

| | | | | | |
|---|--------------------------------|--|----------------------------------|----------------------------|--|
|  PETROBRAS | TECHNICAL SPECIFICATION | | Nº I-ET-3000.00-5400-947-P4X-004 | | |
| | CLIENT: | | | SHEET 1 de 6 | |
| | PROGRAM: | | | | |
| | AREA: | | | | |
| DDP-SRGE | TITLE: RISK ASSESSMENT | | | NP-1 ESUP | |

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

| | | | | |
|---------------------------|--|--|--|--|
| INDEX OF REVISIONS | | | | |
|---------------------------|--|--|--|--|

| | | | | |
|------------|---|--|--|--|
| REV | DESCRIPTION AND/OR REVISED SHEET | | | |
|------------|---|--|--|--|

| | | | | |
|---|----------|--|--|--|
| 0 | ORIGINAL | | | |
| | | | | |

| | REV. 0 | REV. A | REV. B | REV. C | REV. D | REV. E | REV. F | REV. G | REV. H |
|-----------|------------|--------|--------|--------|--------|--------|--------|--------|--------|
| DATE | 26/11/2019 | | | | | | | | |
| PROJECT | ESUP | | | | | | | | |
| EXECUTION | PETERDINIZ | | | | | | | | |
| CHECK | IGORG | | | | | | | | |
| APPROVAL | PAOLO | | | | | | | | |

THE INFORMATION IN THIS DOCUMENT IS PETROBRAS PROPERTY AND ITS USE FOR OTHER PURPOSES IS FORBIDDEN.
THIS FORM IS PART OF PETROBRAS N-0381 REV.L



SUMMARY

| | | |
|-----------|--|----------|
| 1. | INRODUCTION..... | 3 |
| 2. | OBJECTIVES..... | 3 |
| 3. | ESCOPE..... | 3 |
| 4. | ABBREVIATIONS AND DEFINITIONS | 3 |
| 5. | RESPONSABILITIES | 4 |
| 6. | METHODOLOGY AND CRITERIA | 4 |
| 7. | REPORT | 5 |
| 8. | INFORMATION SECURITY..... | 6 |
| 9. | REFERENCED DOCUMENTS..... | 6 |



1. INTRODUCTION

- 1.1 On Risk Assessment Report, hazards associated to four main accidental loads (fire, explosion, dropped objects and ship collision) are presented and evaluated for the Main Safety Functions (MSF) of the Stationery Production Unit (SPU), however not limited to them, in order to achieve tolerability criteria established for the project
- 1.2 The SPU Risk Assessment shall be done after the execution of the Safety Studies in such a way that gathers in a unique document all impairment frequencies that may impact a MSF. The impairment frequency for each accidental load shall not be greater than the established criteria on Project's Safety Engineering Guideline and, in case some of the MSF has impairment frequency above the established criteria, recommendations shall be proposed in order to reduce its impairment.

2. OBJECTIVES

- 2.1 This technical specification has the following objectives:
- 2.1.1 To define scope, methodology and criteria to verify if MSF impairment of a SPU fulfill the hazards tolerability criterion established for the project.
- 2.1.2 To define a standard and minimal content that shall be presented by the analysis to verify the fulfillment of the tolerability criterion established for the project for the impairment of the MSFs of a SPU.

3. ESCOPE

- 3.1 The tolerability criteria established for the project for each MSF verification fulfillment, shall be continuous, such that all changes that alters the hazards presented on the Safety Studies shall refeed information presented on Risk Assessment report of the SPU, as an additional tool to the continuous process of management of change foreseen on reference [1].

4. ABBREVIATIONS AND DEFINITIONS

- 4.1 For the effect of this specification, the following abbreviations and definitions shall be considered:
- 4.2 ABBREVIATIONS:
- 4.2.1 SPU – Stationary Production Unit
- 4.2.2 TS – Technical Specification.
- 4.2.3 MSF - Main Safety Functions
- 4.3 DEFINITIONS:
- 4.3.1 Deviations - Changes in design intentions or normal operating conditions. The relation of the applicable deviations is obtained from the combination of the process parameters (variables) with the guidewords.



- 4.3.2 Study executor - Is responsible for the execution of the study, and may be a contracted company, either by the Designer or Petrobras, the Designer himself or an internal Petrobras body.
- 4.3.3 Safety Studies - All studies of hazard identification and risk analysis, consequence studies and other complementary safety studies carried out in the project.
- 4.3.4 Frequency - Physical quantity indicating the number of occurrences of an event in a given time interval.
- 4.3.5 Total Impairment Frequency – Frequency Sum of all sceneries that affect a MSF above the established criteria for each defined parameter.
- 4.3.6 Main Safety Function (MSF) – Function that a safety item shall fulfill to make capable and/or guarantee the efficiency of the emergency response strategy, scape and abandonment of the asset during an accidental event. Theses main functions are defined on the Safety Guidelines.
- 4.3.7 Integrator - Company responsible for joining all platform systems, with the function of managing all the recommendations generated in the various phases of a SPU design.
- 4.3.8 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.
- 4.3.9 Recommendations - Proposed measures to reduce the likelihood of an accidental scenario or to mitigate its consequences whenever existing safeguards are considered insufficient.
- 4.3.10 Hazard - Combination of the expected frequency of occurrence of a scenario with the severity of its consequence.

5. RESPONSABILITIES

- 5.1 It is the responsibility of the designer/integrator to consider the changes occurred in the various phases of the project that can impact the safety studies, performing a management of these changes according to reference [1]. The process of management of change shall be kept in a way that the calculated impairment frequencies for each accidental load identified by these changes and that impact the MSF shall be updated in the report of item 7 of this specification.
- 5.2 Designer/integrator/study executor shall guarantee the fulfillment of the requirements established on this specification.

6. METHODOLOGY AND CRITERIA

- 6.1 The designer/integrator/study executor shall elaborate a report that contains a hazard global analysis of the SPU aiming to gather in a unique document all impairment frequencies that can impair the MSFs.

6.2 The impairment frequency for each accidental load shall not be higher than the impairment criterion established, the applicable recommendations shall be proposed in the original study related to the accidental load which is above the criterion in order that the identified hazards shall be reduced below the established tolerability criteria. The Risk Assessment Report shall not be source of recommendations for the project, being this a consolidation to guarantee the fulfillment to the project criteria.

6.3 Analysis shall consider all safety studies performed in the phase where the project is.

6.4 The Risk Assessment Report shall consider the impairment frequency summary of the MSFs considering the last revision of the respective project phase.

6.5 In case of project's hiring or implementation strategy implies on the safety studies development in a segregate way by system or packages, the Risk Assessment Report shall consolidate the data from all performed studies, in such a way that do not represent partial sights of the MSFs impairment. In this case, the report shall contain the description that clarifies the interfaces and intersections of the performed analysis.

6.6 The Risk Assessment shall be consistent with the safety studies recommendations implementations, considering project final configuration and the effectiveness of the implemented recommendations on the project, such as the existence of passive fire protection, flange covers, ship collision avoidance mechanisms or dropped object, structure design criteria for explosion loads, and others.

6.6.1 The Risk Assessment report shall consider the impacts in case of the existence of any recommendation of safety study that impairs the impairment frequency of the MSFs that is no implemented on the project or that has received alternative treatment to the original proposed solution in the respective study.

6.7 The report shall contain the evaluation of impairment criterion fulfillment of the MSFs for each accidental load, according to the preconized on the project's Safety Guideline.

7. REPORT

7.1 The designer/integrator/study executor shall elaborate a report containing, at least, the following items:

7.1.1 Executive Summary;

7.1.2 Introduction;

7.1.3 Objective;

7.1.4 Referenced Documents, including their revisions;

7.1.5 SPU description;

7.1.6 MSFs descriptions;

7.1.7 Accidental loads descriptions and the analyzed effects;

7.1.8 Risk Assessment, containing:



7.1.8.1 Description of the MSFs impairment tolerability criteria established for the project.

7.1.8.2 Table with the impairment frequencies of the MSFs, for each accidental load and the total impairment frequency, with the indication whether the total impairment frequency is according to the tolerability criteria established for the project.

7.1.9 Conclusions.

7.2 The report shall be issued for Petrobras approval.

7.3 The report shall be issued in the project idiom and in Portuguese.

8. INFORMATION SECURITY

8.1 In addition to the disposed on Safety Guidelines of the project, the Project Designer and the Study Performer must have a data security system that guarantees the integrity, reliability, traceability, confidentiality and inviolability of the data contained in the study and the data provided by Petrobras. All information must be preserved against accidental or information security events for at least five years.

9. REFERENCED DOCUMENTS

- [1] I-ET-3000.00-5400-947-P4X-001- Management of Change for Safety Studies
- [2] Petrobras Standard - N-1710 – Technical Engineering Documents Codification
- [3] Petrobras Standard - N-381 - Drawing Execution and Others Technical General Documents