PETROBRAS	REPORT	Nº: I-ET-3000.00-5400-983-P4X-002	
	CLIENT: -		SHEET: 1 de 10
	JOB: -		
	AREA: -		
SRGE	TÍTLE: SAFETY LAYOUT REVIEW (SLR)		ESUP
			INTERNAL

INDEX OF REVISIONS

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0	ORIGINAL

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DATE	MAY/08/2023					
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SUMMARY

1. INTRODUCTION

The Safety Layout Review (SLR) is a technique based on a check-list methodology, that is a simple form of risk identification, used to identify hazards and accidental situations upon the arrangement of the Unit, and propose recommendations, when necessary. The technique provides a list of typical uncertainties in the form of questions that need to be considered in the design.

The team can use a list, standards or internal procedures previously developed in the preparation of these typical questions according to the nature of the project.

Once the scope of the activity is defined, a checklist is selected that covers the scope accordingly. Checklists need to be carefully selected for this purpose.

2. PURPOSE

This Technical Specification has the following purpose:

2.1. Define scope and criteria for conducting SLR for project phase of Concept Design of Offshore Production Unit, hereinafter referred to as the Unit.

2.2. Guide the dynamics for the planning, development and follow up of the analysis by the parties involved and final approval thereof.

2.3. Define the model, minimum content and minimum requirements for submission of the SLR report.

3. SCOPE

The SLR analysis shall cover typical uncertainties regarding the arrangement of the Unit analyzed, aircraft operations and other events inherent to its operation, identifying the main situations where any recommendation shall be done.

The final SLR report shall be issued in Portuguese (Brazil). If the contractual language of the project is English, the report shall also be issued in English.

Analyzes shall be based on the data, released by Petrobras, contained in the project documentation of the Unit used as reference, according to this Technical Specification.

If pending or incomplete information is identified in the project documents, prior to the SLR or during its development, the SLR Leader shall request them from the Designer. These requests shall be informed to Petrobras.

The final report of SLR shall contain the complete list of reference documents, indicating the revision used in the analysis. It is SLR Leader's responsibility the verification of completeness of the list of documents.

It is the responsibility of the Designer to carry out the management of change of the reference documents for the realization of the SLR and the consideration of its impacts (changes) in the analysis. All changes shall be informed and approved by Petrobras.

The final SLR report shall be submitted to formal approval by Petrobras.

4. ABBREVIATIONS AND DEFINITIONS

Abbreviations:

PFD - Process Flow Diagrams

SIGEM – Sistema Integrado de Gerenciamento de Empreendimentos

SLR – Safety Layout Review

Definitions:

4.1. Hazard - Condition or property inherent in a substance, an activity, a system or a process, with potential to cause harm to people, environment, asset or image of the Company.

4.2. Designer - company responsible for the elaboration of the engineering project, which may be conceptual design, basic design or executive design, being Petrobras itself or contracted company.

4.3. Recommendations - proposed measures to prevent the occurrence of the accidental event or mitigate its consequences, whenever the existing safeguards are considered insufficient.

4.4. Risk - Combination of the expected frequency of occurrence of an accidental scenario with the severity of its consequence.

4.5. Safeguard - Any device, system or action, already planned in the project or existing in the Unit, capable of interrupting the chain of events that occurs from an initiating event, reducing the probability of occurrence of the undesirable scenario or reducing the severity of its consequences.

5. REFERENCE DOCUMENTATION

5.1. As inputs for the elaboration of SLR, the following documents shall be considered, in its most up-to-date version and with status of COMMENTS ADDED or RELEASED by Petrobras at

SIGEM or another electronic document management system defined in a contract. The revision of each document to be used shall be clearly indicated in the analysis report.

a) General Arrangement of the Unit. Specific equipment layout of accommodations, process plant; utilities and hull compartments such as engine room, pump room, bow compartments shall also be used, if available.

b) PFDs. In the absence of PFDs, a Process Overview containing oil and gas processing systems shall be used.

5.2. Additional documents shall be provided for the identification of the following aspects of the project:

a) Containment and drainage for equipment handling flammable / combustible liquid and hazardous substances (toxic, corrosive).

b) Location of air intakes for closed spaces; process equipment vents; flammable / combustible / chemicals product storage vents, as well as discharges of internal combustion equipment (turbomachinery). All hot surfaces shall be indicated (equal to or greater than 60°C).

c) Type of floor that separates the decks (plated or grid floor).

d) Helicopter operation and vessel approach operations (recommended)

5.3. Other documents can be used to assist the team during the analysis. They shall be properly recorded, with their revisions, in the report.

5.4. The documentation shall be available to the SLR leader and to the participants at least 10 days before the analysis start date.

6. REQUIREMENTS FOR THE PARTICIPATING TEAM DEFINITION

The following are the main requirements for professionals involved in SLR:

6.1. The SLR shall be elaborated by a multidisciplinary team involving professionals from the Designer and Petrobras. The team shall be formed by professionals involved in the project and that are experienced in the area they represent, with representatives of the following disciplines: process, instrumentation/automation and control, safety, mechanics, electrical, naval*, operation, maintenance and subsea* systems professionals.

* Applicable when the analyzed system interfaces with naval or subsea systems.

6.2. The analysis leader shall have experience in applying checklist methodology and in leadership of risk analysis for offshore production Units.

6.3. The defined SLR team shall have composition, function and attributions performed as follows:

Table 1 - Basic composition of the SLR team

FUNCTION	ACTIVITIES
COORDINATOR	Professional of the designer responsible for the event and who shall: · organize the team; · gather up-to-date information, such as PFDs, general arrangement, etc. · distribute material to the team; · schedule meetings.
SLR LEADER	Professional of the SLR consulting who knows the technique, responsible for: · comply with the schedule of planned meetings; · explain the technique to be employed to the other participants, facilitate meetings and define its progress status; · ask participants for pending from the previous meetings; · prior evaluation of the documentation to be used in the analysis, defining the sections to be evaluated; · preparing the final analysis report.
PARTICIPANTS	Professionals of the designers/suppliers and Petrobras, who have knowledge about the design of the unit or system to be analyzed, or experience acquired in similar systems/units. At least one representative from each discipline shall have at least 3 years' experience in the area they represent. Each discipline shall have a professional with this experience, not necessarily the same professional, for full-time participation during SLR.
SPECIALISTS	Professionals from the designer, suppliers or even Petrobras who have advanced knowledge about specific equipment, technologies or systems that can participate on demand, according to the need.

7. PLANNING

Prior to the SLR, a planning stage shall occur, when shall be defined the objectives and scope of the analysis, the schedule of the meetings, the identification of the necessary documentation, the location of the meetings and the team involved, in accordance with item 6.

In addition, invitations shall be sent and all the documentation to be used shall be previously available to the participants.

The language for conducting and recording SLR meetings shall be defined.

During planning, all interfaces between systems shall be identified, which shall be included in SLR scope, in order to guarantee their integrated analysis.

The requirements for this meeting can be found in item 9.1.

8. METHODOLOGY

The methodology of SLR is based on checklist. The checklists to be used is a list of aspects regarding the arrangement of the Unit and that involves safety issues, that shall be considered during the project development. The questions shall have been developed usually from experience, either as a result of a previous risk assessment or as a result of past failures.

The main aspects that the checklist shall cover are the following, but not limited to:

- Segregation of Areas
- Aircraft Operations
- Vessel Operations
- Loss of Containment
- Impairment of Accommodations and Non-Hazardous Areas
- Process Areas, Utilities, Hull Layouts
- Vent and Flare Systems
- Mechanical Handling and Positioning of Cranes
- Evacuation / Abandonment

Once the checklist which adequately covers the scope is defined, the SLR leader using the checklist steps through each element of the aspects and fulfill the spreadsheet with answers to which question. Recommendations / actions shall be defined when the analysis team finds necessary.

8.1. Regarding recommendations, additional comments and notes

Recommendations are proposed measures to prevent the occurrence of the accidental scenario or mitigate its consequences whenever the existing safeguards are considered insufficient.

Recommendations shall be clear, concise, well-defined and preceded by action verb. Terms such as planning, designing, elaborating, identifying, specifying, installing, etc. shall be complemented by conclusive actions.

For each recommendation originating from the SLR, the company or organization responsible for its implementation shall be identified.

The designer shall manage the implementation of these recommendations generated in the analysis, including the impact on the revision of reference documents used in the SLR. If any recommendation is not implemented, or an alternative solution is indicated, it shall be justified and submitted to Petrobras' approval.

Observations are complementary information that can be recorded to clarify the scenario analyzed, without, however, requiring any action.

Further comments are general or specific information that may contribute to clarification of aspects considered in the analysis, but which do not fit as recommendations or observations.

The SLR recommendations will be identified as SLRxxx, the observations will be identified as Oxxx, and the additional comments will be identified as Cxxx, where xxx corresponds to the sequential numbering.

9. REQUIREMENTS FOR SLR MEETINGS

Meetings shall follow as described below:

9.1. Planning Meeting

The scope of this meeting is to summarize the project to be assessed, define the objectives and scope of the contracted analysis, as well as evaluate and make the necessary adjustments in the work schedule proposed by the SLR Consulting, where the minimum agenda shall be:

- Define Petrobras, designer and executor of SLR teams (preparation of list of participants to issue invitations).
- Clarifications on objectives and scope of the analysis.
- Prior analysis of all necessary documentation for the execution of the SLR and elaboration of hold list, if any, to be completed by the Designer.
- Presentation of proposal meetings schedule by the SLR Consulting and evaluation regarding the project schedule.
- Definition of locations, resources needed and duration of meetings.
- Participants: Representatives of Petrobras, designer and SLR Consulting (mandatory participation of the SLR leader).

9.2. Initial SLR meeting and others study development meetings

At the initial SLR meeting, the Leader shall address the following topics:

- Participants presentation.
- Presentation of analysis objective and scope.
- Presentation of the meetings schedule.
- Brief presentation of the methodology and premises.
- Short description of the Unit.

- Description of process systems.

Participants: Professionals from Petrobras, designer and SLR Execution (including the SLR Leader), as defined in item 6 of this specification.

10. REPORT CONTENT

The SLR report shall be issued according to N-1710 and N-381, it shall be issued within five (5) days after the conclusion of the meetings.

The SLR Report shall include at least the following items:

10.1. Purpose and scope of the analysis

Description of the objectives, the scope covered by the analysis, and the structure of the report.

10.2. List of participants

The list of participants shall contain the general data of each participant (full name, company, department, position, contact email, project discipline representing and time of experience in it).

10.3. Executive summary

10.4. Introduction

The introduction shall contain the description of the Unit, description of the process plant, considering modes of operation, and any relevant aspects related to the analysis.

10.5. Justification and description of the SLR technique

10.6. List of documents

All the documents that were used for the analysis with their respective revisions shall be listed.

10.7. Analysis Development

10.8. Assumptions list defined for the analysis. It shall be part of the analysis spreadsheet.

10.9. List of recommendations

It shall be presented in a table to allow management of the implementation of the recommendations. It shall be listed in this table, as well as at the analysis spreadsheet, the responsible for each recommendation, the corresponding scenario number and the project phase of its implementation.

10.10. List of observations

In case there is a list of observations, it shall be displayed in a table, with the corresponding scenario number.

10.11. Additional considerations

These shall be presented in a table along with the identification of those responsible.

10.12. Conclusions

10.13. References used in the analysis

10.14. ANNEXES

a. Filled out SLR worksheet

The completed worksheet shall be presented, as shown in ANNEX of this specification.

b. Documents analyzed

c. Signed presence list

The daily presence lists (morning and afternoon) shall be attached, which shall be signed by the participants in each of the meetings.

11. ANNEX

The following spreadsheet is an example of items to be analyzed in SLR.

ANNEX%20-%20SLR%20spreadsheet.xlsx