

**Scope of Work (For Arabyah Offshore Facilities)**  
**NAGPD Leak Detection and Repair Contract**

**1.0 INTRODUCTION**

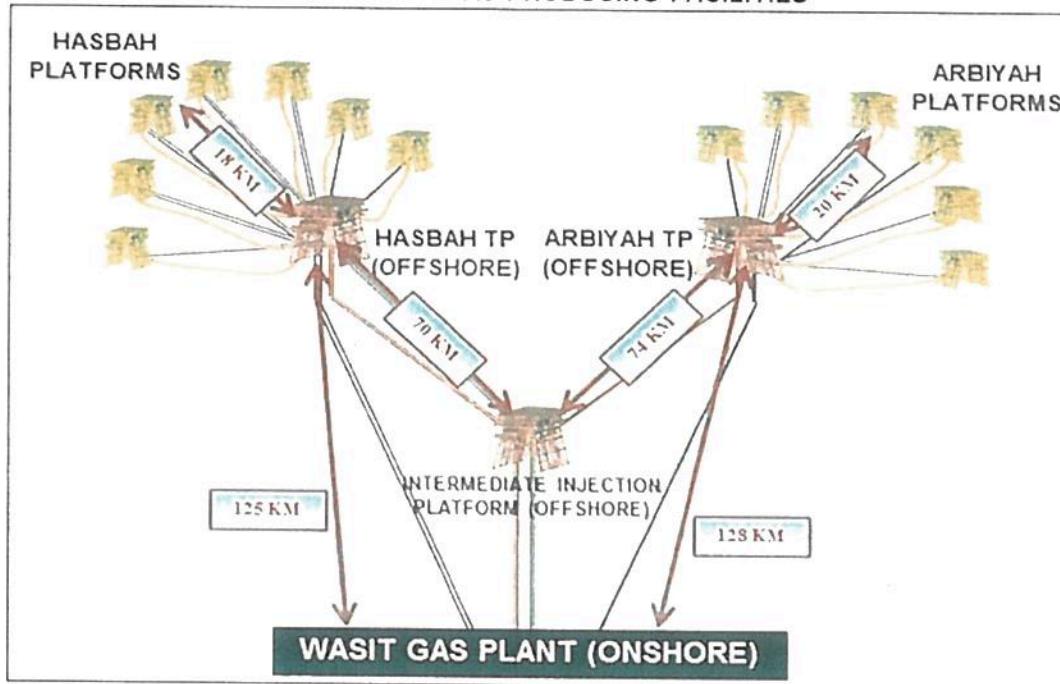
This scope of work is to carry out Leak Detection and Repair (LDAR) survey at ARABIYAH GAS FIELD of Northern Area Gas Producing Department (NAGPD) in accordance with Saudi Aramco Standard SAES-A-102 and LDAR Protocol.

**2.0 LOCATION**

Arabiyah gas producing facilities are located offshore as shown in the following picture.

Hasbah facilities are NOT included in this scope of work.

**HASBAH & ARABIYAH OFFSHORE GAS PRODUCING FACILITIES**



ARABIYAH OFFSHORE FACILITIES FOR LDAR SURVEY	
S. No.	Description
1	A-4: Offshore Gas Producing Platform
2	A-5: Offshore Gas Producing Platform
3	A-6: Offshore Gas Producing Platform
4	A-7: Offshore Gas Producing Platform
5	A-8: Offshore Gas Producing Platform
6	A-9: Offshore Gas Producing Platform
7	TP: Offshore Tie-In Platform

**NOTE:**

1. Above mentioned each ARABIYAH offshore platform has only one part; Wellhead platform.

### **3.0 SCOPE**

**Objective:** The objective is to conduct the Leak Detection and Repair (LDAR) Program using USEPA Method 21 (copy attached) to develop a baseline leak and emission rate at Northern Area Gas Producing Department Offshore & Onshore Facilities. Saudi Aramco standards require facilities to develop and implement LDAR Program to control fugitive emissions.

#### **3.1 GENERAL SCOPE OF WORK**

The Contractor shall carry out leak detection and repair LDAR program survey at NAGPD offshore & onshore facilities in accordance with Saudi Aramco & USEPA environmental requirements to minimize fugitive emissions. In order to control Fugitive Emission a monitoring plan is required, thus this project shall include the following minimum elements:

- a. The contractor shall prepare a master list with identification code of all components that are leaking or have the potential to leak, including pumps, pressure-relief valves, compressors, sampling connectors, flanges, component number, service, and location within the entire NAGPD facilities mentioned in section 2.0.
- b. The contractor shall tag all leaking equipment that is exceeding the applicable leak limitation with a brightly colored weatherproof tag indicating the date the leak was detected as explained in the LDAR Protocol.
- c. The contractor shall install/develop in-house software and database which are capable of analyzing daily monitoring records. The software shall be capable to track and calculate the leak frequencies of sets of equipment, segments, areas and installations from a set of base element data. The output from the software can be used to provide important information on which parts of the plant or types of

equipment are most likely to generate leaks. It shall also ensure that any changes to an installation can be accounted for quickly and easily in the frequency assessment. The software shall use digital images to record the components with location information and shall be capable to send tracing notifications through email, etc.

- d. The Contractor shall recommend components that can be replaced with "leak less" technology if applicable.
- e. The Contractor shall recommend all components that need additional monitoring with the appropriate monitoring technique(s) with specification.
- f. The Contractor shall identify fugitive emission controls or strategies to be deployed at the facility.
- g. The Contractor shall develop a maintenance program that involves the repair/replacement of identified leaking components. The master components list developed by the Contractor shall be in a format / program that can be periodically updated to include all maintenance-related work performed on the affected components.

### **3.2 SPECIFIC SCOPE OF WORK**

- A. Contractor shall perform the following tasks.
  - a. Provide the following:
    - 1. Leak Detection and Repair (LDAR) Program Flowchart and management plan.
    - 2. Benchmarks Program and Work steps to reduce fugitive emission.
  - b. Conduct field survey to screen and measure all leak components at entire NAGPD facilities mentioned in section 2.0. The following sources should be included in the program:
    - 1. Pump seals
    - 2. Relief valves ATM
    - 3. Connections
    - 4. Flanges
    - 5. Valve stem
    - 6. Control valve stem
    - 7. Open Ends
    - 8. Sample points
  - c. Develop Identification list of all Equipment at entire NAGPD facilities mentioned in section 2.0 that has the potential to leak Volatile Organic Compound (VOC), Hazardous Air Pollutants (HAP) and volatile hazardous air pollutants (VHAPs).
  - d. Tag all potential leak components and monitor all these components through LDAR software that needs to be installed /developed in-house. Contractor LDAR specialist shall record the tag number, the date, take image and sufficient information to enable the source to be readily identified and uploaded to the in-house software.

- e. Establish "leak rate" of each components, based on the USEPA Method 21 methodology.
- f. Identify the repairs required by the facility within seven days.
- g. Identify the leaks to the facility that can be minimized within seven (7) days if repair cannot be affected without shutting down the process unit being served. Leaks which cannot be repaired within seven (7) days shall be listed separately for repair by the facility at the first available process turnaround.
- h. Keep the numbered weatherproof tags until the component has passed two consecutive quarterly inspections by the facility and repair is completed.
- i. Calibrate the portable Total Organic Compound (TOC) detector (or alternative equipment such as Flame Ionization Detection, Photo Ionization Detector, and Optical Gas Imaging in daily basis (or before using it at field) using a reference gas of equivalent concentration to the leak definition as approved by Saudi Aramco and USEPA).

B. Contractor shall provide the following:

- a. Report detailing the results of the study of the LDAR technology at the facility supported with all relevant document and sampling and calibration results. This report will be utilized to documents the finding and facilitates the required maintenance activities.
- b. Report detailing the monitoring methodology in all selected facilities.
- c. Report detailing the economical feasibility of LDAR using US EPA's Method 21 (using Photo ionization detector PID or Flame ionization detector FID).
- d. Final report covering the entire scope of work. The report shall, in addition to above requirements, include recommendations, with justifications based on the monitoring study. All log books used by the contractor in the study shall be presented to the facility upon request as specified in the scope of work. Also , the LDAR report should include the following:
  1. Detail list of all measured sources with date, ppm, kg/yr, etc.
  2. List of all leaking sources
  3. List of losses by product
  4. List of losses by source type
  5. Summary overview of results before and after repair
  6. Detailed repair orders for each remaining leak
  7. Repair definition
  8. Multiple graph summaries
  9. LDAR Program and re-monitoring plan for the coming years
  10. Analyzes and maintenance plan for the coming years
  11. Project presentation
  12. Project data hand-over
  13. Generate all of the above information in the LDAR in-house software for tracking and records.

### 3.2.1 Calibration/Calibration Drift Assessment

Saudi Aramco: Company General Use

Contractor shall conduct all calibrations of LDAR monitoring equipment using methane as the calibration gas, in accordance with method indicated in the EPA Method 21.

### **3.2.2 Applicable Codes and Standards**

All work activities shall comply with the Saudi Aramco Construction Safety Manual, Latest edition of Saudi Aramco Engineering Standards (SAES), NAGPD SMS Element# 7 'Contractor Safety' and the following attachments.

### **3.2.3 Saudi Aramco General Instructions**

- G. I. 2.100 Work Permit System
- G. I. 6.012 Isolation Lockout And Use Of Hold Tags
- G. I. 8.001 Safety Requirement Of Scaffolds
- SAES -B-068 Electrical Area classifications

### **3.2.4 Contractor Responsibilities**

- a. The contractor should sign confidentiality and security agreement with Saudi Aramco.
- b. The Contractor shall arrange to provide field supervisors, work permit receivers and a certified Quality Assurance Representative.
- c. The Contractor shall arrange to provide certified and qualified manpower to do the work. The contractors should submit documentation that their LDAR personnel have been trained on Method 21 and facility-specific LDAR procedures.
- d. The contractor shall have procedure in place to review and certify the monitoring data before submitting the data to the facility.
- e. All materials provided by the Contractor shall be inspected and approved by NAGPD Representative prior to their use.
- f. The Contractor shall provide all necessary tools and certified testing equipment to complete this work.
- g. The Contractor shall be responsible to protect all surrounded facilities; any damage to these facilities will be rectified and charged at no cost to Saudi Aramco.
- h. The Contractor shall be responsible for wearing suitable Personnel Protective Equipment on site during working hours.

### **3.2.5 Saudi Aramco Responsibilities**

- a. Saudi Aramco will provide the required process flow diagram (PFD) and P&ID's.
- b. Issue work permit.
- c. Provide a working boat at offshore.

- d. Provide food and accommodation at offshore boats.
- e. Issue gate passes for manpower, tools, materials, and equipment in accordance with Saudi Aramco Industrial Security Regulations.

### **3.2.6 Work Progress Meeting and Correspondence**

- a. Weekly Progress Report- the Contractor shall prepare and submit a weekly progress report on the first day of the following week, which shall include, as a minimum, the major accomplishment achieved during the past week and the major activities for the following two weeks.
- b. Meetings-Weekly Progress Meetings will be conducted between the NAGPD Representative and the Contractor. Minutes of the meetings shall be issued by the Contractor for review by NAGPD Representative not later than three (3) working days after the meeting day.
- c. Correspondences shall be addressed to the NAGPD Representative.
- d. The Contractor shall train the facility employee in who to use the Software and LDAR tools, set notification, take images, do the calculation, create report, etc and shall provide software user guide manual explained in detail how to use the software.
- e. All instructions shall be in writing. For any verbal/telephone information communicated, the Contractor shall initiate a memorandum to be signed by the Contractor and NAGPD Representative.

### **3.2.7 Safety & Security Requirements**

Working Places: Refer to Saudi Aramco Construction Safety Manual Section II-9, "Working Places, Ladders, and Scaffoldings" for detailed LP requirements for the Contractors.

## **3.3 QUALITY ASSURANCE / QUALITY CONTROL**

As part of this scope, the Contractor shall provide a QA/QC Program and shall identify a QA/QC Coordinator. The selected Contractor shall develop this plan further, through discussions with the facility, for inclusion in the final Work Plan. The purpose of this program is to ensure that assessment data are of sufficient quality to support effective site management decision-making. It will address project procedures such as:

- a. Methods documentation.
- b. The number and type of quality control sampling/analysis.
- c. Control of errors in data management; and.
- d. Field equipment calibration.

## **3.4 WORK SCHEDULE**

Saudi Aramco Company General Use

Proposals are to contain a detailed work schedule that incorporates all requirements of this scope of work. The schedule is to demonstrate the timing of each main task, individuals responsible for ensuring the schedule is met, priority tasks and milestones, and completion of the overall project within the specified time constraint. Further, the Contractor must identify risk factors that could affect the schedule, and the measures to minimize those risks.

- a. Contractor shall provide a detailed schedule to NAGPD Representative within 14 days of contract award.
- b. Contractor schedule shall be reviewed and approved by the NAGPD Representative within 7 working days from receiving the schedule or return it with comments. Any changes in schedule shall be approved by the NAGPD Representative.
- c. NAGPD Representative has the right to change the schedule but he must provide 7 days prior notice to Contractor along with the justification.
- d. NAGPD business hours are:  
Onshore: 06:00 through 18:00 hours, five days per week Sunday to Thursday.  
Offshore: 06:00 through 18:00 hours, seven days of week.
- e. The Contractor may request additional working days on Fridays and/or Saturday, if authorized by the NAGPD Representative.
- f. Offshore work requires a standby boat alongside the platform and thus subjected to favorable offshore weather condition. Offshore work shall be planned with NAGPD Representative and may be interrupted by the offshore bad weather condition. In this case, the Contractor may stay offshore or demobilize to onshore until weather improves and survey can continue.
- g. Contractor shall recommend techniques that can be used to remotely measure concentration profile of hydrocarbon in atmosphere without standing at platform (that is to be conducted from the boat) if possible.
- h. Offshore standby time due to bad weather / rough sea condition is Contractor's responsibility.

### **3.5 REPORTING**

The project report is to provide clear and concise presentation of information relevant to the assessment information. The report is to contain a detailed description of project objectives, field methods, field observations, analytical methods, field observation results, analytical results, data assessment and data interpretation. In general, the report will include:

- a. Introduction.
- b. Testing methods and protocols.
- c. Analytical results.
- d. QA/QC samples.
- e. Analyzer calibration details.
- f. Assessment and comparison with PME & Saudi Aramco Standards.

- g. Any deviations from the standards/scope.
- h. Filed Observations.
- i. The Contractor/s must provide a preliminary Table of Contents for the Leak Detection and Repair Program (LDAR) including a listing of proposed testing methods/instrumentation, as part of the contractor Submission.

### 3.6 DELIVERABLES

The Contractor shall provide reports in the following formats:

- a. Bound Draft Reports - One (1) bound copy of the draft report for review and comment. The Contractor is to schedule a reasonable time for Client review, followed by an on-site meeting to discuss the comments of the Client.
- b. Bound Final Reports - Three (3) bound copies of the final report are to be provided within two weeks of the review meeting.
- c. Electronic Report - A CD containing an electronic PDF version of the entire report is to be included in each of the Bound Final Report.

### 3.7 CONTRACT PRICE

Contractor shall submit a bid with one lump sum price in Saudi Riyals with following breakup.

ARABIYAH		
S. No.	Description	Price (SAR)
1	A-4: Offshore Gas Producing Platform	
2	A-5: Offshore Gas Producing Platform	
3	A-6: Offshore Gas Producing Platform	
4	A-7: Offshore Gas Producing Platform	
5	A-8: Offshore Gas Producing Platform	
6	A-9: Offshore Gas Producing Platform	
7	TP: Offshore Tie-In Platform	
TOTAL		

### 3.8 CONTRACTOR PERFORMANCE APPRAISAL

The NAGPD Representative will complete Saudi Aramco Form # 3243 "The Contractor Performance Appraisal" form upon completion of the Contract.

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