

TECHNICAL SCOPE OF WORK

FOR

Safety Engineering Studies (HAZOP, QRA, HAC, EMERA) for various GGL Facilities (Pipeline Network, CGS, PRI, CNG/LCNG Stations etc. and related Equipment) across operational areas of GGL

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1. INTRODUCTION

GUJARAT GAS LTD. (GGL) having its Registered Office at Gujarat Gas CNG Station, Sector 5/C, Gandhinagar – 382006, Gujarat is having Transmission pipeline and City Gas Distribution Networks for Distributing Natural Gas to Industrial, Commercial, Domestic Customers and CNG Stations in various Districts of Gujarat, Maharashtra, Rajasthan, Madhya Pradesh, Punjab & Union Territory of Dadra Nagar Haveli etc. As a part of its business growth plans, GGL regularly expands / extends its existing Network by laying new pipelines to cover newer areas.

This document summarizes the technical requirements and the Specifications for carrying out various safety engineering studies like Hazard & Operability (HAZOP); Quantitative Risk Assessment (QRA); Hazardous Area Classification (HAC); Escape, Muster, Evacuation and Rescue Analysis (EMERA) studies of existing/proposed Pipeline network, Gas Terminals, CGS (City Gate Stations), PRI (Pressure regulating installations/skids), CNG stations, LNG/LCNG Facilities and related equipment, facilities in and around GGL operational areas.

2. SCOPE OF WORK

The scope/specification covers the minimum specified requirement for the various activities to be carried out by the Contractor/Service Providers toward the related work mentioned in contract.

All the materials, equipment, appliances or other things of whatsoever nature required in or about the execution of the work, whether of temporary or permanent nature shall be provided by the Contractor/Service Provider.

2.1 SPECIFICATION OF WORK

2.1.1. Contractor/Service Provider shall, with due care & diligence, execute the work in compliance with all laws, by laws, ordinances, regulation etc. Contractor/Service Provider shall follow the latest edition/amendments of all applicable laws, guidelines, ordinances, regulations etc. issued by the concern authority time to time.

Contractor/Service Provider shall carry out safety engineering study with compliance to latest versions of below listed regulations / codes / standards; but not limited to

- Laws, codes, rules and standards as mandatory under the legislation of India and respective state government
- PNGRB regulations (Technical & Safety Standards, Integrity Management System, Emergency response & Disaster Management Plan)
- OISD standards
- API RP 500 – Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2, Second Edition, Nov 1997.
- HAZOP: Guide to Best Practice. I. Chem. E. Publication, 2000
- BS EN ISO 17776: Guidelines on tools & techniques for Hazard identification & risk assessment.
- BS IEC 61882:2001 Hazard and Operability Studies (HAZOP Studies) – Application guide
- Centre for Chemical Process Safety (CCPS) – for HAZOP study
- Guidelines for Quantitative risk assessment (QRA)- 'Purple Book', CPR 18E
- IP 15 latest addition – for Hazardous area classification (HAC)
- IP Research Report – Ignition Probability Review, Model Development and Look-Up Correlations, January 2006, Energy Institute, London.
- IS 2148: Electrical Apparatus For Explosive Gas Atmospheres - Flameproof Enclosures "d"

- IS 5571:2009 Guide for selection and installation of Electrical equipment in hazardous areas (other than mines), Third Revision.
- IS 5572:2009 Classification of hazardous areas (other Than mines) having flammable gases and Vapours for electrical installation, Third Revision.
- Evacuation, Escape and Rescue – part of the Risk Assessment Data Directory, International Association of Oil and Gas Producers (OGP) Report No. 434-19, March 2010.
- OGP Risk Assessment data directory- Report No. 434-6.1, Ignition Probabilities (March 2010), International Association of Oil and Gas Producers.

- 2.1.2. All documents need to be returned back to OWNER which are taken for the study and no information shall be shared in any form to any third party or any statutory authority without prior written permission from OWNER.
- 2.1.3. Sample report framework describing methodology, compliance of applicable standards shall be prepared by Contractor/Service Provider and same approved by OWNER and / or its representative before execution of Job. The quality of the report shall be decided and approved jointly by OWNER.
- 2.1.4. Contractor/Service Provider shall address all the inputs / comments / suggestion provided by OWNER on the report.

2.2 CONTRACTOR/SERVICE PROVIDER'S SCOPE OF WORK

General:

The scope/ specification covers the minimum specified requirement for the various activities to be carried out by the Contractor/Service Provider towards the contract; but not limited to

- 2.2.1. All the Travel, Transportation, Stay, equipment, appliances, standards or other things of whatsoever nature required in or about the execution of the work, whether of temporary or permanent nature shall be provided by the Contractor/Service Provider with no extra cost to OWNER. Without limiting the generality thereon, Contractor/Service Provider shall do all work necessary at each of the activity which is required to complete job in all respect.
- 2.2.2. Contractor/Service Provider shall deploy adequate manpower, with relevant educational qualifications & professional experience in similar field to perform their duties as per the requirement of contract (but not limited to); to carry out entire work effectively in scheduled time, within the scope.
- 2.2.3. Contractor/Service Provider shall take prior approval from OWNER before deploying manpower /personnel's for carrying out any safety engineering study assignment. Contractor/Service Provider shall submit the CV of the personnel to OWNER for approval before initiation of work till the end of the tenure and if deemed necessary OWNER may take interview for screening of manpower/personnel proposed by Contractor/Service Provider. OWNER shall have right to reject the proposed manpower/personnel without any prejudice and without providing any clarification to Contractor/Service Provider.
- 2.2.4. All persons engaged by the Contractor/Service Provider shall be the Contractor/Service Provider's own employee and they will claim no privileges from OWNER. The Contractor/Service Provider will directly be responsible for the administration of his employee as regard to general discipline and courteous behaviours.

- 2.2.5. The Contractor/Service Provider shall be solely and exclusively responsible for employing persons in execution of this CONTRACT. The OWNER shall have no liability whatsoever concerning the Contractor/Service Provider's employees in any respect.
- 2.2.6. Before starting of WORK, Contractor/Service Provider shall familiarize for the Work having obtained approval / clearance from OWNER.
- 2.2.7. Contractor/Service Provider and its representatives shall take utmost care of OWNER's reputation in public while performing the job.
- 2.2.8. Contractor/Service Provider shall not allot sub-contract for any or part of the above job.
- 2.2.9. All the responsibility for the completion of job will be in the Contractor/Service Provider's scope.
- 2.2.10. Contractor/Service Provider shall dedicate at least 8 hours for HAZOP session of complex P&IDs for e.g. CGS, CNG Stations, LNG / LCNG Stations, major equipment like compressor, Decompressor skid etc.
- 2.2.11. Contractor/Service Provider shall dedicate at least 4 hours for HAZOP session of simpler P&IDs for e.g. CNG Cascade, Dispenser, CNG/LNG Transportation Trucks, and Priority Panel etc.
- 2.2.12. All HAZOP sessions will be carried out virtually/remotely through WEBEX/VC etc. to optimize travel cost.
- 2.2.13. If GGL had already carried out HAZOP session for a particular equipment or installation through current service provider or by previously contracted service provider, contractor/Service provider shall review existing report and discuss inputs if any with GGL however shall be bound to make typical HAZOP report for similar installation with similar equipment P&ID on the basis of previously done HAZOP session.
- 2.2.14. This CONTRACT is non-transferable and non-assignable. The Contractor/Service Provider shall not transfer or assign the whole or any part of the CONTRACT in any manner whatsoever without prior consent of the OWNER in writing in this behalf.
- 2.2.15. The WORK site would be on case to case basis across the GGL operational areas, but no additional transportation charges/miscellaneous charges would be paid.
- 2.2.16. If the WORK is not executed as per OWNER satisfaction level then Contractor/Service Provider shall do the necessary rework at his own cost. Failing upon which OWNER shall reserve the right to complete the work at his own and the actual cost incurred to execute such WORK shall be collected from Contractor/Service Provider.
- 2.2.17. No additional cost shall be paid to the Contractor/Service Provider in case a re-study is demanded by the OWNER due to non-compliance of obligations under this contract.
- 2.2.18. Contractor/Service Provider shall strictly adhere to the HSE requirements as per instruction of the OWNER representative.

2.3 SPECIFIC TERMS & CONDITIONS

- 2.3.1. Contractor/Service Provider shall collect all the required data and documents required for undertaking the safety engineering studies under this contract
- 2.3.2. Contractor/Service Provider shall depute independent and competent manpower as per the requirement of this contract to carry out the relevant safety engineering studies.
- 2.3.3. Contractor/Service Provider shall carry out site visits required for safety engineering studies,. CONTRACTOR/SERVICE PROVIDER shall ensure data collection through a site visit and validation of source of data during site visit; but not limited to.
- 2.3.4. Contractor/Service Provider shall ensure that relevant studies are carried out using latest and authentic version (8.22 & higher) of PHAST & SAFETY software.
- 2.3.5. Contractor/Service Provider shall ensure that latest software version are used for OWNER's assignments/work. Software license shall always remain valid during the contract period with OWNER.
- 2.3.6. Valid License copy of the software shall be submitted to GGL whenever the software is upgraded.
- 2.3.7. Contractor/Service Provider shall provide communication facilities to the crew member's i.e. Mobile telephone for better communication between remote sites.
- 2.3.8. Contractor/Service Provider shall arrange the Computers/laptop including relevant software for daily report generation & data compilation.
- 2.3.9. Contractor/Service Provider shall ensure all assumptions, rule sets, study methodology, data sources, out comes, recommendations, graphical representation of outcomes where required, etc. used in the safety engineering studies are clearly described and fully referenced; but not limited to.
- 2.3.10. Contractor/Service Provider shall submit an electronic copy of the draft report through email for review of OWNER. OWNER shall provide necessary comments / inputs if any and same shall be incorporated by Contractor/Service Provider in revised draft report version for approval of OWNER. OWNER shall be the final authority for approval of report.
- 2.3.11. Contractor/Service Provider shall submit final report after approval from the OWNER in 1 colour hard copies as well as 1 electronic copy in compact discs (CDs) or through Email. Electronic copy of the final report shall be in format (PDF, DWG, WORD, etc.) as instructed by OWNER time to time.
- 2.3.12. Contractor/Service Provider shall present the final report of the study via meeting OWNER shall have the right to decide the presentation place which shall be located at any GGL operational area.
- 2.3.13. The consultant/service provider shall not communicate or use in advertising, publicity, sale releases or in any other medium, photographs or other reproduction of the work under this contract or description of the site dimensions, quantity, quality or other information, concerning the work and name of the company unless prior written permission has been obtained from OWNER.

2.3.14. During carrying out safety engineering studies, site/installations details, data, information if any obtained or gained from the OWNER during the contract, shall be kept strictly confidential and shall not be in any case shared, disclosed or used anywhere or to anyone. Any breach found of such shall lead to Service provider compensating to OWNER for all the damages and may also lead to termination of this contract and blacklisting for any future contracts with OWNER.

2.3.15. WORK RESPONSE TIMELINE

The following critical parameter describes the system performance and service level expectations and requirements during the Implementation phase of contract. The service level includes target performance measures, unacceptable measures and the related penalties for not meeting required service levels.

A. For QRA, HAC, EMERA

- **Intimation** – Intimation to carry out safety engineering studies shall be given by OWNER through EMAIL communication to Contractor/Service Provider
- **Site visit & Data collection** – Contractor/Service Provider shall obtain approval from OWNER and carrying out site visit & data collection within 3 working days from the intimation date or as asked by OWNER
- **Draft report submission** – 1ST DRAFT Report - Contractor/Service Provider shall submit 1st draft report for review of OWNER within 15 working days from the date of site visit or date of receipt of data for that particular site.
- **Review and Comments** – OWNER shall provide comments / inputs if any on the draft report submitted by Contractor/Service Provider.
- **Revised draft report versions after incorporating OWNER comments / inputs** - Contractor/Service Provider shall submit the revised draft report versions after incorporating all the comments / inputs given by OWNER within 3 working days from the date of comments / inputs provided by OWNER, for review of the OWNER
- **Final report** – Upon satisfactory incorporation of all the comments / inputs provided during review and presentation, Contractor/Service Provider shall seek approval for submission of final report. Contractor/Service Provider shall submit the soft copies of final report within 2 working days through email from the date of approval of final report by OWNER.
- **Presentation of final report outcomes** – If asked by owner, Contractor/Service Provider shall present the final report, out comes to the OWNER and respective GGL team within 7 working days or at convenient time suggested by OWNER from submission of final report. Contractor/Service Provider shall obtain approval from OWNER for the same.

B. For HAZOP, HAZID & ENVID

- **Intimation** – Intimation to carry out safety engineering studies shall be given by OWNER through EMAIL communication to Contractor/Service Provider
- **Data collection** – Contractor/Service Provider shall collect required data and documents within 3 working days from the intimation date or as asked by OWNER
- **HAZOP /HAZID / ENVID session** – Contractor/Service Provider shall plan the session required for HAZOP / HAZID / ENVID study along with OWNER multi-disciplinary team within 3 working days or as asked by OWNER. HAZOP / HAZID / ENVID session schedule shall be mutually agreed by OWNER and Contractor/Service Provider. However, OWNER will be the final authority to decide the schedule for the HAZOP / HAZID / ENVID session.

- **Draft report submission** – 1ST DRAFT Report - Contractor/Service Provider shall submit 1st draft report for review of OWNER within 5 working days from the HAZOP / HAZID / ENVID session
- **Review and Comments** – OWNER shall provide comments / inputs if any on the draft report submitted by Contractor/Service Provider
- **Revised draft report versions after incorporating OWNER comments / inputs** - Contractor/Service Provider shall submit the revised draft report versions after incorporating all the comments / inputs given by OWNER within 3 working days from the date of comments / inputs provided by OWNER, for review of the OWNER
- **Final report** – Upon satisfactory incorporation of all the comments / inputs provided during review and presentation, Contractor/Service Provider shall seek approval for submission of final report. Contractor/Service Provider shall submit the soft copies of final report within 2 working days through email from the date of approval of final report by OWNER.
- **Presentation of final report outcomes** – If asked by owner, Contractor/Service Provider shall present the final report, out comes to the OWNER and respective GGL team within 2 working days or at convenient time suggested by OWNER from submission of final report. Contractor/Service Provider shall obtain approval from OWNER for the same

C. For Typical HAZOP

- **Intimation & Data collection** – Intimation to develop Typical HAZOP report along with all relevant equipment details and reference HAZOP report/worksheet (Sample OWNER HAZOP report made by current or previous service provider for similar installation/equipment to be used as reference) shall be given by OWNER through EMAIL communication to Contractor/Service Provider
- **Draft report submission** – 1ST DRAFT Report - Contractor/Service Provider shall submit 1st draft report for review of OWNER within 3 working days from the above step of intimation and data receipt in case of original HAZOP report made by same service provider and within 10 working days for the first instance, in case of original HAZOP report was made by some other service provider.
- **Review and Comments** – OWNER shall provide comments / inputs if any on the draft report submitted by Contractor/Service Provider
- **Revised draft report versions after incorporating OWNER comments / inputs** - Contractor/Service Provider shall submit the revised draft report versions after incorporating all the comments / inputs given by OWNER within 5 working days from the date of comments / inputs provided by OWNER, for review of the OWNER
- **Final report** – Upon satisfactory incorporation of all the comments / inputs provided during review and presentation, Contractor/Service Provider shall seek approval for submission of final report. Contractor/Service Provider shall submit the soft copies of final report within 2 working days through email from the date of approval of final report by OWNER.

Note - Contractor/Service Provider shall obtain prior approval of OWNER in case he needs any timeline extension in any assignment communicated to him by OWNER. OWNER shall be the final authority to grant timeline extension if justified.

2.3.16. In case of any hazard like fire, leakage etc. due to gross negligence of the Contractor/Service Provider, OWNER reserves the right to impose penalty up to actual damage cost and or termination of Work Order depending upon the gravity of the situation.

2.3.17. Contractor/Service Provider shall sort out the queries, if any during the site visit or within 2 days of site visit.

2.3.18. PENALTY CLAUSE

Sr. No	Parameter	Service Level Agreement	Penalty
1	Legal compliance:		
1.1	Non-compliance to applicable Statutory and legal requirements	100 % Compliance	In case of noncompliance, may lead to termination of services or contract subject to discretion of GGL
2	Execution of services		
2.1	Execution of safety engineering studies	Execution of the work shall be strictly done as per the tender terms. Service level agreement for safety engineering report submission must be followed as per 2.3.15 WORK RESPONSE TIMELINE.	In case of non-compliance in SLA for safety engineering study; OWNER shall deduct penalty of INR 200/- per delayed days from CONTRACTOR's bill subject to discretion of GGL.
<p>Note: Instance will be restricted to one instance (stage) per day per assignment*.</p> <p>*Assignment – Execution of safety engineering study/studies intimated through EMAIL communication by OWNER to Contractor/Service Provider shall be consider as one assignment.</p>			

No penalty shall be applicable in case of;

- A. Force majeure,
- B. When GGL has instructed not to carry out the work, for which only written evidence shall be considered / granted.
- C. Reasons attributable to GGL.

The cumulative penalties arising out of Service Level Agreements detailed above shall not exceed 10% of the overall contract value or cumulative invoice value whichever is lower.

The penalties deducted in excess of 10% of cumulative final bill/invoice value shall be adjusted & reimbursed to the contractor along with the final bill.

2.3.19. MANPOWER REQUIREMENT

Manpower requirement to be followed by Contractor/Service Provider to carry out safety engineering studies; but not limited to

Sr. no	Type of study	ROLE	Minimum Manpower requirement to be followed by Contractor/Service Provider
1	HAZOP / HAZID / ENVID	Chairman	<ol style="list-style-type: none"> 1. Shall be an independent person 2. Shall be experienced in the HAZOP and HAZID / ENVID technique and have the skills and robust confidence to lead the team 3. Chairman with minimum of 10 years of experience in conducting HAZOP for Oil and gas and chemical industry 4. Shall have experience of carrying out minimum of 10 studies (HAZID+ENVID+HAZOP) in last 2 year for Oil and gas and/or chemical industry
		Scribe	<ol style="list-style-type: none"> 1. Minimum of 2 years of experience in conducting / part of HAZOP and HAZID/ENVID for Oil and gas and/or chemical industry 2. Shall have experience of carrying out / part of minimum of 5 studies (HAZID+HAZOP+ENVID) in last 2 year for gas transmission and distribution industries
2	QRA, HAC, EMERA	Principal Engineer	<ol style="list-style-type: none"> 1. Shall be an independent person 2. Shall be experienced in the QRA, HAC and EMERA technique and have the skills and robust confidence to lead the team 3. Minimum of 10 years of experience in conducting QRA, HAC, and EMERA for Oil and gas industry installations 4. Shall have experience of carrying out minimum of 10 studies (QRA+HAC+EMERA) in last 2 year for Oil and gas industry installations
		Team member (Software operator, data collector etc.)	<ol style="list-style-type: none"> 1. Minimum of 5 years of experience in conducting / part of (software operations, data collection, interpretation, etc.) QRA, HAC, EMERA for Oil and gas industry installations 2. Shall have experience of carrying out / part of minimum of 5 studies (QRA+HAC+EMERA) in last 2 year for Oil and gas industry installations

3. MINIMUM REQUIREMENTS – TECHNICAL

3.1 Contractor/Service Provider shall give brief introduction of relevant study before starting of HAZOP/HAZID/ENVID session with OWNER representatives to make them aware about the process, methodology, assumptions, exclusions etc.

3.2 Hazard Operability study (HAZOP)

Minimum requirements to be followed for carrying out the Hazard Operability studies of OWNER installations are as below; but not limited to

- 3.2.1 OWNER will provide required technical details for HAZOP studies which may include,
 - a) Process description and parameters
 - b) P&IDs
 - c) Materials of construction
 - d) Physical properties and hazardous data sheets for chemicals (MSDS)
 - e) Layout (if applicable)
 - f) Any other as required
- 3.2.2 Planning the HAZOP session along with OWNER multi-disciplinary team
- 3.2.3 Identifying nodes considering various operating/design parameters
- 3.2.4 Applying Parameters; Guidewords; Determine Deviation; Identify all potential causes of the deviation; Appraise the Consequences of the deviation; qualitative evaluation or estimation of the severity of the consequences using Risk assessment matrix; Appraise the Safeguards preventing or mitigating the deviation and its consequences; Providing Recommendation with justification.
- 3.2.5 Once all causes and consequences for a given deviation have been identified and the requirement for action discussed, the process iterates until all Guidewords have been combined with a selected parameter; Once that all guidewords have been considered the next parameter will be selected and the process will be repeated until all parameters have been applied; and the discussion moves to the next node and the process will be repeated until all nodes are applied.
- 3.2.6 Referring IEC 61882 Hazard and Operability Studies (HAZOP Studies) – Application Guide
- 3.2.7 Documenting all the discussions systematically
- 3.2.8 Preparation of the draft report for review, comments and inputs from OWNER for finalisation
- 3.2.9 Incorporating inputs and changes to address comments of OWNER on draft report, if any provided
- 3.2.10 Presentation and submission of final report after OWNER's approval as per OWNER's requirement

3.3 Hazard Identification & Environmental Impact Identification (HAZID & ENVID) study

Minimum requirements to be followed for carrying out the HAZID and ENVID studies of OWNER installations are as below; but not limited to

- 3.3.1 OWNER will provide required technical details which may include,
 - a) P&ID, layout/ GA drawings

- b) Operating and design pressures
- c) Applicable procedures for all the activities involved
- d) Process Description
- 3.3.2 Planning the HAZID/ENVID session with OWNER multi-disciplinary team
- 3.3.3 Referring BS EN ISO 17776 Guidelines on tools and techniques for hazard identification and risk assessment
- 3.3.4 Listing out the systems / sub systems / activities involved
- 3.3.5 A list of pre-identified Hazards and Environmental Aspects is adopted & applied to every system / subsystem / activity; every Hazard is checked whether applicable or not; if the Hazard is applicable, its Source is identified as well as Causes, Consequences and Safeguards; qualitative evaluation of risk by applying risk assessment matrix and provide recommendations. Provide recommendation
- 3.3.6 Documenting the entire process
- 3.3.7 Preparation of the draft report for review, comments and inputs from OWNER for finalisation
- 3.3.8 Incorporating inputs and changes to address comments of OWNER on draft report, if any provided
- 3.3.9 Presentation and submission of final report after OWNER's approval

3.4 Quantitative Risk Assessment (QRA) study

Minimum requirements to be followed for carrying out the QRA studies of OWNER installations are as below; but not limited to

- 3.4.1 OWNER will provide required technical details which may include
 - a) Process description and parameters
 - b) General Plant layout drawing or layout drawings of the facility
 - c) Piping lengths and sizes (for estimation of failure frequencies) as required, for identified scenarios / risk analysis.
 - d) As-built route drawing or alignment sheets (In case of pipeline QRA)
 - e) Updated P&IDs
 - f) Composition of fluid handled in the pipeline / facility
- 3.4.2 Site visits shall be carried out for all the installations/locations to collect & verify the correctness of the information / data.
- 3.4.3 Population & Environmental data of the surrounding areas shall be collected by the Contractor/Service Provider. The weather data needs to be taken from the state meteorological department (refer PNGRB notification – Wind Rose diagram – with 24 directions) and selection of stability of winds needs to be selected with written logic.
- 3.4.4 Identification of key hazardous initiating events based on the proposed activities
- 3.4.5 Contractor/Service Provider shall use latest version of PHAST & SAFETI QRA assessment software.
Note: As on date there is no software recommended by either PNGRB or MOEF Govt of India, in future if there are any such recommendations, the Contractor/Service Provider should comply with the said requirements
- 3.4.6 The Contractor/Service Provider shall use all the latest approved OGP international data base for failures or probabilities as asked by OWNER and should mention the details / references in the report
- 3.4.7 Estimation of the frequency of key events occurring and development of scenario logic (event tree) for all possible outcomes arising from each top event. Also estimate the probability of each outcome

on event trees. The Contractor/Service Provider shall identify and indicate failure modes, its effects and carry out criticality analysis for most probable and worst-case scenario events

- 3.4.8 The Contractor/Service Provider shall also indicate causes arising out of each event as Fault tree analysis
- 3.4.9 Calculate the quantity of material that may be released in each failure, estimate the probability of such occurrences
- 3.4.10 Evaluate the consequences of such occurrences based on scenarios such as most probable and worst case scenario events
- 3.4.11 The consequence modelling approach and the specific models used by Contractor/Service Provider shall be clearly described within the QRA report. Each stage of the consequence modelling (e.g. discharge, dispersion, toxic effects, fire or explosion, etc.) shall be clearly reported, including discussion of the results. Contractor/Service Provider shall publish the results derived from dispersion and consequence modelling in tabular as well as graphical form
- 3.4.12 The Contractor/Service Provider shall clearly identify the high risk portions of the pipelines network, CGS, CNG stations , PRI and related facilities and show with colours the different damage distances & contours on the actual route diagrams of the pipeline/ or plot plan of the facility
- 3.4.13 Assessing Individual Risk, location specific individual risk and make graphical representation by contouring it
- 3.4.14 Carry out Impact analysis to estimate potential loss (of life, equipment, revenue, environment) from each outcome
- 3.4.15 Integration of the likelihood and consequence to obtain the total risk
- 3.4.16 Development of the risk assessment criteria based on applicable PNGRB notification requirement
- 3.4.17 Assessment of the risk (comparison of different options, comparison against tolerability criteria or against historical achievement, etc.)
- 3.4.18 Contractor/Service Provider shall ensure QRA results are presented to clearly show the most significant contributors to total risk to assist in the identification of potential risk reduction measures
- 3.4.19 The estimated risk needs to be graphed on the ALARP bands as per PNGRB criteria clearly showing the Intolerable, ALARP or Tolerable and Broadly Acceptable bands
- 3.4.20 Recommend appropriate actions to meet ALARP if the risk levels are unacceptable. Identifying risk reduction measures and assessing the effectiveness of such measures. Every recommendation and measures proposed shall be provided with;
 - Detailed standard references / recommended engineering practices in which it is referring to
 - Risk reduction value demonstration if recommendation is implemented
 - Financial feasibility
 - All supporting methodologies , calculations , design as applicable
- 3.4.21 Document all the models systematically
- 3.4.22 Contractor/Service Provider shall ensure all assumptions; rule sets and data sources used in the QRA are clearly described and fully referenced. The Contractor/Service Provider shall ensure QRA report clearly document all of the steps in the QRA process including the frequency analysis and consequence analysis
- 3.4.23 For less complex facilities with standard design units, QRA may use standard industry data from similar operating facilities at a unit or system level. However, for complex facilities, Contractor/Service Provider QRA study shall be based on fully detailed parts counts and the use of

suitable industry failure data or release frequency data at a component level (e.g. per pump, flange, instrument connection, etc.).

- 3.4.24 ALARP demonstration is to be carried out in case there are multiple methods available for reducing overall risk at a facility
- 3.4.25 The results of QRA are an estimate and only representative of the potential risks which may exist to the extent that the input data, assumptions and rule sets are representative of reality. Therefore, Contractor/Service Provider shall use suitably conservative data sets and assumptions, etc. QRA studies to ensure that they do not under-predict risk, and the modelling limitations and the sensitivity of the results to selected significant inputs/assumptions shall be documented in the QRA report
- 3.4.26 Contractor/Service Provider shall provide Intermediate results (such as leak rates for hydrocarbon systems, ignition rate or fire frequency for the facility) to assist in bench-marking facilities against each other, against other sources of historical accident data
- 3.4.27 All assumptions made during the study shall be clearly documented
- 3.4.28 Preparation of the draft report for review, comments and inputs from OWNER for finalisation
- 3.4.29 Incorporating inputs and changes to address comments of OWNER on draft report, if any provided
- 3.4.30 Presentation and submission of final report after OWNER's approval

3.5 Hazardous Area Classification (HAC) study

Minimum requirements to be followed for carrying out the HAC studies of OWNER installations; but not limited to

- 3.5.1 Contractor/Service Provider shall carry out the hazardous area classification to identify the hazardous zones of each installation considering potential sources of hydrocarbon release and other relevant factors so that the appropriate type of electrical equipment for control of ignition sources can be specified for use in the installation.
- 3.5.2 OWNER will provide required technical details which may include which may include
 - a) Process description and parameters
 - b) P&ID, layout/ GA drawings
 - c) Size of orifice in relief valves, vent details, etc.
- 3.5.3 Site visits shall be carried out for all the installations/locations to collect & verify the correctness of the information / data
- 3.5.4 Calculation of zoning distances based upon criteria of IEC 60079-10, IP 15, IS 5572, IS 5571 and relevant Standards and guidelines. This includes estimation for each applicable equipment / system the flow rates considering probability of venting, release rate from dispersion modelling, average number of release source, ignition source, ignition probability, probability of occupancy, leak sizes, grades of release, release frequency level including exposure calculation, probability of ignition sources, level of ventilation, etc.
- 3.5.5 The Contractor/Service Provider shall provide detailed back-up calculation for the above with reference of all data / tables used from various standards, and assumptions as a minimum
- 3.5.6 Preparing hazardous area classification AutoCAD drawings, marking of the hazardous zones on plot plans and also showing elevations as applicable
- 3.5.7 Review the hazardous area classification drawing with OWNER and revise as necessary to finalize agreed classification

- 3.5.8 Preparation of the draft report for review, comments and inputs from OWNER for finalisation
- 3.5.9 Incorporating inputs and changes to address comments of OWNER on draft report, if any provided
- 3.5.10 Presentation and submission of final report after OWNER's approval. Report consisting of 3 colour copies of hazardous area classification drawings in A0/A1/A2 size as instructed by OWNER (Drawing detail should be readable and in OWNER approved size) for each site installations with supporting calculations. Contractor/Service Provider shall submit soft copy of HAC drawings in PDF high resolution and AutoCAD compatible (DWG) file along with soft copy of the report

3.6 Escape, Muster, Evacuation and Rescue assessment (EMERA) study

Minimum requirements to be followed for carrying out the EMERA studies of OWNER installations; but not limited to

- 3.6.1 The EMERA assessment shall be carried out in accordance & in-compliance to the requirements stated in "OGP risk assessment Data directory"
- 3.6.2 Inputs from QRA, HAZID and HAZOP shall be considered for EMERA assessment
- 3.6.3 Site visits shall be carried out for all the installations/locations by the Contractor/Service Provider
- 3.6.4 Segregation of the process / utility systems into fire areas that can be effectively isolated as a single system. Characterization of these systems in terms of pressure, temperature and mass of gas and liquid present
- 3.6.5 Identification of credible scenarios (E.g. Jet fire, Pool fire, BLEVE, Explosion etc.) whose consequence justifies their assessment
- 3.6.6 The principles of Escape, Muster, Evacuation and Rescue (EMER) shall apply to all facilities (from simple office buildings to major industrial complexes, plant, facilities and construction sites) with the aim to ensure there is always a means to remove personnel away from the effects of foreseeable hazardous events (e.g. office fires, gas releases, gas fire, etc.) to a place of safety
- 3.6.7 The arrangements made for EMER shall be designed to cope with the maximum envisaged total number of persons at the facility. The maximum number that the provisions can cope with shall be clearly defined
- 3.6.8 All assumptions made in the EMERA shall be clearly documented. Facilities shall undertake a fully detailed quantitative assessment including consequence modelling of all applicable credible scenarios (E.g. Jet fire, Pool fire, BLEVE, Explosion etc.) The criteria adopted for the assessment (e.g. in relation to impairment of escape routes by heat, smoke etc.) shall be clearly documented and justified
- 3.6.9 The EMERA shall identify the EMER provisions that are required based on the particular features of the facility, the typical effects of the hazards that exist and the numbers of personnel who may be affected by them
- 3.6.10 Where EMER arrangements are found to be inadequate, measures for reduction of risk associated with EMER shall be identified and prioritized using ALARP. The risk reduction measures shall be proposed and agreed with the OWNER
- 3.6.11 Contractor/Service Provider shall assess the existing escape routes, emergency exits and assembly points, Alarm system as applicable
- 3.6.12 Contractor/Service Provider shall identify and mention the following things in report; but not limited to

- a) Escape routes and alternate escape routes
- b) Emergency exits and alternate emergency exits
- c) Assembly points and alternate assembly points
- d) Distribution and effectiveness of alarm systems
- e) Performance criteria for escape routes
- f) Recommendations

- 3.6.13 All the different scenarios assessed during EMER assessment shall be complied and consolidated into a single drawings / sheet for ease in understanding
- 3.6.14 Preparation of the draft report for review, comments and inputs from OWNER for finalisation
- 3.6.15 Presentation and submission of final report after OWNER'S approval. Report consisting of 3 colour copies of EMERA drawings in A0/A1/A2 size as instructed by OWNER (Drawing detail should be readable and in OWNER approved size) for each site installations with supporting calculations. Contractor/Service Provider shall submit soft copy of EMER drawings in PDF high resolution and AutoCAD compatible (DWG) file along with soft copy of the report.

4. CONTRACT DURATION

The contract shall remain valid for 2 years from the date of issuance of contract

5. QHSE REQUIREMENTS

SCOPE AND APPLICATION

Contractor/Service providers are the key stake holder and an integral part of Gujarat Gas Ltd (GGL's) business. Contractors'/Service provider' Quality, Health, Safety and Environment (QHSE) performance reflects on the company's business performance and reputation. GGL has established QHSE Management Systems, Procedures & Guidelines to ensure compliance with GGL's QHSE requirements. These requirements apply to all jobs whilst conducting work for GGL including; Project, Construction, Operation & Maintenance, Field Operations and Services within any given contract or agreement. The overall objective of QHSE management in contract/agreement is to improve the company and Contractor's/Service providers' QHSE performance in all aspects of activities. Active and on-going participation by both the GGL and Contractor/Service provider is essential to achieve this objective.

RESPONSIBILITIES

It is responsibility of GGL management and staffs to ensure that all Contractors/Service providers work under their direction & control are provided with relevant Integrated Management System (IMS) Policies, Procedures & Guidelines that describe the GGL requirements for undertaking work within the company. It is also the responsibility of Contractors/Service providers to ensure that their staff are informed of and comply with GGL's requirement whilst working for the company.

GGL HSE department provides advice and assistance on QHSE requirements across the complete spectrum of all work activities. Contract Owner (Department Head) and Contract Holder (Work in-charge) are responsible to ensure safe execution of work/service include the following:

- Ensuring that the QHSE Policy, Procedures & Guidelines are known and understood by all contractors'/service providers' staff and work force
- Monitoring, Inspecting & Auditing execution of work, activities to ensure adherence to the QHSE compliance requirements

The Contractors'/Service provider' will take the responsibility for implementation of GGL's QHSE Policy, Procedures, Guidelines and other requirements with the advice and support of the GGL's Contract Owner / Contract Holder and HSE representative.

Contractor/Service provider to ensure that all aspects relating to QHSE are adequately addressed and implemented in accordance with the GGL QHSE requirements and QHSE Management Plan, which shall include the management processes and activities to be implemented during the course of work with GGL.

Contractor/Service provider shall be responsible for ensuring that adequate HSE resources are put in place to enable satisfactory implementation of QHSE Management Plan.

This responsibility also applies to ensure the Health and Safety of the people are directly and indirectly engaged / involved whilst working or present at GGL's work area / sites.

MOBILIZATION

- Post selection and awarding of contract, GGL shall arrange a kick-off meeting with Contractor/Service provider where GGL team members Contract Owner (CO), Contract Holder (CH) & HSE representative) will discuss on QHSE Management aspects / plan and requirements in order to make sure that Contractor/Service provider and their team are fully understand the expectation of GGL. During the meeting, QHSE Management Plan shall be discussed and agreed between GGL and Contractor/Service provider
- Contractor/Service Provider shall ensure that all tools, tackles, equipment, machineries & instruments are adequately deployed and are 'Fit for Purpose'. Pre-mobilisation checks/inspection shall be carried out by GGL team for the same before the start of work.
- GGL emphasizes on the importance of the Health and Fitness of all staff/work force deployed at GGL work sites. Contractor/Service provider shall adhere to medical check-up as per the GGL Health check-up matrix (as applicable)
- A proper HSE orientation and training will be organised by GGL for the Contractor/Service provider workforce before the start of work; under no circumstances should the Contractor/Service provider commence the work unless they have undergone the HSE training (as applicable)
- Contractor/Service provider shall ensure that all their staff/work force are provided required Personal Protective Equipment (PPEs) as per GGL PPE matrix (as applicable)
- Contractor/Service Provider shall ensure all required emergency arrangements like Medical treatment, FIRST AID box and Firefighting equipment (as applicable)

EXECUTION

Contractor/Service provider is responsible to ensure the compliance with GGL QHSE requirements. GGL overall QHSE performance is directly influenced by the contractors' performance.

- Contractor/Service provider is responsible for QHSE compliance monitoring at site/work activities to ensure that work/activity is performed in a safe manner. Moreover, they are responsible for reporting of all incidents, Hazard and Near Miss that might happen during work/activity
- Contractor/Service provider shall follow and comply with GGL "Work Permit" system
- During work execution and activities, GGL team will regularly monitor and evaluate the performance of the Contractor/Service provider to identify the shortfalls and weaknesses and assist to improve the overall performance including QHSE performance through CPAR process (as applicable)

We believe that everyone at GGL, Employees, Contractors, Service providers and Associates have the right to go home safely to their families.

HSE Defaults and Penalties (As applicable)

QHSE Defaults and Penalties (As applicable)		
S. No.	Description	Penalty Amount
1	Non-compliance to use of PPE during site visit	Rs. 1,000/- per site visit
2	Violation of safety instructions provided by OWNER representative during site visit	Rs. 1,000/- per site visit
2	Non-compliance to Use of Seat belt while Travelling for GGL work	Rs. 500/- per instance

Remark: Issuance of MEMO against HSE non-compliances including above mentioned defaults shall be decided by Contract Holder

QHSE GUIDELINE (AS APPLICABLE)

1 Contractor/Service provider...

- a) shall ensure that all staff/work force comply with the requirements of the GGL HSE Management System, QHSE policy, standard, procedures, guideline, plan & Life Savers at work site
- b) shall ensure issuance of Identity Card to their team members
- c) shall arrange work related Personal Protective Equipment (PPEs) for their staff/work force and ensure proper use during the execution of job
- d) shall carry out the work within the duty hours/office hours. No Work shall be carried out without permission of GGL's representative beyond the official duty hours unless otherwise agreed upon prior to start of work and recorded appropriately
- e) shall ensure that all tools, tackles, appliances, machines, vehicles, instruments or other equipment are Fit for Purpose and maintained safe working condition at all times and are used only by authorized and competent persons
- f) shall ensure that all Hazards, Near miss, accident, incident, injuries are reported promptly to GGL. Action arises due to reported Hazards, Near miss, incident investigation; audit/inspection shall be closed out as per agreed timelines with site in-charge
- g) shall deploy staff & work force trained, qualified and competent for the work and well aware of risks and mitigation action/s for the activities undertaken
- h) shall initiate immediate actions to hospitalize injured person(s)
- i) shall ensure an injury free, incident free workplace and protect people from harm caused by work activities
- j) shall ensure use of seatbelts while driving four-wheeler and use of crash helmet for Two-wheeler riders during job execution
- k) staff/work force shall not smoke or resort to misuse of drugs, medicines or alcohol while on duty

2 In case of any incident like fire, gas leakage etc. due to gross negligence of the Contractor's staff/work force, GGL reserves the right to impose penalty up to actual damage cost and or termination of work order depending upon the gravity of the situation.

3 Any breach of the QHSE requirements shall be deemed by the company to be a material breach of the terms & condition of the contract. GGL shall be entitled to take appropriate actions including instructing the contractor to (a) remedy the breach; (b) suspend the work or (c) terminate the contract.

4 All activities shall be carried out as per GGL's documented procedures and QHSE requirements, deviation from it shall be dealt with very strictly