



Exploration & Production

GENERAL SPECIFICATION

ENVIRONMENT

GS EP ENV 001

Environmental requirements for projects design and E&P activities

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Contents

1. Scope	3
1.1 Purpose	3
1.2 Applicability.....	3
2. Reference documents.....	3
3. Terms and Definitions.....	6
4. Environmental regulations and standards.....	7
5. Environmental requirements for projects design and E&P activities.....	7
5.1 Environmental footprint.....	7
5.2 Flaring and GHG emissions.....	8
5.3 Other atmospheric emissions	9
5.4 Liquid effluents.....	10
5.5 Waste management.....	15
5.6 Drilling fluids and cuttings	17
5.7 Chemicals	18
5.8 Design of chemicals and petroleum products storage	18
5.9 Noise level	19
5.10 Dust, odours and lighting	19
5.11 Spill response equipment	19
5.12 Decommissioning of installations.....	20
Bibliography.....	22
Appendix 1 Glossary.....	24
Appendix 2 Complementary measures for flaring reduction	26
Appendix 3 Complementary measures for optimizing energy use.....	27
Appendix 4 Waste types and categories.....	28



1. Scope

1.1 Purpose

The purpose of this General Specification is to establish the environmental requirements for projects design and E&P activities.

1.2 Applicability

This General Specification applies to all operated affiliates and projects managed by the E&P branch of the Group.

It covers all the phases of the projects design and E&P activities: seismic exploration, exploratory and production drilling, preliminary and conceptual, pre-project, basic and detailed engineering, construction, installation, commissioning, production, decommissioning.

Remark: some requirements cannot be applied as early as the preliminary or conceptual stages or pre-project study (data not available, not relevant to apply so early in the project life, etc.). In this case, they shall be applied at a later stage.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
ISO 1996-1	Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures
ISO 1996-2	Acoustics - Description, measurement and assessment of environmental noise - Part 2 : determination of environmental noise levels

Professional Documents

Reference	Title
IFC Policy and Performance Standards	Policy and performance standards on social & environmental sustainability, International Finance Corporation, World Bank Group, 2007
Report No 29555	A voluntary standard for global gas flaring and venting reduction, World Bank Group, May 2004
IMO Resolution A.672 (16)	Guidelines and standards for the removal of offshore installations and structures on the continental shelf and in the Exclusive Economic Zone, adopted on 19 October 1989



Regulations

Reference	Title
Montreal Protocol	The Montreal Protocol on substances that deplete the ozone layer, September 1987 and subsequent amendments
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic, September 1992 and subsequent amendments
OSPAR Recommendation 2008/1	OSPAR Recommendation 2008/1 amending OSPAR Recommendation 2000/4 on a Harmonised Pre-screening Scheme for Offshore Chemicals (HOCNF), 2008
Directive 2008/98/EC	Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
Decision 2000/532/EC	Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste (and subsequent amendments and/or corrections)
Directive 2000/76/EC	Directive 2000/76/EC of the European Parliament and of the Council of 04 December 2000 on the incineration of waste (and subsequent amendments and/or corrections)
Directive 99/31/EC	Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (and subsequent amendments and/or corrections)
Regulation (EC) No 1907/2006	Regulation (EC) N°1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
IMO MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL) and subsequent amendments (2008)

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	



Total General Specifications

Reference	Title
GS EP CIV 401	Minimum requirements for building design and construction
GS EP CIV 403	Temporary construction camps and associated facilities (onshore)
GS EP ENV 111	Baseline Study: Environmental status of an onshore site
GS EP ENV 112	Offshore Environmental Baseline Study
GS EP ENV 113	Environmental Baseline Study: Coastal survey
GS EP ENV 120	Environmental Impact Assessment of E&P activities
GS EP ENV 270	Deep well disposal
GS EP ENV 421	Landfill design and operation for E&P sites
GS EP GEO 505	Monitoring of Metocean conditions for offshore units
GS EP MEC 010	Rotating Machine Package Specification – Turbogenerator
GS EP MEC 020	Rotating Machine Package Specification – Turbopump
GS EP MEC 030	Rotating Machine Package Specification – Turbocompressor
GS EP MEC 032	Rotating Machine Package Specification - Gas Engine or Electrical Motor driven Reciprocating Compressor
GS EP MEC 292	Rotating machines packages: Installation requirements
GS EP SAF 221	Safety rules for buildings
GS EP SAF 228	Liquid drainage
GS EP SAF 262	Pressure protection relief and hydrocarbon disposal systems
GS EP SAF 341	Location and protection of onshore hydrocarbon storage
GS EP STR 651	General principles for a F(P)SO design

3. Terms and Definitions

Best Available Techniques (BAT)	The latest stage of development (state of the art) of processes, of facilities or of methods of operation which indicate the practical suitability of a particular measure for limiting discharges, emissions and waste (OSPAR Convention , appendix 1), when economically achievable.
Coastal (also called nearshore) water	In the absence of more stringent local regulations, coastal water starts from the lowest low-tide point and extends up to 3 nautical miles towards the sea
Fresh water	Any surface or groundwater which can be used for human consumption or agricultural use without undergoing a complex processing. This usually applies to waters from utilities grid, from non-contaminated aquifers (private wells) and from non-contaminated rivers or lakes: dry residue < 1500 mg/l.
Hazardous waste	Any waste which displays one or more of the following hazardous properties: explosive, oxidizing, flammable, irritant, harmful, toxic, carcinogenic, corrosive, infectious, toxic for reproduction, mutagenic, sensitizing, ecotoxic..., for man and the environment A complete list of hazardous wastes is usually provided in the respective regulations, and differentiates them from non-hazardous wastes (for example Decision 2000/532/EC)
Inert waste	Waste which is not subject to any significant physical, chemical or biological transformation, shall not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact, in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant.
Low Pressure/ Low Low Pressure gases (LP/LLP gases)	Gases that include, but that are not limited to, condensate and crude stabilization units' emissions, TEG units' emissions, etc. Other sources, depending on the project.
Non-hazardous waste	Waste not covered in previous category (usually waste from households, as well as commercial, industrial, institutional and other waste which, because of its nature or composition, is similar to waste from households)
Potable water	Any water, pumped from surface water or groundwater which can be used directly for human consumption with limited treatment (also called drinking water).
Produced water	Means water which is produced in oil and/or gas production operations and includes formation water, condensation water and re-produced injection water; it also includes process water used for desalting oil.
"Unless not feasible"	Technical non-feasibility or disproportionate economic cost if compared to the environmental benefit.

**Waste**

Any substance or object which the holder discards or intends or is required to discard ([Directive 2008/98/EC](#)). Wastes are characterized according to their toxicity and degree of risk for the environment, and are classified into three main groups based on risk criteria ([Directive 99/31/EC](#))

The list of acronyms used in the present document is in **Appendix 1**.

4. Environmental regulations and standards

DGEP HSE Policy states that: *"In all its operations, the DGEP acts in compliance with national and international legislation and regulations, with the applicable industry standards and Company Specifications."*

Local regulations and standards relevant to environmental preservation in offshore/onshore oil and gas activities shall be applied.

The provisions included in the present specification shall be applied in the absence of more stringent local regulations or standards.

5. Environmental requirements for projects design and E&P activities

To reduce any significant impact of the future activities on the natural and human environment, mitigation measures shall be identified and selected according to the BAT concept and approved by Company.

The Environmental Impact Assessment study (EIA) requirements, when available, shall be integrated in the design definition.

5.1 Environmental footprint

The minimisation of the environmental footprint of the project in any of its phase and including construction shall be systematically implemented.

Particular attention shall be paid to areas where biodiversity is particularly rich or sensitive.

The Environmental Baseline Study (EBS) and EIA studies (refer to [GS EP ENV 111](#), [GS EP ENV 112](#), [GS EP ENV 113](#) and [GS EP ENV 120](#)) or any relevant information provided by Company shall be used as a basis for localization of rich biodiversity and ecologically sensitive zones (deep offshore ecosystems, spawning grounds, sea grass beds, coral reefs, mangroves, natural reserves, pristine rain forest, etc.) and social aspects (fishing zones, water intake points, archaeology, rock art, community settlements, aquaculture, tourist areas, etc.).

Local environmental and social sensitivities shall be taken into account to determine the followings:

- Onshore: site selection, land use, layout of the installation, safety and security distances, pipeline RoW width limitation, pipe route selection, access, visual impact limitation, clearing limitation, landscaping and site conservation, erosion control, etc.
- Offshore: restricted areas, drawbacks to marine fisheries and maritime transportation, seabed disturbance, etc.

Site selection and location shall also take into account natural risks (flooding, seismic events, soil erosion, ground stability and other geo-hazards, etc.).



5.2 Flaring and GHG emissions

The design of new developments shall comply with the following:

- Elimination of continuous flaring and venting in accordance with Company's commitment to adhere to what is stated in the GGFR Voluntary standard ([Report No 29555](#)).
- To keep as low as possible GHG emissions. This includes temporary flaring and venting minimisation, and optimization of fuel gas and energy efficiency.
- To monitor directly or indirectly the flows and characteristics of significant GHG emission sources.
- GHG emission sources and associated emissions shall be identified according to the Company-approved methodology.
- Minimisation of GHG emissions and optimization of energy efficiency shall be considered in the selection of the development scheme and main equipments. The accordance with Company's objectives with respect to energy efficiency and GHG emissions reductions shall be considered.

5.2.1 Flaring and venting minimisation in new projects

Facilities shall be designed to comply with the following:

- No continuous flaring of associated gas, including LP and LLP gas streams, during normal operation, unless there is no feasible alternative. To be noted that safety flaring (gas purging of flare headers) is not covered by this requirement.
- If gas cannot be marketed or used as fuel gas, re-injection either into the producing reservoirs or other adequate reservoirs shall be the base case.
- No continuous venting of associated gas, unless there is no feasible alternative. If venting is to be considered, its replacement by flaring shall be evaluated wherever it represents an environmental benefit in terms of GHG emissions and complies with Company's safety requirements.
- No continuous venting of CO₂ from decarbonation units (amines, membranes), unless there is no feasible alternative or the native CO₂ vented is not significant when compared to the CO₂ from the combustion.
- Flaring during new field's start-up shall be minimized. The project team shall set a strategy and a detailed technical plan (available for internal review) to demonstrate how flaring shall be minimized: schedule of commissioning, flaring and venting profiles including well drilling, testing and workovers and mitigation measures.
- Temporary flaring related to operational upsets shall be minimized by ensuring the targeted availability of the critical systems. Adequate redundancy and/or adequate spare parts philosophy, preventive and curative maintenance strategy and means shall be implemented.
- Flare headers metering systems should cover all the range of gas flow to flare with a good accuracy.
- Instrumentation technologies powered by instrument gas should be avoided whenever feasible, or vented volumes should be minimized.

A non-exhaustive list of complementary measures to be studied in the design for flaring reduction can be found in **Appendix 2**.

5.2.2 Optimization of fuel gas and energy use in new projects

The design of a new facility shall ensure an optimized use of energy, including, but not limited to, the minimization of fuel gas consumption:

- Optimization of energy use shall be considered not only for the oil & gas plateau, but also for the entire life of the facility.
- Where justified by the process heat requirements, the installation of a WHRU on gas turbines shall be the base case.
- A system for quantifying the energy consumption (fuel gas, electricity, mechanical power) of each key component of the system (gas turbine, compressor, pump, and heater), shall be installed in order to enable the monitoring and optimization of the energy efficiency of that component.
- If possible, the main energy consuming machines should include a system to perform the on-line monitoring of the energy efficiency and to compare it to the expected energy efficiency, in order to be optimized by the operation's team.
- Sampling points shall be installed to characterize the composition of LP and HP fuel gases.

A non-exhaustive list of complementary measures to be studied in the design for optimizing fuel gas and energy use can be found in **Appendix 3**.

5.3 Other atmospheric emissions

Installations shall be designed to comply with the following principles:

1. To reduce the emission of gaseous or solid compounds that affect the air quality and human health: H₂S, SO_x, NO_x, VOC, CO, particulates, etc.
2. To monitor the flow and the characteristics of significant emissions before releasing them to the atmosphere.

5.3.1 Reduction of NO_x, SO_x, VOCs and particulate matter emissions

- When some flaring is unavoidable, an efficient flare tip (smokeless device, reference: **GS EP SAF 262**) shall be installed in order to maximize the combustion efficiency.
- Burning emissions from well testing or purging shall be minimised by optimising the burning system design and the testing procedures.
- Emission sources shall be designed so that ground level concentrations meet ambient air quality standards.
- Dispersion studies should be undertaken on a case by case basis in order to assess the potential impact on air quality.

5.3.1.1 NO_x emissions

Gas-fueled turbines used either for power generation or mechanical drive purposes shall be selected to reach a NO_x emissions target of 75 mg/Nm³ (i.e 37 ppm vol.) or less, at 15% O₂.



The selection of diesel and/or gas engines shall be done according to their NO_x emissions levels which shall be as low as possible. Engines equipped with a NO_x control system should be preferred.

5.3.1.2 H₂S and SO₂ emissions

Utility fuels with the lowest possible sulphur content shall be selected.

Where relevant, a H₂S removal and conversion system should be installed in order to avoid H₂S emissions.

In any installation where sour gas is produced, and which is likely to emit significant quantities of SO₂, sulphur shall be removed from the fuel gas and disposed of in sound environmental conditions (Sulphur Recovery Unit or re-injection into deep layer), unless not feasible.

Where SO₂ emissions are foreseen, a dispersion study shall be carried out to check the compliance with the applicable air quality standards.

5.3.1.3 VOC emissions

Facilities shall be designed in order to minimise VOC emissions which are mainly associated with crude/ condensates storage and loading (FPSO/FSO, terminals), OWTU including API basins, and glycol units.

Whenever it is technically and safely possible, the onshore oil storage tanks shall be fitted with a floating roof. The recovery of VOC from fixed-roof storage tanks and FSOs/ FPSOs storage shall be the base case.

5.3.2 Emissions and air quality monitoring

Gaseous emissions: sampling points shall be installed on the main stacks to monitor the fuel gas emissions. For further details, refer to [GS EP MEC 292](#) and to the dedicated rotating machine package specification ([GS EP MEC 010](#) or [GS EP MEC 020](#) or [GS EP MEC 030](#) or [GS EP MEC 032](#)).

Meteorological station: a meteorological station shall be systematically installed to measure continuously and record, as a minimum, temperature, wind, rainfall, and nebulosity in accordance with [GS EP GEO 505](#).

Air quality monitoring: in specific sensitive areas, measurement stations and/or detectors/monitors may be required to ensure a permanent monitoring/control of air quality.

5.4 Liquid effluents

5.4.1 Management of liquid effluents and preservation of water resources

The main categories of liquid effluents to be considered are the following: produced water, process waters, drainage waters, ballast waters, hydrotesting effluents, sewage, cooling waters, brines, workover fluids and well test fluids. Drilling fluids are considered in § 5.6.

All onshore and offshore installations, including drilling rigs, shall be designed to avoid any risk of leak: the site and the facilities shall be watertight and fitted with adequate retention ponds (onshore), process skid base plates and drip pans connected to a relevant drainage system (in accordance with [GS EP SAF 228](#)) and collected for proper elimination.



All potential discharges to surface waters (rivers, lakes, sea,...) or aquifers shall be identified, quantified and their impact on the environment assessed. A dispersion study may be undertaken on a case by case basis in order to assess the potential risk of the effluent discharges on the natural environment.

Water resources, in particular for onshore or coastal sites, shall be protected and managed through a sustainable development approach taking into account the local environmental and socio-economic constraints.

Any pumping from potable water aquifers for industrial purposes (pressure maintenance, cooling water, etc.) shall be strictly forbidden.

Pumping from fresh water aquifers for industrial purposes (pressure maintenance, cooling water, etc.) shall be avoided.

Injection of used waters, including produced water, to potable or fresh water aquifers shall be strictly forbidden.

In case of pumping fresh waters from aquifers, rivers, etc., cannot be avoided the pumping station shall be systematically equipped with sampling point(s) to enable the periodic monitoring of water quality and a flow meter to record the volume of pumped waters. In addition water level shall be recorded regularly.

5.4.2 Produced waters (incl. Process waters)

Produced waters shall be characterised in terms of volume, physical parameters (temperature, salinity, suspended matters, etc.) and chemical parameters (heavy metals, TPH, dissolved components –including phenol, ammonia, mono and poly-aromatic hydrocarbons, radionuclide, etc.).

Measures ensuring reduction/separation at source (water shut-off, downhole disposal, when applicable) should be considered.

The disposal options for the produced waters shall be studied according to the following priority:

1. Where feasible re-injection into the reservoir shall be implemented.

2. Disposal into other adequate geological formation: injection into deep saline geological aquifers, other than the reservoir, shall also be considered (refer to **GS EP ENV 270**).

3. Treatment and further discharge to the natural environment (**if the above options have been proven not feasible**). In that case, chemicals used for oil-water separation and water treatment, and their dosage, shall be selected according to their impact on the environment. An environmental risk assessment shall be carried out in particular as regards hydrocarbons, thermal and/or chemicals effects.

- Offshore, the produced water treatment process shall be designed to ensure, as a minimum, an oil-in-water content not exceeding **30 mg/l** (quantity of dispersed aliphatic hydrocarbons, measured by an IR method approved by the Company), during normal operations and at any discharge point. On F(P)SOs, when produced waters are mixed with contaminated seawaters as defined in **IMO MARPOL 73/78** Annex I, Regulation 39, they must be treated in order to be disposed of with a maximum oil content of 15 ppm according to **IMO MARPOL 73/78** Annex I and in accordance with **GS EP STR 651**.
- In coastal and onshore areas, the oil-in-water content of the produced water discharges shall not exceed **10 mg/l** (quantity of dispersed aliphatic hydrocarbons, measured by an IR method approved by the Company), at any time during normal operations and at any

discharge point. Additional discharge standards (e.g. physical and chemical parameters) on water quality can be defined taking into account the local conditions.

- In the vicinity, or under the influence, of river mouths (transitional areas) a modeling study shall be performed to determine the acceptable oil-in-water content of the discharged effluent on a case by case basis. (The 10 mg/l specification might be applied beyond the 3 nautical miles limit).

A dilution system of treated or untreated produced water whose purpose is to lower the average concentration of oil to comply with the performance standards shall be prohibited (refer to [OSPAR Convention](#)).

Downgraded situations:

- Temporary off-spec produced water discharge related to operational failure (e.g. injection system or oily water treatment) shall be minimized by designing critical systems with adequate capacity/redundancy.
- In addition, in onshore or coastal areas, temporary buffer capacities should be installed to accommodate off-spec waters before reprocessing them when the normal operations can be resumed.

5.4.3 Drainage and bilge waters

In addition to [GS EP SAF 228](#) requirements, the following shall be applied:

- **Offshore**, effluents from open drains shall meet **a discharge target of 30 mg/l of oil content**.

On F(P)SOs, **machinery space effluents** drainage (or bilge waters) shall be collected separately and treated in order to be disposed of with a maximum oil content of **15 ppm** in compliance with [IMO MARPOL 73/78](#).

- **Onshore**, the oil content in open drain discharges **shall not exceed 10 mg/l**.

In any case, the oil recovered shall be sent back to the process.

5.4.4 Contaminated seawaters

On F(P)SOs, seawater introduced into oil tanks (contaminated waters as defined in [IMO MARPOL 73/78](#) Annex I, Regulation 39) must be treated in order to be disposed of with a maximum oil content of **15 ppm** according to [IMO MARPOL 73/78](#) Annex I.

5.4.5 Ballast water

On F(P)SOs, ballast tanks must be designed in compliance with the [IMO MARPOL 73/78](#).

Any discharge of contaminated effluents shall be discharged according to [IMO MARPOL 73/78](#).

5.4.6 Hydrotesting effluents

Chemicals to be used for treatment shall be selected according to the requirement below.

Onshore, to minimize water consumption, the possibility of testing the pipe section by section with recycling of the effluents in the next section of the pipe shall be considered in the design.

Effluents from hydrotesting shall be neutralized and filtered before their discharge to the environment.



A modelling study shall be carried out to assess the potential impact of the discharge on the environment.

If necessary, the effluents shall be stored in temporary pits for treatment before their discharge.

The release process of hydrotesting effluents shall be studied since the design phase taking into account the environmental conditions.

In coastal areas, the use of sea water shall be preferred for hydrotesting. The possibility of discharging the effluents at a controlled flow rate and/or in batch during ebb tide, below the water surface shall be considered in the design.

Discharges from the offshore side shall be preferred in all cases.

When required, a discharge plan may be developed and approved by the local authorities.

5.4.7 Sewage effluents

Sewage effluents include grey waters (effluents from sinks, showers and laundries) and black waters (toilet effluents) from accommodation, including domestic areas like kitchen and toilets.

The sewage system of living quarters and camps shall be designed in accordance with **GS EP CIV 401**, **GS EP ENV 403** and **GS EP SAF 221** requirements. It should contain as a minimum septic tanks and secondary treatments like macerators and/or bioreactors for offshore installations.

For onshore installations, depending on the environmental conditions, treatment units like biofilters, lagoons, should be designed to treat wastewaters for camps with less than 2000 workers. For camps with a number of workers above 2000, in case of limited land availability, prefabricated electro-mechanical sewage treatment units can be envisaged. In case of sufficient land, biological sewage treatment units (activated sludge units, lagoons, planted filters,...) can also be used.

Due consideration shall be given for the sizing of the sewage treatment system of living quarters, including construction camps where the number of workers can significantly increase.

Discharges of effluents from the sewage treatment system into the environment must be compliant with the local regulations and with **IMO MARPOL 73/78** for offshore installations.

Sludge should be managed through the waste management system.

Sampling points shall be installed at the effluent outlets.

The maintenance of the installation shall be considered as early as the design phase.

5.4.8 Well test fluids

The well test discharges and emissions shall be minimised.

The test equipment shall be correctly designed in order to ensure adequate effluents collection and to avoid any liquid overflow or drop-out (with the test separator correctly sized and the burners designed to fully flare all fluid volumes).

Well test burners shall be selected according to the BAT concept with **improved combustion**. Whenever possible, the liquid phase of the separator shall be re-injected into the process lines or stored in appropriate tanks, and only the gaseous phase shall be burned.



5.4.9 Workover fluids and well clean-up

Production facilities shall be designed to collect, store, treat and eliminate effluents from workover and well operations (clean-up and maintenance) through an adequate system (incinerator, special burners, licensed disposal facilities, etc.). In any case, the discharge of untreated hazardous fluids into the environment is prohibited. Liquids shall be recycled as much as possible.

5.4.10 Water intake protection versus discharges

The location of the water discharge points shall be carefully studied in order to avoid any chemical/ biological contamination, or adverse thermal effect on the existing or projected intake points.

5.4.11 Cooling waters

The temperature of the outlet effluents shall be adapted to the sensitivity of the local environment.

For coastal or offshore waters, the generally accepted temperature increase shall not exceed a maximum of 3°C, 100 m away from the outfall discharge point.

It may be necessary to reduce this maximum temperature for sensitive environments such as coral reefs, rivers, etc. In that case, a modelling study shall be carried out to determine the thermal plume and an ad hoc environmental risk assessment shall be carried out.

For inland plants, the water intake for cooling purposes should be minimized, and the water discharge should be designed in order to reduce the impact on the environment or the water supply to other potential users.

5.4.12 Laboratory effluents

Effluents shall be managed according to **GS EP SAF 228** requirements.

5.4.13 Disposal devices

Onshore, prior to discharging treated produced water to surface water and regardless of the disposal solution considered the system shall be fitted with an observation pond as defined in **GS EP SAF 228**.

Offshore and in coastal areas, discharge-to-sea systems shall be extended below the lowest water level at a depth to be determined by a dispersion study. The need for a diffuser at the end of the disposal tube to ensure an optimal dispersion should be considered.

5.4.14 Monitoring of liquid effluents

In order to fulfil monitoring and reporting requirements during the construction and operation phases, sampling points and/or on-line analysers shall be installed at the effluent treatment unit outlets (OWTU, cooling water, sewage effluents, etc) to enable continuous periodical quantitative analyses.

In addition, flow meters shall be installed at OWTU outlet and other **significant** disposal points (eg. cooling water).

As a minimum, hydrocarbons shall be analysed in produced water effluents (by an IR method approved by the Company).



In onshore and coastal areas, pH, temperature, organic compounds (such as BTEX, Phenol, etc.), BOD, COD, TSS, heavy metals, sulfides and chlorides should be analysed.

Other parameters analyses like ammonia, radionuclide, PAH,...can be required on a case by case basis.

5.4.15 Groundwater monitoring

Onshore, monitoring wells (piezometers) shall be installed in order to monitor the quality of the groundwater if there is a risk of contamination of the water table.

They should be installed close to the main oil and chemicals storages, upstream and downstream from both of them.

5.5 Waste management

5.5.1 General principles

Waste generated during all works, including drilling, construction and production phases, shall be clearly identified, classified as hazardous, non-hazardous or inert (refer to **Appendix 4**) and quantified to allow their adequate collection, segregation, temporary storage, treatment and disposal.

Waste collection, segregation and temporary storage

Waste collection and temporary storage shall be designed to minimise the risk of escape to the environment (for example by particulates, infiltration, runoff or odours). On-site waste storage should be limited in time and volume.

In accordance with the local context, waste sorting (preferably at source or after collection) shall be organized to segregate wastes that require different treatment or disposal systems and to avoid mixing non compatible products.

Dedicated containers (bins, skips etc.) shall be provided in quantities adapted to anticipated waste streams and removal frequency. They should be labelled clearly by type of waste (for example by colour-coding and illustrated by pictographs) and should be installed in the vicinity of work units and in living quarters (away from food storage locations). Containers should be made from durable materials compatible with the waste to be collected, be leak-proof, sturdy, stable, easy to handle/clean/disinfect. They should be designed to prevent the ingress of animals (vectors), escaping odours and placed under cover if necessary for protection from direct sunlight, wind and rain.

Preliminary treatment such as compactor/grinder or clean-up facilities may be necessary to reduce waste volumes or hazards, according to further treatment and disposal options.

Waste treatment & disposal

For each waste stream, treatment and disposal alternatives shall be studied, and preferred treatment & disposal options shall be selected, based on:

- The waste management "5 R principles" hierarchy, i.e.: Reduce, Recover, Reuse, Recycle, Residue disposal.
- A preliminary review of the technical capacity of infrastructures available at local or regional level to handle the waste (in-house or third-parties).



- A risk assessment to evaluate the different waste management alternatives for health, the environment and Company reputation.

In case of absence of, or poorly-constructed or operated existing waste management facilities, Company may decide to provide its own infrastructures, to upgrade existing local facilities or to encourage local third-party capacity building.

In any case, all necessary waste treatment and disposal facilities (controlled landfill, incinerator, bio-centre, etc.) shall be fully operational for the drilling, construction and production phases.

Any landfill shall be designed according to **GS EP ENV 421**.

Incinerator must be designed to satisfy the applicable regulations on atmospheric emissions in compliance with **Directives 2000/76/EC** and **Directive 94/67/EC** or equivalent.

5.5.2 Specific requirements for non-hazardous and inert waste

Recycling/ reuse of plastic, paper, cardboard, glass, scrap metal, wood shall be considered.

Onshore, large installations with living quarters or camps shall be fitted with a compactor, a grinder and when necessary an incinerator in accordance with **GS EP SAF 221** requirements.

As regards the onshore construction camps, which can involve up to several thousands of workers, a modular approach to the sizing for waste treatment shall be studied.

Offshore, the disposal of garbage must comply with **IMO MARPOL 73/78** requirements.

5.5.3 Specific requirements for Hazardous waste

Hazardous waste storage should be designed with special arrangements, e.g.:

- storage on an impervious surface connected to a drainage and collection system and/or in a bunded area in compliance with **GS EP SAF 228**,
- storage area equipped with suitable fire-fighting equipment and spillage recovery equipment such as shovels and absorbent materials,
- restricted/controlled area and access to the storage site (in particular for radioactive waste).

When necessary, special containers shall be installed to collect mercury or NORM waste (including contaminated equipments, pipelines, etc.) for adequate elimination to be approved by Company.

Medical waste with potential risk due to infectious agents and toxic substances shall be separated from other wastes. Used needles and syringes shall be packaged in specific puncture-proof and safe-locking 'Sharps' containers. Other biohazardous waste shall be collected in bags or recipients marked with 'Biohazard' symbol. Medical waste shall be incinerated, or disposed of by landfilling after preliminary treatment by chemical or thermal disinfection.

Lubricating oils and used oils shall be systematically collected to be either injected into the process stream or burnt in specially designed incinerators or eliminated through dedicated recycling circuits - when locally available.

Disposal of non-treated oily effluents and hazardous waste into pits, either for burning (burn pits) or burial, is prohibited.



5.6 Drilling fluids and cuttings

5.6.1 Drilling fluids selection and disposal

All the fluid components for NADF or WBDF shall be selected according to the chemicals selection criteria defined below in § 5.7.

WBDF should be preferred when appropriate.

The use of diesel oil in drilling mud is forbidden in any case.

When a NADF is used, the content in aromatics of the base fluid should be less than 0.1% and shall be, in any case, less than 3% by weight. The measure shall be performed by UV spectrophotometry (method of Burdett).

NADF shall be recovered to be recycled or disposed of. Rigs shall be equipped with a fully watertight floor and efficient closed loop systems in order to optimise the fluid re-circulation and to reduce losses. It is forbidden to discharge NADF to the environment.

5.6.2 Drill cuttings and centrifugation residues treatment and disposal

Treatment and disposal options shall be systematically studied taking into account the regulatory and environmental context.

In the absence of local permitting requirement, the following shall be applied:

In conventional offshore areas, the drill cuttings treatment system shall ensure that the percentage of **NADF discharged** to the sea with cuttings and centrifugation residues (fines) shall not exceed **8 % by weight** (weight of base fluid by weight of dry retorted cuttings, measured with the Retorkit 50 cc method) for **each completed well and only for the sections drilled with NADF**. In addition, daily, the average content of NADF in the dry drill cuttings discharged to the sea shall never exceed 14% by weight.

In sensitive marine areas, NADF cuttings discharge shall not exceed an oil concentration of 1% **by weight** on dry cuttings as required by **IFC Policy and Performance Standards**).

When not feasible, other practicable solutions shall be studied, such as cuttings reinjection or transfer/ Ship to Shore for treatment.

In shallow waters where cuttings discharge is likely to strongly modify the sea bottom topography, cuttings discharge shall be forbidden unless a modelling study demonstrates no hazards to navigation.

Onshore, the most relevant method taking into account the oil or other contaminant contents (heavy metals,...), or a combination, for the drill cuttings treatment and disposal should be selected among the followings :

- Cuttings Re-injection, according to the applicable regulation;
- Storage in suitably lined pits prior to treatment, recycling, and/or final treatment and disposal;
- Drying, burying and covering by top soil (unsalted WBDF);
- Inerting method: stabilisation (mixing cuttings with cement and/or lime at a ratio depending on oil content) with an adequate control of leachate;
- Thermal method: thermal desorption, incineration;



- Biological treatment: static composting (biopile), dynamic composting (windrows); Landfarming
- Controlled landfill (as per **GS EP ENV 421**).

5.7 Chemicals

Chemicals shall be selected according to the following criteria: lowest toxicity, lowest bioaccumulation potential and highest biodegradation and must be in compliance with applicable regulations such as **EC N°1907/2006** for Europe.

Offshore, chemicals shall be selected according to a pre-screening scheme based on the OSPAR methodology in force (refer to **OSPAR Recommendation 2008/1**) and provided with their MSDS.

A risk assessment should be carried out to assess the potential toxicological effect of chemicals when discharged to sensitive area.

The use of the following substances is prohibited :

- Ozone Depleting Substances and all products listed in the **Montreal Protocol**: any use of **CFC**, **HCFC** and **Halons**, which contribute to decreasing the ozone layer, is prohibited except for essential use, under derogation. Alternatives shall be used.
- The use of any transformer containing **PCB**-type fluids is forbidden.
- The use of **Glycol ether** is prohibited.

Bulk supply of chemicals via tote tanks or dedicated containers shall be considered to minimise transfer operations and avoid packaging waste.

The chemical stock shall be properly managed to ensure that any over-capacity and leftover chemicals is avoided. The supply contracts for chemicals/ materials should consider the possibility of returning the unused products to the suppliers.

5.8 Design of chemicals and petroleum products storage

Petroleum products comprise crude oil, diesel, helifuel,...

The storage design shall take into account the products compatibility.

An adequate sized area shall be allocated for the chemicals and petroleum products storage.

The storage areas shall be designed to avoid any leak or spillage to the environment.

As a minimum, the storage and transfer areas shall include a secondary containment (double walled container, skid base plate, bunded area, concrete area connected to a tank,...), adequate ventilation and should be protected from rainfalls and direct sun radiation.

Onshore, large storage areas shall be fitted with an impervious slab (concrete or other) with a slope towards a gutter and a relevant drainage system and be designed in accordance with **GS EP SAF 341**.

Overfills of vessels and tanks should be prevented to avoid spills.

Leak detection may be used in conjunction with secondary containment, particularly in highly sensitive areas.

5.9 Noise level

During construction and operations, three kinds of noise levels have to be taken into account:

1. Equipment noise emissions:

All the noise abatement measures shall be taken to ensure an adequate acoustical insulation of the engines, compressors, turbines (enclose engines) and gas flow lines and valves (lagging, in-line silencers, etc.).

2. Noise emissions on the worksite, offices and living quarters (refer to [GS EP SAF 221](#)).

3. Noise emissions at the facility's boundary limit and in residential areas close to the installations :

A noise modelling study should be carried out during the design phase to evaluate the global noise level and select appropriate technologies, equipment and arrangements to reduce the impact of the installation on the environment and the local communities. The noise maps should consider normal, downgraded and emergency situations.

Onshore, the design shall ensure that the noise levels recorded out of doors of typical receptors, beyond the property boundary of the facilities during normal operation of the site, do not exceed the limits set out in the following table (based on [IFC Policy and Performance Standards](#)) or result in a maximum increase in background levels of 3dB at the nearest receptor location off-site, at any time.

Receptor	Noise Level Guidelines (Out of doors) One hour LAeq (dBA)	
	Daytime	Nighttime
	7 am –10pm	10 pm – 7 am
Residential ;institutional; educational	55	45
Industrial; commercial	70	70

Measurement and assessment of noise in the environment shall be carried out according to [ISO 1996-1](#) and [ISO 1996-2](#) methodology or equivalent.

5.10 Dust, odours and lighting

The study of the layout of the process area, in particular the flare and the OWTU, shall take into account the main wind direction to avoid to impact community settlements.

Lighting should be reduced to the minimum and directed in such a way so as to limit nuisance to the surrounding communities and to avoid to attract animals (such as birds or turtles).

5.11 Spill response equipment

Spills may concern oil, diesel, lube oils, chemicals, condensates, etc.

The results of the preliminary risk assessment study carried out by Company at an early phase of the project shall be used as a basis to determine the needs for spill response equipments and their adequate storage on site in accordance with a tiered response organisation.



The location for the equipment storage area shall be close to the helideck and easily reached by a crane.

5.12 Decommissioning of installations

The decommissioning of installations shall be integrated in the early phase of the design and carried out according to the site restitution study (RES), when available.

In addition to local regulations, the decommissioning practices for offshore installations shall be based on [IMO Resolution A.672 \(16\)](#), which applies to all marine areas (CS and EEZ), except for the North East Atlantic regions where [OSPAR Convention](#) is in force, and Company's requirements.

The following points shall be considered since the design phase : well plugging, installation cold phase, cleaning operations, hazardous products elimination, pieces of equipment and facilities which shall be dismantled and removed, The site restitution should include a restoration program of the natural environment.

The development well architecture shall be designed to facilitate the ultimate plugging operations.

For offshore and onshore sites, as a minimum, the followings shall be anticipated in the design to be implemented at the end of the activities:

Offshore:

All offshore installations shall be designed in such a way so that their entire removal is feasible.

- Superstructures/ topsides shall be totally removed after flushing, cleaning and inerting the requested equipment (capacities, drains).
- Jackets shall be totally and entirely removed and transported to the shore for recycling. Dumping into deep sea environments and/or re-use as an artificial reef may only be considered with the stakeholders' agreement and approval of the authorities.
- Drains and connections between platforms shall be flushed and, depending on the diameters, they can be either removed or left in place with the possibility to be covered (rock dumping) after having been filled in with water.
- Export pipelines shall be flushed, cleaned, may be filled in with water and then left in place. The contaminated effluents from cleaning shall be treated or re-injected in order to fulfil regulatory requirements.
- Underwater installations including wellheads, risers, tower risers, manifolds, jumpers, hydraulic connections and cables shall be removed. In deepwaters, the removal of installations shall be considered on a case by case basis.
- Floating installations, such as FPSO's, TLP, semi-sub, loading buoys, shall be disconnected and towed to the shore for dismantling or re-use.
- Anchor lines shall be removed and transported to the shore. Suction anchors may be left in place if their removal is not possible.



Onshore:

- Production sites and tankfarms, including infrastructures (foundations) and superstructures, shall be cleaned and totally removed.
- Production pads and clusters shall be reclaimed.
- Wells shall be plugged according to Company's requirement.
- Aerial drains and pipelines shall be cleaned, flushed and removed.
- Buried pipes shall be cleaned and flushed, then removed or left in place depending on the future use of the land and subject to the approval of the concerned authorities. If the pipes remain in place, they shall not be the source of any possible incident.
- The treatment of cleaning contaminated effluents shall be designed so as to fulfil the applicable regulatory requirements.
- Underground water and contaminated soils shall be reclaimed in accordance with Company requirements.
- Replanting should be considered to re-insert the site into the environment.



Bibliography

E&P Forum Report No 2.49/170	Oil industry operating guidelines for tropical rainforests, April 1991
E&P Forum and IUCN Report No 2.54/184	Oil and gas exploration and production in mangrove areas. Guidelines for environmental protection, November 1993
Report No 2.55/185	Oil and gas exploration and production in arctic and subarctic onshore regions. Guidelines for environmental protection, 1993
E&P Forum Report No 2.59/197	Methods for estimating atmospheric emissions from E&P operations, September 1994
E&P Forum Report No 2.70/242	Decommissioning, remediation and reclamation guidelines for onshore exploration and production sites, October 1996
E&P Forum Report No 2.72/254	Environmental Management in oil and gas exploration and production. An overview of issues and management approaches, May 1997
OGP Report No 2.84/329	Oil & gas exploration & production in arctic offshore regions. Guidelines for environmental protection, June 2002
E&P Forum Report No 10.16/258	Offshore pipeline decommissioning, August 1997
OGP Report No 342	Environmental aspects of the use and disposal of non aqueous drilling fluids associated with offshore oil & gas operations, May 2003
OGP Report No 413	Guidelines for waste management with special focus on areas with limited infrastructure, September 2008
UNEP	Regional Seas Program 1974
UNEP Barcelona Convention	Convention for the Protection of the Mediterranean Sea against pollution (1974) and Offshore Protocols
Rio Convention (1992)	Convention on Biological Diversity (1992)
AFNOR NF FD X31-61 (french standard)	Qualité du sol – Méthodes de détection et de caractérisation des pollutions. Réalisation d'un forage de contrôle de la qualité de l'eau souterraine au droit d'un site potentiellement pollué, October 1999
	IMO Hong Kong International Convention for the safe and environmentally sound recycling of ships, 2009 (HONG KONG SRC 2009)
IMO Resolution MEPC 139(53)	Guidelines for the application of the revised MARPOL Annexe I requirements to Floating Production, Storage and Offloading facilities (FPSOs) and Floating Storage Units (FSUs)



London Convention (LC72)

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 and Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (1996)

IMO International Convention for the Control and Management of ships' ballast water and sediments (BWM,2004)

Appendix 1 Glossary

API	American Petroleum Institute
BAT	Best Available Techniques
BOD	Biological Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CFC	ChloroFluoroCarbons
COD	Chemical Oxygen Demand
CS	Continental Shelf
EEZ	Exclusive Economic Zone (maritime zone within the 200 nautical miles)
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency (USA)
F(P)SO	Floating (Production) Storage Unit
GGFR	Global Gas Flaring and Venting Reduction
GHG	Greenhouse Gases
HCFC	HydroChloroFluoroCarbons
HP	High Pressure
IR	Infrared
IUCN	The World Conservation Union
LP	Low Pressure
LLP	Low Low Pressure
MSDS	Material Safety Data Sheet
NADF	Non-Aqueous Drilling Fluid
NORM	Naturally Occurring Radioactive Material
OGP	International Association of Oil & Gas Producers
OSPAR	Oslo Paris Convention
OWTU	Oily Water treatment Unit
PCB	Polychlorinated Biphenyls
RES	Site Restitution Study
RoW	Right of Way
TLP	Tension Leg Platform
TPH	Total Petroleum Hydrocarbon
TSS	Total Suspended Solids
UV	Ultraviolet
VOC	Volatile Organic Compounds



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Appendix 1

WBDF

Water Base Drilling Fluid

WHRU

Waste Heat Recovery Unit



Appendix 2 Complementary measures for flaring reduction

As a complement to the requirements and recommendations enunciated in section 5.2.1, the following measures enable the reduction of flaring (non-exhaustive list):

- The valorisation of LP and LLP gas streams as fuel gas, export and/or re-injection can be made through the installation of a Flare Gas Recovery Unit.
- The valves installed on the lines connected to the flare can have internal leaks and release significant quantity of gas towards the flare. The selection of appropriate valves enables the minimization of those leaks.
- The purge of flare lines with nitrogen can be evaluated provided that methane vented together with nitrogen does not induce more GHG emissions than hydrocarbon flaring.
- For fields with expected wells offloading, the volume of gas from sensitive wells offloading could be significant. A compression system would enable recovering this gas and injecting it into the production lines.



Appendix 3 Complementary measures for optimizing energy use

As a complement to the requirements and recommendations listed in section 5.2.2, the following measures enable the optimization of energy use (non-exhaustive list):

- For the power range considered, gas turbines, compressors and pumps should be selected among the equipments offering the best energy efficiency.
- The choice in the number of machines on-duty enables the optimization of fuel gas on the life-of-project basis.
- Variable speed drive enables the reduction of energy consumption during the periods of operation below the nominal load.
- The management of heat transfers in the process should be optimized to keep fuel gas consumption as low as possible (if necessary a pinch analysis can be performed).
- The use of a combined cycle gas/ steam turbine enables large energy savings. It should be evaluated for large onshore plants with energy consumption above 100 MW (electrical + mechanical).

Appendix 4 Waste types and categories

Waste categories	Waste types
Hazardous waste	Chemical waste Contaminated packaging (drums, cans...) Used oils PCB Paint waste (pots, brush...) Hydrocarbon contaminated waste (tank bottom sludges, pigging waste, oil filters, oily rags, contaminated soils ...) Asbestos Used batteries Fluorescent tubes Mercury waste Printing cartridges ⁽¹⁾ Electric and electronic waste ⁽¹⁾ Grit blasting waste ⁽¹⁾ Medical waste Ashes from waste incineration ⁽¹⁾
	NORM (Naturally Occurring Radioactive Materials: scales, contaminated equipment) Radioactive sources (smoke detectors,)
	Regular oil or crude based mud cuttings, Low toxicity oil base mud cuttings, Synthetic oil base mud cuttings
	Water based mud cuttings ⁽¹⁾
Non hazardous waste	Biodegradable waste (vegetal waste, biodegradable food waste) General waste (non contaminated packaging, wood, paper, metal scrap, plastic, glass...)
Inert waste	Sub-products from earth works such as gravels and non contaminated demolition rubble

(1) depending on potential contaminants