Capital Expenditure" and the "Equipment Basis" should be updated with each evaluation as the component count changes for scenarios when emissions are increased. The EHS&S Department should maintain notes in the Summary indicating changes to LDAR requirements, such as the date a new LDAR program was implemented on an existing process unit.

Please note that the "affected facility" will likely not correlate to the LDAR inspection route grouping. LDAR inspection route grouping determines efficiency of inspection and is defined later in the process by the LDAR Contractor.

5.3 New Start-Up, Modification, or Reconstruction Evaluation

5.3.1 New Start-up

Before a new process unit is brought online, Stepan must evaluate the "affected facility's" LDAR applicability. This must be done through the Management of Change process. LDAR Applicability should be based on the date that the new unit "Commenced Construction" and will be subject to the applicable LDAR regulation on that date.

New and reworked piping connections shall be welded or flanged. Screwed connections are permissible only on piping smaller than two-inch diameter. Gas or hydraulic testing of the new and reworked piping connections at no less than operating pressure shall be performed prior to returning the components to service or they shall be monitored for leaks using an approved gas analyzer within 15 days of the components being returned to service. Adjustments shall be made as necessary to obtain leak-free performance. Connectors shall be inspected by visual, audible, and/or olfactory means at least weekly by operating personnel walk-through.

Process units at Stepan are not new units and any process units that could have triggered applicability of another LDAR regulation through modification or reconstruction have already been determined to have done so. As such, there are no process units at Stepan that can trigger applicability of another LDAR regulation through modification or reconstruction and therefore, the following section is included for completeness of the Plan.

5.3.2 Modification or Reconstruction Evaluation

In addition to managing the process of including new LDAR components in the program, Stepan must evaluate if a change triggered applicability of additional, or more stringent, LDAR programs due to Reconstruction or Modification. Therefore, Stepan must ensure the LDAR Change Management Process (Section 5.4) evaluates applicable regulations after a change is made. Note that RIK Equipment will be tracked in Stepan's CMMS and new equipment will be identified in Environmental Reviews. ***Appendix B-3, Procedure for Modification and Reconstruction Calculation, Document No. WN-SP-9.54B-3.***

5.4 LDAR Management of Change Process

Stepan's LDAR Management of Change (MOC) process manages changes to LDAR component attributes affecting inspection interval, leak definition, applicable LDAR program, or historical

inspection records. These changes are generated by the Production Areas and/or Maintenance/Operation Departments in accordance with the ***Appendix B-4, PSM Management of Change Procedure, Document No. WN-SP-9.38 and associated attachments***. Additionally, LDAR Contractor observations of field condition changes or LDAR Electronic Database error correction requests should be communicated to the EHS&S Department so that the LDAR database can be updated as necessary.

5.4.1 LDAR Tag Management

Stepan manages changes related to the addition and subtraction of components in the LDAR program in accordance with the ***Appendix B-4, Procedure for LDAR Management of Change, Document No. WN-SP-9.54B-4.***

5.4.2 Escalation Process for Added Equipment

Events resulting in potential noncompliance should be escalated to the EHS&S Department and if necessary, the Plant Manager. Examples of events requiring escalation are: (1) Discovered Components which are not newly installed, (2) MOC projects not communicated to the EHS&S Department, and (3) Piping changes that are not part of an MOC. An incident report (or equivalent) should be submitted by the Maintenance Specialist – EHS&S in response to this occurrence.

5.4.3 Added Components in Reports

Added components should be immediately identified and reported by the MOC process, added components are required to be reported in LDAR Reports.

5.4.4 New Equipment Classification Protocol

When new LDAR components are added to the Site LDAR Program and database, they should be classified with a reason for addition (MOC, etc.) The EHS&S Department must verify the reason for adding each LDAR component, document the impact of adding the component(s), and communicate events resulting in potential noncompliance.

Added LDAR components must be classified in accordance with the ***Appendix B-2, Procedure for Applicability Determination and Program Development, Document No. WN-SP-9.54B-2.*** The EHS&S Department must review LDAR reports to determine classifications on a regular basis.

5.5 Determination of Affected Materials

Stepan's Site documentation of LDAR rule applicability of affected materials should be in accordance with the ***Appendix B-2, Procedure for Applicability Determination and Program Development, Document No. WN-SP-9.54B-2*** and include comments on the following categories (See Definitions): Volatile Organic Compounds (VOCs) or Volatile Organic Material (VOM) and Hazardous Air Pollutants (HAPs). Note that purchased chemicals are potentially subject to LDAR regulations just like produced chemicals, and must be evaluated for VOC, HAP, and stream phase. Purchased chemicals include additives, injection chemicals, lubricants, barrier fluids, glycols, amines, and others. Purchased chemicals should be documented after the review is conducted.

5.6 Determination of Stream Phase

LDAR rules define inspection and emission control requirements by stream phase. Stream phases are: (1) Gas/Vapor Service; (2) Light Liquid Service; and (3) Heavy Liquid Service. Each applicable LDAR rule defines how to determine stream phase, typically in the "Test Methods" section of the rule.

Regulatory definitions for each phase are listed in the "Definitions" section. Refer to ***Appendix B-2, Procedure for Applicability Determination and Program Development, Document No. WN-SP-9.54B-2*** for guidelines on determining stream phase.

5.7 Exemption Criteria for LDAR and Overlap

The EHS&S Department shall document criteria for exempting equipment or process streams from the Site LDAR program. These criteria should be utilized to define exempt reasons utilized in LDAR databases, or for the purpose of color-coding P&IDs for implementation. This list should be utilized to verify the exempt reason listed in the LDAR database is uniform with the applicable rules.

Typical streams that are exempt from LDAR include:

- Utility lines (e.g. Steam, Nitrogen) that do not mix with process fluid;
- Wastewater drains, sewer vents, and sump drains; and
- Vacuum Service equipment (i.e., Internal pressure is at least 0.7 psi below ambient pressure.)

Stepan's EHS&S Department should determine if the exemption from LDAR also exempts the component or stream from fugitive emission calculations required for air emissions inventories or permit fugitive emission estimates.

In the event multiple LDAR regulations overlap, each standard from each rule will be followed. A notation of this overlap should be made in the Summary of Process Unit document.

The equipment leak standards of TCEQ 28 VHP apply to equipment defined in Section 2.0, with the exception of those exclusions identified in Table 5-1. All exemptions claimed shall be documented as described in Attachment 2.

Table 5-1
Exemptions to Applicability of TCEQ 28 VHP
Equipment Leak Requirements

Regulation	Exemption Types	Exemption Applicability	Stepan Company - Winder
28 VHP	Exempt from equipment leak requirements	Equipment components that are not a pump, compressor, agitator, valve, connector, piping.	No other components identified at this time that do not meet the definition of equipment components
28 VHP 1A	Exempt from monitoring requirements	Where the Volatile Organic Compound (VOC) has an aggregate partial pressure or vapor pressure of less than 0.044 pounds per square inch, absolute (psia) at 68°F	Stepan Winder is not claiming any exemptions under this section
28 VHP 1A	Exempt from monitoring requirements	Where the VOC has an operating pressure is at least 5 kilopascals (0.725 psi) below ambient pressure	Stepan Winder is not claiming any exemptions under this section
28 VHP 1E	Exempt from the requirement to install a cap, blind flange, plug, or second valve for 72 hours.	Isolation of equipment for hot work or the removal of a component for repair or replacement results in an open ended line or valve	Stepan Winder will evaluate this on a case by case basis.
28 VHP 1F	Exempt from monitoring requirements	.Sealless/leakless valves (including, but not limited to, welded bonnet bellows and diaphragm valves) and relief valves equipped with a rupture disc upstream or venting to a control device	Stepan Winder does not have any sealless or leakless valves at this time.
28 VHP 1F	Exempt from recordkeeping requirements specified for valves	Pressure-sensing devices that are continuously monitored with alarms	Stepan Winder does not have any pressure sensing devices that are continuously monitored at this time
28 VHP 1G	Exempt from monitoring requirements	Pumps, Agitators, Compressor Seal systems designed and operated to prevent emissions or seals equipped with an automatic seal failure	Stepan Winder does not have any Pumps, Agitators, Compressor Seal systems designed and operated to

Regulation	Exemption Types	Exemption Applicability	Stepan Company - Winder
		detection and alarm system. These seal systems may include (but are not limited to) dual pump seals with barrier fluid at higher pressure than process pressure, seals degassing to vent control systems kept in good working order, or seals equipped with an automatic seal failure detection and alarm system. Submerged pumps or sealless pumps (including, but not limited to, diaphragm, canned, or magnetic-driven pumps).	prevent emissions or seals equipped with an automatic seal failure detection and alarm system at this time.

5.8 Implementation

Once applicable rules are identified in the Applicability Determination Process, the next step is to identify the scope of those rules (i.e., where they apply), the associated work practices, emissions control standards, recordkeeping, and reporting requirements of each. Therefore, implementation of the Applicability Determination Process focuses exclusively on the process unit(s), fugitive emission component types, and applicable regulation for each.

5.8.1 Site LDAR Program Scope Documentation Identification (LDAR Tagging)

Process Units must be defined in the Site LDAR Program before affected process streams can be defined and LDAR tagging can begin. Affected processes, streams, boundaries of the affected facility and groups of equipment should be documented clearly to ensure inclusion of all LDAR components. A process is used to categorize, document, and define affected process streams and the boundaries of each affected facility on **color-coded** P&IDs, requiring input from the Environmental, Engineering, and Operations Departments. The lines are flagged, and components tagged based on the ***Appendix B-5, Procedure for LDAR Inventory and Component Management, Document No. WN-SP-9.54B-5.*** It should also be noted that Stepan has a policy regarding the treatment and preservation of LDAR ID Tags, ***Appendix B-6, Policy for LDAR ID Tag Management, Document No. WN-SP_9.54B-6.***

During this process, the LDAR Contractor uses an understanding of the LDAR rule criteria that define affected pollutants to support the EHS&S Department, Production Areas, and Operations Departments as they define the boundaries and scope of affected process equipment. The resulting work products include **color-coded Piping and Instrument Diagrams, representing affected process streams and equipment, and grouping that equipment into "affected units".**

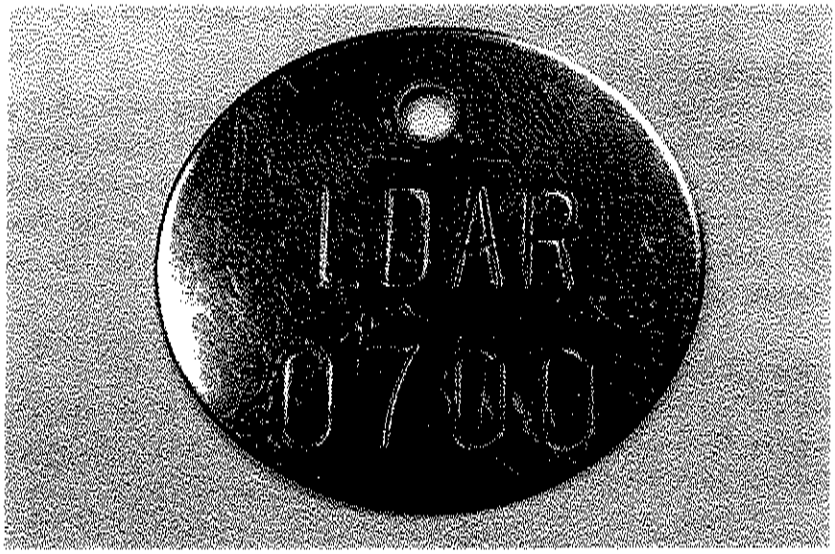
5.8.2 Identification of Equipment

Stepan Company - Winder will identify applicable equipment so that it is readily distinguishable from equipment that is not subject to the program. The component inventory allows for the tracking of found leaks on individual components by means of a unique identification (ID) number and provides equipment component count totals for each type of component. Each equipment component is assigned a unique ID number and the inventory provides the following information for each: Tag ID,

Inspection Point Status, Process Unit, Area (ultimate parent), Subarea (parent), Equipment Name, Equipment Type, Description (Location), Facility Drawing Reference, Facility Drawing Name, Service Type, Stream, Organic Percentage By Weight (optional), Unsafe-to-Monitor (UTM) Status, Reason UTM, Difficult-to-Monitor (DTM) Status, Reason DTM, In-Service Date, Removal Date, Inspection Schedule, Inspection Method.

A component's unique ID number is tracked by the placement of ID tags (**Figure 1: Identification Tag**), which are affixed to the applicable component with a steel wire. These tags contain a unique tracking number that can easily be referenced to a hard copy print out of the inventory. Components that do not have tags are referenced with additional decimalized numbers related to a nearby parent tag.

Figure 1
Identification Tag Sample



Stepan Company - Winder maintains a log with unique ID tag numbers for valves, connectors, pumps, agitators, and compressors. Equipment is also tracked and maintained on Process and Instrumentation Diagrams (P&IDs) maintained by the facility. The inventory is organized by LDAR process areas identified as "Process Units". These are split into "Areas" that contain a grouping of vessels, which are split into smaller "Subareas" that identify the individual vessels. Subareas are further identified by a description of each component's "Location." This logic is known as "geography". The geography serves as the basis for a list of all equipment that has the potential to release fugitive emissions.

TCEQ 28 VHP (Recordkeeping) requires a list of the equipment to be maintained. Table 5-2 summarizes the LDAR Identification Requirements and provides a description of Stepan Company - Winder's method of compliance.

Table 5-2

LDAR Identification Requirements

TCEQ 28 VHP	Identification Requirement	Stepan Company - Winder
1A(1)-(5)	Exempted components may be identified by one or more of the following methods: P&ID, written or electronic database or electronic file; color coding; a form of weatherproof identification; or designation of exempted process unit boundaries.	Exempt components shall be identified by electronic database.
1D	Difficult-to-monitor and unsafe-to-monitor valves, shall be identified in a list to be made readily available upon request.	DTM and UTM valves will be identified in the inventory with a reason and a plan to monitor these components, referenced in B-5A and B-5B

5.8.3 Access to Applicability Data

Once this process is complete, all stakeholders should be able to access the applicability data as a point of reference when evaluating equipment for inclusion in the LDAR program. This is an important tool for evaluating completeness of LDAR inventories during field review, identifying if added piping is part of an affected stream, and documenting the basis for calculating base cost for NSPS applicability determinations. The EHS&S Department is accountable for documenting and maintaining this system of applicability determination.

5.8.4 Loose, Fallen or Removed Tags

Facility employees are trained to collect and turn in all loose, fallen or removed tags to the LDAR Technicians, so they can be properly reattached. The LDAR Technicians are also instructed to identify and replace any lost or removed tags during routine monitoring rounds.

5.8.5 Site LDAR Applicability Documentation

The purpose of Site LDAR Applicability Documentation is to provide a reference to other stakeholders involved with the operation of the LDAR program. This documentation provides site specific data necessary for operation of the program and provides a list of action items and procedures necessary to keep the facility in compliance.

This documentation can be in electronic or paper form in a database file or a book. This should include:

- Facility Information;
- The Applicability Determination basis;
- Color-Coded Piping and Instrument Diagrams;
- Monitoring Information;
- Site LDAR Work Procedures;
- Monitoring Schedules (including DTM and other Annual Schedules); and
- UTM Plans.

Other important facility information related to the LDAR program, such as color-coded P&IDs can be kept in a readily accessible location. This document serves as the product of the Applicability Determination Process.

5.9 Master Equipment List and Database

The applicable inspection types (e.g., Visual or Method 21) should be documented in the LDAR database and summarized for each LDAR rule affecting the site. The summary defines the following elements:

- Applicable Rule Name;
- Inspection Method (Visual, Method 21)
- Equipment Type and Classification;
- Physical State (Vapor, light liquid, or heavy liquid) of equipment type and classification;
- Inspection interval for type of inspection;
- Initial required inspection period for new affected facility;
- Inspection interval components added to an existing affected facility;
- Leak Definition (Value at which a component is counted as leaking for reporting purposes); and
- Repair Action Level (Value at which a component must be counted as a leak and repaired within a specified time.)

The EHS&S Department will ensure that the monitoring frequency occurs as described in the regulation. For example, monthly monitoring means a minimum of one monitoring event in every calendar month. Additionally, guidelines for outlining steps for collecting, processing, and assessing data prior to reporting are included in ***Appendix B-7, Procedure for Data Management, Document No. WN-SP-9.54B-7.***

5.9.1 LDAR Monitoring Schedule

In accordance with TCEQ 28 VHP, all equipment, with the exception of exempted devices listed in Table 3-1 are required to be inspected in accordance with the following procedures.

1. **Audio, Visual, Olfactory Inspection:** Inspection to identify visible leakage, audible leakage, or any smell that is indicative of leakage.
    a. **Connectors** shall be inspected at least weekly by operating personnel walk-through.

2. **EPA Method 21:** Inspection to identify leakage by means of an approved gas analyzer

The following appendices summarize the inspection frequency and methodology for the facility. These are the minimum requirements set forth by the regulation; however, Stepan Company - Winder may elect to perform inspections more frequently. Ethylene Oxide monitoring defined in the appendix is required, at a minimum, for the facility, while Propylene Oxide and other VOC's are optional.

Appendix A-3: Facility Inspection Frequency & Methodology Ethylene Oxide Service, Doc. No.WN-SP-9.54A-3

Appendix A-4: Facility Inspection Frequency & Methodology Propylene Oxide Service, Doc. No.WN-SP-9.54A-4
Appendix A-5: Facility Inspection Frequency & Methodology VOC Service, Doc. No.WN-SP-9.54A-5

5.10 Recordkeeping and Work Products

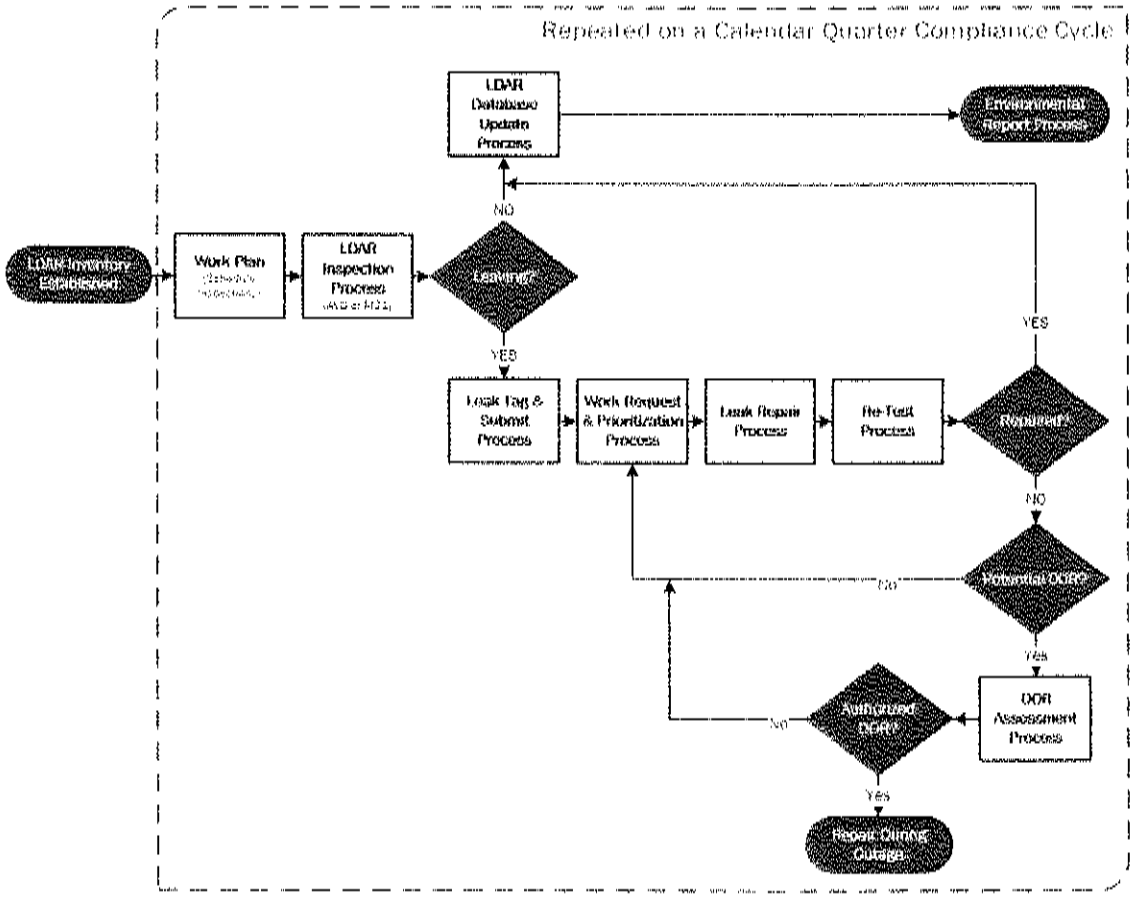
The Applicability Determination Process should produce the following work products and records:

- Summary of Process Units (List of Affected Facilities);
- Color-coded P&IDs;
- Stream List and Characterization Summary;
- Equipment Classification and Inspection Interval Summary;
- Site LDAR Applicability Documentation; and
- Master Equipment List and database.

6.0 MONITORING INSPECTION & REPAIR

6.1 LDAR Leak Inspection Process

LDAR rules utilize inspections to detect and identify leaks. A simplified workflow diagram of a typical LDAR inspection and repair process is presented below.



The LDAR Leak Inspection Process is comprised of the following elements:

- Approved Method 21 equipment leak test methods;
- Method 21 Equipment Monitoring Activities;
- Leak Identification and Communication;
- Repair Requirements;
- Audio, Visual, or Olfactory (AVO) Inspections,
- Difficult to Monitor Inspections;
- Unsafe to Monitor Inspections;
- Repair Interval and Delay of Repair (DOR) Criteria;
- Work Planning;
- Non-Leak Inspection Related Field Tasks;
- Health and Safety Management Plan; and
- Work Procedures

The following sections summarize the leak inspection process.

6.2 Approved Method 21 Equipment Leak Test Methods

6.2.1 Instrumentation

Each LDAR testing device must be compliant with the design specifications and performance criteria of Method 21 with the ability to gather data electronically and upload data to a database. The LDAR Contractor's device must be compliant with Method 21 for a compliant LDAR program. Examples of preferred equipment are: Thermo TVA model 1000B or model 2020 flame ionization detector, or another U.S. EPA Method 21-approved portable instrument.

TVA instrument specifications are summarized in Table 6-1.

Table 6-1
Instrument Specifications

Specification	Thermo TVA 1000B	Thermo TVA 2020
Sensor Type	Flame Ionization	Flame Ionization
Readout	1 to 50,000 ppm	1 to 30,000 ppm
Response Time	< 5 seconds to achieve 90%	<3.5 seconds for 90%
Sampling Method	Integral Pump	Integral Pump
Sample Flow Rate	1.0 liters per minute	1.0 liters per minute
Intrinsically Safe	Yes	Yes

The LDAR Contractor will supply all Method 21 inspection equipment and supplies. ***Exhibit 1, Standard Operating Procedures for Method 21*** will be supplied for the following: document how the selected

device meets compliance with the method using a specified leak testing equipment, calibration gases, calibration procedures, calibration-precision and response time test procedures, drift check procedures, technician training, and forms. In cases where necessary, hygiene practice plans will be supplied to include Personal Protective Equipment requirements.

For reference, ***Appendix C-1, Method 21 – Determination of Volatile Organic Compound Leaks*** procedure document is included.

6.2.2 Calibration and Maintenance

LDAR Contractor must perform an instrument calibration in accordance with Method 21, Section 10.1 prior to monitoring instrument use at the start of each work day. Daily calibration assessments and calibration precision must be performed by the LDAR Contractor.

The EHS&S Department must verify that calibration records are maintained and available. The LDAR Contractor must provide the EHS&S Department with a copy of the performance evaluation procedure for the Method 21 device(s) utilized.

A Calibration Gas Certificate of Analysis (COA) is required for all calibration gases utilized for instrument calibration during the Inspection Period and should be in a readily accessible location.

6.2.3 Calibration-Precision Test and Response-Time Test

The LDAR Contractor must perform an instrument calibration-precision and response time test in accordance with Method 21, Section 8.1.2 and 8.1.3, respectively, utilizing the following frequency:

- Prior to placing the instrument into service.
- Once every 3-months (Preferably the first business day of a calendar quarter.)
- After any modification to the sample pumping system or flow configuration that would change the response time.
- In this process, the LDAR Contractor must ensure that these tests are performed in a timely manner and records maintained, and that no instrument is used for leak detection without proper certifications.
- The EHS&S Department performs quality checks of the records to ensure accuracy prior to submittal of the record, as a Best Management Practice and before use of the instrument in the field. Records of calibration-precision tests should be reviewed by the EHS&S Department. The Calibration-Precision Test procedure for the Method 21 device must be available to the EHS&S Department.

6.2.4 Inspection Methodology

Type I Leak Definition Based on Concentration will be utilized for inspections.

For the majority of Method 21 based inspection, the LDAR Contractor must utilize Type I protocols found in Method 21, Section 8.3.1. This protocol is used for individual source surveys with a leak definition in ppm VOC.

The LDAR Technician will place the probe inlet at the surface of the component interface where leakage could occur, and begin moving the probe along the interface periphery while observing the instrument readout at 1 inch per 10 seconds. If the source is a rotating shaft, the probe inlet must be positioned within one centimeter of the shaft-seal interface. If an increased meter reading is observed, the LDAR Technician will slowly sample the interface where leakage is indicated until the maximum meter reading is obtained. The probe inlet must remain at this maximum reading location for approximately two-times the instrument response-time. If the maximum observed meter reading is greater than the leak definition in the applicable regulation (or a lower value if the facility chooses), the LDAR Technician will record and report the results as specified in the regulation reporting requirements. This inspection protocol will also be followed after the repair of leaking components to verify the efficacy of the repair.

Type II Survey (No Detectible Emissions (NDE)

For each affected component requiring performance based, or no detectable emissions testing, the LDAR Contractor must utilize Type II monitoring found in Method 21, Section 8.3.2. This protocol requires collection of background ambient VOC concentration and a record of the observed value.

Soap-bubble screening.

Soap-bubble screening will be utilized as an alternative screening method where appropriate. This method is best used to identify a specific leak path, when the background reading is high and it is difficult to determine the exact source of the leak.

6.2.5 Drift Check

While a drift check is not required for TCEQ 28 VHP, best practice indicates to perform a drift check at the end of each day. The LDAR Technicians will check the instrument using the same calibration gas(es) that were used to calibrate the instrument that morning before use. Following the procedures specified in Method 21 of appendix A-7 of this part, Section 8.1.2, except do not adjust the meter readout to correspond to the calibration gas value. Record the instrument reading for each scale used. Calculating the average algebraic difference between the three-meter readings and the most recent calibration value by dividing the algebraic difference by the initial calibration value and multiply by 100 to express the calibration drift as a percentage.

If any calibration drift assessment shows a negative drift of more than 10 percent from the initial calibration value, then all equipment monitored since the last calibration with instrument readings below the appropriate leak definition and above the leak definition multiplied by (100 minus the percent of negative drift/divided by 100) will be re-monitored. For example, If 1000 ppm is your leak threshold and the negative drift was off by 14 %, the equation would be 1000 ppm (100-14/100)=860 ppm. Therefore, any readings that were 860 and above should be remonitored.

If any calibration drift assessment shows a positive drift of more than 10 percent from the initial calibration value, then, at the owner/operator's discretion, all equipment since the last calibration with instrument readings above the appropriate leak definition and below the leak definition multiplied by (100 plus the percent of positive drift/divided by 100) may be re-monitored.

6.2.6 Calibration Gas Specifications

Purchased certified calibration gas mixtures will be used with manufacturer's gas concentration, mixture analysis accuracy, and specified cylinder shelf life certification documented on the Certificate of Analysis (COA). The LDAR Contractor should make all COA records available for review by the EHS&S Department. Zero air records must include certification of less than 10 ppmv of hydrocarbon in air and must not be a mixture of air and other chemical compounds. Calibration gas must be a mixture of zero air and methane unless authorized by the LDAR Coordinator.

If a mixture of VOCs is being monitored, the response factor shall be calculated for the average composition of the process fluid. A calculated average is not required when all of the compounds in the mixture have a response factor less than 10 using methane. If a response factor less than 10 cannot be achieved using methane, then the instrument may be calibrated with one of the VOC to be measured or any other VOC so long as the instrument has a response factor of less than 10 for each of the VOC to be measured.

Calibration gases utilized by the LDAR Contractor must be at or approximately the following concentrations:

- No more than 2,000 parts per million greater than the leak definition concentration of the equipment monitored.
- If the monitoring instrument's design allows for multiple calibration scales, then the lower scale shall be calibrated with a calibration gas that is no higher than 2,000 ppm above the concentration specified as a leak, and the highest scale shall be calibrated with a calibration gas that is approximately equal to 10,000 ppm.
- Stepan Company - Winder has taken a conservative leak threshold of 250 ppm, 500 ppm and 2,000 ppm for leak thresholds; Therefore, the facility is only calibrating to zero part per million (ppm) gas (air), 250 ppm, 500 ppm, 2,000 ppm methane.

Calibration gas concentration specifications should be reviewed by the EHS&S Department prior to implementation of any new or more stringent leak regulations for the facility. The EHS&S Department must verify that calibration gas concentrations adhere to these standards.

6.3 Method 21 Monitoring Activities

6.3.1 Equipment Monitoring Classifications (including Routine/Non-Routine Inspections)

Equipment monitoring classifications designate the LDAR component class in the database being used. These designations tell the database the monitoring frequency of the component and whether the component is a routine monitoring event or a non-routine monitoring event. Standard monitoring classifications include:

- **Normally Inspected (NI, NTM or N)** – Does not meet any exemptions and would need to be inspected on the intervals described in the applicable standard.

- **Emissions Controlled** – Exempt from normal inspection intervals because fugitive emissions are controlled by an approved method or technology. An example would be a relief valve routed to a Closed Vent System.
- **No Detectable Emissions (NDE)** – Items that are designed to perform below the Method 21 Type II NDE threshold.
- **Difficult to Monitor (DTM)** – Requires elevating monitoring personnel so that fall protection is required. Requires a plan for inspection when safe.
- **Unsafe to Monitor (UTM)** – Conditions surrounding the affected equipment would place the monitoring personnel in immediate danger during inspection. Requires a plan for inspection when safe.
- **Temporarily Out of Service Status (TOS)** – Removed from and not in VOC Service on a temporary basis with the intention of placing the component back in service at some point. Also called temporarily removed from service (TRFS.) As a Best Practice these should be tagged.
- **Removed from Service (RFS)** – Removed from and not in VOC Service on a permanent basis with no intention of ever placing the component back in service. Also called permanently removed from service (PRFS.) LDAR tags should be removed and returned to either LDAR Contractor or EHS&S Department.

The EHS&S Department must review each applicable LDAR standard for monitoring classifications, and work with the LDAR Contractor to make sure that the appropriate designation is made in the electronic database. The EHS&S Department must review any changes made to these classifications. Stepan's **Appendix B-8, Procedure for LDAR Component Classification, Document No. WN-SP-9.54B-8**, provides guidelines to identify LDAR components as difficult to monitor, unsafe to monitor, no detectable emissions, exempt, and unsafe to repair.

Temporarily Out of Service Status (TOS) and Removed from Service (RFS) Components

Components reported as Temporarily Out of Service (TOS) or Removed from Service (RFS) by Production Areas or the LDAR Contractor must be approved by the EHS&S Department prior to exclusion from the current inspection schedule. The component should be monitored again once it is placed back in service.

Components that are TOS or RFS go onto an 'OOS' list in the LDAR Database which prevents them from going onto the monitoring schedule. However, this list is visually verified by the LDAR Contractor in the field to ensure components are still not in service. Once they return to regulated service they are taken off the 'OOS' list and get placed on the schedule to ensure a follow up within the required time period. TOS components should be reviewed monthly.

6.3.2 Routine and Non-Routine Method 21 Inspections

Inspections can be categorized in two ways: (1) Routine inspections and (2) Non-routine inspections. This section ensures required Method 21 inspection intervals, or those driven by visual leak detection, are met.

Routine Inspections:
Routine inspections for equipment leak detection are composed of visual inspections as well as instrument-based surveys. The Site LDAR Program will summarize the required inspection intervals by inspection method and equipment classification for the applicable LDAR rules at the site.

The EHS&S Department must verify all affected components scheduled and inspected in a timely manner comply with the applicable regulations. Exceptions or variances must be reported to the EHS&S Department promptly by the LDAR Contractor.

Annual Monitoring Schedule (AMS):
An Annual Monitoring Schedule (AMS) documents the components in each affected facility at specific intervals and provides an estimated monthly count of inspections. This AMS balances labor and equipment resources, ensures emissions inventory is managed and communicates monitoring events with the Production Superintendent or designee. Closed Vent System and DTM components should be included with this schedule.

The EHS&S Department should review the Annual Monitoring Schedule with the LDAR Contractor to ensure balanced monthly inspection schedules, which includes ensuring that approximately the same number of inspections or labor resources are required each calendar month. This process helps prevent overwhelming site maintenance resources during a given inspection period. Once a process unit's inspection schedule is established for a specific month of the quarter, the LDAR Contractor should not deviate without approval, regardless of exemptions within the regulations.

In addition, the AMS includes notations of when DTM and UTM inspections are scheduled. This is critical for ordering fall protection (e.g. scaffolds, aerial lifts, etc.) and specialized safety equipment (e.g. SCBA) for these events. As a reminder, UTMs must include a plan that designates when UTMs are safe to monitor.

Non-Routine Inspections:
For non-routine inspections resulting from AVO leak detection, the Production Areas, Maintenance Departments, or the LDAR Contractor can notify the EHS&S Department of the need for inspection. The EHS&S Department must integrate the inspection event into the current work plan and inform the LDAR Contractor of the task.

6.3.3 Leak Threshold
The LDAR Technician will identify all equipment with calibrated instrument readings, collected using the correct methodology. All equipment will have documentation of the background and readings. All readings greater than the leak threshold will be documented as "leaking". Table 6-2 reflects the Leak Thresholds for TCEQ 28 VHP; however, Stepan Company - Winder has implemented a more stringent leak threshold for all equipment.

Ethylene Oxide leak thresholds as defined in the appendix is required, at a minimum, for the facility, while Propylene Oxide and other VOC's are optional.

- **Appendix A-3: Facility Inspection Frequency & Methodology Ethylene Oxide Service, Doc. No. WN-SP-9.54A-3**
- **Appendix A-4: Facility Inspection Frequency & Methodology Propylene Oxide Service, Doc. No. WN-SP-9.54A-4**
- **Appendix A-5: Facility Inspection Frequency & Methodology VOC Service, Doc. No. WN-SP-9.54A-5**

6.4 Leak Identification and Communication

6.4.1 Existing Components

All LDAR leaks (Existing or New) discovered using Method 21 require the following:

1. A first attempt within five (5) days.
2. A repair within 15 days, indicated by a re-monitoring of the component during that time.
3. A weatherproof and readily visible leak tag, with the Equipment Identification Number, the Date the Leak was Detected, and the Method 21 Device Reading or notation of "AVO Leak".
4. Communication to the EHS&S Department including the maintenance tech that performed the repair and work performed to conduct the repair.
5. An LDAR Work Request.
6. Re-monitoring events to be uploaded to the LDAR Electronic Database, including 1) Date of re-monitoring, (2) Type of repair attempt performed, (3) LDAR Contractor performing the re-monitoring, and (4) Method 21 result value.

The LDAR Contractor is responsible for updating the leak tag or removing it, depending on leak status. The following procedures address component leak identification and communication:

- ***Appendix B-9, Procedure to Identify Leaking LDAR Components, Document No. WN-SP-9.54B-9.***
- **Appendix B-10, Procedure for Leak Management, Document No. WN-SP-9.54B-10.**

6.4.2 "New" Components

New valves, pumps, agitators, compressors and connectors added to existing affected facilities (i.e. Process Units) or to the LDAR Electronic Database:

1. Must be monitored and/or inspected initially in accordance with applicable regulations (e.g. TCEQ 28 VHP requires initial monitoring of piping connections within 15 days of being placed in VOC service).
2. Subsequent monitoring and/or inspection must be conducted in accordance with applicable regulations.
3. New and reworked valves and piping connections shall be so located to be reasonably accessible for leak-checking during plant operation where possible.
4. New and reworked piping connections shall be welded or flanged. Screwed connections are permissible only on piping smaller than two-inch diameter.

6.4.3 Fugitive Emission Control Equipment Management

Guidelines to maintain compliance standards for control devices of open-ended lines, sampling systems, and equipment vented to control devices are included in in ***Appendix B-11, Procedure for Open-Ended Lines and Sample Systems Management, Document No. WN-SP-9.54B-11.*** Additionally, best engineering standards related to sample systems and pipe runs and pipe rack valves are included in ***Appendix B-12, Engineering Standards for Pipe Run and Pipe Rack Valves, Document No. WN-SP-9.54B-12***. It should also be noted that Stepan has a policy regarding equipment leak emission control expectations including the use of technology. The Policy for ***Appendix B-13, Policy for Equipment Leak Emissions Control and Reduction, Document No. WN-SP-9.54B-13.***

6.5 Repair Requirements

6.5.1 General Repair Schedule (5/15)

For components meeting the leak criteria contained in the Site LDAR Program, the leak must be repaired as soon as practicable, but not later than 15 calendar days after it is detected. A first attempt at repair must be made no later than five calendar days after each leak is detected. ***Appendix B-9, Procedure to Identify Leaking LDAR Components, Document No. WN-SP-9.54B-9***. And **Appendix B-10, Procedure for Leak Management, Document No. WN-SP-9.54B-10** address repair schedule and requirements.

Pressure Relief Device Schedule

Relief valves equipped with a rupture disc upstream or venting to a control device are not required to be monitored. If a relief valve is equipped with rupture disc, a pressure-sensing device shall be installed between the relief valve and rupture disc to monitor disc integrity. A check of the reading of the pressure-sensing device to verify disc integrity shall be performed at least quarterly and recorded in the unit log or equivalent. Pressure-sensing devices that are continuously monitored with alarms are exempt from recordkeeping requirements specified in this paragraph. All leaking discs shall be replaced at the earliest opportunity but no later than the next process shutdown.

6.5.2 First Attempts at Repair of Leaking Components

Procedures for first attempt at repairs are included in ***Appendix B-10, Procedure for Leak Management, Document No. WN-SP-9.54B-10***

6.5.3 Leak Tracking Procedure

The LDAR Contractor will upload inspection and leak data regarding repairs to the LDAR Electronic Database at the end of each work shift and will report the results back to the EHS&S Department. The EHS&S Department will work with Production Areas, Maintenance Departments, and LDAR Contractor to ensure repairs are completed in a timely manner.

6.6 Audio, Visual, or Olfactory (AVO) Inspections

Some LDAR equipment classes require routine visual inspections to detect evidence of leaks or liquids dripping (i.e. pump seals.) Also, it is a general duty of all Stepan Production Areas, Maintenance Departments, and LDAR Contractor personnel to report leaks detected by audio, visual, or olfactory

(AVO) methods. The ***Appendix B-14 Procedure for LDAR Seal Visual Inspections, Document WN-SP-9.54B-14*** provides guidelines for completing AVO inspections.

6.6.1 Connector AVO Inspections and Documentation

Weekly visual inspections of connectors for liquids dripping, in each operating area must be performed by Production Areas and Maintenance Departments.

The Production Department ensure that inspections are assigned, scheduled, and conducted in a timely manner. The weekly connector inspections are kept in the EHS&S Department. The EHS&S Department must review inspection records for accuracy, completeness, leaks and repair attempts weekly if possible.

The EHS&S Department will notify the LDAR Contractor if there are leaks. Leaks detected by audio, visual or olfactory evidence should be verified by the LDAR Contractor with use of Method 21 within five days of detection of the leak. The LDAR Contractor should affix the equipment with a leak tag if found reading equal to or greater than the applicable leak definition, referencing ***Appendix B-10, Procedure for Leak Management, Document No. WN-SP-9.54B-10.***

6.6.2 Closed Vent System (CVS) Equipment

Stepan Production Area, Maintenance Departments, and LDAR Contractor personnel must maintain emission control equipment in compliance with the LDAR regulations. This includes Method 21 monitoring the equipment upon Start-Up and annually with an Audio, Visual, or Olfactory inspection for CVS constructed of hard-piping or Method 21 for CVS constructed of ductwork.

6.6.3 Heavy Liquid Leaks and Pressure Relief Devices in Liquid Service

If evidence of a potential leak is found by AVO methods for equipment in heavy liquid service, or pressure relief devices in liquid service, the Production Area or Maintenance Departments personnel may elect to eliminate the indications of a potential leak within five (5) days of initial detection without further action required (i.e. tagging or reporting of a leak.) Note that pressure relief devices subject to Subpart Q must monitor within 24 hours of detection by AVO.

Pressure relief devices in hydrocarbon service venting to atmosphere are to be reported promptly, but no later than the end of the current work shift, to allow retesting to confirm complete closure.

6.6.4 Pressure Relief Devices in Vapor Hydrocarbon Service

Pressure relief devices in vapor hydrocarbon service release events do not require identification/tagging, but do require prompt reporting. Any release to the atmosphere by pressure relief devices in vapor hydrocarbon service and detected by Production Area or Maintenance Departments personnel or anyone else must be reported to the EHS&S Department before to the end of the work shift.

The EHS&S Department is responsible for promptly requesting the LDAR Contractor to perform Method 21 Type II inspections within five days to verify the device is operating with no detectable emissions (NDE.)

6.7 Difficult to Monitor (DTM) Inspections

Components classified as "Difficult to Monitor" (DTM) may require advanced scheduling and specialized fall protection equipment. DTM inspections must be planned in advance and must be done according to Stepan safety procedures. DTMs are defined as a person standing more than **two meters** above a support surface, which generally means components greater than 13 feet (six feet (or 2 M) plus five-foot person plus two foot reach) above a support surface.

The LDAR Contractor must:

1. Schedule the monitoring of DTMs once per calendar year (monitoring events must be separated by at least 120 calendar days and must not exceed 13 months between monitoring events);
2. Review and assess field LDAR components for fall protection needs;
3. Notify the Supervisor of Plant/Process Operations and the LDAR Coordinator of required scaffolds and/or aerial lifts at least 30 days before the scheduled inspection event;
4. Train LDAR Field/Monitoring Technicians for fall protection, including aerial lift training and proper use of fall arrest systems; and
5. Inform the Supervisor of the Maintenance Department prior to conducting DTM inspections on a daily basis.

Maintenance will provide a choice of items 1, 2 or 3, and must perform item 4:

1. Provide scaffolds approved by a competent person at DTM locations where necessary.
2. Provide aerial lifts (also known as man lifts) in good working order for use by trained LDAR Contractors, or other means of arranging for aerial lift resources.
3. Provide extension ladders to access DTMs for annual monitoring.
4. Make personnel available to perform immediate repair efforts for any DTM leaks detected. This should be done by the Supervisor of the Maintenance Department.

The LDAR Contractor may use extension probes. Method 21 calibrations must be done on the Method 21 compliant extension probes before monitoring with these probes.

DTMs in new Process Units are limited to 3% DTM by regulation.

6.8 Unsafe to Monitor Inspections

Components classified as "Unsafe to Monitor" (UTM) require a plan for each component for when it is safe to monitor the component. If an unsafe to monitor component is not considered safe to monitor within a calendar year, then it shall be monitored as soon as possible during safe to monitor times. This requires advanced scheduling, updated job hazard analysis, and specialized personal protective equipment (PPE).

The Maintenance Specialist – EHS&S must:

1. Review the UTM inspection plan and notify the LDAR Contractor in a timely manner before conducting UTM inspections; and

The EHS&S Department must:

1. Ensure the work will be conducted in a safe manner and that all required resources are available for the LDAR Contractor; and
2. Notify Stepan Production Areas, Maintenance, and Safety departments of upcoming UTM inspections and work plan documentation.

Elimination of UTMs is recommended wherever possible during Process Unit Shutdowns.

6.9 Repair Interval and Delay of Repair (DOR) Criteria

6.9.1 Delay of Repair Guidelines

Delay of Repair is allowed for leaking equipment when:

- A unit shutdown must be performed for repair;
- The component has been isolated from service;
- And/or the seal will be replaced within six months of the initial leak (applies to pumps only).

Lack of parts for a component is not a legitimate reason to place a component on DOR. Legitimate reasons for placing a component on DOR include the following:

Requires Unit Turnaround – Leaking component would require a unit turnaround for repair and cannot be safely isolated without shutting down the process unit. This category of delay of repair MUST be repaired during unit outages. All equipment classes can qualify for this reason.

Isolated from Hydrocarbon Service – For all equipment classes, a leaking component has been isolated from hydrocarbon service until final leak repair efforts can be initiated. This category of delay of repair may remain unrepaired indefinitely, as long as the equipment is not placed back in an applicable service before a repair is made.

Equipment in this category may not utilize performance as a basis for removal from DOR.

Seal Re-design Required – For pumps, the pump seal will be allowed to continue leaking until a seal re-design is completed. The seal re-design must be completed within six months of initial leak detection. This option should only be used when a pump seal cannot be isolated, and the site understands the re-design deadline is firm.

Repair causes more emissions – This reason applies to all equipment classes except pumps. This option entails allowing a component to leak until a unit outage, despite the fact that isolation is possible without unit outage, as long as during the unit outage all process material is vented to a

control device. Examples of where this might apply are interconnecting piping circuits that would require venting of large amounts of product to isolate the leaking equipment. This option should only be used as a last resort, and the LDAR Coordinator must understand how material will be routed to a control device.

Stepan does not generally use the "stop the clock" approach when isolating equipment from hydrocarbon service to repair a leak. Stepan views the repair period as unstoppable and ending on the 15th day after detection in either repair of the component, or the leak meeting criteria for legal delay of repair. The repair process or delay of repair decision process should not exceed fifteen calendar days from the detection of the leak.

6.9.2 Documentation of Delay of Repair

Documentation must be used to identify and/or explain the conditions that qualify a leaking component for DOR. ***Appendix B-15, Procedure to Assess and Authorize use of the Delay of Repair Option, Document No. WN-SP-9.54B-15*** is included as and provides guidelines for evaluating items to be placed on the delay of repair (DOR) list. Further, ***Appendix B-16, Procedure to Identify Delay of Repair Components and Manage ID Tags, Document No. WN-SP-9.54B-16***, provides guidelines for managing DOR field tags.

6.9.3 Delay of Repair Component Inspections

Procedures for tracking, repairing, and retesting items placed on the DOR list are included in ***Appendix B-17, Procedure to Track, Repair, and Retest Delay of Repair Components, Document No. WN-SP-9.54B-17***.

6.9.4 Process Unit Shutdowns

Procedures addressing DOR requirements following process unit shutdowns (i.e., turnarounds and outages) is included in ***Appendix B-18, Procedure for Process Turnarounds & Outages, Document No. WN-SP-9.54B-18***. DOR items must be monitored immediately after the unit returns to service from a Process Unit Shutdown in accordance with applicable regulations to verify repair (e.g. TCEQ 28 VHP requires monitoring to verify repair must occur within 15 days after startup of the process unit).

Criteria allowing legal delay of repair beyond the required repair period should be documented by the EHS&S Department.

Operations must make plans to fix the component during the Process Unit Shutdown. The Supervisor of Plant/Process Operations, or designee, responsible for the leak must notify the EHS&S Department when/if a valve DOR is extended beyond the next process unit shutdown. The EHS&S Department should remind the Supervisor of Plant/Process Operations that the valve must be repaired within six months of the first Process Unit Shutdown.

6.9.5 Delay of Repair Component Identification

Stepan's policy is that a special tag for delay of repair components is a requirement of the program (i.e. a larger leak tag.) DOR tags should not be removed by Stepan personnel or Contractors, including the LDAR Contractors, without prior authorization from the EHS&S Department.

6.9.6 Delay of Repair (DOR) Resolution

The removal of the DOR tag should be authorized by the EHS&S Department and submitted to the LDAR Contractor prior to removing DOR items from the list due to performance.

After the DOR is repaired during a Process Unit Shutdown, the Production Area or Maintenance Department must manage DOR repair actions and provide the EHS&S Department with repair action information so that the equipment can be monitored as required. The LDAR Contractor may remove DOR items from the active list after receiving repair activity data, and a non-leak Method 21 reading with the approval of the EHS&S Department. The LDAR Contractor will notify the EHS&S Department any time DOR items are removed.

6.10 Inspection of Repaired Leaks

Replacements for leaking components shall be re-monitored within 15 days of being placed back into VOC service. If the repair is successful and the reading is below the leak threshold the leak tag may be removed. Documentation of the date, time, instrument used, reading and technician shall be recorded and uploaded to the database to close the leak.

If the repair is unsuccessful, meaning the reading is above the leak threshold, then the technician will record the date, time, instrument used, reading and technician and document and communicate that another repair or replacement is required. The clock on the leak does not start over.

The only person to remove a leak tag shall be the LDAR contractor after the repair is verified successful.

6.11 Work Planning

A work plan will ensure the success of timely and compliant inspections. This section suggests Best Management Practices for LDAR inspection work plans.

6.11.1 Monthly Work Plan

This plan communicates inspection information and LDAR related tasks during the month and the schedule to conduct these tasks.

The monthly LDAR Inspection work plan should include the following:

- Units due for quarterly inspections.
- Total count of components due for inspection (includes previous leaks, DOR items, new components, routine inspections, and temporarily out of service components scheduled to return to service.)
- LDAR Identification Tag Maintenance.
- DTM inspection locations and counts and required fall protection resources.
- UTM inspection locations and counts and required safety equipment.

6.11.2 Daily Work Plan Adjustments

Multiple changes result in the need to adjust the daily work plan. These adjustments must be communicated by the EHS&S Department to the LDAR Contractor, Production Areas, and Maintenance Departments each day. Reasons for work plan adjustments include:

- Weather impact,
- Labor or equipment resource changes,
- Addition of inspections due to return to service equipment,
- Addition of inspections due to newly identified LDAR components,
- Component ready for re-monitoring or which inspection is due,
- Unplanned unit outage,
- DOR item re-monitor within 15 days of unit return to service, and
- Approved changes to LDAR component inspection frequency or leak definition in LDAR Electronic Database.

To prevent deviations, the EHS&S Department must approve all schedule changes and requisitioning of any additional resources necessary to complete inspections in a timely manner.

6.11.3 Suggested Work Plan Inspection Timing Policy

At times, process equipment may be or become unavailable for inspection due to temporary conditions (e.g. pumps temporarily out of service for a portion of the month.) To prevent potential deviations of the inspection interval requirements, the EHS&S Department should use the following guidelines when preparing the work plan:

- Prevent routine inspection intervals by accounting for Process Units scheduled for outages later in the month or quarter.
- DOR items returning to service should be inspected as a priority over routine inspections.
- Components temporarily out of service (TOS) and scheduled for inspection during the current month should be reviewed for in-service status before the end of the current month.

Equipment with shorter inspection intervals should be inspected earlier to allow time for work plan adjustments or rescheduling. The EHS&S Department will configure the work plan to meet these criteria.

6.11.4 Inspection Period Completion Target

All inspections should be completed by the LDAR Contractor with a 10% buffer as a Best Management Practice between the date the last due inspection is conducted and the end of the period. At no time will inspections be conducted by the LDAR Contractor on the last day of a month or during weekend periods without prior authorization from the EHS&S Department and affected Production Area or Maintenance Departments Manager. Inspection periods should be reviewed monthly.

6.12 Non-Leak Inspection Related Field Tasks

Stepan requires LDAR Contactors to perform other tasks in addition to the required inspections.

These tasks are related to overall compliance of the LDAR program or safety hazard recognition. During leak inspections, the LDAR Contractor is expected to observe, note, tag (depending on item type as defined below), and report any of the following items to the EHS&S Department:

- Open-ended Lines (Tagging Required);
- Missing identification tags (Tagging Required);
- Correct component attribute information (e.g. location and size);
- Hazardous conditions (after ensuring relocation to safe area);
- Overlooked or new non-MOC related components;
- Noting and reporting improperly sealed or configured control devices; and
- Correct classification of components (e.g. NI, DTM, UTM.)

The EHS&S Department must ensure each LDAR Contractor is trained to properly recognize each of these items, and consistently performs these work tasks while inspecting. The LDAR Contractor must communicate observations to the EHS&S Department so that these items can be resolved where necessary.

6.12.1 LDAR Contractor Component Changes

During routine inspections, the LDAR Contractor may observe conditions or component attributes that require a change to the LDAR component database. The LDAR Contractor will follow the ***Appendix B-19, Procedure to Report and Track LDAR Errors, Document No. WN-SP-9.54B-19***.

6.12.2 Component Inventory Attribute Changes

Changes to the LDAR component inventory and LDAR Electronic Database must only occur with EHS&S Department approval. Examples of changing component inventory attributes include the following:

- A component with a routine inspection schedule to "Exempt" status in the LDAR electronic database;
- A component's inspection frequency to less stringent than currently assigned;
- A component's leak definition concentration to less stringent than currently assigned; and
- The status of a component that fails to meet required emission control standards.

These changes must be reviewed with the EHS&S Department before finalization in the LDAR Electronic Database.

6.12.3 Discovered Components

The LDAR Contractor will report any additional components affected by the LDAR regulations but not contained in the inspection route to the EHS&S Department by the end of the LDAR Contractor's work shift. The LDAR Contractor should investigate if the added equipment is part of an existing MOC project, when the equipment was placed in service, and, if possible, the reason for the added equipment. The LDAR Contractor will report this information to the EHS&S Department as soon as possible. The LDAR Contractor should utilize the ***Appendix B-4, Procedure for Component Change***

Management, Document No. WN-SP-9.54B-4, to add these discovered components to the LDAR database. The EHS&S Department will enter these components into the LDAR database.

Discovered components affected by the LDAR program should be classified so that it is apparent the component(s) were overlooked during the initial inventory process. The LDAR Contractor should utilize one of the following classifications as the "reason added" for discovered components:

- Existing Component (In the case of overlooked); and/or
- Newly Added Component (In the case of components added without an MOC, but not overlooked in the initial inventory process).

The LDAR Contractor should assess the reasons for newly added components without an MOC, and escalate the issue to the EHS&S Department to prevent recurrence. Discovered components will be reported by the LDAR Contractor to the EHS&S Department in a report as discovered.

6.12.4 Open-Ended Lines (OELs) and Reporting

Valves, except pressure relief valves, contacting hydrocarbon on one side of the seat and atmosphere on the other must maintain a plug, cap, or two closed valves in series at all times except when active maintenance activities are ongoing. See ***Appendix B-11, Procedure for Open Ended Lines and Sample Systems Document No. WN-SP-9.54B-11*** and ***Appendix B-20, Engineering Standards for Open Ended Line Control and Valve Design Document No. WN-SP-9.54B-20***

For open-ended lines controlled using two closed valves in series, the Production Area or Maintenance Department personnel utilizing the system for venting are responsible for operating the system such that the valve on the process fluid end is closed before the second valve is closed.

OELs apply to process lines containing gas/vapor, light liquid, or heavy liquid hydrocarbons. OELs do not apply to nitrogen or non-process material streams.

LDAR Contractors should, as a Best Management Practice, note any observance of open-ended lines while performing routine inspections. The LDAR Contractor, Production Area, or Maintenance Department personnel shall report OELs to the EHS&S Department before the end of the work shift, or before leaving the facility or the operating area. For Stepan's policy regarding OELs, see ***Appendix B-21, Policy for Open Ended Line Management, Document No. WN-SP-9.54B-21***.

If a question exists whether a situation is a maintenance activity (sampling, draining, double block and bleed, etc.) or whether the component is really an Open-Ended Line, the person that identified the OEL must contact the EHS&S Department for guidance. As long as a cap that was removed for a maintenance activity within the same shift is replaced, it is generally not considered an OEL.

According to TCEQ 28 VHP, if the isolation of equipment for hot work or the removal of a component for repair or replacement results in an open-ended line or valve, it is exempt from the requirement to install a cap, blind flange, plug, or second valve for 72 hours. If the repair or replacement is not completed within 72 hours, the permit holder must complete either of the following actions within that time period;

(1) a cap, blind flange, plug, or second valve must be installed on the line or valve;

or

(2) the open-ended valve or line shall be monitored once for leaks above background for a plant or unit turnaround lasting up to 45 days with an approved gas analyzer and the results recorded. For all other situations, the open-ended valve or line shall be monitored once within the 72-hour period following the creation of the open-ended line and monthly thereafter with an approved gas analyzer and the results recorded. For turnarounds and all other situations, leaks are indicated by readings of 500 ppmv and must be repaired within 24 hours or a cap, blind flange, plug, or second valve must be installed on the line or valve.

6.13 Health and Safety Management Plan

Health and safety management plans include processes to address issues unique to the LDAR program. This section defines some of those elements and addresses typical management techniques.

6.13.1 Unsafe to Monitor Components

The LDAR Contractor should be aware of the components categorized as "unsafe to monitor" (UTM) in the LDAR database, and therefore exempt from typical inspections. A review of inspection records should indicate a plan to inspect. Inspection of UTMs should always include consultation with the facility's EHS&S Department.

6.13.2 Large LDAR Leaks and Escalating DOR Readings

The EHS&S Department will review any large leaks, the increase in VOC concentration of Delay of Repair (DOR) components, and unusual or high background readings. These situations may be of sufficient concentration as to pose a risk for fire and explosion. Although the primary purpose of an LDAR program is an environmental focus (to reduce fugitive emissions), these leaks can also represent a safety concern.

6.14 Work Procedures

LDAR procedures associated with this plan include those maintained directly by Stepan's EHS&S Department and are included in **Appendix B Attachments 1 – 28.**

6.14.1 LDAR Contractor Procedures

LDAR Contractor procedures are not the responsibility of Stepan to maintain but are listed below as a useful reference tool for the management plan and are included on the LDAR Contractor's web site. Some examples of LDAR Contractor procedures are listed below:

- Establishing LDAR Field Inspection Routes
- LDAR Inspection Route Management
- Method 21 Instrument Calibration
- Method 21 Inspections

7.0 RECORDKEEPING

7.1 Document Control

Revisions to the LDAR Management Plan will be recorded by updating the "Revisions Table" of this document (See Section 3.) The LDAR Management Plan will be reviewed for accuracy.

A current copy of this plan should be maintained on the Stepan network drive by the EHS&S Department. Site-specific LDAR documents should be maintained at a location designated by the EHS&S Department.

7.2 Data Retention Policy

LDAR regulations require that records shall be maintained for two (2) years. Consult the EHS&S Department before destroying any LDAR records or with any questions.

7.3 Recordkeeping and Documentation

7.3.1 Documenting Interpretation Basis

For any LDAR regulatory standard requiring interpretation by the EHS&S Department, all research documents and basis data should be retained for future reference. The EHS&S Department should document the outcomes and results of the Applicability Determination Process in the Site LDAR Applicability Document.

7.3.2 Site LDAR Applicability Documentation

Details regarding the Site LDAR Applicability Documentation are discussed in Section 5.0. The document should be made available for all stakeholders to access and should be the basis of compliance checklists for internal performance auditing.

7.3.3 Regulatory Recordkeeping

Stepan shall utilize the Site LDAR Applicability Document and the Regulations for each process unit to document the required recordkeeping for the applicable regulations.

Records must be kept "in a readily accessible location" specifying the design capacity of the facility, CapEx evaluations, analyses showing that a stream is a heavy liquid, and analyses showing equipment not in VOC service.

7.3.4 Quality Management Program

The quality management program is composed of quality checks on critical compliance or process items, continuous improvement, and a performance reporting process. The EHS&S Department must have a procedure for QA/QC review that includes regular reports highlighting any anomaly. This ensures and verifies that LDAR compliance is maintained, see ***Appendix B-22 Procedure for LDAR Data QA/QC, Document No. WN-SP-9.54B-22***.

Corrective Actions

During the QA/QC process, Stepan must identify actions necessary to correct, or improve, see ***Appendix B-23, Procedure for LDAR Inspection Reconciliation, Document No. WN-SP-9.54B-23***. All

corrective actions must be completed and if necessary, recorded as deviations to be reported in the next LDAR Report.

7.4 LDAR Personnel Accountability and Code of Ethics

Stepan and the LDAR Contractor will establish and maintain job descriptions for all LDAR Personnel. These job descriptions will identify accountable items for each employee. Section 4.2 (Roles, Responsibilities, & Expectations) lists the current job descriptions. Additionally, see ***Appendix B-24, Policy for LDAR Code of Ethics, Document No. WN-SP-9.54B-24.***

7.5 Performance Measurement and Audit Plan

7.5.1 Internal Audits

Stepan EHS&S staff at the Stepan facility conducts internal audits of the LDAR program periodically.

7.5.2 Third Party LDAR Audits

Stepan may retain Third Party LDAR Auditors to conduct LDAR audits to ensure its program meets the regulatory requirements of LDAR. These audits should meet with the approval of the Corporate Environmental Director, the facility EHS&S Department, and should be reviewed by the Corporate Environmental Attorney.

7.6 Compliance Risk Assessment

Assessing LDAR compliance risk is accomplished by reviewing program performance measures, see ***Appendix B-25, Procedure for LDAR Performance Metrics, Document No. WN-SP-9.54B-25***, as well as reviewing audit results. The goal of the risk assessment process for LDAR is to determine the likelihood of system failure or noncompliance based on the available data. The EHS&S Department is responsible for developing criteria for assessing risk and communicating the results of risk assessments to the stakeholders.

8.0 REPORTING

8.1 Agency Notifications

Stepan will submit an agency notification as needed.

8.2 Compliance Reporting Process

The purpose of Compliance Reporting is to provide a way to measure Site LDAR program performance. To address these needs, the EHS&S Department provides the following reports:

- LDAR Recordkeeping Reports – Historical inspection and leak repair reports that comply with recordkeeping requirements.
- Deviation Summary Reporting – Summary of LDAR deviations from the database.
- Project Management Reports – Reports used to manage the Site LDAR program or to measure performance.
- LDAR Reports – Mandatory LDAR program performance reports submitted to the agency, see ***Appendix B-26, Procedure for LDAR Periodic Reporting, Document No. WN-SP-9.54B-26.***

For more information on LDAR rule required recordkeeping or reporting for a site, refer to the applicable regulations.

8.3 LDAR Recordkeeping Reports

The EHS&S Department is responsible for generating LDAR Reports by the 10th of each month to represent the processed LDAR data, after all leaks except DORs are closed. This package must contain all required recordkeeping. The purpose of these reports is to support site agency audits by providing a history of inspections and leak repair, and by explaining various anomalies or changes to the program.

The monthly report should contain:

- Summary by Process Unit;
- Equipment Class (i.e. Valve, Compressor, Pump, PRV, Connector);
- Equipment Category (i.e., Normal to Monitor, DTM, UTM, NDE);
- Inspection Interval;
- Count of initial leak inspections, count of leaks, and count of re-inspections to identify leak status;
- Process Unit Leak Percentage calculation for each Equipment Class;
- OEL Count;
- Delay of Repair Count, and count of new DORs, and DORs repaired during inspection months;
- Added component summary by Process Unit, Equipment Class, and "Added Reason Category"; and
- Other items as needed.

The EHS&S Department will review LDAR Reports for potential compliance errors, and ensure copies are maintained. Report updates at the site level can be delegated to the LDAR Contractor, but the EHS&S Department must ensure that updates occur.

8.4 Deviation Summary Reporting

The EHS&S Department ensures that deviations are captured in the reporting system necessary for verification and/or tracking purposes. Additionally, see ***Appendix B-27, Stepan's Policy for Deviation Tracking and Reduction, Document No. WN-SP-9.54B-27.***

8.5 Project Management Reports

The EHS&S Department will generate project reports listed in the table "Project Management Reporting Summary". The reports must be accurate and generated in a timely manner.

The purpose of these reports is to support the operation of the Site LDAR program and provide key communication by the EHS&S Department to the Production Area and Maintenance Department personnel responsible for the program.

Reports due on the last day of the month, or inspection period, are typically compliance checklist related. A deviation of the regulation will result if these compliance checks are not performed, and issue corrected, before the end of the inspection period. The EHS&S Department is responsible for timely reports.

Table 8-1
PROJECT MANAGEMENT REPORTING SUMMARY

Report Name	Submitted To	Description	Frequency
Leak Summary	Production Area, Maintenance Departments & LDAR Contractor	• Open leaks requiring repair and their status as it relates to deadline, or delay of repair candidate.	• As needed for each day a leak is found.
Leak Work Order Request	Maintenance Manager & Maintneance Specialist – EHS&S	• A form for leaks detected by the LDAR Contractor and requiring repair. The form is used by Mechanics to document repair efforts, dates, and person performing activities. Form is given back to LDAR Contractor for re-inspection process.	• As needed for each day a leak is found.
OEL Reporting Form	Production Area, Maintenance Departments & LDAR Contractor	• Open ended lines detected by LDAR Contractor that do not meet regulatory standards, to be corrected by Production Area and Maintenance.	• When Found
LDAR Program Status & QC Checklist	Production Area, Maintenance Departments & LDAR Contractor	• Progress report defining work areas, performance of leaks, missing tags, and OEL for work area, and a checklist of compliance items that shall be reviewed daily by the LDAR Contractor. Also contains safety hazard observations and notable changes to inventory detected by LDAR Contractor.	• As needed
Added Components List	Production Area, Maintenance Departments & LDAR Contractor	• Components added to the LDAR program by category. (Existing – W/O MOC; New-W/O MOC; New-W/MOC)	• Monthly

Report Name	Submitted To	Description	Frequency
End of Period (EOP) Checklist	Production Area, Maintenance Departments & LDAR Contractor	• Checklist of items to be reviewed for compliance prior to the end of the current inspection period.	• Monthly

8.6 Periodic Reports (Quarterly Reports)

Each applicable LDAR rule requires periodic reports to summarize the performance of the program. These reports must be summarized by "affected facility". The EHS&S Department must track the date of "initial startup" for each affected facility to determine months to include in summary and report due dates.

The EHS&S Department is responsible for generating LDAR reports. LDAR reports should be submitted to the EHS&S Manager before the 10th day after the end of the reporting period.

9.0 TRAINING

9.1 Training Program Management Plan

9.1.1 Monitoring Contract Personnel

All LDAR Contractors and other monitoring personnel must be trained to perform Method 21 monitoring. Method 21 training and certification must be completed prior to LDAR Contractor performing independent (i.e. unobserved) monitoring within the facility.

The LDAR Contractor is responsible for completing training of the LDAR Field/Monitoring Technicians in a timely manner. In addition, the LDAR Contractor will submit records of new employee training on a quarterly basis to the EHS&S Department. These records are due as soon as possible after the end of the calendar quarter.

9.1.2 Non-Monitoring Contract Personnel

All contract personnel with LDAR related job responsibilities other than monitoring (e.g. leak repair contractors, tagging technicians, data management personnel, etc.) are required to be trained, where applicable, on the applicable elements and procedures required by the LDAR written plan prior to beginning facility LDAR work activity. Training must be provided initially and annually thereafter. Records of contractor training must be provided or made available by the contractor to the EHS&S Department.

9.1.3 Stepan LDAR and Non-LDAR Personnel Training

The EHS&S Department, or designee, will provide training to other facility LDAR and Non-LDAR personnel, consistent with their specific job duties, see ***Appendix B-28, Procedure for LDAR Personnel***

Training, Document No. WN-SP-9.54B-28. Training is required initially and as needed thereafter. Stepan's LDAR personnel training records will be maintained by EH&S department.

9.1.4 Training Modules

All LDAR training modules associated with the training requirements of this Plan are included in Appendix D – Training Modules. As these modules are part of the Plan, any updates and/or revisions will be documented in accordance with Section 3 of the Plan. Additionally, the training modules will be reviewed annually to ensure they remain up-to-date and current.

Summary of Applicable LDAR Regulations

Process Unit (Affected Facility)	Boundaries (P&ID Highlighted Pages)	Date of Initial Construction	Date of most recent Modification/ Reconstruction	Regulatory Applicability	Initial Startup Date	Permit Numbers	Service	Stream
				TCEQ 28 VHP				
				x				
				x				
				x				
				x				
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Summary of Applicable LDAR Regulations

Process Unit (Affected Facility)	Boundaries (P&ID Highlighted Pages)	Date of Initial Construction	Date of most recent Modification/ Reconstruction	Regulatory Applicability	Initial Startup Date	Permit Numbers	Service	Stream
				TCEQ 28 VHP				
				x				
				x				
				x				
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Texas Commission on Environmental Quality
Air Permits Division

New Source Review (NSR) Boilerplate Special Conditions

This information is maintained by the Chemical NSR Section and is subject to change. Last update was made **September 2015**. These special conditions represent current NSR boilerplate guidelines and are provided for informational purposes only. The special conditions for any permit or amendment are subject to change through TCEQ case-by-case evaluation procedures [30 TAC 116.111(a)]. Please contact the appropriate Chemical NSR Section management if there are questions related to the boilerplate guidelines.

Fugitives

28VHP

Piping, Valves, Connectors, Pumps, Agitators, and Compressors - 28VHP

1. Except as may be provided for in the Special Conditions of this permit, the following

   A. The requirements of paragraphs F and G shall not apply (1) where the Volatile Organic Compound (VOC) has an aggregate partial pressure or vapor pressure of less than 0.044 pounds per square inch, absolute (psia) at 68°F or (2) operating pressure is at least 5 kilopascals (0.725 psi) below ambient pressure. Equipment excluded from this condition shall be identified in a list or by one of the methods described below to be made readily available upon request.

      The exempted components may be identified by one or more of the following methods:

      (1) piping and instrumentation diagram (PID);

      (2) a written or electronic database or electronic file;

      (3) color coding;

      (4) a form of weatherproof identification; or

      (5) designation of exempted process unit boundaries.

   B. Construction of new and reworked piping, valves, pump systems, and compressor systems shall conform to applicable American National Standards Institute (ANSI), American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), or equivalent codes.

   C. New and reworked underground process pipelines shall contain no buried valves such that fugitive emission monitoring is rendered impractical. New and reworked buried connectors shall be welded.

   D. To the extent that good engineering practice will permit, new and reworked valves and piping connections shall be so located to be reasonably accessible for leak-checking during plant operation. Difficult-to-monitor and unsafe-to-monitor

valves, as defined by Title 30 Texas Administrative Code Chapter 115 (30 TAC Chapter 115), shall be identified in a list to be made readily available upon request.
The difficult-to-monitor and unsafe-to-monitor valves may be identified by one or more of the methods described in subparagraph A above. If an unsafe to monitor component is not considered safe to monitor within a calendar year, then it shall be monitored as soon as possible during safe to monitor times. A difficult to monitor component for which quarterly monitoring is specified may instead be monitored annually.

E. New and reworked piping connections shall be welded or flanged. Screwed connections are permissible only on piping smaller than two-inch diameter. Gas or hydraulic testing of the new and reworked piping connections at no less than operating pressure shall be performed prior to returning the components to service or they shall be monitored for leaks using an approved gas analyzer within 15 days of the components being returned to service. Adjustments shall be made as necessary to obtain leak-free performance. Connectors shall be inspected by visual, audible, and/or olfactory means at least weekly by operating personnel walk-through.

Each open-ended valve or line shall be equipped with an appropriately sized cap, blind flange, plug, or a second valve to seal the line. Except during sampling, both valves shall be closed. If the isolation of equipment for hot work or the removal of a component for repair or replacement results in an open ended line or valve, it is exempt from the requirement to install a cap, blind flange, plug, or second valve for 72 hours. If the repair or replacement is not completed within 72 hours, the permit holder must complete either of the following actions within that time period;

(1) a cap, blind flange, plug, or second valve must be installed on the line or valve;

or

(2) the open-ended valve or line shall be monitored once for leaks above background for a plant or unit turnaround lasting up to 45 days with an approved gas analyzer and the results recorded. For all other situations, the open-ended valve or line shall be monitored once within the 72 hour period following the creation of the open ended line and monthly thereafter with an approved gas analyzer and the results recorded. For turnarounds and all other situations, leaks are indicated by readings of 500 ppmv and must be repaired within 24 hours or a cap, blind flange, plug, or second valve must be installed on the line or valve.

F. Accessible valves shall be monitored by leak checking for fugitive emissions at least quarterly using an approved gas analyzer. Sealless/leakless valves (including, but not limited to, welded bonnet bellows and diaphragm valves) and relief valves equipped with a rupture disc upstream or venting to a control device are not required to be monitored. If a relief valve is equipped with rupture disc, a pressure-sensing device shall be installed between the relief valve and rupture disc to monitor disc integrity.

A check of the reading of the pressure-sensing device to verify disc integrity shall be performed at least quarterly and recorded in the unit log or equivalent. Pressure-sensing devices that are continuously monitored with alarms are exempt from recordkeeping requirements specified in this paragraph. All leaking discs shall be replaced at the earliest opportunity but no later than the next process shutdown.

The gas analyzer shall conform to requirements listed in Method 21 of 40 CFR part 60, appendix A. The gas analyzer shall be calibrated with methane. In addition, the response factor of the instrument for a specific VOC of interest shall be determined and meet the requirements of Section 8 of Method 21. If a mixture of VOCs is being monitored, the response factor shall be calculated for the average composition of the process fluid. A calculated average is not required when all of the compounds in the mixture have a response factor less than 10 using methane. If a response factor less than 10 cannot be achieved using methane, then the instrument may be calibrated with one of the VOC to be measured or any other VOC so long as the instrument has a response factor of less than 10 for each of the VOC to be measured.

Replacements for leaking components shall be re-monitored within 15 days of being placed back into VOC service.

G. Except as may be provided for in the special conditions of this permit, all pump, compressor, and agitator seals shall be monitored with an approved gas analyzer at least quarterly or be equipped with a shaft sealing system that prevents or detects emissions of VOC from the seal. Seal systems designed and operated to prevent emissions or seals equipped with an automatic seal failure detection and alarm system need not be monitored. These seal systems may include (but are not limited to) dual pump seals with barrier fluid at higher pressure than process pressure, seals degassing to vent control systems kept in good working order, or seals equipped with an automatic seal failure detection and alarm system. Submerged pumps or sealless pumps (including, but not limited to, diaphragm, canned, or magnetic-driven pumps) may be used to satisfy the requirements of this condition and need not be monitored.

H. Damaged or leaking valves or connectors found to be emitting VOC in excess of 500 parts per million by volume (ppmv) or found by visual inspection to be leaking (e.g., dripping process fluids) shall be tagged and replaced or repaired. Damaged or leaking pump, compressor, and agitator seals found to be emitting VOC in excess of 2,000 ppmv or found by visual inspection to be leaking (e.g., dripping process fluids) shall be tagged and replaced or repaired. A first attempt to repair the leak must be made within 5 days and a record of the attempt shall be maintained.

I. A leaking component shall be repaired as soon as practicable, but no later than 15 days after the leak is found. If the repair of a component would require a unit shutdown that would create more emissions than the repair would eliminate, the repair may be delayed until the next scheduled shutdown. All leaking components which cannot be repaired until a scheduled shutdown shall be identified for such repair by tagging within 15 days of the detection of the leak. A listing of all components that qualify for delay of repair shall be maintained on a delay of repair

list. The cumulative daily emissions from all components on the delay of repair list shall be estimated by multiplying by 24 the mass emission rate for each component calculated in accordance with the instructions in 30 TAC 115.782 (c)(1)(B)(i)(II). The calculations of the cumulative daily emissions from all components on the delay of repair list shall be updated within ten days of when the latest leaking component is added to the delay of repair list. When the cumulative daily emission rate of all components on the delay of repair list times the number of days until the next scheduled unit shutdown is equal to or exceeds the total emissions from a unit shutdown as calculated in accordance with 30 TAC 115.782 (c)(1)(B)(i)(I), the TCEQ Regional Manager and any local programs shall be notified and may require early unit shutdown or other appropriate action based on the number and severity of tagged leaks awaiting shutdown. This notification shall be made within 15 days of making this determination.

J. Records of repairs shall include date of repairs, repair results, justification for delay of repairs, and corrective actions taken for all components. Records of instrument monitoring shall indicate dates and times, test methods, and instrument readings. The instrument monitoring record shall include the time that monitoring took place for no less than 95% of the instrument readings recorded. Records of physical inspections shall be noted in the operator's log or equivalent.

K. Alternative monitoring frequency schedules of 30 TAC " 115.352 - 115.359 or National Emission Standards for Organic Hazardous Air Pollutants, 40 CFR Part 63, Subpart H, may be used in lieu of Items F through G of this condition.

L. Compliance with the requirements of this condition does not assure compliance with requirements of 30 TAC Chapter 115, an applicable New Source Performance Standard (NSPS), or an applicable National Emission Standard for Hazardous Air Pollutants (NESHAPS) and does not constitute approval of alternative standards for these regulations.

Appendix A-3
Facility Inspection Frequency and Methodology – Ethylene Oxide Service

Component Type	Material Stream	Inspection Frequency	Method Inspected
Established Accessible Equipment			
Valves	Ethylene Oxide Service	Monthly	Method 21
Pumps, Compressors, Agitators	Ethylene Oxide Service	Monthly	Method 21
Connectors	Ethylene Oxide Service	Weekly	Audio, Visual, Olfactory
Connectors	Ethylene Oxide Service	Monthly	Method 21
PRD-RD	Ethylene Oxide Service	Monthly	Method 21
OEL/V	Ethylene Oxide Service for turnaround lasting up to 45 days	Once	Method 21
OEL/V	Ethylene Oxide Service OELs not closed within 72 hours	Once within 72 hours of the creation and Monthly thereafter	
Established Difficult-to-Monitor Equipment			
Valves	Ethylene Oxide Service	Annually	Method 21
Established Unsafe-to-Monitor Equipment			
Valves	Ethylene Oxide Service	When safe to do so	Method 21
New, Reworked, Replaced, and Repaired Equipment			
New and Reworked Equipment Piping Connections	Ethylene Oxide Service	Within 15 days of returning to VOC service	Method 21
Replaced Equipment	Ethylene Oxide Service		Method 21
Repaired Equipment	Ethylene Oxide Service	Within 15 days of the leak identification	Method 21

Leak Thresholds for Ethylene Oxide Service

Component Type	Stream	Regulatory Leak Threshold	Stepan Leak Threshold
Pumps, Compressors, Agitators	Ethylene Oxide	>2,000 ppm or visually leaking	≥250 ppm
PRD-RD	Ethylene Oxide	>500 ppm	≥250 ppm
Valves	Ethylene Oxide	>500 ppm or visually leaking	≥250 ppm
Open-Ended Line/Valve	Ethylene Oxide	≥500 ppm	≥250 ppm
Connectors	Ethylene Oxide	>500 ppm or visually leaking	≥250 ppm

Revision History

Revision #	Description of Change
0	December 2019 Original

Appendix A-4
Facility Inspection Frequency and Methodology – Propylene Oxide Service

Component Type	Material Stream	Inspection Frequency	Method Inspected
Established Accessible Equipment			
Valves	Propylene Oxide Service	Monthly	Method 21
Pumps, Compressors, Agitators	Propylene Oxide Service	Monthly	Method 21
Connectors	Propylene Oxide Service	Weekly	Audio, Visual, Olfactory
Connectors	Propylene Oxide Service	Monthly	Method 21
PRD-RD	Propylene Oxide Service	Monthly	Method 21
OEL/V	Propylene Oxide Service for turnaround lasting up to 45 days	Once	Method 21
OEL/V	Propylene Oxide Service OELs not closed within 72 hours	Once within 72 hours of the creation and Monthly thereafter	
Established Difficult-to-Monitor Equipment			
Valves	Propylene Oxide Service	Annually	Method 21
Established Unsafe-to-Monitor Equipment			
Valves	Propylene Oxide Service	When safe to do so	Method 21
New, Reworked, Replaced, and Repaired Equipment			
New and Reworked Equipment Piping Connections	Propylene Oxide Service	Within 15 days of returning to VOC service	Method 21
Replaced Equipment	Propylene Oxide Service		Method 21
Repaired Equipment	Propylene Oxide Service	Within 15 days of the leak identification	Method 21

Leak Thresholds for Propylene Oxide Service

Component Type	Stream	Regulatory Leak Threshold	Stepan Leak Threshold
Pumps, Compressors, Agitators	Propylene Oxide	>2,000 ppm or visually leaking	≥250 ppm
PRD-RD	Propylene Oxide	>500 ppm	≥250 ppm
Valves	Propylene Oxide	>500 ppm or visually leaking	≥250 ppm
Open-Ended Line/Valve	Propylene Oxide	≥500 ppm	≥250 ppm
Connectors	Propylene Oxide	>500 ppm or visually leaking	≥250 ppm

Revision History

Revision #	Description of Change
0	December 2019 Original

Appendix A-5
Facility Inspection Frequency and Methodology – VOC Service

Component Type	Material Stream	Inspection Frequency	Method Inspected
Established Accessible Equipment			
Valves	VOC Service	Quarterly	Method 21
Pumps, Compressors, Agitators	VOC Service	Quarterly	Method 21
Connectors	VOC Service	Weekly	Audio, Visual, Olfactory
Connectors	VOC Service	Quarterly	Method 21
PRD-RD	VOC Service	Quarterly	Method 21
OEL/V	VOC Service for turnaround lasting up to 45 days	Once	Method 21
OEL/V	VOC Service OELs not closed within 72 hours	Once within 72 hours of the creation and Monthly thereafter	
Established Difficult-to-Monitor Equipment			
Valves	VOC Service	Annually	Method 21
Established Unsafe-to-Monitor Equipment			
Valves	VOC Service	When safe to do so	Method 21
New, Reworked, Replaced, and Repaired Equipment			
New and Reworked Equipment Piping Connections	VOC Service	Within 15 days of returning to VOC service	Method 21
Replaced Equipment	VOC Service		Method 21
Repaired Equipment	VOC Service	Within 15 days of the leak identification	Method 21

Leak Thresholds for VOC Service

Component Type	Stream	Regulatory Leak Threshold	Stepan Leak Threshold
Pumps, Compressors, Agitators	VOC Service	>2,000 ppm or visually leaking	≥500 ppm
PRD-RD	VOC Service	>500 ppm	≥500 ppm
Valves	VOC Service	>500 ppm or visually leaking	≥500 ppm
Open-Ended Line/Valve	VOC Service	≥500 ppm	≥500 ppm
Connectors	VOC Service	>500 ppm or visually leaking	≥500 ppm

Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Regulatory Interpretation

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to outline the process for interpretation of LDAR regulations and obtain consensus and approval for required changes.

1.2 This standard applies to the Winder Facility and is subject to LDAR regulatory oversight.

2.0 References

2.1 TCEQ 28 VHP

3.0 Definitions

3.1 Environmental Protection Agency (EPA) Public Comments and Responses – Responses to public questions submitted to the EPA regarding interpretation of EPA rules and regulations available on the EPA website.

4.0 Responsibilities

4.1 EHS&S Department

- 4.1.1 Interpret the language of the LDAR regulations.
- 4.1.2 Obtain consensus between the Maintenance Specialist – EHS&S and the EHS&S Department for challenges to existing governing regulations for a facility.
- 4.1.3 Provide final approval for regulatory LDAR determination for all new facilities.
- 4.1.4 Ensure required documentation is complete, proper record keeping is maintained and readily accessible.
- 4.1.5 Update P&IDs and regulatory documents associated with the facility.
- 4.1.6 Report regulatory deviations to Georgia EPD in accordance to the Facility's Permit.

5.0 Procedure

5.1 Challenges to existing governing regulations for a Facility can be made by any employee involved in the current LDAR program but must be presented to the EHS&S Department. Consensus among all EHS&S professions must be reached before changes are implemented.

5.2 Determination of governing regulations for the Facility should be made by the EHS&S Department with input from the Production Area as needed.

6.0 Training

6.1 Changes to this procedure shall require appropriate training to the impacted personnel.

6.2 Training records will be retained in EHS&S Department records.

7.0 Forms and Records

7.1 LDAR Regulatory Interpretation files are maintained in the EHS&S Department by year.

7.2 Facility applicable P&ID's are included in Appendix A-2.

8.0 Appendices

8.1 None

9.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for Applicability Determination and Program Development

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide the applicability by process for LDAR monitoring.
1.2 This standard applies to the Winder Facility and is subject to LDAR regulatory oversight.

2.0 References

2.1 TCEQ 28 VHP

3.0 Definitions

3.1 **In Gas/Vapor Service** – A piece of equipment in regulated material service containing a gas or vapor at operating conditions.
3.2 **In Heavy Liquid Service (HL)** – Volatile organic compounds that have a true vapor pressure equal to or less than 0.044 pounds per square inch absolute (0.3 kiloPascal) at 68 degrees Fahrenheit (20 degrees Celsius).
3.3 **In Light Liquid Service (LL)** – Volatile organic compounds that have a true vapor pressure greater than 0.044 pounds per square inch absolute (0.3 kiloPascal) at 68 degrees Fahrenheit (20 degrees Celsius), and are a liquid at operating conditions.

4.0 Responsibilities

4.1 EHS&S Department
- 4.1.1 Interpret the language of the LDAR regulations.
- 4.1.2 Ensure required documentation is complete, proper record keeping is maintained and readily accessible.
- 4.1.3 Update P&IDs and regulatory documents associated with the facility.

5.0 Procedure

5.1 The EHS&S Department will maintain controlled LDAR applicability P&ID's.
5.2 Engineering, Production, and EHS&S will determine the service state for each applicable chemical/process at the site and highlight drawings according to the service.
5.3 Determination of governing regulations for the Facility should be made by the EHS&S Department with input from the Production Area as needed.

6.0 Training

6.1 Changes to this procedure shall require appropriate training to the impacted personnel.

6.2 Training records will be retained in EHS&S Department records.

7.0 Forms and Records

7.1 LDAR Regulatory Interpretation files are maintained in the EHS&S Department by year.

8.0 Appendices

8.1 None

9.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Modification and Reconstruction Calculation

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to outline the process for assessing impact of change to LDAR based on the definition of "modification" and "reconstruction."

1.2 This standard applies to the Winder Facility and is subject to LDAR regulatory oversight.

2.0 References

2.1 TCEQ 28 VHP

3.0 Definitions

3.1 Capital Expenditure – physical or operational changes to an existing facility.

4.0 Responsibilities

4.1 EHS&S Department

- 4.1.1 Interpret the language of the LDAR regulations.
- 4.1.2 Provide final approval for regulatory LDAR determination for all new facilities.
- 4.1.3 Ensure required documentation is complete, proper record keeping is maintained and readily accessible.
- 4.1.4 Report regulatory deviations to GAEPD in accordance to the Facility's Permit.

5.0 Procedure

5.1 Changes to existing governing regulations for a facility can be made by any employee involved in the current LDAR program but must be presented to the EHS&S Department. Consensus must be reached before changes are implemented.

5.2 Determination of governing regulations for the Facility should be made by the EHS&S Department with input from the Production Area as needed.

6.0 Training

6.1 Changes to this procedure shall require appropriate training to the impacted personnel.

6.2 Training records will be retained in EHS&S Department records.

7.0 Forms and Records

7.1 None

8.0 Appendices

8.1 None

9.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Management of Change

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to outline steps for verifying, approving, and processing component changes using Stepan's Winder MOC process.

1.2 This standard applies to the Winder Facility and is subject to LDAR regulatory oversight.

2.0 References

2.1 TCEQ 28 VHP

3.0 Definitions

3.1 Component Change – any change to a component in LDAR service via Management of Change (MOC), some Replacement In Kind (RIK) or otherwise that affects the component compliance or monitoring schedule

3.2 Replacement in Kind (RIK) – A valve or pump in LDAR Service that is replacing existing equipment in service and it has exactly the specifications.

3.3 Management of Change (MOC) – The process by which changes to equipment in LDAR service are approved and communicated to all affected departments and parties

3.4 EHS&S Review – Documents regulatory requirements for EHS&S Regulations.

3.5 CMMS –Computerized Maintenance Management System.

4.0 Responsibilities

4.1 Production Area/Maintenance Department/Engineering

4.1.1 To ensure on-going compliance with State and Federal LDAR regulation, communicate status changes that could affect equipment in LDAR service to the EHS&S Department.

4.1.2 Communicate when added components are placed in service or deleted components removed from service to the EHS&S Department.

4.1.3 Submit Capital Projects and large maintenance projects to the EHS&S Department.

4.2 EHS&S Department

4.2.1 Ensure required documentation is complete, proper recordkeeping is maintained, and readily accessible.

4.2.2 Conduct environmental reviews on process changes that could potentially change LDAR Applicability of process equipment. Changes in LDAR applicability shall be recorded in the environmental review.

4.2.3 Ensure that component changes affecting compliance are processed according to governing regulatory requirements.

4.2.4 Communicate changes to LDAR Contractor.
4.2.5 Field verify all components after changes have been completed by LDAR Contractor.
4.2.6 QA/QC LDAR changes in database.
4.2.7 Report any added or deleted components without an MOC to Production Area Management.

4.3 LDAR Contractor
4.3.1 LDAR Contractor will maintain a backup database to the Stepan Facility database.
4.3.2 Perform updates to LDAR to include complete changes to physical LDAR tags and database.
4.3.3 Conduct Method 21 monitoring on newly added LDAR components.
4.3.4 Communicate to the Facility's EHS&S Department that the changes to the LDAR database have been completed.

5.0 Procedure

5.1 CRITERIA FOR LDAR CHANGE MANAGEMENT

5.1.1 LDAR components that are temporarily taken out of service ("OOS"). This would be LDAR components that are completely purged of process material. These components would not be monitored during normal monitoring periods while the process equipment is temporarily out of service.

NOTE: An example of VI.A.i is a complete unit outage/turnaround where LDAR Components are purged and taken out of service during the outage/turnaround. Placing equipment in a state that complies with the Facility's Confined Space Policy could be identified as temporarily out of service.

NOTE: To take LDAR components out of service does not require a Management of Change. All Production Areas are required to notify EHS&S Department when LDAR components are taken out of service and placed back into service. It is the Production Area's responsibility to report equipment that is OOS to EHS&S Department.

5.1.2 LDAR components identified for regulatory program change. New process equipment, such as process equipment that would require Capital or changes of service to process equipment shall require an environmental review. The environmental review would record regulatory program changes to LDAR components. The completed environmental review would be submitted with the MOC and routed to the EHS&S Department to initiate the changes.

NOTE: Changes to equipment or process that would result in regulatory program changes requires a Management of Change.

5.1.3 Replacement in Kind (RIK) of pumps and valves in light liquid or gas vapor service. New RIK pumps and valves shall be monitored per Method 21 within 30 days, starting when the pump or valve is placed into service.

NOTE: RIK pumps do not require a Management of Change. A notification is required in CMMS, as well as an email notification will be submitted to the EHS&S Department that an LDAR RIK will take place.

5.1.4 LDAR components added to or removed from LDAR Service

NOTE: Physical Changes to LDAR components will require a Management of Change.

5.2 Guidelines for LDAR Management of Change

In addition to Stepan Company, Winder Facility's MOC Policy, if any of the criteria listed are met, a Management of Change shall be submitted to EHS&S for review. EHS&S shall review the MOC in accordance with the regulatory applicability. Before approving the MOC, the EHS&S Department shall make a note in the MOC that the change affects the Facility's LDAR Program.

Before a PSSR is conducted, the Change Requester shall notify the EHS&S Department that the change has been completed and placed into service.

NOTE: If the change involves a pump in light liquid service, the Weekly AVO Inspection Checklist will have to be updated.

5.2.1 EHS&S shall notify the LDAR Contractor with a date of when the equipment was placed into service.

5.2.2 For Regulatory Program Changes and added or removed, the Contractor has 30 days to update LDAR Database and Tags in the field, and conduct monitoring based on component applicability.

5.2.3 When the LDAR Contractor performs Method 21 on the new or changed equipment, the LDAR Contractor will also provide new data in the database and LDAR tags.

5.2.4 When the new or changed equipment has been method 21 monitored and the database updated, the EHS&S Department will notify the Change Requester that all LDAR compliance has been completed.

6.0 Training

6.1 Changes to this procedure shall require appropriate training to the impacted personnel.

6.2 Training records will be retained in EHS&S Department records.

7.0 Forms and Records

7.1 All LDAR Changes mentioned in this procedure will be managed in the Facility's database.

7.2 The Facility's LDAR database, will contain a time stamp when new LDAR components are added or removed from the database.

8.0 Appendices

8.1 None

9.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Inventory and Component Management

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to outline the process for identifying LDAR components and maintaining an inventory database.

1.2 This standard applies to all facilities subject to Production Areas and associated process equipment subject to LDAR regulatory oversight.

2.0 Safety

2.1 Proper PPE required for entry into site units as needed.

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

• Difficult to Monitor (DTM) – Component monitoring would require elevating the monitoring personnel more than 2 meters above a support surface.

• Unsafe to Monitor (UTM) – Component monitoring would expose monitoring personnel to imminent or potential danger.

• No Detectable Emissions (NDE) – no escape of HAP (Hazardous Air Pollutant) from a device or system to the atmosphere as determined by (1) instrument monitoring in accordance with Method 21, 40 CFR part 60, appendix A (2) the absence of visible openings or defects in the device or system, such as rips, tears, or gaps.

• Component – Each valve, pump, compressor, agitator, pressure relief device, open-ended valve or line, connector in VOC service.

5.0 General Requirements/Procedures

5.1 Guidelines for Managing Physical LDAR Tags

5.1.1 Physical tagging of ALL individual LDAR components in the field is not required

NOTE: Only valves, pumps, and PRVs are physically tagged for Emission Units applicable to LDAR requirements.

5.1.2 All physical LDAR tags must be weatherproof and readily visible to Operations and Maintenance Personnel.

5.1.3 All physical LDAR tags must be attached to individual LDAR components using steel wiring.

5.1.4 Numerical order of all physical LDAR tags must be maintained.

5.1.5 See Attachment 5A for an example of a physical LDAR tag used at the Facility.

5.1.6 Physical LDAR tags in the field will be audited during Method 21 monitoring by the Facility's LDAR Contractor.

5.2 Guidelines for Managing Missing Physical LDAR Tags

5.2.1 The Facility's LDAR Contractor should identify missing tags during regular monitoring and attach a temporary paper tag.

5.2.2 Missing LDAR tags must be re-stamped and replaced in the field during period when monthly, quarterly, and annual Method 21 monitoring is conducted.

5.2.3 Missing physical LDAR tags found in the field must be returned to the EHS&S Department for re-tagging by the Facility's LDAR Contractor.

5.2.4 All Production Areas must be trained on proper LDAR tag management that includes a process for returning missing tags to the EHS&S Department.

5.2.5 Maintenance Department must be trained on proper LDAR tag management when completing repairs that includes ensuring that removed tags are reattached to the LDAR equipment as soon as repairs are completed.

5.3 Guidelines for Managing Physical LDAR Tags and Changes to Process Equipment

5.3.1 If unauthorized changes to process equipment are observed in the field by the Facility's LDAR Contractor, the LDAR Contractor will notify the EHS&S Department and will document the change. The EHS&S Department will coordinate with LDAR Contractor to schedule physical tagging of the new LDAR components.

5.3.2 EHS&S Department shall notify production area of the unauthorized LDAR change.

5.3.3 Production Area shall submit an MOC for each unauthorized LDAR change. The MOC will be used to document the component and in compliance with Management of Change Procedure.

5.4 Guidelines for Managing LDAR Program Inventory Database

5.4.1 A master equipment list (MEL), with equipment identification numbers, for regulated light liquid and/or gas vapor components should be accessible through the site's LDAR database and should identify each component's type and classification as followed:

- Valves, Pumps, and Connectors/Flanges
- Pressure Relief Device
- LDAR Components in LDAR Service less than 300 hrs per year.
- Pumps, Valves, and Connectors/Flanges designated as DTM or UTM.
- Normal To Monitor
- Regulatory Applicability
- Emission Unit and Location
- LDAR Component Size
- Service Type – Gas Vapor, Light Liquid, or Heavy Liquid

5.4.2 LDAR database must be updated when changes to LDAR components are added or removed from process equipment in the field.

5.4.3 Temporarily out of service ("OOS" equipment should be entered into database to communicate to the LDAR Contractor that the equipment is OOS.)

6.0 Responsibilities

6.1 EHS&S Department

6.1.1 Ensure that this procedure is part of the overall site MOC process so that when new components are added or changes occur all identification processes are followed.

6.1.2 Maintain required recordkeeping processes.

6.1.3 Ensure that Maintenance and Production Area Personnel are trained on LDAR tag management.

6.1.4 Ensure that missing tags are communicated to LDAR Contractor.

6.1.5 Schedule missing LDAR tag replacement in the field.

6.2 LDAR Contractor

6.2.1 Ensure LDAR Technicians are trained on proper identification and reporting practices for missing LDAR ID tags.

6.2.2 Identify all missing tag information and tags in the field.

6.2.3 Identify unauthorized changes to process equipment and notify EHS&S Department.

6.2.4 Audit LDAR program and physical LDAR tags while conducting method 21 monitoring.

6.2.5 Maintain backup of the Facility's LDAR Database

7.0 Training

7.1 None

8.0 Forms and Records

8.1 None

9.0 Appendices

9.1 None

10.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Policy for LDAR Tag Management

1.0 Purpose

1.1 Management's expectations of company and contractor treatment and preservation of LDAR ID Tags.

2.0 Policy Statement

In the course of LDAR work, Stepan will physically tag all equipment in VOC and HAP service. Maintaining this physical tagging system is the sum of the work of the officers, employees, contractors, and affiliates who work on and come in contact with LDAR equipment.

Officers, employees, contractors, and affiliates will maintain physical tags on LDAR equipment by adhering to the following standards:

- Understand and be familiar with what an LDAR tag looks like and what it is. (see page 2)
- Physical LDAR tags found in the field shall be returned to the Environmental Department as soon as possible
- Physical LDAR tags that must be removed in order to repair leaking equipment shall be reattached to the repaired equipment as soon as possible
- Equipment found to be missing physical LDAR tags shall be documented and sent to the Environmental Department for verification and tagging / retagging

I, _____ (print name) have read and understand Stepan's LDAR ID Tag Management Policy. On the date of signature, I am acknowledging my acceptance to abide by this LDAR ID Tag Management and have no knowledge of prior non-adherence to this policy, by either me or other Stepan personnel.

_____ _____

Signature Date of Signature

3.0 Training

3.1 None

4.0 Forms and Records

4.1 None

5.0 Appendices

5.1 None

6.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedures for Data Management

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to outline steps for collecting, processing, and assessing data prior to reporting.

1.2 This standard applies to Stepan Company Winder that is subject to LDAR regulatory oversight.

2.0 Safety

2.1 None

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

4.1 None

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 Ensure required documentation is complete, proper recordkeeping is maintained and readily accessible.

5.1.2 Ensure that the EHS&S Department is properly trained on LDAR data collection and processing, and the required traverse times based on component type and size.

5.1.3 Review calibration records and monitoring before uploading data.

5.1.4 Report any data issues and seek resolution.

5.2 LDAR Contractor

5.2.1 Complete instrument daily calibrations and precision checks per 40 CFR 60, Appendix A, Method 21.

5.2.2 Complete daily LDAR monitoring per the required traverse times based on component type and size.

5.2.3 Report any data issues and seek resolution.

6.0 Procedure

6.1 Guidelines for Conducting Routine Method 21 Monitoring

6.1.1 EHS&S Department will schedule LDAR Contractor for routine Method 21 monitoring.

6.1.2 EHS&S Department will notify Productions Areas and Maintenance Department when the LDAR Contractor is scheduled to arrive at the Facility.

6.1.3 LDAR Contractor and EHS&S Department will generate routine monitoring routes.

6.1.4 Once at the Facility, the LDAR Contractor will calibrate Toxic Vapor Analyzer (TVA) per Method 21. Calibration records will be certified by the LDAR Contractor and submitted to EHS&S Department before leaving the site.

6.1.5 LDAR Contractor will conduct monitoring route as defined.

6.1.6 When monitoring is completed, the LDAR Contractor will conduct a Calibration Drift Assessment per Method 21.

6.1.7 In the event the Calibration Drift Assessment fails, the LDAR Contractor must re-monitor all LDAR components on the previously completed monitoring route.

6.1.8 At the end of the route, the LDAR Contractor must communicate any LDAR tags that will require updating.

6.1.9 LDAR Contractor must identify any leaks above leak definition.

6.1.10 EHS&S Department will immediately notify Production Area of the leak. This will start the repair process.

6.2 Guidelines for LDAR Data Collection

6.2.1 LDAR Contractor will use intrinsically safe, electronic data collection device for data collection for routine LDAR monitoring. The electronic data collection device must include:

- An accurate time/date stamp for each monitoring event.
- Monitoring reading
- Technician and TVA monitoring equipment identification

6.2.2 LDAR Contractor will upload daily monitoring data from field instruments into database.

6.2.3 EHS&S Department must review and evaluate the following:

- Number of components tested
- Average scan time per component
- Average meter deflection
- Time between components
- Meter inactivity periods

6.2.4 EHS&S Department shall investigate any LDAR monitoring data anomalies and determine if monitoring data set should be rejected and components re-monitored.

NOTE: An example of a LDAR monitoring data anomaly:

1. Incorrect number of components monitored
2. Average scan time per component is too short
3. Long periods when the TVA meter is not active.
4. Time between components being monitored is either too short or too long.

6.2.5 Once monitoring and data collection is complete the LDAR Contractor must provide the following records to the EHS&S Department:

- Verification that calibration gas cylinders used have not expired.
- Verification that each instrument used was calibrated and passed per Method 21.
- Verification that the instrument used has been precision certified within the last 90 days per Method 21.
- Verification that each instrument used received a calibration drift assessment after monitoring is conducted.

6.3 Guidelines for LDAR Data QA

6.3.1 QA of LDAR Data will be conducted on a semiannual basis

- First Semiannual QA Review – January through June
- Second Semiannual QA Review – July through December

6.3.2 QA LDAR Database Review Areas

- Repair records review for repair attempt/final repair completion

- Monitoring records review for passing re-monitoring readings that indicate repair attempt/final repair
- First attempt at repair within required timeframe
- Final repairs or Delay of Repair (DOR) designations completed within required time frame.
- Monitoring completion analyses – Percent Active Inventory during each monitoring period and initial monitoring requirements for changes to field equipment.
- LDAR Inventory Increases and Decreases – MOC Evaluation
- LDAR Technician Daily and Hourly monitoring event totals
- DTM classification

6.4 Shadow-Monitoring of Primary LDAR Contractor for Compliance with Method 21

Shadow-monitoring of the primary LDAR contractor will be conducted once per year for one monitoring period/route. The purpose of the shadow monitoring is to ensure that the Primary LDAR contractor is abiding by Method 21.

7.0 Training

7.1 None

8.0 Forms and Records

8.1 None

9.0 Appendices

9.1 None

10.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedures for LDAR Component Classification

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to identify LDAR components as difficult to monitor, unsafe to monitor, no detectable emission, exempt, and unsafe to repair.

1.2 This standard applies to all components in LDAR service.

2.0 Safety

2.1 Proper PPE required for entry into site units.

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

- Difficult to Monitor (DTM) – Component monitoring would require elevating the monitoring personnel more than two meters above a support surface.
- Unsafe to Monitor (UTM) – Component monitoring would expose monitoring personnel to imminent or potential danger.
- Unsafe to Repair – Component repair would expose monitoring personnel to immediate danger
- No Detectable Emissions (NDE) – No escape of HAP from a device or system to the atmosphere as determined by (1) instrument monitoring in accordance with Method 21, 40 CFR part 60, appendix A; (2) the absence of visible openings or defects in the device or system, such as rips, tears, or gaps.
- Exempt – Components that are exempt from regularly scheduled LDAR monitoring in accordance with the procedures outlined in Method 21

6.0 Exemptions by Component Type

6.1 Pressure Relief Device Exemptions: TCEQ 28 VHP

6.1.1 Routed to a process or fuel gas system or closed vent system

6.1.2 Equipped with rupture disk

6.1.3 In light liquid or heavy liquid service

6.2 Pump Exemptions: TCEQ 28 VHP

6.2.1 Equipped with a dual mechanical system

6.2.2 Equipped with a closed vent system

6.2.3 In heavy liquid service

6.3 Valve Exemptions: TCEQ 28 VHP

6.3.1 In heavy liquid service

6.4 Connectors: TCEQ 28 VHP

6.4.1 Exempt from monitoring standards under TCEQ 28 VHP

7.0 Responsibilities

7.1 EHS&S Department

7.1.1 Interpret the language of the LDAR regulations.

7.1.2 Provide adequate training for Stepan personnel to recognize components designated as DTM, UTM, NDE, unsafe to repair, or exempt.

7.1.3 Ensure component classification procedure is a part of the MOC process.

7.1.4 Ensure required documentation is complete, proper record keeping is maintained and readily accessible.

7.1.5 Complete database changes to component classifications.

7.1.6 Validate component classification annual and update LDAR database

7.2 LDAR Contractor

7.2.1 Identify classification changes for DTM, UTM, or exempt components during regularly scheduled monitoring and provide that information to the EHS&S Department for validation.

7.2.2 Complete NDE monitoring per regulatory requirements.

7.2.3 Notify the EHS&S Department if asked to repair components they feel should be identified as unsafe to repair.

7.3 Production Areas

7.3.1 Identify unsafe to repair conditions and provide reasons for this designation to the EHS&S Department as needed

8.0 Procedure

8.1.1 Component classification identification should be completed during initial tagging and validated annually thereafter.

8.1.2 Changes to component classification should be identified and validated by the EHS&S Department using the procedures outlined in the Management of Change Procedure.

8.1.3 The total percentage of valves designated as DTM should not exceed 3.0 percent of the total number of valves in each process unit. This requirement MUST be taken into account when making DTM valve changes for facilities subject to federal regulations.

8.1.4 Written plans for UTM components must include explanations of why components have been designated with this classification as well as a plan to monitor these components when conditions permit. UTM plans must be reviewed and kept readily accessible (See Attachment A Unsafe to Monitor Plan.)

8.1.5 Written plans for DTM components must include explanations of why components have been designated with this classification as well as plans to monitor these components annually. DTM plans should be reviewed annually and kept readily accessible (See Attachment B Difficult to Monitor Plan.)

9.0 Training

9.1 None

10.0 Forms and Records

10.1 None

11.0 Appendices

11.1 See attachment 8A Unsafe to Monitor Plan

11.2 See attachment 8B Difficult to Monitor Plan

12.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Attachment A

Instructions:
Utilize this plan and the annual monitoring schedule to ensure Unsafe to Monitor components meet compliance.

Unsafe-to-Monitor (UTM) Valve Monitoring Plan

A UTM valve, as defined in Federal (and most state) LDAR regulations, is a valve that is unsafe to monitor because monitoring personnel would be exposed to an immediate danger as a consequence of monitoring. The LDAR rules do not define the types of hazards that would constitute "immediate danger", but some examples might include:

- Heat so high that approaching the valve for the time required to monitor would cause burns to the monitoring personnel;
- Components within 10 feet of a high voltage power line;
- Components under extreme pressure where a pin hole leak creates a cutting effect;
- Components where the monitoring personnel might be exposed to concentrations greater than the ERPG-2 level of a toxic compound at which irreversible health effects might occur; and
- Components at extreme heights that cannot be safely reached by scaffold and with impediments to access by cherry pickers or crane buckets.

This list is not meant to be comprehensive, and other situations resulting in immediate danger to monitoring personnel might occur in specific facilities. There are also many hazardous valve locations which can be monitored safely with proper PPE and work permits, such as those in confined spaces. Since confined space work is done routinely within the facility for other reasons, it should not by itself be considered justification for UTM designation. There are some confined space situations that would present immediate danger to monitoring personnel, however, such as scenarios where personnel would have to crawl through congested piping and would have no way to escape a failure quickly enough to avoid injury.

Each UTM valve will be monitored whenever it is safe to do so and at least once at turnaround frequency. Certain hazards clearly allow identification of safe monitoring conditions, such as when the high voltage power line in the above examples is de-energized. Others can generally be tested by Method 21 before, during, or after an extended turnaround activity.

In cases where no safe approach to Method 21 monitoring can be devised, a surrogate leak detection technique will be employed. Some examples of surrogate leak detection methods would include:

- A pressure decay test;
- Use of an infrared imaging device, such as the FLIR GasFindIR; and
- Bench testing using standard helium leak tests or API 622.

Using an infrared imaging device has a lower sensitivity than Method 21 and will only detect larger leaks. IR imaging of UTM valves should be conducted more frequently than Method 21 or other surrogate methods because of this; at least annual imaging is recommended and quarterly imaging should be considered.

Any valve for which no safe monitoring time or surrogate leak detection method can be devised will be submitted as a challenge to operations to determine:

- Can this valve be operated?
- If so, how is it done and can monitoring be coordinated with operation?
- If not, does it really serve a purpose?
- If not serving a purpose, it should be removed.

This UTM monitoring plan satisfies the requirements of 40 CFR 60.486(f)(1) / 63.168(h)(2) / 63.1022(c)(4). The required list of identification numbers of UTM equipment can be found in the LDAR database, as well as in the following table.

Attachment B

Instructions:
Utilize this plan and the annual monitoring schedule to ensure Difficult to Monitor components meet compliance.

Difficult-to-Monitor (DTM) Valve Monitoring Plan

A DTM valve is defined in Federal and most state LDAR regulations as a valve that cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface. Since 2 meters is about 6 feet and even shorter technicians can reach up to monitor components up to 7 feet above the support surface, DTM valves at Stepan Company Winder Plant are defined as being at least 13 feet above ground or the nearest safe support surface for the monitoring technician. Valves within 3 feet off the edge of an elevated platform are considered to be normally accessible, but those more than 3 feet off the edge are considered DTM if there is no support surface within 13 feet directly below the component.

Each DTM valve will be monitored at least annually. The monitoring frequency in the database rule set requires each DTM valve to be monitored once during each calendar year. Unless forced by an extended out of service period, no two consecutive monitoring events for a non-leaking DTM valve shall be less than 6 months apart nor more than 18 months apart.

Units built new since NSPS VV were promulgated (approximately January 1983), and subject to these rules, may have a maximum of 3% of total valves designated as DTM. On these units, all valves that meet the DTM definition have been identified as DTM, but a group of the easier to access DTM valves has been assigned to a QDTM set requiring quarterly monitoring. Valves have been shifted from the DTM to QDTM set until the 3% cap is met for DTM valves that can be monitored annually.

This DTM monitoring plan satisfies the requirements of 40 CFR 60.486(f)(2) / 63.168 (i)(2) / 63.1022(4)(ii), which applies to all Production Areas at the Winder Facility. The required list of identification numbers of DTM equipment can be found in the LDAR database in LeakDAS.

Procedure to Identify Leaking LDAR Components

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines for maintaining leak tag inventories.

1.2 This procedure applies to all Production Areas and associated process equipment subject to LDAR regulatory oversight.

2.0 Safety

2.1 Proper PPE required for entry into site units.

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

4.1 Equipment – Each pump, agitator, pressure relief device, sampling connection system, open-ended valve or line, valve, connector, surge control vessel, bottoms receiver, and instrumentation system in organic hazardous air pollutant or LDAR service; and any control devices or systems required by the LDAR regulations.

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 Interpret the language of the LDAR regulations.

5.1.2 Provide adequate LDAR training to the facility.

5.1.3 Maintain records for LDAR leaks and repair.

5.1.4 Perform/schedule a LDAR Leaker Tag audit to ensure that all leak tags are legible and have the appropriate leak history documented on the leak tag.

5.1.5 If LDAR Leaker Tag is missing, contact Maintenance Specialist – EH&S to replace tag.

5.2 LDAR Contractor

5.2.1 Place LDAR Leaker Tag immediately upon detection and document all required information.

5.2.2 Document each re-monitoring reading.

5.2.3 Be aware of components that have met the applicable time requirement for follow up monitoring. Remove these and dispose of properly.

5.2.4 Document re-monitor events or remove tag as defined by the appropriate regulation.

5.2.5 Verify previously leaking valves or connectors have legible leak tags attached during follow up monitoring if federal rules apply.

5.3 Maintenance Department

5.3.1 Maintain integrity of LDAR Leaker tag while making repair attempt.

5.3.2 Record Maintenance Tech. that conducted first attempt, date first attempt occurred, and work performed

5.4 Production Areas

5.4.1 Hang LDAR Leaker Tags on leaking equipment during visual inspections.

5.4.2 Maintain integrity of LDAR Leak Tag while taking equipment out of service for repair

5.4.3 Leave LDAR Leaker Tag hanging after placing equipment back in service or after repairs have been completed

5.4.4 Replace missing LDAR Leaker Tags

6.0 Guidelines for Hanging LDAR Leaker Tags

6.1 Production Area Personnel or LDAR Contractor will place LDAR Leaker tags immediately when a LDAR leak is detected per Method 21 monitoring or by Audio, Visual, and Olfactory ("AVO"). LDAR Leaker Tags shall be hung on leaking components that are in light liquid, gas vapor, and heavy liquid service. Therefore, Production will hang LDAR Leaker tags on .

6.2 LDAR Leaker Tags will have:

- Date tagged – This is the date the LDAR leak is found
- Component ID – LDAR Tag Number, which can be found on the physical LDAR tag on the equipment or on LDAR Isometrics.
- Date Repair – Date the first attempt at repair is made.
- Maintenance Tech. Name – Name of the Maintenance personnel conducting the first attempt of repair.
- Work Performed – Document how the first attempt of repair was made

- When completing the repair efforts and Method 21 re-monitoring, record the re-monitoring readings on the LDAR Leaker Tag.
- After follow-up Method 21 monitoring is conducted on other equipment by the LDAR Contractor, the LDAR Leaker Tag can be removed.
- LDAR Leaker Tags must be hung on LDAR components that are in gas vapor, light liquid, or heavy liquid service when identified as leaking whether Method 21 or AVO.

7.0 Auditing

7.1 An audit of LDAR Leaker Tags will be conducted on a monthly basis.

7.2 The audit will be based on a report generated out of the database. The report will cover all leakers over the last 30 days.

7.3 Using the report generated from the database, the EHS&S Department will confirm in the field that LDAR Leaker Tags are present.

7.4 Any missing LDAR Leaker Tags will be reported to the EHS&S Department personnel.

7.5 LDAR Leaker Tags will be replaced by production.

7.6 Records of monthly LDAR Leaker Tag Audits will be maintained for up to one year. Records will be reviewed by EHS&S Manager after one year.

8.0 Training

8.1 None

9.0 Forms and Records

9.1 None

10.0 Appendices

10.1 See Attachment 9A Completed LDAR Leak Tag

11.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedures for Leak Management

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines for managing LDAR leaks found during routing Method 21 monitoring.

1.2 This standard applies to all components in LDAR service

2.0 Safety

2.1 Proper PPE required for entry into site units.

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

4.1 DOR (Delay of Repair) – Lawfully postponing a component leak repair when:

- A unit shutdown must be performed for repair
- The component has been isolated from VOC/HAP service
- The seal will be replaced within six months of the initial leak (applies to pumps only.)

4.2 DOR List – A list of components awaiting shutdown for repair.

4.3 First Attempt at Repair – To take action for the purpose of stopping or reduced leakage of materials listed in this procedure to the environment. Should be taken within five days from the time the leak was identified.

4.4 Second Attempt at Repair – Same definition as First Attempt at Repair. For Second Attempt at Repair shall be completed within 10 days from when the first attempt was completed.

4.5 AVO Leaker – A leak that is identified using audio, visual, and olfactory senses.

NOTE: The total days to repair a leak is 15 days. The clock begins the day the leak is found. The clock stops when an attempt at repair is completed and the Method 21 re-test is below the LDAR components leak threshold. See Appendix A, Attachment 2 Fugitive Emissions Regulations Comparison Table in EHS 67 Leak Detection and Repair of Components Containing Volatile Material for a list of leak definitions based on regulatory applicability and equipment.

5.0 Responsibilities

5.1 Maintenance Manager

5.1.1 Plans the work order task for first and second attempt at repair.

5.1.2 Ensure that the first attempt at repair is completed in five days from the date when the leak was identified.

5.1.3 Ensure that the second attempt at repair is completed in 10 days (or remaining days) from the date when the first attempt at repair is completed.

5.1.4 Plans WOs with a task in each WO. Moves WO to Active Status.

5.1.5 Looks for resources to sync with equipment availability

5.1.6 Discusses execution timing during MOWP Meeting.

5.1.7 Distributes WO for execution to Maintenance Techs.

5.1.8 Provide complete and accurate records for the first and second attempt at repair.

5.1.9 Ensure that LDAR Leaker Tags are accurate and completely filled out after an attempt at repair is completed.

5.1.10 Ensure that complete and accurate records are documented on the LDAR Leaker Form.

5.1.11 Notify Production Superintendent and EHS&S Department when the first or second attempt at repair is complete.

5.2 Production Superintendent

5.2.1 Notify Maintenance Specialist – EHS&S for scaffold or manlift for Difficult to Monitor LDAR Components.

5.2.2 Review LDAR Work Request submitted by Operators and other Stepan Personnel.

5.2.3 Estimates time to equipment available and HECP required WR-WO Process.

5.2.4 Works with Production Area on execution timing and communicates timing to the Maintenance Planner.

5.2.5 Initiate Delay of Repair process.

5.3 EHS&S Department

5.3.1 Notify Production and Maintenance when LDAR Contractor is scheduled to arrive onsite for routine Method 21 Monitoring.

5.3.2 Notify Production and Maintenance of leaking LDAR components.

5.3.3 Schedule LDAR Contractor for initial and retest Method 21 monitoring.

5.3.4 Attend MOWP Meetings to communicate leaking LDAR Components.

5.3.5 Ensure Production Areas and Maintenance Department is trained on this procedure.

5.3.6 Ensure that the leak log is kept up to date and readily accessible.

5.3.7 Ensure that repaired leaks and DOR items are reported in a timely manner per the timeframe of the governing regulation(s)

5.3.8 Ensure required documentation is complete, proper record keeping is maintained and readily accessible

5.3.9 Ensure that leak tags are present and replaced if missing.

5.3.10 Track Weekly Late Repairs to determine if any first attempts are missed.

5.4 LDAR Contractor

5.4.1 Attach leak tags to leaking equipment immediately upon detection and document all required information.

5.4.2 Ensure that the leak tags are legible and contain all required information during follow-up monitoring. If not, replace with the appropriate information.

5.4.3 Re-monitor leaking equipment

5.4.4 Ensure Method 21 monitoring procedures are followed for each LDAR component monitored.

5.4.5 Communicate to EHS&S Department on leaking equipment.

6.0 General Procedure for Managing LDAR Leaks During Routine Method 21 Monitoring (See Attachment A – Leak Repair Workflow):

6.1 Leaking equipment, identified by either regular Method 21 monitoring by LDAR Contractor or by AVO inspections shall be identified with a LDAR Leaker tag that will have tag/equipment number, date of leak, initial reading, part leaking, first attempt type, and re-monitor reading.

6.2 LDAR Contractor delivers LDAR Leaker package from the previous 24 hours of testing to the Maintenance Specialist – EHS&S. At the end of the monitoring route the LDAR Contractor is still required to submit all LDAR Leakers to EHS&S Department.

> NOTE: All LDAR Leakers submitted to EHS&S at the end of the monitoring route will be communicated to Maintenance and Production.

6.3 Maintenance Manager distributes leak packages for execution to Maintenance Tech at morning meeting.

> NOTE: Common examples of first attempts at repair for flanges, valves, and pumps include: tighten packing gland nuts, bonnet bolts or flanges, inject lubricant into packing, grease or re-position fitting, recap, plug or seal open ended lines, venting of pump or pump seal chamber, clean or stream pump seal, and cycle pump on and off.

6.4 Maintenance Techs attempts repair and notes date the attempt at repair is completed, work performed, and Maintenance Tech name on the LDAR Leaker Tag that was hung by the LDAR Contractor.

6.5 EHS&S Department enters date attempt at repair is completed, work performed, and Maintenance Tech name into database after Maintenance Manager provides the completed LDAR Leaker Package to EHS&S Department. This distribution would go out Production Area and EHS&S.

6.6 EHS&S Department contacts LDAR Contractor that the attempt at repair is complete and the component is ready for re-test (Method 21).

> NOTES: For AVO leaks identified on LDAR Components in Heavy Liquid Service first attempt at repair shall be completed in 5 days and final repair in 15. No retest (Method 21) is required, so once the Maintenance Manager communicates that an AVO leaker in heavy liquid service is completed EHS&S Department can remove the LDAR Leaker Tag if no leak is identified after the repair per the AVO method. If a Method 21 Leaker is identified on a component in heavy liquid service then after the component is repaired a Method 21 re-test will be required to confirm the repair.

6.7 LDAR Contractor re-test's the now repaired LDAR component per Method 21. LDAR Contractor also uploads re-test into database.

6.8 EHS&S Department communicates results from the re-test to Production Area and Maintenance.

> NOTE: Stop here if the re-test Method 21 monitoring for the first attempt at repair passed.

6.9 Second attempt at repair shall be completed within 10 days (or remaining days) from when the first-attempt at repair is completed.

6.10 To complete the final attempt at repair follow conditions above.

> NOTE: Multiple attempts at repair can be conducted after the first attempt at repair fails re-test.

6.11 If the final attempt at repair fails Production, Maintenance, and EHS&S shall begin reviewing procedures for guidance on the Delay of Repair process. Delay of Repair is necessary if the repair is technically infeasible without a process unit shutdown. It is highly advised to not wait until the 15th day to attempt the final attempt at repair unless it has been determined to be necessary.

> NOTE: Signed approval from Plant Manager and EHS&S Manager must be obtained before a leaking component can be placed on the Delay of Repair List.

7.0 General Procedure for Managing AVO LDAR Leaks (See Attachment A – Leak Repair Work Flow AVO – RIK LDAR Work Flow):

7.1 AVO Leaker is identified and Stepan Personnel submit LDAR work request in CMMS.

7.2 Production Area Operator hangs Leaker Tag and contacts Production Superintendent and EHS&S Department.

7.3 An email from CMMS is sent to the EHS&S Department confirming that an LDAR AVO was identified.

7.4 EHS&S Department enters AVO into database using the information provided in the work request.

7.5 EHS&S Department emails LDAR Leaker Package to Production Maintenance. See Attachment C – Example of AVO LDAR Leak Package with First Attempt.

NOTE: Once Environmental submitted the AVO LDAR Leak Package to the Production and Maintenance the process is the same as managing Method 21 Leakers.

8.0 Training

8.1 None

9.0 Forms and Records

9.1 The following records for leaking LDAR components must be maintained in the EHS&S Files for up to five years:

9.1.1 Method 21 Calibration and Monitoring Record

9.1.2 Scanned copy of the LDAR Leaker Tag

9.1.3 Date of first attempt at repair and final attempt at repair.

9.2 Method 21 monitoring records shall be uploaded in the LDAR database.

10.0 Appendices

10.1 See Attachment 10A – LDAR Work Request/Work Order Writing

11.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for Open-Ended Lines and Sample Systems Management

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to maintain compliance standards for control devices of open-ended lines, sampling systems, and equipment vented to control devices.

1.2 This standard applies to all facilities subject to LDAR regulatory oversight.

2.0 Definitions

2.1 Open-Ended Valve or Line (OEL) – any valve, except safety relief valves, having one side of the valve seat in contact with process fluid and one side open to the atmosphere, either directly or through open piping

2.2 Potential Open-Ended Valve or Line (POEL) – any line openings that, if not properly sealed, could be open-ended lines

2.3 Sampling Connection System (SS) – an assembly of equipment within a process unit used during periods of representative operation to take samples of process fluid. Equipment used to take non-routine grab samples is not considered a sampling system

2.4 In-situ Sampling System – non-extractive samplers or in-line samplers

2.5 Closed Vent System / Control Device – an enclosed combustion device, vapor recovery system, or flare

3.0 Responsibilities

3.1 EHS&S Department

3.1.1 Ensure required documentation is complete, proper record keeping is maintained and readily accessible

3.1.2 Ensure that Production Areas and Maintenance Department are trained on OEL, SS, Control Device and Closed Vent System management, maintenance and reporting procedure

3.1.3 Ensure that the EHS&S Department understands and schedules monitoring required by LDAR Contractor at the correct frequency

3.1.4 Compliance and submit OEL performance by Emission Unit

3.1.5 Ensure LDAR Contractor are trained to recognize and report OELs & POELs

3.1.6 Report all OELs in Semiannual Report.

3.1.7 Schedule all required Method 21 and AVO monitoring of control devices and control equipment completed by LDAR Contractor

3.2 Maintenance Specialist – EHS&S

3.2.1 Submit OELs and POELs observed during regular monitoring to the LDAR Coordinator

3.2.2 Inspect Closed Vent Systems during regularly scheduled LDAR monitoring per governing regulations

3.3 Production Areas

3.3.1 Identify and notate OELs and POELs during daily and weekly OEL inspections

3.3.2 Ensure that all OELs are buttoned up after maintenance activities are performed under a work permit

3.3.3 Take the proper steps to prevent and resolve OELs as soon as possible

3.3.4 Take the proper steps to identify any leaks from control devices and closed vent systems and report them to the EHS&S Department immediately

3.3.5 Schedule all required visual monitoring of control devices and control equipment completed by the Production Areas

3.4 Maintenance Department

3.4.1 Take the proper steps to prevent and resolve OELs as soon as possible

3.4.2 Ensure that all OELs are buttoned up after maintenance activities performed under a work permit

3.4.3 Take the proper steps to prevent and repair leaks from control devices and closed vent systems per governing regulatory requirements

4.0 Procedure

4.1 OEL

4.1.1 Each OEL or POEL in a line must have one of the following:

- Two valves in series that are both closed
- A Plug
- A cap

- A blind flange

4.1.2 OELs and POELs shall be reported to the EHS&S Department.

- An LDAR work order shall be submitted if Maintenance Dept. resources are needed to mitigate the OEL.
- OEL performance should be tracked by emission unit and reported as a performance indicator to the EHS&S Department each month.

4.1.3 **Sample Systems (SS)** - Each SS shall be equipped with a closed-purge, closed-loop, or closed-vent system as required by the applicable regulations

4.1.4 Each closed-purged, closed-loop, or closed vent system shall meet the following requirements:

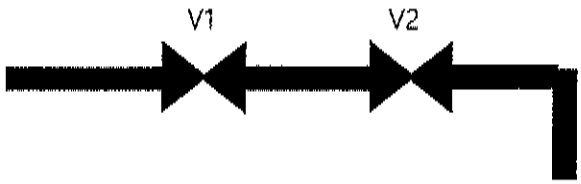
1. Gases displaced during filling of the sample container are not required to be collected or captured
2. Containers that are part of the closed-purge system must be covered or closed when not being filled or emptied
3. Gases remaining in the tubing or piping between the closed-purge system valve(s) and sample container valve(s) after the valves are closed are not required to be collected or captured.

4.1.5 Each closed-purge, closed-loop, or closed-vent system shall be designed and operated to meet requirements one of the following requirements:

4. Return the purged process fluid directly to the process line.
5. Collect and recycle the purged process fluid to a process unit.
6. Collect purged material and transfer to a designated area.

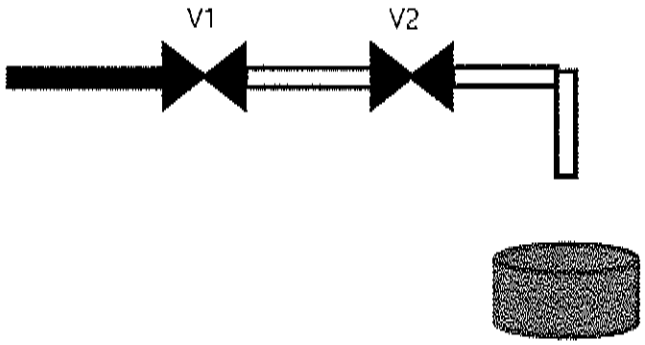
4.1.6 In situ sampling systems and sampling systems without purges are exempt from being equipped with a closed-purge, closed-loop, or closed-vent system

4.1.7 If valves are not closed correctly, could potentially result in an open-ended valve/line. See steps below for managing LDAR sample systems.



Open V1 & V2 and purge material into container

Take sample and close V1.



Once no more material exists in the piping, close V2. Or as appropriate use plug or cap. No material should exist between V1 and V2.

Cover purged material container and dispose of material per Stepan's waste requirements.

5.0 Training

5.1 None

6.0 Forms and Records

6.1 None

7.0 Appendices

7.1 See Attachment 11A – Environmental Leak and OEL Survey Form

8.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Engineering Standards for Pipe Run and Pipe Rack Valves

1.0 Purpose and Scope

Management's regulatory position regarding design requirements for valves on process piping run down lines, transfer lines and pipe racks in Volatile Organic Compounds (VOCs) and Hazardous Air Pollutants (HAPs) service to optimize LDAR program monitoring and repair.

2.0 Engineering Protocol

Stepan understands the importance of managing valves in VOC and HAP service associated with the LDAR program. The intent of this standard is to minimize the number valves where possible and establish the proper placement for the valves that are required for process operation during the design phase.

The regulatory requirements influencing this design standard are valves being classified as Difficult to Monitor (DTM) and Unsafe to Monitor (UTM).

2.1 Difficult-to-Monitor (DTM) Valve Monitoring Plan

A DTM valve is defined in Federal and most state LDAR regulations as a valve that cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface. Valves within 3 feet off the edge of an elevated platform are considered normally accessible, but those more than 3 feet off the edge are considered DTM if there is no support surface within 13 feet directly below the component.

Each DTM valve will be monitored at least annually instead of monthly or quarterly. The monitoring frequency in the database rule-set requires each DTM valve to be monitored once during each calendar year. Unless forced by an extended out of service period, no two consecutive monitoring events for a non-leaking DTM valve shall be less than 6 months apart nor more than 18 months apart.

2.2 Unsafe-to-Monitor (UTM) Valve Monitoring Plan

A UTM valve, as defined in Federal (and most state) LDAR regulations, is a valve that is unsafe to monitor because monitoring personnel would be exposed to an immediate danger because of monitoring. The LDAR rules do not define the types of hazards that would constitute "immediate danger", but some examples might include:

- Heat so high that approaching the valve for the time required monitoring would cause burns to the monitoring personnel.
- Components within 10 feet of a high voltage power line.
- Components under extreme pressure where a pin hole leak creates a cutting effect.

- Components where the monitoring personnel might be exposed to concentrations greater than the ERPG-2 level of a toxic compound at which irreversible health effects might occur. And
- Components at extreme heights that cannot be safely reached by scaffold and with impediments to access by cherry pickers or crane buckets.

This list is not meant to be comprehensive, and other situations resulting in immediate danger to monitoring personnel might occur in specific facilities. There are also many hazardous valve locations that can be monitored safely with proper PPE and work permits, such as those in confined spaces. Since confined space work is done routinely within the facility for other reasons, it should not by itself be considered justification for UTM designation. Each UTM valve will be monitored whenever it is safe to do so.

2.3 Engineering Design

The below standards should be followed when designing piping systems that are affected by LDAR regulations.

- Valves intended to be routinely operated, should be accessible at ground level and/or have a platform/support surface associated with them.
    - This will help reduce the DTM/UTM valves under the LDAR program.
- Minimize piping connections/flanges or valves as much as possible.
    - This reduces the number of potential leak points and facility annual emission calculations.
    - This will also reduce the DTM/UTM components under the LDAR program.
- No piping connections/flanges or valves should be designed to be buried/underground.
    - This reduces the potential of unknown underground leaks/spills that affect the environment.
    - This reduces the UTM or inaccessible components under the LDAR program
- Piping designed to contain valves placed above a support surface/grade and would meet the definition of DTM, should have the valve stem placed such that it is accessible for Method 21 monitoring as required by LDAR regulations.
    - This will allow the use of an extension wand (which is allowed under the LDAR regulations) for monitoring to help reduce the number of DTM components or have the DTM components move to QDTMs with the ease of using an extension wand instead of ladders or aerial lifts.
- As a best management practice, new valves purchased should be certified Low Emission (Low E) valves meeting API 600 series for the different sizes and types of valves, API 622 – which certifies the packing as Low – E and API 624 - which certifies the valve with API 622 packing installed in the stuffing box.

This will reduce the potential of leaks and spills with valves not routinely monitored under LDAR because they are on process piping run down lines, transfer lines and in pipe racks.

3.0 Training

3.1 None

4.0 Forms and Records

4.1 None

5.0 Appendices

5.1 None

6.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Policy for Equipment Leak Emissions Control and Reduction

1.0 Purpose and Scope

Management's statement regarding standard of equipment leak emission control expectations, including use of technology.

2.0 Policy Statement

Stepan understands the importance of using Best Available Control Technology (BACT) in order to control emission leaks. BACT is termed as an emission limitation based on the maximum degree of reduction of each pollutant subject to EPA regulations. BACT includes, but is not limited to considering alternative production processes and available methods, systems, and techniques, including fuel cleaning. Stepan will maintain and utilize BACT whenever possible in order to ensure the health and safety of our employees and neighbors

3.0 Training

3.1 None

4.0 Forms and Records

4.1 None

5.0 Appendices

5.1 None

6.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Seal Visual Inspections

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to complete and record weekly pump and agitators in light liquid inspections.

1.2 This standard applies to all Production Areas and equipment that is regulated under LDAR.

2.0 Safety

2.1 Proper PPE required for entry into site units.

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

- AVO Leak – A leak from process equipment that can be audibly heard, visually observed, or smelled by the human olfactory.
- Calendar Week – A calendar week, beginning on Sunday and ending on Saturday.
- Liquids Dripping – Means any visible leakage from the seal including dripping, spraying, misting, clouding, and ice formation. Indications of liquid dripping include puddling or new stains that are indicative of an existing evaporated drip.
- Weekly AVO Inspection Checklist – form used by the Production Departments to document completion of weekly pump and agitator seal inspections and any leaks found during the inspections.
- Component – Each pump, compressor, agitator, pressure relief device, open-ended valve or line, valve, connector, and in VOC service.

5.0 Responsibilities

5.1 Production Area Personnel (Operators)

5.1.1 Complete Weekly AVO Inspections on agitators, and pumps in light liquid service using the provided checklist.

5.1.2 Perform a unit walk-through to detect leaks that are apparent by audio, visual, or olfactory (smell) methods. Leaks must be documented on the AVO Inspection Checklist.

5.1.3 Maintain records of AVO Inspections in a binder located in the control rooms. Checklist may be stored electronically.

5.1.4 Submit Work Request per the Maintenance LDAR Work Request Writing Guidelines.

5.1.5 Hang LDAR Leaker Tag on leaking LDAR component. Fill out the date the leak was observed and LDAR tag number on the LDAR Leaker Tag.

5.1.6 Communicate to appropriate personnel that an LDAR work request has been submitted.

5.2 Maintenance Manager with support of Maintenance Specialist – EHS&S

5.2.1 Ensure first attempt at repair is completed within 5 days and the second attempt at repair is completed within 10 days.

5.2.2 Determine if Delay of Repair is necessary.

5.2.3 Ensure LDAR Leaker Tag is signed and dated correctly by Maintenance personnel.

5.2.4 Provide records on how first and second attempt at repair was conducted, date when the repair was completed, and name of the Maintenance Tech.

5.3 EHS&S Department

5.3.1 Audit AVO Inspection Checklist for each production area on a monthly basis. Any noncompliant recordkeeping or work standards shall be reported internally and externally.

5.3.2 Schedule LDAR Contractor for Method 21 monitoring.

5.3.3 Communicate monitoring status to Production and Maintenance for first attempt and second attempt.

5.3.4 Maintain leaker and repair records in database.

5.3.5 Provide LDAR Leaker Tags to Production Areas.

5.4 LDAR Contractor

5.4.1 Conduct Method 21 monitoring on LDAR components.

5.4.2 Maintain back-up leak and repair records in LeakDAS.

5.4.3 Communicate to EHS&S Department on status of leaking component.

5.4.4 Conduct follow-up monitoring for AVO and Method 21 leakers that have been successfully repaired.

6.0 Guidelines for Conducting Inspections of Pumps and Agitators in Light Liquid Services ("Also known as AVO Inspections") See Attachment A of this procedure.

6.1 Checklists for conducting AVO Inspections are stored on the Network Drive.

6.2 Production Area Personnel shall conduct AVO inspections Monday through Wednesday of each calendar week. Area Production personnel will perform a unit walk-through to detect leaks that are apparent by audio, visual, or olfactory (smell) methods.

NOTE: Must be three days between each AVO Inspection.

6.3 For guidance on properly filling out an AVO Inspection Checklist, see Attachment B of this procedure. It should be noted that all AVO Inspections shall require a signature from the individual conducting the AVO inspection and the Production Area Day Facilitator or Manager.

6.4 In the event that an AVO is detected during a weekly inspection, the Area Production personnel must record the AVO ("the leak") as FAIL on the Weekly AVO Checklist. No leaks detected would be indicated on the checklist by marking PASS.

NOTE: All AVO Checklists contain a column for Temporarily Out of Service ("OOS"). This would be equipment that has been purged of process fluids. An example of OOS equipment is when equipment is placed into a stated so confined space entry is achievable.

NOTE: All AVO Checklists contains a column for Leaks Previously Identified ("LPI"). This would be equipment where a leak has already been identified. In this case, the equipment would have a LDAR Leaker Tag.

6.5 After documenting the AVO on the AVO Checklist, Production Area personnel must write and submit a schedule break Work Request.

NOTE: All LDAR repairs are BREAKDOWNS ASSET MTCE Priority 9 Environmental and Safety Repair

6.6 Production Area personnel must hang leaker tag. The leak tag must be hung as soon as possible. Leak tags must be hung within one hour of the leak detection.

NOTE: LDAR Leaker Tags will be provided by the EHS&D Department.

6.7 Leaker tag must be completely filled out by the Production Area personnel.

6.8 Production Area personnel must communicate LDAR Schedule Break Work Request.

6.9 When an LDAR work request is properly submitted Maintenance Personnel, and EHS&S Department will receive an email notification regarding the identified AVO.

NOTE: If the LDAR work request not submitted correctly as described the EHS&S Department will not receive the email notification that an AVO leak was identified.

6.10 Upon receiving the email notification, the EHS&S Department will notify the Production Superintendent, LDAR Contractor, and the Maintenance Manager.

6.11 The EHS&S Department shall enter AVO leaker that was identified in the LDAR work request into database as soon as possible. Once in the database, the EHS&S Department and LDAR Contractor will be able to track the attempts at repair process

6.12 When the repair and re-test is completed and the repair is successful, the LDAR Contractor will provide the EHS&S Department with the bottom half of the LDAR Leaker Tag.

6.13 The EHS&S Department will enter the date repaired, maintenance tech name, and work performed into the database to close out the work order. This entry can be done before or after the LDAR contractor uploads the Method 21 re-test data.

6.14 Maintenance Department will close out the work order.

7.0 Training

7.1 None

8.0 Records

8.1 AVO Inspection Checklists shall be maintained onsite for five years. AVO inspection records may be recorded electronically in database.

8.2 AVO Inspection Checklists will be maintained in binders located in the control rooms for one year, along with a copy to the EHS&S Department.

8.3 Leaker and repair records shall be maintained onsite for five years.

9.0 Auditing

9.1 Completed AVO Inspections will be audited by the Environmental Department on a monthly basis to ensure compliance.

9.2 Findings from monthly audits shall be reported to the proper Stepan personnel.

9.3 Prompt reporting of all audit findings will be determined by the EHS&S Department.

10.0 Appendices

10.1 See Attachment 14A – Example of a Completed Weekly AVO Inspection

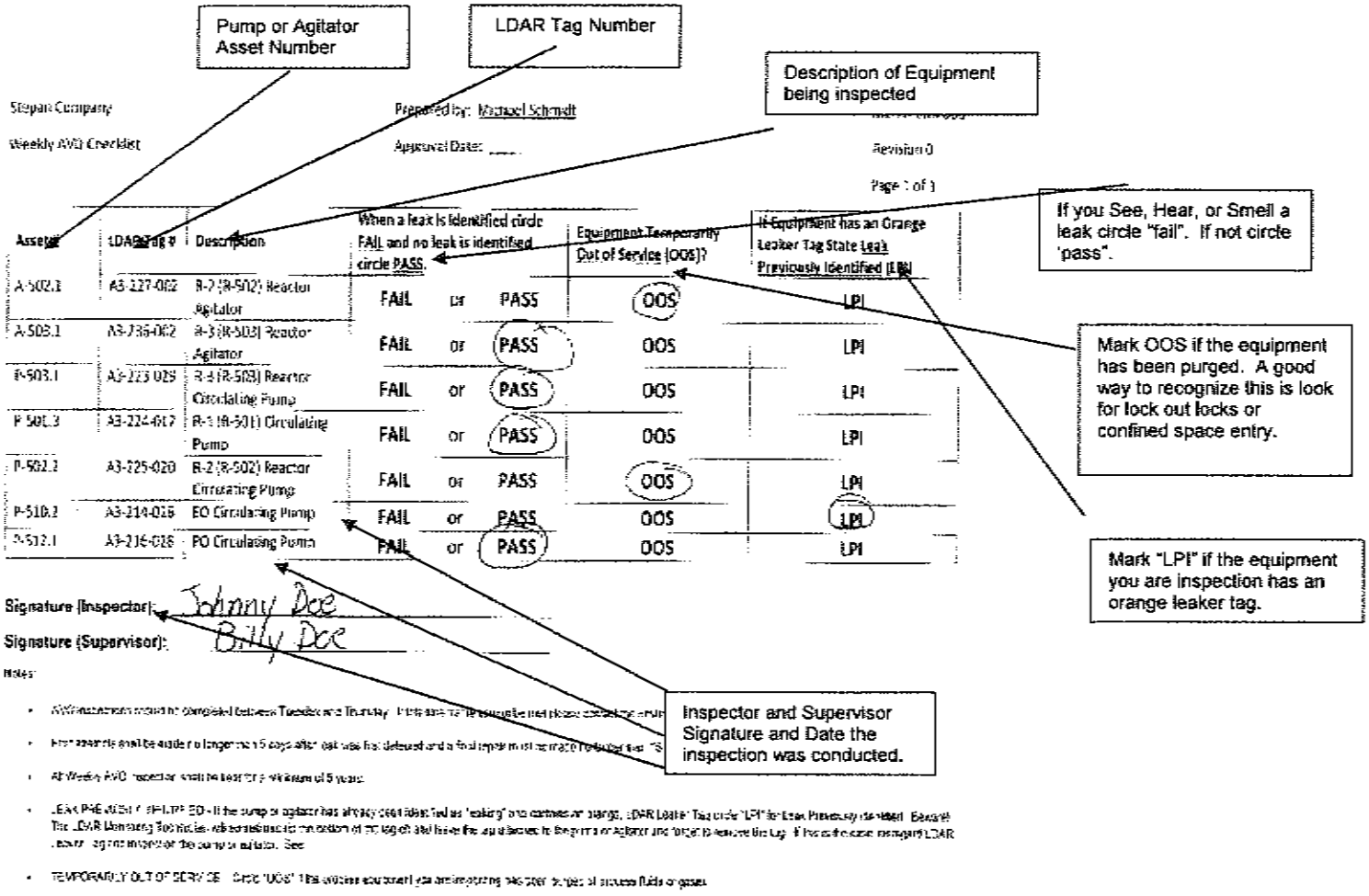
10.2 See Attachment 14B – AVO Inspection Sheet

10.3 See Attachment 14C – Monthly Audit Form AVO Inspection

11.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Attachment 14A - Example of a Completed AVO Inspection



Asset #	LDAR Tag #	Description	When a leak is identified circle FAIL and no leak is identified circle PASS.	Equipment Temporarily Out of Service (OOS)?	If Equipment has an Orange Leaker Tag State Leak Previously Identified (LPI)
			FAIL or PASS	OOS	LPI
			FAIL or PASS	OOS	LPI
			FAIL or PASS	OOS	LPI
			FAIL or PASS	OOS	LPI
			FAIL or PASS	OOS	LPI

Signature (Inspector): _____ Date: _____

Signature (Supervisor): _____

Notes:

- AVO Inspections should be completed between Tuesday and Thursday. If this time frame cannot be met please contact the Environmental Manager to discuss an alternative schedule.
- First attempts shall be made no longer than 5 days after leak was first detected and a final repair must be made no longer than 15 days after leak was first detected.
- All Weekly AVO Inspection shall be kept for a minimum of 5 years.
- LEAK PREVIOSLY IDENTIFIED - If the pump or agitator has already been identified as "leaking" and contains an orange, LDAR Leaker Tag circle "LPI" for Leak Previously Identified. Beware! The LDAR Monitoring Technician will sometimes rip the bottom of the tag off and leave the tag attached to the pump or agitator and forget to remove the tag. If this is the case, disregard LDAR Leaker Tag and inspection the pump or agitator.

- TEMPORARILY OUT OF SERVICE – Circle "OOS" if the process equipment you are inspecting has been purged of process fluids or gases.

Monthly Audit Form – AVO Inspections

Area:
Audit Completed By:
Date of Audit:

Question	Y	N	N/A	Comments/Recommendations
Is there at least 3 days between each Weekly AVO Inspection (63.162 (g)(i))?				
Was there a missed weekly inspection?				
Do all leaks have a documented Work Order number?				
Was a first attempt made within 5 days from the date that the leak was first detected?				
Was a final attempt made within 10 days from the date that the leak was first detected?				
If yes above, is there a delay of repair?				
If yes above, was there an acceptable justification?				

NOTE:

- Monthly Audit Forms must be kept for 5 years.

Delay of Repair Authorization

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines for evaluating items to be placed on the delay of repair (DOR) list.

1.2 This standard applies to all components in LDAR service that are eligible for DOR status based on the referenced regulations below.

2.0 Safety

2.1 None

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

4.1 DOR – Delay of Repair – Lawfully postponing a component leak repair when:
- a unit shutdown must be performed for repair
- the component has been isolated from service
- and/or the seal will be replaced within six months of the initial leak (applies to pumps only.)

4.2 DOR Candidate – A component that is being evaluated for delay of repair, but is not yet approved and therefore still applicable to the repair deadline.

4.3 DOR Initiator (Gatekeeper) – The person or group that initiated the intent to delay repair on a component. Typically, either operations or maintenance personnel having direct knowledge of the component configuration and availability.

4.4 DOR List – A list of components awaiting shutdown for repair.

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 Ensure facility personnel understand delay of repair options and communications process.

5.1.2 Review DOR checklist, provide data as necessary, and supply approval signature or deny components as a delay of repair candidate.

5.1.3 Maintain a list of active DORs and ensure that they get included in the scope of work during the applicable unit outage.

5.1.4 Monitor DOR items per facility/regulatory guidelines.

5.1.5 Verify that all DOR data is collected on the DOR Checklist.

5.1.6 Verify that DOR data is properly entered into the LDAR database and retained per recordkeeping requirements.

5.1.7 Ensure that LDAR Contractors are trained on DOR procedures.

5.2 Production Superintendent

5.2.1 Hang a DOR tag on the component after the authorization process has been completed.

5.2.2 Tag leakers and initiates DOR Checklist when informed of delay of repair intention.

5.2.3 Properly gather DOR data and submit to EHS&S Department

6.0 Delay of Repair General Guidelines

6.1 Some components cannot be repaired within the limits defined in various LDAR programs because:

- They would create more emissions than would be eliminated by immediate repair (the unit can stay up but the emissions from isolated specific pieces of equipment would be greater than the leak), or
- They would cause the unit to shut down if isolated.

6.2 Some components can delay repair because they are not critical to daily operation and can be isolated from LDAR service.

6.3 In these cases, the component repair can be delayed until the next unit shutdown as long as proper documentation is maintained.

6.4 In most cases, maintenance or operations departments typically perform initial repair attempts.

6.5 If initial attempts are unsuccessful, operations may identify that further attempts would require a unit shutdown.

6.6 If this is the case, the leaks are not submitted to maintenance for further repair attempts but a DOR Checklist must be completed.

6.7 If leaks are submitted to maintenance they may make several attempts and determine that the equipment must be taken off line to repair. This could lead to delay of repair.

7.0 Delay of Repair Authorization Checklist Procedure:

7.1 Step 1 – Complete the plant information sections of the checklist. Complete LDAR Tag Number, Equipment Type, Size, and Initial Leak Date.

7.2 Step 2 – In Section 1, determine which type of delay of repair item the component would be. Pick one (1) option only and each option informs the user what other sections must be completed.

- Option 1 – The component requires new equipment design or seal replacement. This option can only be used for pumps and repairs must be completed within six months of the initial leak. Option 1 is used when a pump is leaking and cannot be isolated from LDAR service. In this case, the pumps would continue to leak until unit shutdown.
- Option 2 – Can be used for all types of components because any component can be isolated form LDAR service until final repair.
- Option 3 – The component, excluding pumps, can be repaired without a unit shutdown, but by isolating the equipment to be repaired more emissions would result than could be eliminated. (Typically oriented around a small section of a unit.)
- Option 4 – The component can be repaired but by isolating the component for repair the entire unit would shut down.

7.3 Step 3 – Complete the appropriate section for the option chosen in Step 2.

7.4 Step 4 – Review the data collected with maintenance and/or operations (depending on the DOR initiator) and acquire a signature validating the data contained in the DOR Checklist. (NOTE: This person is accountable for the data presented.)

7.5 Step 5 – Review the DOR Checklist data with the EHS&S Manager and Plant Manager and either acquire an approval signature or communication of a denial of DOR candidate status.

7.6 Step 6 – Complete the "Date of Delay Decision" and "Expected Date of Repair" boxes in the plant information section. "Expected Date of Repair" can be acquired from a maintenance planner or turnaround schedule for the facility.

7.7 Step 7 – Either forward the approved and completed DOR Checklist to the LDAR Coordinator or communicate that the DOR candidate has been denied to maintenance and initial further repairs.

8.0 Delay of Repair Checklist Components:

8.1 Section 3 – Pump Requirements

- Used for Option 1 in Section 1 Delay of Repair Type
- Only Pumps can qualify for this option.

- Ensure that maintenance and operations personnel understand that repairs will include replacing the current system with one of the options listed in this section and that repairs must be completed within six months.

8.2 Section 4 – Isolated Equipment

- Used for Option 2 in Section 1 Delay of Repair Type
- Any equipment can qualify for this option
- Ensure the maintenance and operations personnel understand the equipment cannot be utilized until final repair is complete.
- Field verify that some means of blocking the equipment from service are in place, and that there are locks, chains, or tags that notify personnel that the equipment cannot be utilized.

8.3 Section 5 – Awaiting Turn-Around (TA): More Emissions than Eliminated

- Used for Option 3 in Section 1 Delay of Repair Type (Excludes Pumps)
- Used for equipment that can be isolated without a unit shutdown, but would create more emissions during repair than would be eliminated by the repair.
- Typically utilized because a section of the unit would have to be de-inventoried and purged to a control device. There are more emissions associated with shutting down a unit, especially if you have to de-inventory a VOC or HAP.
- Ensure a functioning and approved control device is present.
- Ensure the EHS&S Department performs emissions estimates. Emissions estimates shall include:
    - Total emissions for the leak from the initial leak date at the final reading to the estimated date of repair.
    - Total emissions produced by de-inventorying all equipment necessary to isolate the leaker and purging to the control device.

8.4 Section 6 – Awaiting Turn-Around: Requires Unit Shutdown

- Used for components that would shut the unit down if isolated.
- Requires a full description of how the component would cause a unit shutdown in the memo box. (NOTE: Operations should supply this information.)
- Requires attaching a P&ID with component circled and tag numbers written in.

9.0 Training

9.1 None

10.0 Forms and Records

10.1 None

11.0 Appendices

11.1 See Attachment 17A - Delay of Repair Approval Instructions & Authorization Checklist

12.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Delay of Repair Authorization Checklist

Yellow – Production Superintendent is Responsible for Providing Data

Blue – EHS&S is Responsible for Providing Data

Information	Responsible	
1. LDAR Tag Number	Production	Tag number can be found on equipment in the field, work order, or the orange leaker tag.
2. Equipment Type	Production	Information can be collect in field observation, work order, or P&ID
3. Size	Maintenance	Refers to the pipe sizing. Information can be collected in the field or use P&IDs.
4. CMMS Number	Maintenance	Information can be found on the work order.
5. Section 1 – Delay of Repair Type	Production	Need to determine what type of equipment will be in delay of repair and options how delay of repair will be conducted. YOU CAN CHOOSE MULTIPLE OPTIONs.
6. Option 1 – Pumps	Production	Only pertains to pumps. A leaking pump in delay of repair must be replaced with low-leak technology pumps.
7. Option 2 – All Components	Production	Determine if you can isolate the component from service. Isolated equipment must be locked out or blinded, and drained.
8. Option 3 – Awaiting Unit Turnaround	Production	This option excluded pumps. If purging equipment would result in higher emissions
9. Option 4 – Awaiting Unit Turnaround	Production	Use this option if the emission from isolating the equipment is higher.
10. Section 2 Pump Requirements	Production	Must install low leak technology. Choose one of the four options.
11. Section 3 – Isolate Equipment	Production	Is it possible to isolate leaking equipment?
12. Section 4 – More Emissions	EHS&S	Would purging lines results in more emission
13. Section 5 – Unit Shutdown	Production	Before choosing this option, the leaking equipment cannot be isolated. Must document why the leaking component cannot be isolated from service.

LDAR Tag Number	Equipment Type	Size	Isometric Drawing Number	Initial Leak Date
Data Processing Information for Recording DOR				Date within 15 Days
DOR Decision Date:		Expected Date of Repair:		☐ NO (Deviation)
Final Reading Date:		Final Reading (PPMV):		☐ YES

SECTION 1 – DELAY OF REPAIR ("DOR") TYPE		
☐ Option 1 – Specific – Pumps Only – New Equipment Design (Complete Section 2)	REF	63.171(d) 63.1024 (d)(4)
☐ Option 2 – General – All Component Types – Isolate from VOC/HAP service until repair is complete. (Complete Section 3)	REF	63.171(b) 63.1024 (d)(2)
☐ Option 3 – Specific – Excludes Pumps –Isolate for repair would cause more emissions than eliminated but not shut unit down (Complete Section 4)	REF	63.171(c)(1) 63.1024(d)(3)(i)
☐ Option 4 – General – All Component Types – Awaiting Unit Turnaround for repair would shut unit down. (Complete Section 5)	REF	63.171(a) 63.1024(d)
SECTION 2 – PUMP REQUIREMENTS – New Equipment Design		
2.1 – Will repair include replacing existing system with one of the following: (If none below, DOR is not an option)	REF	63.171(d) 63.1024(d)(4)
☐ New system design better suited to control emissions.	REF	63.171(d)(1) 63.1024 (d)(4)(i)(C)
☐ Dual seal system replacement.	REF	63.171(d)(1)(i) 63.1024 (d)(4)(i)(A)
☐ Seal less Pump	REF	63.171(d)(1)(ii) 63.1024 (d)(4)(i)(B)
☐ Equipped with Closed Vent System	REF	63.171(d)(1)(iii) 63.1024 (d)(4)(i)(C)
2.2 – Repair must be completed within **6 months of detection**. Identify date below and ensure responsible facility personnel are aware of deadline.	REF	63.171(d)(2)
Required date for Pump		**Facility Representative Initials**

SECTION 3 – ISOLATED EQUIPMENT	
3.1 – Is the equipment locked out or blinded and drained of product? (If "No", not a candidate for DOR.)	☐ YES ☐ NO
3.2 – Do facility personnel understand they cannot utilize the equipment until repair? (If NO, not a candidate for DOR)	☐ YES ☐ NO
SECTION 4 – AWAITING T/A – MORE EMISSIONS THAN ELIMINATED	
4.1 – Does the facility maintain an approved, tested, and compliant control device? (If No, not a candidate for this type of DOR)	☐ YES ☐ NO
4.2 – Calculate total emissions from leaker from date of detection to expect date of repair noted above? Utilize factors from EPA document No. 453/R-95-017 "*Protocol for Equipment Leak*	**Total Emissions**

Emissions Estimates" and attach calculations.		
4.3 – Calculate total potential emissions resulting from repair.		**Potential Emissions**
4.4 – Compare emissions difference of potential control device to leaker. Are potential emission greater? (If "No", item is not a DOR candidate.)		☐ YES ☐ NO
SECTION 5 – WAITING T/A – REQUIRES UNIT SHUTDOWN		
5.1 –Explain how affected equipment would cause a unit shutdown if isolated for repair. Attach LDAR Isometric.	REF	**63.171(c)(1)** **63.1024(d)(3)(I)**

Maintenance Manager Approval:	**Production Superintendent Approval:**
Plant Manager DOR Approval:	**EHS&S Manager DOR Approval:**

Procedure to Identify Delay of Repair Components and Manage ID Tags

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines for managing Delay of Repair (DOR) field tags.

1.2 This standard applies to all components in VOC or HAP service that are on the DOR list.

2.0 Safety

2.1 Proper PPE required for entry into site units.

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

4.1 Equipment – For each pump compressor, agitator, pressure relief device, sampling connection system, open-ended valve or line, valve, connector, surge control vessel, bottoms receiver, and instrumentation system in organic hazardous air pollutant or LDAR service; and any control devices or systems required by the LDAR regulation

4.2 DOR (Delay of Repair) – Lawfully postponing a component leak repair when:

- A unit shutdown must be performed for repair
- The component has been isolated from VOC/HAP service
- The seal will be replaced within six months of the initial leak (applies to pumps only)

4.3 DOR list – A list of components awaiting shutdown for repair

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 Interpret the language of the LDAR regulations

5.1.2 Review Delay of Repair Checklist for additions or DOR maintenance forms for removal of delay of repair items

5.1.3 Ensure required documentation is maintained for the specified period of time.

5.1.4 Provide delay of repair maintenance forms to the LDAR Coordinator

5.2 LDAR Contractor

5.2.1 Remove Delay of Repair tags from components after directed to do so by Stepan EHS&S Department.

5.2.2 Monitor Delay of Repair items per facility/regulatory guidelines

6.0 Guidelines for Adding Delay of Repair Tags

6.1 Before a Delay of Repair Tag can be hung, Delay of Repair Approval Instructions & Authorization Checklist shall be signed.

6.2 When authorized, Delay of Repair Instructions & Authorization Checklist will be received by the EHS&S Department for entry into the LDAR database and requires Production Superintendent to hang the Delay of Repair Tag within 24 hours of the Delay of Repair authorization.

6.3 The Delay of Repair tag will have the tag number, date of delay of repair decision, and part leaking. See Attachment B for example DOR tag. Attach the tag at the point on the leaking component that ensures tag will remain in place.

7.0 Guidelines for Maintaining Delay of Repair Tags

7.1 The Delay of Repair items require auditing monthly to ensure DOR tags stay attached. The Maintenance Specialist – EHS&S prints a current list to field verify DOR tags. DOR list can be printed out from database.

7.2 In addition, DOR items are monitored according to regulatory and site requirements and LDAR monitoring technician verifies the tags are present while monitoring.

8.0 Guidelines for Removing Delay of Repair Tags

8.1 DOR tags can only be removed after repairs are completed during applicable periods of repair, or if the DOR item has not leaked for at least two (2) consecutive months

9.0 Training

9.1 None

10.0 Forms and Records

10.1 None

11.0 Appendices

11.1 See Attachment 18A and 18B – Example Delay of Repair Tag

12.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure to Track, Repair, and Retest Delay of Repair Components

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines for tracking, repairing, and retesting items placed on the delay of repair (DOR) list.

1.2 This standard applies to all components in LDAR service that are on the DOR list.

2.0 Safety

2.1 None

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

4.1 DOR – Delay of Repair. Lawfully postponing a component leak repair when:

- a unit shutdown must be performed for repair
- the component has been isolated from LDAR service
- the seal will be replaced within six months of the initial leak (applies to pumps only)

4.2 DOR List – A list of components awaiting shutdown for repair

5.0 Guidelines for DOR Tracking:

5.1 DOR components should have a DOR physical tag attached to the leaking equipment and should be replaced if missing or illegible. Also, the tag is required to stay on the equipment until successfully repaired and re-tested.

NOTE: DOR tag must be hung within 24 hours after the DOR has been authorized.

5.2 The Maintenance Specialist – EHS&S should maintain a complete readily accessible DOR list to successfully manage DOR compliance.

NOTE: DOR List can be managed in databse.

5.3 Upon notification that a production unit shutdown lasting greater than 24 hours is scheduled, a complete DOR list from EHS&S should be sent to the Production Superintendent so that repairs to each DOR item can be completed.

5.4 A DOR list of items that are isolated will be supplied by EHS&S Department to Production Superintendents so that repairs can be made before bringing the equipment back into service.

6.0 Guidelines for Delaying of Repair/Retesting

6.1 Delay of repair components can only be removed from the delay of repair list after performing the following:

- Unit shutdown and required maintenance has been performed.
- Component isolation and required maintenance has been performed.
- After unit start up, the DOR items require scheduling for Method 21 monitoring within the time period specified in the applicable LDAR regulation.
- Each DOR component verified as repaired can be removed from the DOR list and the DOR tags removed from the equipment.
- DOR items found to be still leaking after a Method 21 reading above the required leak definition should be left on the DOR list, repair attempts documented, and these items passed to the EHS&S Department for review.

6.2 The following must be kept in a readily accessible location for all components on the DOR list at any point in the timeframe required by the governing regulation(s):

- Reason for Delay including the facts that explain each delay and why a process unit shutdown was technically infeasible.
- Signature of the Maintenance Manager and Production Superintendent whose decision it was that a proper repair is not possible without a unit shutdown.
- The signature of the EHS&S Department personnel confirming the required documentation is present on the form.
- The expected date of successful repair.
- Dates of unit shutdown.
- Dates of successful repair.

6.3 The following must be reported in periodic reports for all components on the DOR list at any point during the reporting period:

- Reason for Delay, including the facts that explain each delay and why a process unit shutdown was technically infeasible.
- Dates of process unit shutdowns which occurred during the reporting period

7.0 Responsibilities

7.1 EHS&S Department

7.1.1 Ensure required documentation is complete, proper record keeping is maintained and readily accessible.

7.1.2 Interpret the language of the LDAR regulations.

7.1.3 Ensure that repaired DOR items are reported in a timely manner per the timeframe of the governing regulation(s).

7.1.4 Provide updated DOR list for each Area Superintendent for their review.

7.1.5 Ensure that the LDAR Contractor, Production Areas, and Maintenance Department understand the importance of DOR management and retesting during unit shutdowns lasting greater than 24 hours.

7.1.6 Initiate and schedule DOR re-monitoring when informed of repair attempts.

7.1.7 Ensure that LDAR Contractors are trained on Stepan DOR procedures.

7.1.8 Verify that all DOR data is collected and updated in the database.

7.2 LDAR Contractor

7.2.1 Remove DOR tags from components after directed to do so by the Stepan EHS&S Department.

7.2.2 Monitor DOR items per facility/regulatory guidelines

8.0 Training

8.1 None

9.0 Forms and Records

9.1 None

10.0 Appendices

10.1 None

11.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for Process Turnarounds and Outages

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to determine the Leak Detection and Repair (LDAR) rules that apply to the facility, the regulatory applicability of process streams affected by the rules and the determination of LDAR tasks and applicability parameters, which will define the compliance requirements of the program.

1.2 This standard applies to all components in VOC or HAP service.

2.0 Safety

2.1 Proper safety equipment required for process unit entry and when obtaining samples.

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

4.1 **In Volatile Organic Compound (VOC) Service** – The piece of equipment contains or contacts a process fluid that is at least 10 percent VOC by weight.

4.2 **In Organic Hazardous Air Pollutant (HAP) Service** – A piece of equipment either contains or contacts a fluid (liquid or gas) that is at least five percent by weight of total organic HAP's as determined according to the provisions of this subpart.

4.3 **Exempt Organic Compound** – The compounds listed in the following citation; 40 CFR 51.100(s)(1).

4.4 **True Vapor Pressure** – means the equilibrium partial pressure exerted by a petroleum liquid as determined in accordance with methods described in American Petroleum Institute Bulletin 2517, Evaporation Loss from External Floating-Roof Tanks, Second Edition, February 1980 (incorporated by reference—see §60.17).

4.5 **In Light Liquid (LL) Service** – that the piece of equipment contains a liquid that meets the conditions specified in §60.485(e).

4.6 **In Gas and Vapor (GV) Service** – The piece of equipment contains process fluid that is in the gaseous state at operating conditions.

4.7 **In Heavy Liquid (HL) Service** – The piece of equipment is not in gas/vapor service or in light liquid service.

4.8 **Volatile Organic Compound (VOC)** – Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate, which participates in atmospheric photochemical reactions, except those designated by EPA as having negligible photochemical reactivity.

4.9 **Hazardous Air Pollutant** – Any compound that is known to cause cancer and other serious health impacts.

4.10 **Safety Data Sheet (SDS)** – Informational data sheets used to provide comprehensive information about a substance or mixture for use in workplace chemical management. Also includes hazard and safety material related to the substance or mixture.

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 Ensure the applicability determination process is funded and stays on schedule.

5.1.2 Ensure key stakeholders are included in the regulatory and technical research and determination part of the project.

5.1.3 Ensure required applicability documentation is complete, proper record keeping is maintained and readily accessible.

5.1.4 Fully execute the results of the applicability determination process to ensure full compliance of LDAR requirements.

5.1.5 Make regulatory interpretation decisions from the language of the LDAR rules.

5.1.6 Work with Production Areas to obtain stream samples as needed.

5.1.7 Maintain current regulatory and field status of the ongoing LDAR program.

5.1.8 Ensure that notification of regulatory changes are reported to proper governing entities in the required timeframes.

5.1.9 Ensure the integrity of the LDAR field and database compliance are maintain in the day to day operation of the program.

5.1.10 Ensure that LDAR Technicians (LDAR Contractor) are trained to recognize potential applicability issues while performing scheduled LDAR monitoring.

5.1.11 Report potential applicability issues or questions to the EHS&S Department.

5.1.12 Ensure the integrity of the LDAR database compliance requirements and information is maintained.

5.1.13 Complete required database changes.

5.2 LDAR Contractor

5.2.1 Report potential issues or questions pertaining to applicability to the EHS&S Department.

5.2.2 Maintain training and knowledge of LDAR applicability requirements needed to recognize compliance issues or problems while performing routine technician task.

6.0 Procedures

6.1 Facility Definition and Applicability Determination

6.1.1 Most LDAR rules list the applicable industry sectors. Use the Facility(s) NAICS code(s) to zero in on rules that apply to your facility type.

6.1.2 If the facility is a major source of HAPs (Potential to emit 10 tons of a single HAP or 25 tons of two or more HAPs) then you must review Part 63 rules for applicability and record applicable subparts.

6.1.3 Determine if the facility has process areas or process units that are newly constructed, reconstructed, or modified. These attributes typically drive 40 CFR Part 60 applicability.

6.1.4 Determine if the facility is currently affected by an agreement/settlement or order requiring enhanced LDAR or non-standard requirements such as an EPA consent decree.

6.1.5 If the facility has an active Title V permit it is an excellent source of data for applicability. ("Don't re-invent the wheel") However, if the facility has an active Title V permit deviation report, then the necessary LDAR management systems should exist for the facility for proper reporting.

6.1.6 Generally, if the facility has the potential to emit 20 tons of UNCONTROLLED fugitive emission then an LDAR program will be necessary. Greater than 40 tons and an LDAR program is required. If >20 or 40 tons and no LDAR program, contact your permit writer and question this circumstance.

6.1.7 Generally, if the facility is within a mile of a business (other than Parent company) or resident an LDAR program will be required. If no LDAR program is required, contact your permit writer and question this circumstance.

6.1.8 If facility(s) maintain a flare or other emission control device, this equipment determines if EXEMPTIONS from inspections will be allowed for your program, and if an inspection program for CLOSED VENT SYSTEMS will be required.

6.1.9 Storage vessels may be included as part of the "Affected Facility" definition and applicable to the standard, or may be affected by inspection requirements specific to loading facilities. Verify if the loading facility has a separate NAICS. This may also require additional review of 40 CFR Part 60 and 63 for LDAR requirements for this facility type.

6.1.10 Determine if facility(s) has OPERATING, CONSTRUCTION, or STANDARD permit with special conditions for fugitive emission requirements. If LDAR applies then these standards may be more stringent or may apply in addition to other requirements. Be certain to research, record and incorporate any requirements into the LDAR program.

6.1.11 Determine if facility(s) are located in OZONE non-attainment zone and if so, then a State Implemented Program (SIP) may apply for LDAR. These programs often are more stringent than federal requirements and/or must be complied with in addition to the federal requirements.

6.1.12 Once you have identified key facility attributes which "trigger" LDAR applicability, then perform a review of regulations to determine if one or more facility attributes are relevant.

6.1.13 Once you have defined your affected facilities and applicable LDAR regulations perform process stream speciation to determine heavy liquid, light liquid and gas vapor (See Section B "Stream Applicability Determination" below).

6.2 Stream Applicability Determination

6.2.1 Obtain the stream composition either from the facility design process or sampling and speciation of the compound.

6.2.2 Vapor pressure, can be used to determine applicability, can be obtained from the compound SDS.

6.2.3 The context in which the material is in on the P&IDs can also give information if the material will be a vapor or not and information about its boiling point.

6.3 Applicability Determination Using Composition

6.3.1 Calculate the percent VOC and HAP composition and put into service as applicable. If the stream is 10 percent VOC or 5 percent HAP then it has the potential to be a light liquid.

6.3.2 If possible, use simulation software to determine the vapor pressure at 20 degrees Celsius. Using the appropriate equation of state is very important. Peng Robinson for nonpolar system and Saove Redlich Kwong for polar systems.

8.3.2.1 If the material is organic and the vapor pressure is above 0.3 kPa then it is a light liquid.

8.3.2.2 If the material is only partially organic multiply the organic mole fractions in the total pressure and add them together to estimate the vapor pressure of the organic components. If this is above 0.3 kPa, it is a light liquid.

6.3.3 Estimate the vapor pressure using the following methods in order to classify a stream either light liquid or heavy liquid:

8.3.3.1 Using Raoult's Law calculate the mole fraction of each compound and then multiply it by each compounds vapor pressure, summing the result to get the vapor pressure of the mixture. If there are a lot of nonorganic compounds in the mixture, only sum the organic compound to determine the vapor pressure of the organic components. Note the following:

a. This method to estimate the pressure will always yield an overestimate; therefore, the potential for a compliance issue is low.

b. Once the vapor pressure is calculated it can be used to determine if the material is a vapor or a liquid. If the pressure in the system is higher than the vapor pressure, then it is a liquid. Otherwise, it is a vapor or a mixed fluid.

c. If there are non-organic components, add up the partial pressures of only the organic components. If they are above 0.3 kPa, then it is a light liquid.

8.3.3.2 If a component is likely to be excluded from the inventory of a facility, then check the organics content of the stream. If it is under 20 percent by weight organics it can be considered exempt.

8.3.3.3 If 20% of the organic compound(s) have a vapor pressure greater than 0.3 kPa, it is considered a light liquid.

8.3.4 Information derived from SDS. (Note: When dealing with chemical additives this can be the only information one can obtain since many of the chemicals and compositions are proprietary)

8.3.4.1 If the vapor pressure at 20 degrees is less than 0.3 kPa, the material is a heavy liquid.

8.3.4.2 If the vapor pressure is measured at a higher temperature and is still less than 0.3 kPa, it is also considered to be heavy.

8.3.5 When a material is in a separation process it is at its boiling point and this can be used to help determine its regulatory applicability.

8.3.5.1 When the pressure is at atmospheric pressure, the temperature is the same as the boiling point can directly be used to determine its applicability.

8.3.5.2 When the temperature is very high and the pressure is above atmospheric pressure, it is likely heavy but this is a judgment call and should be made by an experienced person.

8.3.6 Overall the steps to determine if the stream will be regulated are as follows:

8.3.6.1 Calculate the VOC and HAP content. If the VOC content is above 10 percent by mass and the HAP content is above 5 percent by mass, it has the potential to be a light liquid.

8.3.6.2 Determine the vapor pressure at 20 degrees Celsius. If the vapor pressure of the organic compounds is above 0.3 kPa, then it is a light liquid.

8.4 LDAR Program Development

8.4.3 Review applicable LDAR regulations and define the fugitive emission control process (e.g., Method 21 inspection or emission control equipment) and other classification of affected equipment.

8.4.4 Review applicable LDAR regulations and define inspection intervals for each equipment type (e.g., valves, connectors, pumps, etc.)

8.4.5 Review applicable LDAR regulations and define leak definitions and repair requirements for each equipment type.

8.4.6 Review applicable LDAR regulations and identify required records that must be maintained, which often influences LDAR database management.

8.4.7 Review applicable LDAR regulations and identify elements in required periodic report of each regulation.

8.4.8 Using the Applicability Parameters that define the Affected Facility (e.g., Process Unit) to determine the best grouping of fugitive equipment to comply with the applicable standard. This grouping ultimately affects: (1) Periodic Reporting, (2) Capital Expenditure calculations, (3) Leak % calculations, and (4) Difficult to Monitor calculations.

8.4.9 Establish each affected facility as defined in the regulation to determine the best grouping scheme for database set up. This summary of affected facilities and applicable LDAR program per facility is often used to transfer information in a concise manner to all LDAR program stakeholders, track and manage applicability changes and compliance status, and answer questions during LDAR audits.

8.4.10 Ensure that ancillary tanks and ancillary loading racks, which may be associated with the regulatory definition of "affected facility" or "affected source" (i.e., the affected source group name) are classified correctly under their regulatory assignment.

8.5 Once program attributes are developed and defined, the facility should have clear documentation of the LDAR rules affecting the facility, a list of LDAR tasks to be completed, clear documentation of the affected source boundaries with applicable LDAR rules and documentation of fugitive emission estimate reporting parameters and boundaries

7.0 Training

7.1 None

8.0 Forms and Records

8.1 None

9.0 Appendices

9.1 None

10.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure to Report and Track LDAR Errors

1.0 Purpose and Scope

1.1 The purpose of this procedure is to properly report, investigate, and document LDAR errors discovered during fugitive emission monitoring or LDAR database QA/QC.

1.2 This standard applies to all non-safety related variances to internal site procedures and policies, or compliance with agency regulations occurring in the course of and/or arising from LDAR work activities.

2.0 Safety

2.1 Proper PPE required for any field related investigations.

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

- Environmental Compliance Investigation Report – A standardized form used to record the results of variance investigations resulting in an environmental standard variance
- Environmental Standard Variance – Non-compliance with agency regulations that must be reported as a potential deviation to all governing agencies. Environmental Standard Variances may or may not have monetary impacts
- Final Corrective Action – Change to policy or procedure after a variance investigation designed to prevent recurrence
- Immediate Corrective Action – Action taken upon discovery of the variance to both mitigate the issue and prevent further immediate non-compliance
- Root Cause – The fundamental, underlying reason(s) for the occurrence of a variance, which if eliminated, would prevent recurrence. The source or origin of an event. A Root Cause explains "why" a variance occurred. A Root Cause is not always readily apparent or easily observed, and is determined only through the use of an investigative process.
- Variance – Any non-safety related deviation to site procedures or agency regulations. Variances may or may not be possible reportable deviations.
- Variance Investigation – The process of investigating, evaluating and analyzing a variance to determine "Root Causes" of the variance so that appropriate actions can be taken to minimize the possibility of recurrence.
- Variance Report – A standardized form used to record the facts, Root Causes and Corrective Actions associated with a variance

5.0 Responsibilities

5.1 Maintenance Specialist – EHS&S

5.1.1 Completes the variance investigation process by completing or delegating all tasks. Maintains the variance tracking log

6.0 Requirements

6.1 It is everyone's responsibility to report all possible variances as defined in this Document. Variances discovered by facility staff should be reported to the EHS&S Department immediately and should include as much detail about the variance as possible but at a minimum must include the following:

- Area or Unit
- Associated Equipment ID or LDAR tag (if applicable)
- Discovery date of the variance
- All parties notified up to that point
- Initial corrective action taken, if any

6.2 Using the information provided, the EHS&S Department will conduct an investigation to determine root cause and final corrective actions to be taken

7.0 Investigation Process

7.1 The Maintenance Specialist – EHS&S will complete or assign completion of the variance report within 48 hours of notifications.

7.2 Using the variance report (See Attachment A), the EHS&S Department will complete an assessment of the variance to determine policy and regulatory impact including monetary liability, if applicable.

7.3 If the investigation results in an environmental standard variance the Environmental Investigation Report form (See Attachment B) will be completed and the findings reported to the regulatory agency in either semiannual reporting or Title V deviation reports.

7.4 If the investigation determines violations of internal policies but no regulatory impact, findings will be reported to the EHS&S Department (This would include Environmental, Production, and Maintenance.) along with corrective actions necessary to prevent recurrence.

7.5 At the conclusion of all variance incidents a program-wide investigation will be conducted for potential gaps. Findings of this internal investigation will be reported to the LDAR management team and subsequent policy suggestions will be reported to the affected parties

8.0 Investigative Tools

8.1 To assist with the investigation process, the following is a list of forms and resources that a minimum is available to all investigators of a variance incident:

1. Site database
2. Variance Report
3. Environmental Compliance Investigation Report Form

9.0 Training

9.1 All LDAR contractor employees shall receive training on this document and how to report a variance. Employees continue to receive periodic reviews and training on reporting of incidents on a monthly basis. LDAR employees are trained to report all incidents.

10.0 Forms and Records

10.1 None

11.0 Appendices

11.1 See Attachment 21A – LDAR Variance Tracking Form & Error Tracking

11.2 See Attachment 21B – LDAR Investigation Report

12.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Attachment A
Environmental Compliance Observation Log
Field Worksheet

1/30/2020

Type the Month Name in Caps.				If no tag in field, what equipment number is the observed variance on or what LDAR tag is it by?	List the employee or client initiating the variance.	Explain the details of the suspected variance	Explain the details of the immediate corrective action taken	What date was the variance discovered?	What date was the variance reported to R&T?	Who will be conducting the investigation?	What date was the variance report returned to investigating party?
Month	Year	Time	Observation Number	Associated Equipment ID or LDAR Tag #	Initiating Party	Explanation of Variance	Immediate Corrective Action	Date Discovered	Date Reported	Assigned Investigator	Report Returned
			10000								
			10001								
			10002								
			10003								
			10004								
			10005								
			10006								
			10007								
			10008								
			10009								
			10010								
			10011								
			16012								
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WN-SP-9.54B-19A.2

VARIANCE REPORT

VARIANCE TRACKING NO.:

FACILITY: Stepan Company
DATE REPORTED:
REPORTER:
INVESTIGATING EMPLOYEE:

SECTION 1 - VARIANCE CLASSIFICATION

Instructions: Place a ✓ next to the item(s) that best classifies the topic of the variance.

GENERAL	SERVICE LINE	PROCEDURE
___ Environmental Issue ___ Other (Specify):	___ LDAR ___ Mechanical ___ S&I ___ GHG	___ Site Procedures ___ Compliance with Agency Regulations

SECTION 2 - VARIANCE DESCRIPTION

COMPLETED BY REPORTER: Describe in detail the variance below. Include data sources, times, dates, witness names, and how the variance was detected. Include your recommendations to resolve.

SECTION 3 - IMMEDIATE CORRECTIVE ACTION(S) AND RECOMMENDATIONS

COMPLETED BY REPORTER: Describe the actions you took immediately to resolve the issue. If none, indicate this and explain why. Also note your recommendations to resolve/prevent.

SECTION 4 - REPORTER SUBMITTAL

Sign-off on the section below. Forward to the [TITLE OF RESPONSIBLE EMPLOYEE]. Retain a copy for your files.

Reporter's Signature *Date & Time Submitted* *[TITLE OF RESPONSIBLE EMPLOYEE]'s Date & Time Received/Reviewed*

SECTION 5 - [TITLE OF RESPONSIBLE EMPLOYEE] REVIEW

COMPLETED BY [TITLE OF RESPONSIBLE EMPLOYEE]: Answer the following questions based on the information above and interview of the Reporter.

1.) Is the assessment by the Reporter of "General", "Service Line", and "Procedure" variance correct?	
2.) To your knowledge, does the variance affect compliance with any EPA regulations?	
3.) What specific procedure/policy number or EPA standard (by citation) do you think is associated with the variance?	
4.) Who was involved with the work performed that varied from the procedure?	

Identify the **ROOT CAUSE** of the variance, key evidence items you used to confirm your assessment, and impact on the project in the memo box below.

If this is a **SITE** or **PROCEDURE** variance, note your recommendations and/or steps taken to **PREVENT** this variance from occuring in the future.

SECTION 6 - [TITLE OF RESPONSIBLE EMPLOYEE] SUBMITTAL

Sign-off on the section below. Forward to the [TITLE OF RESPONSIBLE EMPLOYEE]. Retain a copy for your files.

[TITLE OF RESPONSIBLE EMPLOYEE]'s Signat Date & Time Submitted *[TITLE OF RESPONSIBLE EMPLOYEE] 's Date & Time Received/Reviewed*

SECTION 7 - CSM REVIEW

ENVIRONMENTAL STANDARD VARIANCE - Discuss why you think this IS or IS NOT a variance of an Environmental Standard.

FINAL CORRECTIVE ACTION - Explain final Corrective Action for this variance and preventative measures.

Assessment Result: Reported Variance ___ **IS** *OR* ___ **IS NOT** a potential deviation of

Note: If reported Variance IS a potential Deviation, Section 7 MUST be completed and a copy of this report forwarded to Dexter's CEO & CLIENT.

CLOSURE

If a Variance did occur, what was the date that the "FINAL CORRECTIVE ACTION" was reviewed with the [TITLE OF RESPONSIBLE EMPLOYEE], Reporter, and Person(s) involved with work affected by or causing the variance?	
If the Variance is a potential deviation, what was the date the Variance Report was reviewed with [TITLE OF RESPONSIBLE EMPLYEE]? ***(Must signoff at bottom of form.)***	

[TITLE OF RESPONSIBLE EMPLYEE] Signature & Date

WN-SP-9.54-19B.1

METHOD 21 ANOMALY FIELD INVESTIGATION FORM

DATE OF RESEARCH: _____

DATE(S) OF ANOMALY: _____

FORM No.: LDR-02.01.09

TECHNICIAN: _____

Revision: 00

AUDITED BY: _____

Item No.	Audit Item	Result
1	What was the criteria that triggered this audit?	
2	Which Process Units are associated with the scope of this audit?	
3	Attach a list of the anomalous data that includes total traverse time, time between monitoring events, component category, component size, and tag number.	[ ] Complete [ ] Incomplete (Explain)
4	What is the root cause of the anomalies? (e.g. Monitoring too fast, wrong component size, missed potential leak interfaces, etc.)	
5	Explain in detail the corrective action needed. Do components need to be re-monitored and Method 21 properly applied? Should size correction be performed? Does the technician require retraining?	
6	If re-monitoring components is required, will the work take place prior to the end of the proper monitoring period? (Mark "Na" if not applicable.)	
7	Does the audit warrant comparative monitoring? If yes, detail the results. (e.g. leak percent comparison, how big was the comparative monitoring sample population.) Mark "Na" if Comparative Monitoring not performed.	
8	List any other notes or suggestions based on the audit performed.	

Environmental Engineer Signature: _____ **Date/Time:** _____

Environmental Manager Signature: _____ **Date/Time:** _____

LDAR INVESTIGATION REPORT

AREA: _____

PROCESS UNIT: _____

INVESTIGATION DATE(S): _____

DATE(S) OF ANOMALY: _____

FORM No.: LDR-02.01.09

ANOMALY TYPE: _____

Revision: 01

INVESTIGATOR: _____

Section I. CAUSE/INCIDENT SUMMARY

Provide a summary of the compliance incident or cause for concern leading to the investigation. Be specific concerning dates of discovery, affected period, personnel involved or witnesses, and times of key events.

Section II. INVESTIGATION

Define the investigation team and methodology, and basis for methodology. Then summarize the facts detected in the investigation, and detail any associated data sources necessary to complete the investigation.

Section III. CONCLUSION

Summarize the investigation conclusion in regard to the anomaly type initially identified, or subsequently identified during the investigation.

Section IV. CORRECTIVE ACTION/CONTINUOUS IMPROVEMENT

Provide mandatory and recommended corrective actions to prevent or resolve this incicent. Additional, propose or review continuous improvement processes necessary to prevent future occurances at the Company. Ensure responsible parties are identified along with deadlines and method to verify proper outcome.

Mandatory Corrective Actions:

Recommended Corrective Actions:

Continuous Improvement Process Recommendations:

Auditor Signature: _____ **Date/Time:** _____

Project Manager Signature: _____ **Date/Time:** _____

Engineering Standards for Open Ended Line Control and Valve Design

1.0 Purpose and Scope

1.1 Management's regulatory position regarding design requirements for open ended line piping controls to minimize LDAR compliance risk and exposure while maintaining operational bleed and drain valve functionality.

1.2 This standard applies to all components in VOC or HAP service that are on the DOR list.

2.0 Engineering Statement/Protocol:

Stepan understands the importance of managing pipelines and valves from being left open-ended. Managing OELs is the sum of the work of the company employees, contractors and affiliates, who design, work on, routinely use, perform maintenance and/or is a part of the LDAR program for process equipment in VOC/Chemical service.

The best-engineered solution for minimizing exposure to open-ended lines is to separate the function or purpose of the pipelines and valves that require a blind flange, plug or cap into three categories.

Maintenance Use Category:

If the intent or purpose of a valve or line requiring a blind flange, plug or cap is to only be removed during maintenance and turnaround activities, then designing that vent, bleed or drain location with a single valve and a blind flange, plug or cap is recommended (See Diagram A.) This will minimize potential leak points and LDAR program components.

Operational Use Category:

If the intent or purpose of a valve or line requiring a blind flange, plug or cap is to be used by operations personnel as a routine or non-routine drain, vent or bleed to manage process operations, then designing that vent, bleed or drain with two double block valves is recommended (See Diagram B.) This design will allow the system to remain in compliance by having both valves closed and the end open when not in use as discussed in the LDAR regulatory language of §60.482.6 enclosed.

Location examples:

- Vessel drain lines
- Pump casing drains
- Control loop bleeds and drains
- Transfer piping manifold bleeds and drains

Process Exemptions Category:

Open-ended valves or lines in an emergency shutdown system which are designed to open automatically in the event of a process upset are exempt from the requirements or open-ended valves or lines containing materials which would autocatalytically polymerize or would present an explosion, serious overpressure, or other safety hazard if capped or equipped with a double block and bleed system are exempt from the requirements.

Specific Regulatory Language for OELs

TCEQ 28 VHP Section E

Each open-ended valve or line shall be equipped with an appropriately sized cap, blind flange, plug, or a second valve to seal the line. Except during sampling, both valves shall be closed. If the isolation of equipment for hot work or the removal of a component for repair or replacement results in an open ended line or valve, it is exempt from the requirement to install a cap, blind flange, plug, or second valve for 72 hours. If the repair or replacement is not completed within 72 hours, the permit holder must complete either of the following actions within that time period;

(1) a cap, blind flange, plug, or second valve must be installed on the line or valve;

or

(2) the open-ended valve or line shall be monitored once for leaks above background for a plant or unit turnaround lasting up to 45 days with an approved gas analyzer and the results recorded. For all other situations, the open-ended valve or line shall be monitored once within the 72-hour period following the creation of the open ended line and monthly thereafter with an approved gas analyzer and the results recorded. For turnarounds and all other situations, leaks are indicated by readings of 500 ppmv and must be repaired within 24 hours or a cap, blind flange, plug, or second valve must be installed on the line or valve.

3.0 Training

3.1 None

4.0 Forms and Records

4.1 None

5.0 Appendices

5.1 See Attachment 20A – Diagram A – Operational Use Category

5.2 See Attachment 20B – Diagram B – Operational Use Category

6.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Policy for Open Ended Line Management

1.0 Purpose and Scope

Management's position regarding open ended line ownership and control, standard of control, and consequences for failure to follow policy.

2.0 Policy Statement

Stepan understands the importance of managing and repairing open-ended lines in order to maintain the safety and health of our employees and our neighbors. Managing OELs is the sum of the work of the officers, employees, contractors, and affiliates who work on, encounter process equipment in VOC/Chemical service, and is a part of the LDAR program.

Officers, employees, contractors, and affiliates will contribute to the management and repair of OELs by adhering to the following standards:

- Have read and understands the OEL regulatory requirements (see page 2)
- OELs observed in the field shall be documented and sent to the Environmental Department as soon as possible
- OELs observed in the field shall be documented and repaired as soon as possible

I, _____ (print name) have read and understand Stepan's OEL Management Policy. On the date of signature, I am acknowledging my acceptance to abide by this OEL Management Policy and have no knowledge of prior non-adherence to this policy, by either me or other Stepan personnel.

_____ _____

Signature Date of Signature

Specific Regulatory Language for OELs

TCEQ 28 VHP

New and reworked piping connections shall be welded or flanged. Screwed connections are permissible only on piping smaller than two-inch diameter. Gas or hydraulic testing of the new and reworked piping connections at no less than operating pressure shall be performed prior to returning the components to service or they shall be monitored for leaks using an approved gas analyzer within 15 days of the components being returned to service. Adjustments shall be made as necessary to obtain leak-free performance. Connectors shall be inspected by visual, audible, and/or olfactory means at least weekly by operating personnel walk-through.

Each open-ended valve or line shall be equipped with an appropriately sized cap, blind flange, plug, or a second valve to seal the line. Except during sampling, both valves shall be closed. If the isolation of equipment for hot work or the removal of a component for repair or replacement results in an open-ended line or valve, it is exempt from the requirement to install a cap, blind flange, plug, or second valve for 72 hours. If the repair or replacement is not completed within 72 hours, the permit holder must complete either of the following actions within that time period;

(1) a cap, blind flange, plug, or second valve must be installed on the line or valve;

or

(2) the open-ended valve or line shall be monitored once for leaks above background for a plant or unit turnaround lasting up to 45 days with an approved gas analyzer and the results recorded. For all other situations, the open-ended valve or line shall be monitored once within the 72-hour period following the creation of the open-ended line and monthly thereafter with an approved gas analyzer and the results recorded. For turnarounds and all other situations, leaks are indicated by readings of 500 ppmv and must be repaired within 24 hours or a cap, blind flange, plug, or second valve must be installed on the line or valve.

3.0 Training

3.1 None

4.0 Forms and Records

4.1 None

5.0 Appendices

5.1 None

6.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Data QA/QC

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines for LDAR data QA/QC.

1.2 This standard applies to all Production Areas and equipment regulated under LDAR.

2.0 Safety

2.1 None

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

- QA/QC – Quality assurance and quality control process to verify that LDAR data was collected, documented and reported per governing regulations.
- Certificate of Analysis (COA) – A document that represents the certified concentration of a component of a mixture.
- Calibration Precision – The degree of agreement between measurements of the same known value, expressed as the relative percentage of the average differences between the meter readings and the known concentration.
- Response Factor – The ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation. This is traditionally set to "1".
- Response Time – The time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90% of the corresponding final value is reached as displayed on the instrument readout meter.
- Management of Change (MOC) – The process by which changes to equipment in VOC or HAP service are approved and communicated to all affected departments and parties
- Difficult to Monitor (DTM) – Component monitoring would require elevating the monitoring personnel more than two meters above a support surface.
- Unsafe to Monitor (UTM) – Component monitoring would expose monitoring personnel to imminent or potential danger.
- No Detectable Emissions (NDE) – No escape of HAP from a device or system to the atmosphere as determined by (1) instrument monitoring in accordance with Method 21, 40 CFR part 60, appendix A; (2) the absence of visible openings or defects in the device or system, such as rips, tears, or gaps.

- Exempt – Components that are exempt from regularly scheduled LDAR monitoring in accordance with the procedures outlined in Method 21
- Light Liquid (LL) Service – The piece of equipment contains a liquid that meets the conditions specified in 40 CFR 60.485(e)
- Gas/Vapor (GV) Service – The piece of equipment contains process fluid that is in the gaseous state at operating conditions
- Heavy Liquid (HL) Service – The piece of equipment is not in gas/vapor or light liquid service
- DOR – Delay of Repair. Lawfully postponing a component leak repair when:
- Master Equipment List (MEL) – A complete list of identification numbers for each piece of equipment in VOC or HAP service; the list should contain location descriptions, component types, sizes, NDE/CVS classifications, exempt reasons, chemical states, and any other information required by the governing regulation or Environmental Department
- Replace in Kind (RIK) – A valve or sealing system that is replaced and put into service for any reason other than to replace a leaking pump or valve
    - a unit shutdown must be performed for repair
    - the component has been isolated from VOC/HAP service
    - the seal will be replaced within six months of the initial leak (applies to pumps only)

- Master Equipment List (MEL) – A complete list of identification numbers for each piece of equipment in VOC or HAP service; the list should contain location descriptions, component types, sizes, NDE/CVS classifications, exempt reasons, chemical states, and any other information required by the governing regulation or Environmental Department

- Replace in Kind (RIK) – A valve or sealing system that is replaced and put into service for any reason other than to replace a leaking pump or valve

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 Ensure required documentation is complete, proper recordkeeping is maintained and readily accessible.

5.1.2 Interpret the language of the LDAR regulations.

5.1.3 Ensure that required reports are submitted on time to the EPA Administrator and/or State Agency.

5.1.4 Ensure that the EHS&S Department understands the importance of field verification of discrepancies that arise from all QAQC processes.

5.1.5 Ensure that the EHS&S Department understands the importance of daily monitoring and calibration QAQC.

5.1.6 Communicate all MOC items to the EHS&S Department for field verification and entry into the LDAR Database.

6.0 Guidelines for LDAR Inspection Data QA/QC:

6.1 At the end of each monitoring shift the following should be verified for all Method 21 and visual monitoring completed electronically or on paper:

6.1.1 An accurate time/date stamp for each monitoring event

6.1.2 The monitoring value (Method 21 only)

6.1.3 Correct traverse/monitoring time based on component type and size

6.1.4 Pass/fail value (Method 21 and Visual events)

6.1.5 Technician identification

6.1.6 Monitoring equipment identification

7.0 LDAR Calibrations Data QA/QC:

7.1 At the start of each monitoring shift, each instrument being used for Method 21 monitoring should be calibrated

7.2 At the start of each monitoring shift, the following should be verified for each daily instrument calibration:

7.2.1 Verify that calibration gas cylinders used have not expired

7.2.2 Verify that each instrument used was calibrated and passed per 40 CFR 60 Appendix A, Method 21

7.2.3 Verify that the instrument used has been certified within the last 3-month period per 40 CFR 60 Appendix A, Method 21

7.2.4 Verify that each instrument used received a calibration drift assessment after the initial calibration

8.0 Verify that all daily calibrations are accurate and meet the requirements of 40 CFR 60 appendix B, Method 21 using the ML-LDR-QA.006 COA/ Instrument Certification/Daily Instrument Calibration Checklist

9.0 LDAR MOC QA/QC (Procedure for Component Change Management (MOC))

9.1 On a timeframe outlined by the EHS&S Department but not less than semi-annually and following tagging retagging events and unit turnarounds/outages, all MOC items updated in the LDAR database should be verified for the following:

9.1.1 Added components requiring Method 21 monitoring should receive initial monitoring as required by the governing regulation.

9.1.2 Added components should be identified by the corresponding site MOC number

9.1.3 Permanently removed from service components should be identified by the corresponding site MOC number

9.1.4 Verify that notification was received for each RIK installed and the component has received initial monitoring as required by the applicable regulation.

10.0 LDAR Inventory QA/QC (LDAR Database QA Checklist)

10.1 On a timeframe outlined by the EHS&S Department but not less than semi-annually and following tagging/retagging events, the following items should be verified in the site LDAR database or MEL per the LDAR Database QA Checklist.

10.1.1 Equipment in each process unit has been assigned the correct regulation

10.1.2 Equipment sizes

10.1.3 Equipment types assigned correct monitoring frequencies, paying close attention to the following:

a. DTM

b. UTM

c. NDE

d. Exempt

10.1.4 Equipment state (LL/GV/HV)

10.1.5 Process Unit DTM percent for LL/GV valves, where applicable

11.0 LDAR Periodic Report (See Procedure for LDAR Periodic Reporting)

11.1 Periodic reports based on the timeframe set forth in the governing regulation should be submitted to the EPA Administrator and/or State Agency beginning six months after the initial startup date

11.2 Initial periodic reports should be QA'd against the facility MEL and should contain, at a minimum:

11.3 Process unit identification

11.3.1 Number of pumps, valves, compressors, and connectors (if applicable) separated by component type

11.4 Subsequent periodic reports should be verified against monthly monitoring reconciliation reports (Report in database) to ensure proper leaker totals, DOR items and changes are reported and should include, at a minimum:

11.4.1 Process unit identification

11.4.2 Number of leaks found each month for pumps, valves, compressors, and connectors (if applicable) separated by component type

11.4.3 Number of leaks not repaired each month for pumps, valves, compressors, and connectors (if applicable) separated by component type

11.4.4 Facts explaining each DOR component

11.4.5 Dates of process unit shutdowns/turnarounds/outages lasting greater than 24 hours

11.4.6 Changes to items reported since the previous periodic report (See LDAR MOC QAQC above for verification of these items)

12.0 Training

12.1 None

13.0 Records

13.1 LDAR Database QA Checklist (Attachment A) will be maintained in the EHS&S Files for up to one year. On an annual basis, the EHS&S Department will review filed checklists.

13.2 COA/Instrument Certification/Daily Instrument Calibration Checklist (Attachment B) will be maintained in the EHS&D Files for up to one year. On an annual basis, the EHS&S Department will review filed checklists

14.0 Auditing:

14.1 LDAR Database QA Checklist and COA/Instrument Certification/Daily Instrument calibration Checklist shall be completed semi-annually

14.1.1 January 1st to June 30th

14.1.2 July 1st to December 31st

15.0 Appendices

None

16.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Inspection Reconciliation

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide steps to reconcile LDAR inspections conducted versus inspections due, and any changes that affect compliance to ensure component accountability.

1.2 This standard applies to all components in LDAR service.

2.0 Safety

2.1 None

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

- DOR – Delay of Repair – Lawfully postponing a component leak repair when:
  - a unit shutdown must be performed for repair
  - the component has been isolated from VOC/HAP service
  - the seal will be replaced within six months of the initial leak (applies to pumps only)
- DOR List – A list of components awaiting shutdown for repair
- TOS – Temporarily out of Service – Equipment normally in VOC/HAP service that temporarily does not have process material in the lines for a limited period of time. This equipment does not have to be included in regular monitoring.
- RFS – Removed from Service – Equipment previously in VOC/HAP service that has been permanently removed from VOC/HAP service or completely demolished and removed from the facility.
- Difficult to Monitor (DTM) – Component monitoring would require elevating the monitoring personnel more than two meters above a support surface.
- Unsafe to Monitor (UTM) – Component monitoring would expose monitoring personnel to imminent or potential danger.
- Added – Equipment newly placed in VOC/HAP service
- Changed – VOC/HAP equipment changes that affect component count totals
- Turnaround/Outage – Work practice or operational procedure that stops production from a process unit or part of a process unit during which it is technically feasible to clear process material from a process unit consistent with safety constrains and during which repairs can be accomplished. The following are not considered a turnaround or outage
  - An unscheduled work practice or operational procedure that stops production from a process unit or part of a process unit for less than 24 hours

- An unscheduled work practice or operational procedure that would stop production from a process unit or part of a process unit for a shorter period of time than would be required to clear a process unit of materials and start up the unit and would result in greater emissions than delay of repair of leaking components until the next scheduled process unit shutdown
- The use of spare equipment and technically feasible bypassing of equipment without stopping production

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 Interpret the language of the LDAR regulations

5.1.2 Review Delay of Repair Checklist for additions or DOR maintenance forms for removal of delay of repair items

5.1.3 Ensure required documentation is maintained for the specified period of time.

5.1.4 Provide delay of repair maintenance forms to the LDAR Coordinator

5.2 LDAR Contractor

5.2.1 Remove Delay of Repair tags from components after directed to do so by Stepan Environmental Department.

5.2.2 Monitor Delay of Repair items per facility/regulatory guidelines

6.0 Predicting Inspections Schedule (Attachment B - LDAR Scheduled Inspection QA Form):

6.1 Section 1 – Predicted Inspection Schedule

6.1.1 Prior to the start of the month, insert totals for columns A thru K for each equipment class and program option

6.1.2 Totals will predict the component count for monitoring due by equipment type for the month

6.1.3 Note that depending on when this section is completed totals may or may not include component monitoring changes (See Procedure for Component Change Management)

6.2 Section 2 – Non-normal to inspect review

6.2.1 This section can be used to make a work plan for Method 21 monitoring requiring background to be recorded

6.2.2 This section can be used to make a work plan with the Operations Department so that DTM or UTM monitoring can be completed

6.3 Section 3 – Predicted to Actual Comparison

6.3.1 Use this section to compare the predicted count with the actual inspection count from the database review

7.3.2 Identify, research and explain differences in the text box provided

7.0 Completed Inspection Monitoring Summary (See Attachment A - LDAR Program Monthly Monitoring Summary):

7.1 Report Headers:

- Complete the site and program identification information
- Complete processor information

7.2 LDAR Program Monthly Monitoring Summary:

> NOTE: Each process unit will be summarized on the Maintenance Specialist – EHS&S, on a separate tab of Attachment A - LDAR Program Monthly Monitoring Summary and Attachment B - LDAR Schedule Inspection QA Form.

7.2.1 Component Count Balance

a. Identify component categories and frequencies included in that specific unit in column B

b. Complete the beginning totals for each component category/frequency at the start of the monitoring month

c. For the monitoring month, complete totals for added (+), removed from service (-), and changed (+ or -) equipment (See Procedure for Component Change Management, for verification procedure) (Note that the Ending Totals will calculate automatically)

7.2.2 Monitoring Balance

a. Big Month Scheduled Events will be used for components scheduled for monitoring that month, i.e. monthly pump seal inspections or annual DTM inspections scheduled for the month

b. TOS Current (-) will be used to subtract the out of service equipment for scheduled inspection events (See Procedure for Component Change Management, for TOS verification process)

c. Off Month columns will be used for all monitoring that is not a regularly scheduled inspection event

1. TOS Return Initial/Second: equipment that has been purged and out of service during regularly scheduled monitoring and has been returned to VOC/HAP service during the monitoring period

2. Added Initial/Second: equipment added to VOC/HAP service during the monitoring period

3. Changed Initial/Second: equipment that has received a compliance change during the inspection month

4. PL First/Second: previously leaking equipment that requires follow-up monitoring in subsequent months

5. Previous DOR: equipment previously on the DOR list; this does not include equipment added to the DOR list during the current monitoring period

6. Monitor Other: equipment that has been monitored during the current monitoring period for reasons other than the previous reasons stated (Ex: AVO leaks)

7. Off Month TOS: equipment that was required to be monitored for the reasons previously stated but that were TOS during the inspection period

d. Total Monitored will calculate automatically

e. If equipment inspections are identified in the Scheduled Events column they are not required to be identified in the subsequent Off Month column

7.2.3 Leak Balance

a. Identify equipment leak totals found and repaired within the required regulatory timeframe or identified as a DOR item (See Procedures to Assess and Authorize Use of Delay of Repair Options)

b. Equipment leaks that were not repaired within the regulatory timeframe should be noted in the Comments and Explanations Box and a Variance Investigation completed (See Procedures to Report and Track LDAR Errors)

7.2.4 DOR Balance (See Procedure for Process Turnarounds & Outages)

a. If a process unit Turnaround or Outage occurred during the monitoring month, identify the start and end dates

b. Start DOR is the total of components on the DOR list at the start of the inspection period

c. New DOR is the total of components added to the DOR list during the inspection period

d. Repaired DOR is the total of components repaired and removed from the DOR list during the inspection period

e. End DOR is the balance of components on the DOR list at the end of the inspection period

7.2.5 Comments and Explanations Box

a. This section can be used to make special comments or track section circumstances that occurred during the monitoring month like monitoring equipment failure, monitoring that was not completed due to unforeseen unsafe conditions, variance occurrences during the inspection period

7.2.6 Abbreviations Key

a. This section should be updated to identify any abbreviations used in the completion of the summary report

8.0 Inspection Reconciliation (LDAR Program Monthly Monitoring Summary Form vs LDAR Scheduled Inspection QA Form)

8.1 Compare the Total Monitored for all units in Attachment A - LDAR Program Monthly Monitoring Summary Form to the predicted/actual totals of Attachment B - LDAR Scheduled Inspection QA Form

8.2 Identify, research, and explain the cause of differences by comparing Attachment B - LDAR Scheduled Inspection QA Form to the monitoring summaries in Attachment A - LDAR Program Monthly Monitoring Summary Form

8.3 If any possible variances are discovered during the reconciliation process, complete a variance investigation.

9.0 Training

9.1 None

10.0 Records

10.1 All inspection reconciliation forms listed in this general requirement shall be maintained in the EHS&S Files for up to one year. EHS&S Department shall review forms after one year

11.0 Appendices

11.1 See Attachment 23A - LDAR Program Monthly Monitoring Summary

11.2 See Attachment 23B - LDAR Scheduled Inspection QA Form

12.0 Revision History

Revision #	Description of Change
0	December 2019 Original

WN-SP- 9.54B-25A

Regulatory Program: ____________
Month: ____________
Emission Unit Unit: ____________

LDAR Specialist ____________
Date: ____________
Environmental Manager ____________
Date: ____________

Component Count Balance						Monitoring Balance														Leak Balance		
						Big Month		Off Month														
Comp. Cat & Freq:	Begin Total:	Added: (+)	Removed from Service: (-)	Changed: (+ / -)	Ending Total:	Scheduled Events:	TOS Current: (-)	TOS Return Initial Monthly:(+)	TOS Return 2nd Monthly:(+)	Added Initial Monthly: (+)	Added 2nd Monthly: (+)	Changed Initial Monthly: (+)	Changed 2nd Monthly: (+)	PL 1st Monthly: (+)	PL 2nd Monthly: (+)	Previous DOR: (+)	Monitor-Other: (+)	Off Month TOS Items: (-)	Total Monitored:	Total Leaks Found:	Total Leaks Repaird:	Total New DOR Items:
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total:	0			Total:	0													Total Monitored:	0			

DOR Balance	
Unit Turnaround Date: 00/00/0000	
Start DOR:	0
New DOR:	0
Repaired DOR:	0
End DOR:	0

Comments and Explanations Box

Abbreviation Key:

PL=Previous Month Leak-Repaired
M=Monthly Monitoring
Q=Quarterly Monitoring
Y=Yearly Monitoring
NR=Does Not Require Monitoring
TOS=Temporarily Out of Service
DOR=Delay of Repair

Date: 12/26/2019
Rev. 0
WN-SP-9.54B-25B

Report Date: _____
Inspection Period: _____
Reporter: _____
Revision No.: 0

Purpose: This process is a "checks and balances" system for inspection schedules. This form facilitates documentation of the LDAR Coordinators and Work Planners should use to "predict" the inspection workload for the month.

General Instructions: Start by populating the data in Section 1 below at least 5 business days prior to the end of the current month. The total represents the "predicted" inspections scheduled for the upcoming month, but does not account for details such as unprocessed removed from service / temporarily out of service, or other QC processes performed. It does, however, ensure the LDAR Coordinator and Work Planners understand the amount of work to be performed.

SECTION 1 - PREDICTED INSPECTION SCHEDULE

Instructions: Use reports and other information FROM THE LDAR DATABASE to populate the grid of data below. Due 5 business days prior to end of current period.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	TOTALS
	Count W/Monthly Interval	Count W/Qtrly Interval Due this Month	Count Semiannual Interval Due this Month	Count W/Yrly Interval Due this Month	Count of New Valves Added in Prev. Month NOT in A-D Counts	Count of Unique Valve Leaks from Prev. 1 Months NOT in A-D Counts (PL1)	Count of Unique Valve Leaks from Prev. 2 Months NOT in A-D Counts (PL2)	Count of Valve or Connector Leak from Prev. Month NOT in A-D Counts	Count of DOR Items NOT Included in A-D	Count of Return to Service TOS NOT in A-D counts & due this Month (Affected ONLY)	Count of Schedule Changed or Moved, and NOT in A-D counts & Due this Month	This represents the Total "Predicted" inspection count by Equipment Class for the Month.
APPLICABLE LDAR PROGRAMS	All	All	All	All	NSPS or NSPS Option	NSPS or NSPS Option	NSPS or NSPS Option	HON	All	All	All	All
EQUIP CLASS												
Agitator	0	0	0	0	0	0	0	0	0	0	0	0
Compressor	0	0	0	0	0	0	0	0	0	0	0	0
Connector	0	0	0	0	0	0	0	0	0	0	0	0
CVS	0	0	0	0	0	0	0	0	0	0	0	0
Open Ended Line	0	0	0	0	0	0	0	0	0	0	0	0
PRV	0	0	0	0	0	0	0	0	0	0	0	0
Pump	0	0	0	0	0	0	0	0	0	0	0	0
Valve	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0	0	0	0	0

Predicted Total: 0 This total represents the Method 21 inspections due for the month. Use the predicted total to plan resources.

SECTION 2 - NON-NORMAL TO INSPECT REVIEW

Instructions: Answer these questions at least 5 business days prior to the end of the current month.

	Response
1. Does this month's inspection schedule require inspection of Difficult to Monitor (DTM) Components?	--
1.a. If "Yes", are aerial lifts required?	--
1.b. If "1.a." is "Yes", has aerial lift availability been confirmed/secured?	--
1.c. If "1" is "Yes", are any scaffolds required?	--
1.d. If "1.c." is "Yes", has the scaffolds been requested, and do you know date of availability?	--
1.e. If "1" is "Yes", have you reviewed the fall protection plan with Dexter HSE?	--
2. Does this month's inspection schedule require inspection of Unsafe to Monitor (UTM) Components?	--
2.a. If "2" is "Yes", have you reviewed the components for required PPE, and is that PPE secured?	--
2.b. If "2" is "Yes", have you discussed/updated the Job Hazard Analysis with Dexter HSE?	--
3. Does this month's inspection schedule require inspection of CVS components or NDE components?	--
3.a. If "3" is "Yes", have you ensured the mobile data collection software includes "background"?	--
3.b. If "3" is "Yes", have you reviewed Method 21 Type II traverse requirements with the team?	--

SECTION 3 - PREDICTED TO ACTUAL COMPARISON

Instructions: Complete this section once the final inspection count from the database is available.

PREDICTED COUNT:	0
ACTUAL COUNT:	0

1. Does the "Predicted" and "Actual" counts match? --

2. If "No", review with the QA/QC Database staff and summarize the cause in the box below.

Completed by: (Signature) _____ Date _____

Policy for LDAR Code of Ethics

1.0 Purpose and Scope

Management's expectation of honesty in execution of LDAR duties.

2.0 Policy Statement:

In the course of business, Stepan will conduct its business honestly and ethically. The ethical performance of Stepan is the sum of the ethics of the officers, employees, contractors, and affiliates who work here. Thus, we will all adhere to high standards of personal integrity.

Officers, employees, contractors, and affiliates will not falsify information, specifically any monitoring, sampling, regulatory record or reports for which the company was trusted to generate as part of its contractual obligations for services provided to its clients. Officers, employees, contractors, and affiliates will not provide false information or participate in deception during any LDAR related activities. Employees witnessing or being requested to generate fraudulent work products, by client or by any other Stepan personnel, will report such incidents within 24 hours of occurrence.

Any violation of this policy will result in disciplinary action up to and including termination.

3.0 Training

None

4.0 Forms and Records

None

5.0 Appendices

None

6.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Performance Metrics

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines for defining program metrics and measurements to optimize LDAR programs and drive compliance sustainability (You cannot change what you do not measure.)

1.2 This standard applies to all components in LDAR service.

2.0 Safety

2.1 None

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

- Time on Tool (ToT) for Method 21 – the total time a LDAR Technician spends monitoring during a shift eliminating time spent on breaks, calibrating, etc.
- Time Between Monitoring Events (TBME) for Method 21 - the time it takes the LDAR Technician to finish one M21 event, find the next component and complete that event
- Key Performance Indicators (KPI) – criteria used to measure the success of a program
- Replace in Kind (RIK) – A valve or sealing system that is replaced and put into service for any reason other than to replace a leaking pump or valve
- Management of Change (MOC) – the process by which changes to equipment in VOC or HAP service are approved and communicated to all affected departments and parties
- Difficult to Monitor (DTM) – Component monitoring would require elevating the monitoring personnel more than two meters above a support surface
- Unsafe to Monitor (UTM) – Component monitoring would expose monitoring personnel to imminent or potential danger
- DOR – Delay of Repair – Lawfully postponing a component leak repair when:
    - a unit shutdown must be performed for repair
    - the component has been isolated from VOC/HAP service
    - the seal will be replaced within six months of the initial leak (applies to pumps only)
- Turnaround/Outage – Work practice or operational procedure that stops production from a process unit or part of a process unit during which it is technically feasible to clear process material from a process

unit consistent with safety constraints and during which repairs can be accomplished. The following are not considered a turnaround or outage:

- An unscheduled work practice or operational procedure that stops production from a process unit or part of a process unit for less than 24 hours
- An unscheduled work practice or operational procedure that would stop production from a process unit or part of a process unit for a shorter period of time than would be required to clear a process unit of materials and start up the unit and would result in greater emissions than the delay of repair of leaking components until the next scheduled process unit shutdown
- The use of spare equipment and technically feasible bypassing of equipment without stopping production

- Repeat/Chronic Leaker – A pump or valve that has leaked and been repaired multiple times in a specified timeframe. The number of leaking events and timeframe will vary between sites and is sometimes defined in a site consent decree. These components are often replaced during turnarounds/outages

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 EHS&S Department is responsible to completing LDAR metrics on a monthly basis for the previous month

5.1.2 EHS&S Department shall submit LDAR metrics to Plant Manager and all Area Operation Managers

5.1.3 Provide continual feedback through LDAR metrics to establish behaviors that positively effect LDAR compliance.

5.1.4 Provide support to Production Areas for the purpose of improving LDAR Compliance Metrics

5.1.5 Continue to develop leading and lagging metrics that will measure the health of LDAR Program

5.2 Plant Manager

5.2.1 Set expectations that will drive LDAR compliance improvements

5.2.2 Hold Environmental and Production Areas accountable for their own compliance.

6.0 General Elements of an LDAR Metrics:

6.1 Process Unit Leak Percent Tracking

6.1.1 Calculated as percentage of leaks versus components monitored in one monitoring period.

6.1.2 Compare to same component population in the previous monitoring period

6.1.3 Historical leak percent should not change dramatically unless Operations and Maintenance Departments complete major replacement or repair work

6.2 Repeat/Chronic Leak Tracking

6.2.1 Identify and track frequently leaking equipment for replacement during TA processes (See Process Turnarounds and Outages)

6.3 DTM Tracking

6.3.1 DTM percent should be tracked by process unit in order to verify that regulatory % limit requirements are met

DTM pending inspections should have a running balance tracked to ensure all annual required inspections are planned and completed efficiently

6.3.2 DTM valves should be validated annually

6.3.3 DTM written plans for monitoring should be reviewed annually

6.4 UTM Validation

6.4.1 UTMs that missed their opportunity for monitoring based on its written plan should be tracked

6.4.2 Pumps designated as UTM should be validated annually

6.4.3 Valves designated as UTM should be validated annually

6.4.4 Pumps and valves designated as UTM should be validated annually

6.5 Delay of Repair Tracking

6.5.1 Total DOR percentage should be tracked by process unit to determine "problem" units for Maintenance and the total count does not get unrealistic

6.5.2 Any DORs unable to be repaired during an outage should be tracked and explained to look for trends

6.6 Percent Missing Tags

6.6.1 Equipment found to be missing a physical ID tag during regular LDAR processes should be tracked by process unit

6.6.2 Increased percentages of missing ID tags should result in retraining of LDAR personnel and the organization on the importance of tag maintenance

6.6.3 Large numbers of missing ID tags affects the integrity of the program

6.7 MOC Adherence and Inventory Error Tracking

6.7.1 Equipment found to be added to or removed from LDAR service without MOC verification paperwork should be tracked by process unit

6.7.2 Equipment changes with no MOC tracking should result in consultations with all affected departments to reevaluate the health of the MOC communication process

6.8 Weekly Pump Seal Inspection Tracking

6.8.1 Pump seal inspection forms completeness and timely submittal should be tracked by process unit

6.8.2 Not submitting inspection forms or submitting incomplete forms generates potential non-compliance for the program

6.9 Open Ended Lines (OEL) Tracking

6.9.1 The submission or the lack of submission for found OELs should be tracked by process unit

6.9.2 Maintaining a level of awareness on OEL activity across the facility helps to minimize risk during unexpected agency audits

6.10 Monitoring Equipment Downtime/Repairs

6.10.1 Time and length of equipment downtime should be tracked along with repair time to identify equipment reliability and costs to the overall program

6.10.2 If you using the Time on Tool (ToT) metric, monitoring equipment downtime will surface because it adversely effects performance

6.11 Time on Tool (ToT):

6.11.1 Calculated by adding up technician monitoring time minus breaks, time spent calibrating, uploading, etc.

6.11.2 Tracks how much time LDAR Technicians actually spend in the process units monitoring components in a shift to measure efficiency and productivity

6.11.3 Should be tracked or measured by process unit and technician

6.11.4 Ways to improve ToT:

a. Cut down calibration time by assigning one tech to calibrate all machines prior to other technician start times

b. Reduce break time

c. Adjust shift start/end times

6.12 Time Between Monitoring Events:

6.12.1 Calculated by adding up the time LDAR technicians spend between M21 events

6.12.2 Should be tracked and measured by process unit and technician

6.12.3 TBME is heavily affected by how well a process unit is routed, i.e. longer TBME means that LDAR Technicians are taking a long time finding the next component in a route sequence

6.12.4 TBME is also affected by how familiar an LDAR Technician is with the process unit

6.12.5 Ways to improve TBME:

a. Retag/Reroute process units with high TBME

b. Edit component descriptions to improve accuracy

6.13 Monitor/Day/Tech:

6.13.1 Calculated as average inspections per day per tech

6.13.2 Should be tracked and measured to ensure that inspections completed per day are realistic and within regulatory guidelines

6.13.3 Will vary depending on process unit terrain and type of components monitored

6.13.4 Ways to improve components monitored per day:

a. Edit component descriptions to improve accuracy

b. Adjust shift start/end times

6.14 Monitor/Hour/Tech:

6.14.1 Calculated as total average inspections per hour per tech

6.14.2 Should be tracked and measured to ensure that inspections completed per hour are realistic and within regulatory guidelines

6.14.3 Will vary depending on process unit terrain and type of components monitored

6.14.4 Ways to improve components monitored per day:

a. Edit component descriptions to improve accuracy

b. Adjust shift start/end times

7.0 Training

7.1 None

8.0 Forms and Records

8.1 None

9.0 Appendices

9.1 None

10.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Periodic Reporting

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines for the proper reporting requirements of LDAR data and the QA/QC process.

1.2 This standard applies to all components in LDAR service

2.0 Safety

2.1 None

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

- DOR – Delay of Repair – Lawfully postponing a component leak repair when:
  - a unit shutdown must be performed for repair
  - the component has been isolated from VOC/HAP service
  - the seal will be replaced within 6 months of the initial leak (applies to pumps only)

5.0 LDAR Reporting QA/QC:

5.1 Complete QA/QC process at the direction of the EHS&S Department (See Procedure for LDAR Data QA/QC)

5.2 Initial periodic reports should be QA'd against the facility MEL and initial monitoring requirements.

5.3 Subsequent periodic reports should be verified against monthly monitoring reconciliation reports to ensure proper leaker totals, DOR items and component changes are reported (See Procedure for LDAR Inspection Reconciliation)

6.0 Responsibilities

6.1 EHS&S Department

6.1.1 Ensure required documentation is complete, proper recordkeeping is maintained and readily accessible.

6.1.2 Interpret the language of the LDAR regulations.

6.1.3 Ensure that required reports are submitted on-time to the GAEPD, Compliance Section accurately and in a timely manner.

6.1.4 All final drafts of periodic LDAR reports shall be sent to a third party for a cold-eye review and to Stepan Legal for a legal review before being submitted to the Plant Manager for signature

7.0 Training

7.1 None

8.0 Forms and Records

8.1 All periodic reports listed in this general requirement shall be maintained in the EHS&S Files for up to five years.

9.0 Appendices

9.1 None

10.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure to Identify Delay of Repair Components and Manage ID Tags

1.0 Purpose

1.1 Management's expectation of LDAR deviation tracking, analysis, corrective action process and metrics.

2.0 Policy Statement

2.1 Stepan understands the importance of tracking, reporting, and correcting LDAR deviations in order to improve environmental LDAR performance and reduce the number of fugitive emissions from process equipment in VOC and HAP service. Stepan will maintain performance metrics and using those metrics to fix gaps and drive continuous improvement in order to ensure the health and safety of our employees and neighbors. Officers, employees, contractors, and affiliates will support this effort to achieve sustainable environmental compliance for the organization.

3.0 Training

3.1 None

4.0 Forms and Records

4.1 None

5.0 Appendices

5.1 None

6.0 Revision History

Revision #	Description of Change
0	December 2019 Original

Procedure for LDAR Personnel Training

1.0 Purpose and Scope

1.1 The purpose of this procedure is to provide guidelines to train LDAR personnel for the role they fill within the organization.

1.2 This standard applies to all components in VOC or VHAP service.

2.0 Safety

2.1 None

3.0 References

3.1 EPA Code of Federal Regulations Part 60 Appendix A, Method 21, TCEQ 28 VHP

4.0 Definitions

- Training Curriculum – A listing of available training classes for employees; the list associates classes with skill levels, performance requirements, and reference materials
- Training Materials – Both internally developed and externally acquired material that contain the information required to educate employees on their skill level
- Training Classes – Routine and as needed classes designed to review applicable materials, test employee understanding, and establish individual employee requirements
- Skills Testing – Documentation of employee learned skills; composed of both written tests and observations of applied skills
- Qualified Trainer – An individual that is qualified to teach training classes to fellow employees; these personnel have demonstrated understanding of the materials and have previously completed the classes
- Key Performance Indicators (KPI) – Criteria used to measure the success of a program

5.0 Responsibilities

5.1 EHS&S Department

5.1.1 Ensure required documentation is complete, proper record keeping is maintained and readily accessible.

5.1.2 Interpret the language of the LDAR regulations and update training as needed.

5.1.3 Ensure that training classes are conducted on-time and within the deadline for completing the training

METHOD 21 - DETERMINATION OF VOLATILE ORGANIC COMPOUND LEAKS

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.
Volatile Organic Compounds (VOC)	No CAS number assigned.

1.2 Scope. This method is applicable for the determination of VOC leaks from process equipment. These sources include, but are not limited to, valves, flanges and other connections, pumps and compressors, pressure relief devices, process drains, open-ended valves, pump and compressor seal system degassing vents, accumulator vessel vents, agitator seals, and access door seals.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method

2.1 A portable instrument is used to detect VOC leaks from individual sources. The instrument detector type is not specified, but it must meet the specifications and performance criteria contained in Section 6.0. A leak definition concentration based on a reference compound is specified in each applicable regulation. This method is intended to locate and classify leaks only, and is not to be used as a direct measure of mass emission rate from individual sources.

3.0 Definitions

3.1 *Calibration gas* means the VOC compound used to adjust the instrument meter reading to a known value. The calibration gas is usually the reference compound at a known concentration approximately equal to the leak definition concentration.

3.2 *Calibration precision* means the degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration to the known concentration.

3.3 *Leak definition concentration* means the local VOC concentration at the surface of a leak source that indicates that a VOC emission (leak) is present. The leak definition is an instrument meter reading based on a reference compound.

3.4 *No detectable emission* means a local VOC concentration at the surface of a leak source, adjusted for local VOC ambient concentration, that is less than 2.5 percent of the specified leak definition concentration. that indicates that a VOC emission (leak) is not present.

3.5 *Reference compound* means the VOC species selected as the instrument calibration basis for specification of the leak definition concentration. (For example, if a leak definition concentration is 10,000 ppm as methane, then any source emission that results in a local concentration that yields a meter reading of 10,000 on an instrument meter calibrated with methane would be classified as a leak. In this example, the leak definition concentration is 10,000 ppm and the reference compound is methane.)

3.6 *Response factor* means the ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation.

3.7 *Response time* means the time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter.

4.0 Interferences[Reserved]

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Hazardous Pollutants. Several of the compounds, leaks of which may be determined by this method, may be irritating or corrosive to tissues (*e.g.*, heptane) or may be toxic (*e.g.*, benzene, methyl alcohol). Nearly all are fire hazards. Compounds in emissions should be determined through familiarity with the source. Appropriate precautions can be found in reference documents, such as reference No. 4 in Section 16.0.

6.0 Equipment and Supplies

A VOC monitoring instrument meeting the following specifications is required:

6.1 The VOC instrument detector shall respond to the compounds being processed. Detector types that may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.

6.2 The instrument shall be capable of measuring the leak definition concentration specified in the regulation.

6.3 The scale of the instrument meter shall be readable to ±2.5 percent of the specified leak definition concentration.

6.4 The instrument shall be equipped with an electrically driven pump to ensure that a sample is provided to the detector at a constant flow rate. The nominal sample flow rate, as measured at the sample probe tip, shall be 0.10 to 3.0 l/min (0.004 to 0.1 ft^3 /min) when the probe is fitted with a glass wool plug or filter that may be used to prevent plugging of the instrument.

6.5 The instrument shall be equipped with a probe or probe extension or sampling not to exceed 6.4 mm (1/4in) in outside diameter, with a single end opening for admission of sample.

6.6 The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the National Electrical Code by the National Fire Prevention Association or other applicable regulatory code for operation in any explosive atmospheres that may be encountered in its use. The instrument shall, at a minimum, be intrinsically safe for Class 1, Division 1 conditions, and/or Class 2, Division 1 conditions, as appropriate, as defined by the example code. The instrument shall not be operated with any safety device, such as an exhaust flame arrestor, removed.

7.0 Reagents and Standards

7.1 Two gas mixtures are required for instrument calibration and performance evaluation:

7.1.1 Zero Gas. Air, less than 10 parts per million by volume (ppmv) VOC.

7.1.2 Calibration Gas. For each organic species that is to be measured during individual source surveys, obtain or prepare a known standard in air at a concentration approximately equal to the applicable leak definition specified in the regulation.

7.2 Cylinder Gases. If cylinder calibration gas mixtures are used, they must be analyzed and certified by the manufacturer to be within 2 percent accuracy, and a shelf life must be specified. Cylinder standards must be either reanalyzed or replaced at the end of the specified shelf life.

7.3 Prepared Gases. Calibration gases may be prepared by the user according to any accepted gaseous preparation procedure that will yield a mixture accurate to within 2 percent. Prepared standards must be replaced each day of use unless it is demonstrated that degradation does not occur during storage.

7.4 Mixtures with non-Reference Compound Gases. Calibrations may be performed using a compound other than the reference compound. In this case, a conversion factor must be determined for the alternative compound such that the resulting meter readings during source surveys can be converted to reference compound results.

8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Instrument Performance Evaluation. Assemble and start up the instrument according to the manufacturer's instructions for recommended warm-up period and preliminary adjustments.

8.1.1 Response Factor. A response factor must be determined for each compound that is to be measured, either by testing or from reference sources. The response factor tests are required before placing the analyzer into service, but do not have to be repeated at subsequent intervals.

8.1.1.1 Calibrate the instrument with the reference compound as specified in the applicable regulation. Introduce the calibration gas mixture to the analyzer and record the observed meter reading. Introduce zero gas until a stable reading is obtained. Make a total of three measurements by alternating between the calibration gas and zero gas. Calculate the response factor for each repetition and the average response factor.

8.1.1.2 The instrument response factors for each of the individual VOC to be measured shall be less than 10 unless otherwise specified in the applicable regulation. When no instrument is available that meets this specification when calibrated with the reference VOC specified in the applicable regulation, the available instrument may be calibrated with one of the VOC to be measured, or any other VOC, so long as the instrument then has a response factor of less than 10 for each of the individual VOC to be measured.

8.1.1.3 Alternatively, if response factors have been published for the compounds of interest for the instrument or detector type, the response factor determination is not required, and existing results may be referenced. Examples of published response factors for flame ionization and catalytic oxidation detectors are included in References 1–3 of Section 17.0.

8.1.2 Calibration Precision. The calibration precision test must be completed prior to placing the analyzer into service and at subsequent 3-month intervals or at the next use, whichever is later.

8.1.2.1 Make a total of three measurements by alternately using zero gas and the specified calibration gas. Record the meter readings. Calculate the average algebraic difference between the meter readings and the known value. Divide this average difference by the known calibration value and multiply by 100 to express the resulting calibration precision as a percentage.

8.1.2.2 The calibration precision shall be equal to or less than 10 percent of the calibration gas value.

8.1.3 Response Time. The response time test is required before placing the instrument into service. If a modification to the sample pumping system or flow configuration is made that would change the response time, a new test is required before further use.

8.1.3.1 Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the specified calibration gas. After switching, measure the time required to attain 90 percent of the final stable reading. Perform this test sequence three times and record the results. Calculate the average response time.

8.1.3.2 The instrument response time shall be equal to or less than 30 seconds. The instrument pump, dilution probe (if any), sample probe, and probe filter that will be used during testing shall all be in place during the response time determination.

8.2 Instrument Calibration. Calibrate the VOC monitoring instrument according to Section 10.0.

8.3 Individual Source Surveys.

8.3.1 Type I—Leak Definition Based on Concentration. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery while observing the instrument readout. If an increased meter reading is observed, slowly sample the interface where leakage is indicated until the maximum meter reading is obtained. Leave the probe inlet at this maximum reading location for approximately two times the instrument response time. If the maximum observed meter reading is greater than the leak definition in the applicable regulation, record and report the results as specified in the regulation reporting requirements. Examples of the application of this general technique to specific equipment types are:

8.3.1.1 Valves. The most common source of leaks from valves is the seal between the stem and housing. Place the probe at the interface where the stem exits the packing gland and sample the stem circumference. Also, place the probe at the interface of the packing gland take-up flange seat and sample

the periphery. In addition, survey valve housings of multipart assembly at the surface of all interfaces where a leak could occur.

8.3.1.2 Flanges and Other Connections. For welded flanges, place the probe at the outer edge of the flange-gasket interface and sample the circumference of the flange. Sample other types of nonpermanent joints (such as threaded connections) with a similar traverse.

8.3.1.3 Pumps and Compressors. Conduct a circumferential traverse at the outer surface of the pump or compressor shaft and seal interface. If the source is a rotating shaft, position the probe inlet within 1 cm of the shaft-seal interface for the survey. If the housing configuration prevents a complete traverse of the shaft periphery, sample all accessible portions. Sample all other joints on the pump or compressor housing where leakage could occur.

8.3.1.4 Pressure Relief Devices. The configuration of most pressure relief devices prevents sampling at the sealing seat interface. For those devices equipped with an enclosed extension, or horn, place the probe inlet at approximately the center of the exhaust area to the atmosphere.

8.3.1.5 Process Drains. For open drains, place the probe inlet at approximately the center of the area open to the atmosphere. For covered drains, place the probe at the surface of the cover interface and conduct a peripheral traverse.

8.3.1.6 Open-ended Lines or Valves. Place the probe inlet at approximately the center of the opening to the atmosphere.

8.3.1.7 Seal System Degassing Vents and Accumulator Vents. Place the probe inlet at approximately the center of the opening to the atmosphere.

8.3.1.8 Access door seals. Place the probe inlet at the surface of the door seal interface and conduct a peripheral traverse.

8.3.2 Type II—"No Detectable Emission". Determine the local ambient VOC concentration around the source by moving the probe randomly upwind and downwind at a distance of one to two meters from the source. If an interference exists with this determination due to a nearby emission or leak, the local ambient concentration may be determined at distances closer to the source, but in no case shall the distance be less than 25 centimeters. Then move the probe inlet to the surface of the source and determine the concentration as outlined in Section 8.3.1. The difference between these concentrations determines whether there are no detectable emissions. Record and report the results as specified by the regulation. For those cases where the regulation requires a specific device installation, or that specified vents be ducted or piped to a control device, the existence of these conditions shall be visually confirmed. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required. Examples of this technique are:

8.3.2.1 Pump or Compressor Seals. If applicable, determine the type of shaft seal. Perform a survey of the local area ambient VOC concentration and determine if detectable emissions exist as described in Section 8.3.2.

8.3.2.2 Seal System Degassing Vents, Accumulator Vessel Vents, Pressure Relief Devices. If applicable, observe whether or not the applicable ducting or piping exists. Also, determine if any sources exist in the ducting or piping where emissions could occur upstream of the control device. If the required ducting or piping exists and there are no sources where the emissions could be vented to the atmosphere upstream of

the control device, then it is presumed that no detectable emissions are present. If there are sources in the ducting or piping where emissions could be vented or sources where leaks could occur, the sampling surveys described in Section 8.3.2 shall be used to determine if detectable emissions exist.

8.3.3 Alternative Screening Procedure.

8.3.3.1 A screening procedure based on the formation of bubbles in a soap solution that is sprayed on a potential leak source may be used for those sources that do not have continuously moving parts, that do not have surface temperatures greater than the boiling point or less than the freezing point of the soap solution, that do not have open areas to the atmosphere that the soap solution cannot bridge, or that do not exhibit evidence of liquid leakage. Sources that have these conditions present must be surveyed using the instrument technique of Section 8.3.1 or 8.3.2.

8.3.3.2 Spray a soap solution over all potential leak sources. The soap solution may be a commercially available leak detection solution or may be prepared using concentrated detergent and water. A pressure sprayer or squeeze bottle may be used to dispense the solution. Observe the potential leak sites to determine if any bubbles are formed. If no bubbles are observed, the source is presumed to have no detectable emissions or leaks as applicable. If any bubbles are observed, the instrument techniques of Section 8.3.1 or 8.3.2 shall be used to determine if a leak exists, or if the source has detectable emissions, as applicable.

9.0 Quality Control

Section	Quality control measure	Effect
8.1.2	Instrument calibration precision check	Ensure precision and accuracy, respectively, of instrument response to standard.
10.0	Instrument calibration	

10.0 Calibration and Standardization

10.1 Calibrate the VOC monitoring instrument as follows. After the appropriate warm-up period and zero internal calibration procedure, introduce the calibration gas into the instrument sample probe. Adjust the instrument meter readout to correspond to the calibration gas value.

Note: If the meter readout cannot be adjusted to the proper value, a malfunction of the analyzer is indicated and corrective actions are necessary before use.

11.0 Analytical Procedures[Reserved]

12.0 Data Analyses and Calculations[Reserved]

13.0 Method Performance[Reserved]

14.0 Pollution Prevention[Reserved]

15.0 Waste Management[Reserved]

16.0 References

1. Dubose, D.A., and G.E. Harris. Response Factors of VOC Analyzers at a Meter Reading of 10,000 ppmv for Selected Organic Compounds. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2–81051. September 1981.

2. Brown, G.E., *et al.* Response Factors of VOC Analyzers Calibrated with Methane for Selected Organic Compounds. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2–81–022. May 1981.

3. DuBose, D.A. *et al.* Response of Portable VOC Analyzers to Chemical Mixtures. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2–81–110. September 1981.

4. Handbook of Hazardous Materials: Fire, Safety, Health. Alliance of American Insurers. Schaumberg, IL. 1983.

17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]

6.0 General Elements of LDAR Training Program:

6.1 Training Goals

6.1.1 All employees are consistently trained and assessed throughout the company.

6.1.2 All employees are trained for the tasks associated with their job descriptions prior to performing the work.

6.1.3 All employees understand the requirements of the facility prior to performing work.

6.1.4 Provides a resource that fosters job satisfaction.

6.2 LDAR Program Development and Implementation

6.2.1 Establish training curriculum to match job functions as it relates to their compliance responsibility.

6.2.2 Establish performance criteria for each training class to determine what an acceptable level of knowledge needed to pass is.

6.2.3 Track employee performance and training status.

6.2.4 Ensure trainers receive adequate training prior to teaching training classes.

6.3 Key Performance Indicators for Training Programs

6.3.1 Training material must be 100% accurate and is associated with the training topic.

6.3.2 Material must be understandable.

6.3.3 Training modules must be updated after regulatory changes or at least once per year to ensure content is still relative.

7.0 Training

None

8.0 Forms and Records

All LDAR training records shall be maintained for five years.

9.0 Appendices

None

10.0 Revision History

Revision #	Description of Change
0	December 2019 Original

STANDARD OPERATING PROCEDURE

SOP Title: EPA Method 21 Inspections Procedure	**Implementation Date:** June 30, 2019
Document Number: 929AL-QUAMAN-SP-19B	**SOP Owner (Department):** AQS - LDAR.
Revision Number: R2	**SOP Approval: Paul Dumas/Director of LDAR Operations**

1.0 PURPOSE

1.1 The purpose of this Standard Operating Procedure (SOP) is to establish a uniform procedure for performing EPA Method 21 Inspections.

2.0 APPLICABILITY

2.1 The policies and procedures of this SOP are applicable to all MAQS personnel involved in performing EPA Method 21 Inspections.

3.0 RESPONSIBILITY

3.1 It is the responsibility of the Field Technicians to follow this SOP.

4.0 DEFINITIONS

4.1 Leak definition concentration means the local VOC concentration at the surface of a leak source that indicates that a VOC emission (leak) is present. The leak definition is an instrument meter reading based on a reference compound.

4.2 No detectable emission means a local VOC concentration at the surface of a leak source, adjusted for local VOC ambient concentration, that is less than 2.5 percent of the specified leak definition concentration. that indicates that a VOC emission (leak) is not present.

5.0 SAFETY

5.1 This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

6.0 EQUIPMENT AND SUPPLIES

6.1 Thermo TVA 1000b or TVA 2020

6.2 Internet and access to the Database

7.0 PROCEDURE

7.1 Type I - Leak Definition Based on Concentration. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery while observing the instrument readout. If an increased meter

reading is observed, slowly sample the interface where leakage is indicated until the maximum meter reading is obtained. Leave the probe inlet at this maximum reading location for approximately two times the instrument response time. If the maximum observed meter reading is greater than the leak definition in the applicable regulation, record and report the results as specified in the regulation reporting requirements. Examples of the application of this general technique to specific equipment types are: All calibration gas standards should be entered into the correct form and/or database, including the cylinder ID number and original gas certification. Calibration gases must also list their expiration date.

7.1.1 Valves. The most common source of leaks from valves is the seal between the stem and housing. Place the probe at the interface where the stem exits the packing gland and sample the stem circumference. Also, place the probe at the interface of the packing gland take-up flange seat and sample the periphery. In addition, survey valve housings of multipart assembly at the surface of all interfaces where a leak could occur.

7.1.2 Flanges and Other Connections. For welded flanges, place the probe at the outer edge of the flange-gasket interface and sample the circumference of the flange. Sample other types of nonpermanent joints (such as threaded connections) with a similar traverse.

7.1.3 Pumps and Compressors. Conduct a circumferential traverse at the outer surface of the pump or compressor shaft and seal interface. If the source is a rotating shaft, position the probe inlet within 1 cm of the shaft-seal interface for the survey. If the housing configuration prevents a complete traverse of the shaft periphery, sample all accessible portions. Sample all other joints on the pump or compressor housing where leakage could occur.

7.1.4 Pressure Relief Devices. The configuration of most pressure relief devices prevents sampling at the sealing seat interface. For those devices equipped with an enclosed extension, or horn, place the probe inlet at approximately the center of the exhaust area to the atmosphere.

7.1.5 Process Drains. For open drains, place the probe inlet at approximately the center of the area open to the atmosphere. For covered drains, place the probe at the surface of the cover interface and conduct a peripheral traverse.

7.1.6 Open-ended Lines or Valves. Place the probe inlet at approximately the center of the opening to the atmosphere.

7.1.7 Seal System Degassing Vents and Accumulator Vents. Place the probe inlet at approximately the center of the opening to the atmosphere.

7.1.8 Access door seals. Place the probe inlet at the surface of the door seal interface and conduct a peripheral traverse.

7.2 Type II— "No Detectable Emission". Determine the local ambient VOC concentration around the source by moving the probe randomly upwind and downwind at a distance of one to two meters from the source. If an interference exists with this determination due to a nearby emission or leak, the local ambient concentration may be determined at distances closer to the source, but in no case shall the distance be less than 25 centimeters. Then move the probe inlet to the surface of the source and determine the concentration as outlined in Section 8.3.1. The difference between these concentrations determines whether there are no detectable emissions. Record and report the results as specified by the regulation. For those cases where the regulation requires a specific device installation, or that specified vents be ducted or piped to a control device, the existence of these conditions shall be visually confirmed. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required. Examples of this technique are:

7.2.1 Pump or Compressor Seals. If applicable, determine the type of shaft seal. Perform a survey of the local area ambient VOC concentration and determine if detectable emissions exist as described in Section 7.2

7.2.2 Seal System Degassing Vents, Accumulator Vessel Vents, Pressure Relief Devices. If applicable, observe whether or not the applicable ducting or piping exists. Also, determine if any sources exist in the ducting or piping where emissions could occur upstream of the control device. If the required ducting or piping exists and there are no sources where the emissions could be vented to the atmosphere upstream of the control device, then it is presumed that no detectable emissions are present. If there are sources in the ducting or piping where emissions could be vented or sources where leaks could occur, the sampling surveys described in Section 7.2 shall be used to determine if detectable emissions exist.

7.3 Alternative Screening Procedure

7.3.1 A screening procedure based on the formation of bubbles in a soap solution that is sprayed on a potential leak source may be used for those sources that do not have continuously moving parts, that do not have surface temperatures greater than the boiling point or less than the freezing point of the soap solution, that do not have open areas to the atmosphere that the soap solution cannot bridge, or that do not exhibit evidence of liquid

leakage. Sources that have these conditions present must be surveyed using the instrument technique of Section 7.1 or 7.2.

7.3.2 Spray a soap solution over all potential leak sources. The soap solution may be a commercially available leak detection solution or may be prepared using concentrated detergent and water. A pressure sprayer or squeeze bottle may be used to dispense the solution. Observe the potential leak sites to determine if any bubbles are formed. If no bubbles are observed, the source is presumed to have no detectable emissions or leaks as applicable. If any bubbles are observed, the instrument techniques of Section 7.1 or 7.2 shall be used to determine if a leak exists, or if the source has detectable emissions, as applicable.

8.0 RECORDS MANAGEMENT

8.1 CONTACTS

SOP Owner(s):

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SOP Approval:

Paul Dumas, Director of Operations, pdumas@montrose-env.com

9.0 REVISION HISTORY

Revision Number	Revision Description
0	Initial document approval/implementation
1	Updated to apply to all of Montrose LDAR
2	Annual review of procedures

STANDARD OPERATING PROCEDURE

SOP Title: EPA Method 21 Calibration Procedure	**Implementation Date:** June 30, 2019
Document Number: 929AL-QUAMAN-SP-19B	**SOP Owner (Department):** AQS - LDAR.
Revision Number: R2	**SOP Approval: Paul Dumas/Director of LDAR Operations**

1.0 PURPOSE

1.1 The purpose of this Standard Operating Procedure (SOP) is to establish a uniform procedure for performing EPA Method 21 Calibration, Precision Test, Response Time, and Drift Check.

2.0 APPLICABILITY

2.1 The policies and procedures of this SOP are applicable to all MAQS personnel involved in performing EPA Method 21 calibration.

3.0 RESPONSIBILITY

3.1 It is the responsibility of the Field Technicians to follow this SOP.

4.0 DEFINITIONS

4.1 Calibration gas- means the VOC compound used to adjust the instrument meter reading to a known value. The calibration gas is usually the reference compound at a known concentration approximately equal to the leak definition concentration.

4.2 Calibration precision- means the degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration to the known concentration.

4.3 Reference compound- means the VOC species selected as the instrument calibration basis for specification of the leak definition concentration. (For example, if a leak definition concentration is 10,000 ppm as methane, then any source emission that results in a local concentration that yields a meter reading of 10,000 on an instrument meter calibrated with methane would be classified as a leak. In this example, the leak definition concentration is 10,000 ppm and the reference compound is methane.)

4.4 Response factor- means the ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation.

4.5 Response time- means the time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter.

5.0 SAFETY

5.1 Proper PPE must be worn including safety glasses and gloves.

6.0 EQUIPMENT AND SUPPLIES

6.1 Thermo TVA 1000b or 2020

6.2 Calibration gases including zero air gas and Methane gases for each regulatory leak threshold (span gas), not exceeding the leak threshold.

6.3 Zero air gas.

6.4 Ultra pure hydrogen (UHP) gas.

6.5 Tedlar bags or on-demand pressure regulators.

6.6 Calibration sheets.

6.7 Stop watch.

6.8 Internet and access to the Database

7.0 PROCEDURE

7.1 Calibration Gases

7.1.1 All calibration gas standards should be entered into the correct form and/or database, including the cylinder ID number and original gas certification. Calibration gases must also list their expiration date.

7.1.2 After completing the calibration precision test, record the cylinder PSI for each gas cylinder used.

7.2 Performing a Calibration. The general process for performing a calibration is to first perform the calibration, then perform a calibration-precision test. All calibration gases including pressures, certificates, and response times must also be current and documented for auditing purposes. Certain regulations may require that a response time test, and/or a drift assessment be performed daily.

7.2.1 Warm up the instrument per manufacturer guidelines (Thermo TVA is for 30 minutes) and ignite the detector. Give the instrument another 5 minutes to warm up as to allow the detector to stabilize.

7.2.2 Document on your calibration form the following:

7.2.2.1 Date and time

7.2.2.2 Technician Name performing calibration

7.2.2.3 Company and Facility if needed

7.2.2.4 Instrument ID

7.2.2.5 Probe Type

7.2.2.6 Calibration Gas Information

7.2.2.6.1 Calibration Gas (air or methane typically)

7.2.2.6.2 Cylinder ID #

7.2.2.6.3 Expiration Date

7.2.2.6.4 Actual concentration of the bottle (not regulatory standard, see certificate)

7.2.3 Prepare the calibration standards including the following: Methane for each regulatory leak threshold and zero air. Samples should be prepared in 1 liter or larger sample bags and should be labeled accordingly, or you may use an on-demand pressure regulator.

7.2.4 Purge the instrument with zero air gas. The TVA will save the reading automatically. Introduce the first span gas standard and record the instrument reading on the calibration field sheet along with the time. Note: Calibrations are also stored electronically within the instrumentation. Alternate between zero gas and each span gas until completing all span gas calibrations.

7.3 Performing a Calibration-Precision Test. A Calibration-Precision test must be performed at minimum once every 3-months or upon returning to service (maintenance or brand new). Various Montrose offices have implemented this daily to assure that your instrument is properly calibrated. The results must be equal to or less than 10% of the calibration gas value. If your instrument fails this test, then it must be calibrated again before it is placed into service.

7.3.1 Complete steps 7.2.2 and document on the Calibration-Precision form.

7.3.2 Prepare the number of calibration standards required for each regulatory leak threshold and zero air. Samples should be prepared in 1 liter or larger sample bags and should be labeled accordingly, or you may use an on-demand pressure regulator.

7.3.3 Purge the instrument with zero air gas, and record the instrument reading on the calibration-precision field sheet.

7.3.4 Introduce the first span gas standard and record the instrument reading on the calibration-precision field sheet.

7.3.5 Repeat the last two steps until three (3) runs are performed for each gas. Record the results on the calibration field sheet.

7.3.6 Perform steps 7.3.3-7.3.5 for each span gas. A total of three run for each gas shall be recorded.

7.3.7 Calculate the average algebraic difference for each span gas, see calculation on Calibration-Precision form.

7.3.8 Calculate the percent of the standard, see calculation on Calibration-Precision form. If the percent is less than 10%, the calibration-precision test passes. If it is greater than 10%, then the instrument must be recalibrated.

7.4 Response time test

7.4.1 The response time test is introducing a known standard and recording the time needed for the instrument to read 90% of the known standard. This value in seconds is known as response time, the number of seconds that you should take to monitor each inspection point.

7.4.2 A response time test should be completed at the same time as a calibration-precision test, and at any time the flow configuration has been altered. The procedures are as follows.

7.4.2.1 Complete steps 7.2.2 and document on the Calibration-Precision form.

7.4.2.2 Prepare the number of calibration standards required for each regulatory leak threshold and zero air. Samples should be prepared in 1 liter or larger sample bags and should be labeled accordingly, or supplied by use of an on-demand pressure regulator.

7.4.2.3 Purge the instrument with zero air gas.

7.4.2.4 Introduce the first span gas standard and record the number of seconds it takes for the instrument to read 90% of the first span gas. For example, if the span gas was 100 ppm, then how many seconds does it take for the instrument to read 90 ppm. Record the reading

on the calibration-precision field sheet under Response time test section.

7.4.2.5 Repeat the last two steps until three (3) runs are performed for each gas. Record the results on the calibration-precision field sheet.

7.4.2.6 Perform steps 7.4.3.3-7.4.3.5 for each span gas. A total of three run for each gas shall be recorded.

7.4.2.7 Add the total seconds for all three runs for each span gas.

7.4.2.8 Calculate the average seconds for each span gas.

7.4.2.9 Determine the required scan time for a deflection.

7.5 Performing a calibration drift assessment.

7.5.1 To perform a drift assessment, follow steps 7.3.3-7.3.5 of this procedure. Document all results on the Calibration form, in the drift check section.

7.6 Documenting calibration results

7.6.1 All calibrations, precision tests, gas cylinders, response times and drift assessments must be documented by hand using the calibration field sheet.

7.6.2 The results of the above tests should also be entered into the LDAR database daily (if applicable) by the person performing the calibration. Note: The LDAR Database is then used to prepare a summary of all the calibration and precision tests for audit purposes.

8.0 RECORDS MANAGEMENT

8.1 CONTACTS

SOP Owner(s):

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SOP Approval:

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9.0 REVISION HISTORY

Revision Number	Revision Description
0	Initial document approval/implementation
1	Updated to apply to all of Montrose LDAR
2	Annual review of procedures