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Updating of Environmental Impact Assessment for Nawara Concession Development Project – Gas Pipeline Construction Project (KP0 - KP52)

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Project : Updating of Environmental Impact Assessment for Nawara Concession Development Project - Gas Pipeline Construction Project (KP0 - KP52)

Version : Final Report

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Position: General Manager

Date: January 6th, 2014

This report has been prepared by Environmental Assessment and Management (EAM) with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

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This work has been undertaken in accordance with the Integrated Management System of EAM.

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ACRONYMS & ABREVIATIONS

ANGed	Agence Nationale de Gestion des Déchets
ANPE	Agence Nationale de Protection de l'Environnement
CPF	Central Processing Facility
CRDA	Commissariat Régional de Développement Agricole
EAM	Environmental Assessment and Management
EIA	Environment Impact Assessment
EPCI	Engineering, Procurement, Construction and Installation
INM	Institut National de la Météorologie
FEED	Front End Engineering Design
INS	Institut National de la Statistique
ONAS	Office Nationale de l'Assainissement
EMP	Environemental Management Plan
GIS	Geographic Information System
ODS	Office de Développement du Sud
ROW	Right Of Way
SOTULUB	Société Tunisienne de Lubrifiants
STEG	Société Tunisienne de l'Electricité et du Gaz

NON-TECHNICAL SUMMARY

Introduction

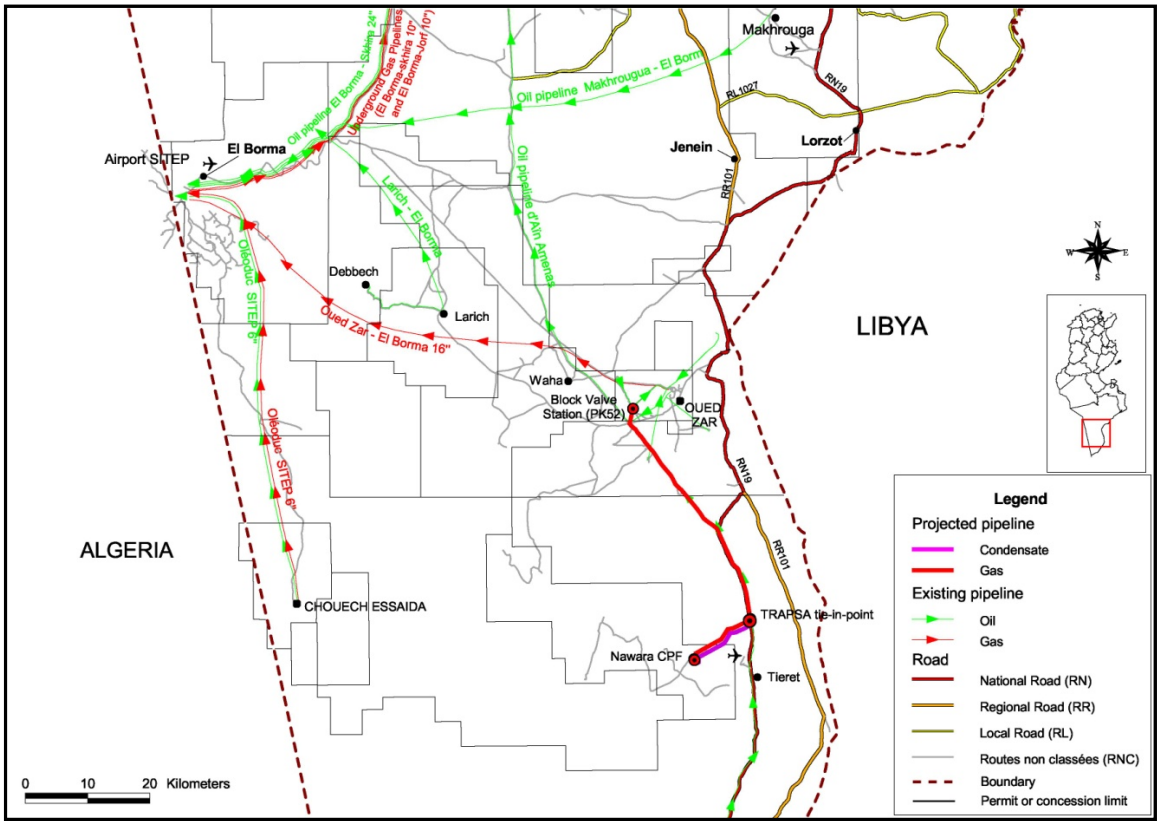
OMV (Tunesien) Production GmbH. proposes to install and operate a gas export pipeline from its Central Processing Facility (Treatment Plant) located in Nawara field to a gas treatment plant (GTP) planned in Gabès Ghannouch. The total lenght of this gas pipeline is 370 km. This EIA concerns the first section of pipe (KP0 - KP52) connecting the Nawara central processing facility (CPF) into Hammouda area (about 2 km west of Oued Zar CPF).

OMV (Tunesien) Production GmbH. is a subsidiary of the OMV AG, considered as Austria's largest listed industrial company. In Exploration and Production, OMV is active in 17 countries in five continents.

With reference to the Decree no. 2005-1991 of July 11th, 2005 relating to environmental impact assessment, the proposed project is considered as an "Oil and natural gas transport equipment" and requires an Environmental Impact Assessment (EIA).
With reference to Article 9 of this Decree, the National Environmental Protection Agency (ANPE) has a period of three months (3 months) from receipt of the EIA report to notify its decision of opposition to the realization of the project, and upon expiration of this deadline, the approval is tacit for the realization of the project.

Project Overview

The development project consists in the construction and operation of Nawara CPF, a condensate export pipeline and a gas export pipeline. This EIA is focused on the gas export pipeline (KP0 - KP52). The two other project components as well as the gas export pipeline (KP52 - KP370) will be the subject of three separate environmental impact assessments.
The Nawara CPF will be designed to provide separation, treatment and stabilization of the wells fluids (Nawara-1, Rytma-1, Fella-1, Khouloud-1, Benefsej-1, Benefsej Sud-1, Souroure-1, Ahlem-1 and Ahlem-2). The condensate will be exported via the existing TRAPSA oil pipeline to La Skhira oil terminal close to Gabes. The pre-treated gas will be transported to the gas treatment plant in Gabes via the gas pipeline, subject of the present EIA.



The 52 km 24" gas pipeline will be buried with the nominal burial depth of 1 m to top of pipe. It will be externally coated with three Polyethylene or polypropylene anticorrosion coating layers. A cathodic protection will be provided to the gas pipeline. The gas pipeline will be equiped with appropiate tools to record pressure, temperature and flow at both ends.

The gas export pipeline shall contain two Line Valve Stations (LVS) to limit the amount of piping that may need to be depressurized for tie-ins and maintenance, and to reduce the amount of gas that would be lost in the event of a line break.

The pipeline installation will be limited to the identified right of way (ROW) of the pipeline. The pipeline will extend from Nawara CPF to a line valve station (KP52). It will cross the National Road RN19 then goes along Ain Amenas pipeline.

The pipeline will be clearly marked with marker stations at intersection and crossing points.

Front End Engineering Design started in 2011 and will be followed by material and services tendering, equipment ordering and procurement. The gas export pipeline installation is planned for 2014 and will last approximately one year.

The project design and the pipeline route selection were based on environmental

sensitivities, economic considerations of pipeline construction costs and spatial extent.
The design, construction, operation and maintenance of the pipeline comply with national and international standards and guidelines.
The contractor will develop construction camps to accommodate 300 people for the workforce engaged in construction activities.
The construction of the pipeline requires water, power and fuel. The normal operations will not require any utility.

Existing Environment

The description of existing environment is based on scientific literature and relevant documents related to the study along with data collected from field survey.
For the purpose of this project, a Geographical Information System (GIS) was constructed to provide a central information resource where environmental and socio-economic sensitivities were placed into geographical context.

The study area is located in the Dahar which is a wide plateau constituted of Cretaceous outcrops with altitudes varying from 300 to 550 m.
The soils of the study area are fragile and they are affected by wind erosive processes.

The Continental Intercalaire aquifer is the main water resource of the study area.

In terms of climatology, the study area is classified as Mediterranean bioclimate of inferior Saharian stage with cool winter.
The wind regime is dominated by the frequent presence of sirocco. The annual average number of days of sandstorms is 30 days. It varies from 1 to 6 days. The highest number of windy days was recorded during the spring season (March-April-May) with 19 days of sandstorms.

The vegetation of the region is typically saharian, being little diversified, sporadic and presents a very low density. The associated fauna is adapted to the drastic conditions of the area.
As for socio-economic conditions, the study area is underpopulated and undeveloped.
It mainly consists of the military personnel at the frontier post of Borj El Khadra.

Transhumance and pastoral activities are the main livelihood income of the local communities.

Impacts Assessment

The impacts assessment methodology is based on the appreciation of an indicator which constitutes the significance of the impact. This indicator gives a judgment on the importance of the gains and losses for the natural and human components related to the proposed activities. The established judgment represents the integrated result of three components, including the intensity, the extent and the duration of the impact.

A great effort was provided for the selection of the pipeline Right Of Way (ROW) in order to reduce the project's impacts on the biophysical and human environment. In fact, route selection for the pipeline route was based on the following general criteria: minimize the length of the pipeline, minimize crossing of roads or water courses, minimize the impact on the environment and avoid when possible and maintain a minimum safe distance from existing infrastructures.

The impact on the biological environment, the water resources and the soil is very low in view of the absence of flora or fauna of particular ecological interest and considering the precautions and measures to be taken by OMV in order to assure the safety and to preserve the environment.

During construction phase, several liquid, gaseous and solid wastes will be generated. They will be subject to specific management plans allowing to reveal the potential of a reduction at the source, a re-use, a recycling, a material or energy valuation and disposal means. The project will be beneficial to local service companies.

No operational environmental negative impact could be expected during the pipeline operation phase. However, high economic impact is supported by the generated gains arising from the gas production.

Prevention of accidents is an integral part of operational procedures and mitigation measures presented in this report. The involvement of such measures demonstrates the commitment of OMV towards the preservation of the environment.

Taking into account the environmental description, predicted levels of interaction and the extent of mitigation measures presented in this report, it is thought that the gas export pipeline project is environmentally acceptable.

1.0 GENERALITIES

1.1 Introduction

OMV (Tunesien) Production GmbH. proposes to install and operate a gas export pipeline from its Central Processing Facility (CPF) located in Nawara field to a gas treatment plant (GTP) planned in Gabès Ghannouch. The total lenght of this gas pipeline is 370 km.
This EIA concerns the first section of pipe (KP0 - KP52) connecting the Nawara central processing facility (CPF) into Hammouda area (about 2 km West of Oued Zar CPF).

With reference to Decree 2005-1991 of July 11th, 2005, related to the environmental impact study, the proposed project falls within Annex 1 (Category B 16 – Oil and natural gas transport equipment projects). As such, it requires an EIA (*Article 2*) intending to:

- ✓ Describe the project;
- ✓ Analyse the relevant features of the existing environmental baseline;
- ✓ Identify and assess the potential environmental impacts of the project;
- ✓ Recommend mitigation measures to reduce, minimise or avoid adverse impacts of the project on the environment;
- ✓ Outline the Environmental Management Plan.

With reference to Article 9 of this Decree, the National Environmental Protection Agency (ANPE) has a period of three months (3 months) from receipt of the EIA report to notify its decision of opposition to the realization of the project, and upon expiration of this deadline, the approval is tacit for the realization of the project.

1.2 Study Scope

This study describes the project characteristics in particular those, which could have potential impacts on the environment. The significance of the potential impacts is determined according to appropriate criteria. Mitigating measures are also described in order to reduce the identified significant impacts.
The scope of this work is based on the following reference documents:

- ✓ Decree no. 2005-1991 dated 11 July 2005 relative to the Environmental Impact Assessment;
- ✓ Terms of reference set up by ANPE for Oil and natural gas transport equipment projects;
- ✓ Contract between OMV and EAM for the preparation of the Environmental Impact Assessment.

1.3 Report Structure

The report is organised as follows:

- Chapter 2: Summarises the main regulatory texts governing the environment and the oil and gas transport activities ;
- Chapter 3: Introduces the involved parties in the project ;
- Chapter 4: Provides a detailed description of the project;
- Chapter 5: Describes the existing environment with a focus on the components which could be affected by the project ;
- Chapter 6: Explains the methodology of the impacts assessment ;
- Chapter 7: Identifies and evaluates the potential impacts which may result from the gas pipeline construction and operation ;
- Chapter 8: Recommends mitigation measures to avoid, reduce or offset the adverse impacts to the environment ;
- Chapter 9: Constitutes the environmental management plan of the project.

1.4 Project Justification

This justification concerns the technical, environmental and socio-economic aspects of the construction and operation of the gas export pipeline.

1.4.1 Technical Aspect

The gas produced in Nawara CPF will be transported via a dedicated pipeline to a line valve station (KP52). Such a gas transport means is considered as reliable common practice in the oil and gas industry worldwide.

The bedding shall not contain any rock, clay, organic materials or other material that may damage the pipeline coating.

A hydrotest will be undertaken to prove the integrity of the gas pipeline and to ensure that there are no defects which could result in a leak occurring during its operation.

1.4.2 Environmental Aspect

From an environmentally perspective, the project presents the following advantages:

- ✓ A safe transportation mean : the gas pipeline reduce to minimum the uncontrolled risks of spills and the associated impacts;
- ✓ An optimum land management: the gas pipeline route will follow the defined pipeline ROW which minimize the land occupation and the associated disturbances to biophysical environment. In fact, the selected ROW will go along Ain Amenas pipeline;

- ✓ Best operating conditions: the gas export pipeline provides better operating conditions as it does not require significant maintenance and human intervention. Besides, it doesn't rely on weather condition and climatic hazard. Moreover, two line Valve Stations (LVS) will be instalaled to reduce the amount of gas that would be lost in the event of a line break.

1.4.3 Socio-economic Aspect

The proposed gas pipeline will allow the export of gas from Nawara CPF to a line valve station (KP52) then to South Tunisian Gas Project (STGP) facilities.

The STGP project integrates as part of the development of the southern concessions. It was designed to transport gas production from gas concessions in the south of Tunisia to the Gas Treatment Plant (GTP) in Gabes.

The project will allow limiting the flaring of produced gas in the southern Tunisian concessions and consequently a reduction of air pollution.

In a general, the construction and operation of the proposed gas pipeline will contribute to sustain the Tunisian hydrocarbons infrastructures development. In particular, it allows the capacity increase of the domestic exploitation and transportation of produced gas. Besides it may contribute to the development of marginal oil fields in the area and therefore, increase the potential of oil exploitation and enhances the potential for development of energy resources of the country.

2.0 REGULATORY COMPLIANCE

In addition to its Corporate Environmental Policy and Best Practice for Oil and Gas Industry, OMV is committed to conduct its operations in line with national regulations and international agreements to which Tunisia is a signatory.

2.1 Tunisian Legislation and Standards

The main regulatory texts relating to the environment and petroleum activities are summarized as follows:

- ✓ Law no. 66-27 dated 30 April 1966, relating to the promulgation of the Labor Code and all the texts which have amended and completed it, including Law no. 96-62 dated 15 July 1996 and Law no. 2007-19 dated 2 April 2007.

- ✓ Law no. 75-16 dated 31 March 1975, relating to the promulgation of the Water Code, as amended by Law no. 2001-116 dated 26 November 2001. The Water Code contains various dispositions managing, safeguarding and valorizing the public hydraulic domain. According to the terms of article 109 of this code, it is illegal to let flow, discharge or throw away into the public hydraulic domain any residual waters as well as waste or substances susceptible of affecting the public health or the good use of these waters for potential usage.

- ✓ Law no. 82-60 dated June 30, 1982 for carrying out, laying and operation of the pipelines of public interest intended to the transportation of gaseous, liquid or liquefied hydrocarbons, as modified and completed by the law n° 95-50 of June 12, 1995.

- ✓ Decree no. 85-56 dated 2 January, 1985, relating to the organization of waste disposal into the environment. It fixes the conditions concerning the regulated or illegal waste disposal into public areas.

- ✓ Order of the Minister of national economy of August 15th, 1985 approval of the Tunisian standard NT 109.01 related to safety of structures transporting combustible gas.

- ✓ Law no. 88-20 dated 13 April 1988, as modified by the Law no. 2005-13 dated 26 January 2005, Relating to revision of recasting the Forest Code, which includes the set of special rules applying to forests, esparto surfaces, pasture land, forest occupied land, national parks and reserves, wild fauna and flora, in an effort to ensure their protection, conservation and rational exploitation as well as to guarantee that the

users legally exercise their rights.

- ✓ Law no. 88-91 of August 2nd 1988, relating to the creation of the "Agence Nationale de Protection de l'Environnement" (ANPE) as modified by the law no. 92-115 of November 30th 1992. According to the terms of article 8 of this law, the operators who impact the environment or whose activities cause environmental pollution through solid, liquid or gaseous waste are required to eliminate, reduce or eventually recover the discharged matters as well as to repair the resulting damages. The National Environmental Protection Agency (ANPE) is allowed to go to court and defend any case in order to restore any damages to public properties.
- ✓ Order of the Ministry of National Economy of July 20th 1989 enacting the Tunisian standard NT 106.02 which defines the conditions for discharging waste effluents into water bodies (marine public domain, hydraulic public domain and public sewer network). This standard contributes to the adequate application of decree no. 85-56 of January 2nd, 1985 relating to the regulations of the waste disposal into the receiving environment.
- ✓ Law no. 90-56 of June 18th, 1990, concerning the encouragement of exploration and production of petroleum hydrocarbons in Tunisia.
- ✓ Decree no. 90-2273 of December 25th, 1990 defining the internal regulation of the ANPE inspectors.
- ✓ Law no. 94-35 of February 24th 1994, relating to the Patrimony Code of Archaeology, History and Traditional Arts. In case of accidental discovery of sites, concerning prehistoric or historic ages, arts or traditions, the developer is required to immediately inform the corresponding services of the Ministry in charge of Patrimony or the closest regional authorities in order for them to inform the concerned services, within a period not exceeding five days. The specialized authorities will take all the necessary measures of preservation by themselves or if needed the supervision of the undergoing works.
- ✓ Order of the Ministry of National Economy of December 28th, 1994, relating to the homologation of the Tunisian standard NT 106.04 concerning the limit values and guideline values of pollutants into the ambient air.
- ✓ Law no. 95-73 of 24 July 1995 defining the natural public marine domain (sea shore,

lakes, lagoons and sebkhas in natural communication with the sea, continental shelf, exclusive fishing zone, exclusive economical zone,..) and the artificial public marine domain (harbours, sea ports, fortresses,..).

- ✓ Law no. 96-29 of 3rd April 1996, instituting a national plan of urgent intervention for the fight against accidents of marine pollution. Within the article 22, it has been specified that the managers of the trade ports, the leisure ports, the petroleum terminals and the production and prospection platforms, must establish specific intervention plans in case of low intensity pollution within the ports installations and nearby the platforms.
- ✓ Law no. 96-25 of 25 March 1996 creating the International Centre for Environmental Technologies of Tunis with a mission to acquire, adapt and develop new technologies, promote ecotechnologies and their production, strengthen national capacity and develop scientific knowledge necessary for the elaboration and implementation of appropriate environmental techniques specific to national and regional needs in the perspective of sustainable development.
- ✓ Law no. 96-41 of June 10th 1996, relating to waste and control of its management and elimination. The waste products are classified according to their origin as domestic waste or industrial waste and according to their characteristics as dangerous, non-dangerous or inert waste. The hazardous waste management modes are regulated. The list of hazardous waste is fixed by Decree no. 2000-2339 of October 10th, 2000.
- ✓ Law no. 97-37 of June 2nd, 1997 instituting the rules relating to the transport by road of hazardous materials to avoid risks and damages likely to affect persons, goods, and the environment. Hazardous materials are divided into 9 classes. The list and definition of materials of each class that could be transported by road are determined by decree.
- ✓ Law no. 99-93 of August 17th, 1999, as modified by the Law no. 2002-23 of February 14th, 2002 and the Law no 2004-61 of July 27th, 2004 promulgating the Hydrocarbons Code which defines the judicial regime of preliminary exploration activities, exploration, the search and the exploration for hydrocarbons, as well as the equipment and the installations pertaining to the execution of these activities.
- ✓ Decree no. 2000-967 of May 2nd, 2000, fixing the geographical coordinates and the

summits reference numbers of the elementary perimeters constituting the hydrocarbons blocks.

- ✓ Law no. 2001-14 of January 30, 2001, stating simplification of administrative procedures in relation to the authorisations delivered by the "Ministère de l'Environnement et de l'Aménagement du Territoire" in the domain of its competence.
- ✓ Decree no. 2002-693 of 1st of April 2002, fixing the conditions and modalities for lubricants and used filters recovery, in an effort to ensure their rational management and to avoid any discharge to the environment.
- ✓ Decree no. 2005-1991 of July 11th, 2005 relating to the Environmental Impact Study. Oil and natural gas exploration and transportation projects are subject to the environmental impact procedure.
- ✓ Decree no. 2005-2317 of August 22nd, 2005, relating to the creation of the "Agence Nationale de Gestion des Déchets", ANGed. With reference to the article 8 of this decree, the Agency prepares the specifications and the authorizations files of relating to waste management in accordance with the regulation in force and follows-up their execution. In addition, the Agency inspects the registers and logbooks that must be held by the professional establishments and the enterprises in charge of the collection, transportation, elimination and recovery of wastes.
- ✓ Decree no. 2005-2933 of November 1st, 2005 establishing the remit of the Ministry of the Environment and Sustainable Development (Ministère de l'Environnement et du Développement Durable, MEDD), which includes the requirement that the Tunisian government respects international environmental agreements.
- ✓ Decree no. 2005-3079 of 29 November 2005 establishing the list of hazardous materials which are transported by road under the mandatory supervision and with the accompaniment of security units.
- ✓ Decree no. 2005-3395 dated 26 December 2005, fixing the conditions and the modalities for collecting used accumulators and batteries.
- ✓ Order of the Minister of the Environment and Sustainable Development dated 23 March 2006, relating to the creation of a hazardous waste treatment unit and reception, storage and transfer centers.

- ✓ Order of the Minister of Agriculture and Hydraulic Resources dated 19 July 2006, fixing the list of rare and endangered wild fauna and flora.
- ✓ Law no. 2007-34 dated 4 June 2007 relating to the air quality.
- ✓ Decree no. 2010-2519 of 28 September 2010 fixing the limit values at source of air pollutants from stationary sources.
- ✓ Order of the Minister of Agriculture dated 11 September 2012, relating to the organization of hunting for the season 2012-2013.

2.2 International Conventions

The Tunisian environmental legislation extends to the following international conventions:

- ✓ Convention on the conservation of the migratory species belonging to the wild fauna, adopted in Bonn on 23 June 1979 (ratified by the Law no. 86-63 dated 16 July 1986).
- ✓ Convention for the protection of the ozone layer, Vienna 22.03.85 (adherence of Tunisia by the Law no. 89-54 of March 14th, 1989).
- ✓ Protocol on substances that deplete the ozone layer, Montreal 16.09.87 (adherence of Tunisia by the Law no. 89-55 of March 14th, 1989).
- ✓ United Nation Convention on Biological Diversity signed by Tunisia in Rio de Janeiro on June 13th, 1992 and ratified on May 3rd, 1993;
- ✓ United Nations agreement concerning the climate changes signed in 1992, during the Earth summit in Rio. Tunisia, having ratified such an agreement on July 15th, 1993, is required to communicate to the conference parties, all information relating to the national inventory of green house effect gases (GES), to the GES attenuation action plan and to the adaptation against negative effects of the climate changes;
- ✓ Convention on the Conservation of European Wildlife and Natural Habitats of Europe concluded in Berne on 19 September 1979. This agreement was designed to ensure the conservation of flora and fauna and their natural habitats. Appendix II provides a list of species for flora and fauna which the Contracting Parties shall ensure the conservation (Ratified by Tunisia January 12th, 1996 and entered into force on May 1st, 1996).

- ✓ Kyoto protocol to the United Nations Framework Convention on Climate Change strengthens the international response to climate change, adopted in Kyoto on the December 10th, 1997 (adherence of Tunisia by the Law no. 89-54 of June 19th, 2002);
- ✓ Stockholm Convention on persistent organic pollutants (POPs) adopted on May 22nd, 2001 and approved by Tunisian Law no. 2004-18 of March 15th, 2004. POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife. POPs circulate globally and can cause damage wherever they travel. In implementing the Convention, governments will take measures to eliminate or reduce the release of POPs into the environment.
- ✓ Agreement on the Conservation of Migratory seabirds (AEWA) of Africa-Eurasia. The agreement came effectively in force on 1 November 1999. Tunisia has ratified this agreement on 1st October 2005.

3.0 PRESENTATION OF THE INVOLVED PARTIES

3.1 Presentation of the Operator

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OMV is an integrated, international oil and gas company with three core business segments: Gas and Power (G&P), Refining and Marketing (R&M) and Exploration and Production (E&P).

3.1.1 Gas and Power

OMV integrated Gas and Power (G&P) business segment operates across the entire gas value chain. OMV have long-proven partnerships with major gas suppliers to assure stable supply to our markets and also produce gas at our own fields. With 2,000 km gas pipeline network as well as gas storage facilities with a capacity of 2.4 bcm, OMV is a major contributor to security of supply in Austria and beyond. Additionally, it is driving the Nabucco gas pipeline project, which will also increase Europe's security of supply. The Central European Gas Hub (CEGH) is the most important gas trading platform on the gas routes from East to West and also operates a gas exchange. The gas hub in Baumgarten is Central Europe's largest gas distribution node for Russian gas.

3.1.2 Refining and Marketing including petrochemicals

OMV operates refineries in Schwechat (Austria) and Burghausen (Southern Germany), both with integrated petrochemical complexes. Together with the Petrobrazi refinery (Romania) and 45% stake in Bayernoil (Southern Germany), these give a total annual processing capacity of 22.3 mn t (450,000 bbl/d). The retail network consists of approx. 4,500 filling stations in 13 countries including Turkey. With strong retail brands, high quality non-oil business (VIVA) and an efficient commercial business, we have a leading position in the market.

3.1.3 Exploration and Production

OMV is successfully exploiting its core assets in Romania and Austria and has a well-balanced International portfolio. In 2011, OMV's oil and gas production was 288 kboe/d and its proven reserves were about 1.13 bn boe at year-end. More than two-thirds of its

production comes from Romania and Austria –the remainder from a growing international portfolio. Oil and gas account for around 50% each of overall production.

3.1.4 OMV in Tunisia

Tunisia has an important place in the history of OMV, as it was the location of E&P's first international exploration and production project in 1971. Since then, Tunisia has become an important part of the company's North Africa core region with the acquisition of Preussag's international business in 2003, which held seven exploration and production licenses in the country.

Tunisia offers a stable economic climate and excellent growth opportunities, and is a vital source of potential future growth especially in natural gas. OMV's activities are currently focused on drilling and infrastructure development in the Ghadames Basin in the south of the Country and on exploration and field redevelopment in the Gulf of Gabes. Net production in Tunisia is around 12,000 bbl/d.

OMV E&P entered Tunisia in 1971, as a partner in the Marin du Golf d'Hammamet license in which oil was discovered 1977. The Halk el Menzel concession was awarded in 1980 in which OMV acquired Shell's remaining interest in 1990.

In 2003 OMV acquired the international assets of Preussag Energie which were comprised of TPS which operates four concessions and Serept, which operates the Ashtart concession on behalf of OMV and ETAP, the Tunisian state oil Company. In the same year, OMV signed the Jenein Sud Exploration license. In 2005 the Warda-1 exploration was successfully drilled and tested, resulting in the first of a series of gas-condensate discoveries in this license. Since then, OMV has consolidated its portfolio by selling the Chergui and Halk el Menzel concessions and acquiring 80% of the Sidi Mansour exploration block in the Gulf of Gabes.

In terms of further activities, OMV is working on the development of the Nawara concession, which was granted within the Jenein Sud exploration area and contains most of the discoveries.

OMV strives to use its production expertise in Tunisia to maximize recovery from the current oil production facilities in the Gulf of Gabes.

The Ashtart field is located approximately 60 km offshore in the Gulf of Gabes in a water depth of 66 m. The field was developed with a platform complex and an offloading vessel in 1974, which makes it the first offshore development in Tunisia. Current Ashtart

production is around 10,000 bbl/d.

The TPS fields, one offshore and 4 onshore, are located in the vicinity of Sfax and Kerkennah Island. The oil production of around 5,000 bbl/d is treated and collected at two stations from where it is transported to storage and offloading facilities in La Skhira.

OMV's exploration activities in Tunisia are presently focused on Sidi Mansour, where seismic data have been gathered in the shallow waters between Sfax and Kerkennah Island to evaluate drilling prospects.

Following completion of successful drilling campaigns, further activities are planned in the Jenein Sud exploration license.

In November 2009, OMV commenced a five-well drilling campaign in Jenein Sud and, early 2010, was granted the Nawara production concession, (50% OMV, 50% ETAP (Tunisian State Oil Company). Development work is on-going and includes the construction of field infrastructure and the STGP, which will facilitate the transportation of gas from the south to Gabes and on to the Tunisian domestic market.

In early 2012 and after Pioneer acquisition, OMV has boosted its activities in South Tunisia

- ✓ Production increased by 55% to 10.1 kboe/d in 2011
- ✓ Nine consecutive successful wells proved >400 bcf gas (>68 mn boe)
- ✓ 2 OMV operated rigs drill for South Tunisian oil development project

The figure below shows OMV Tunisia assets in Tunisia

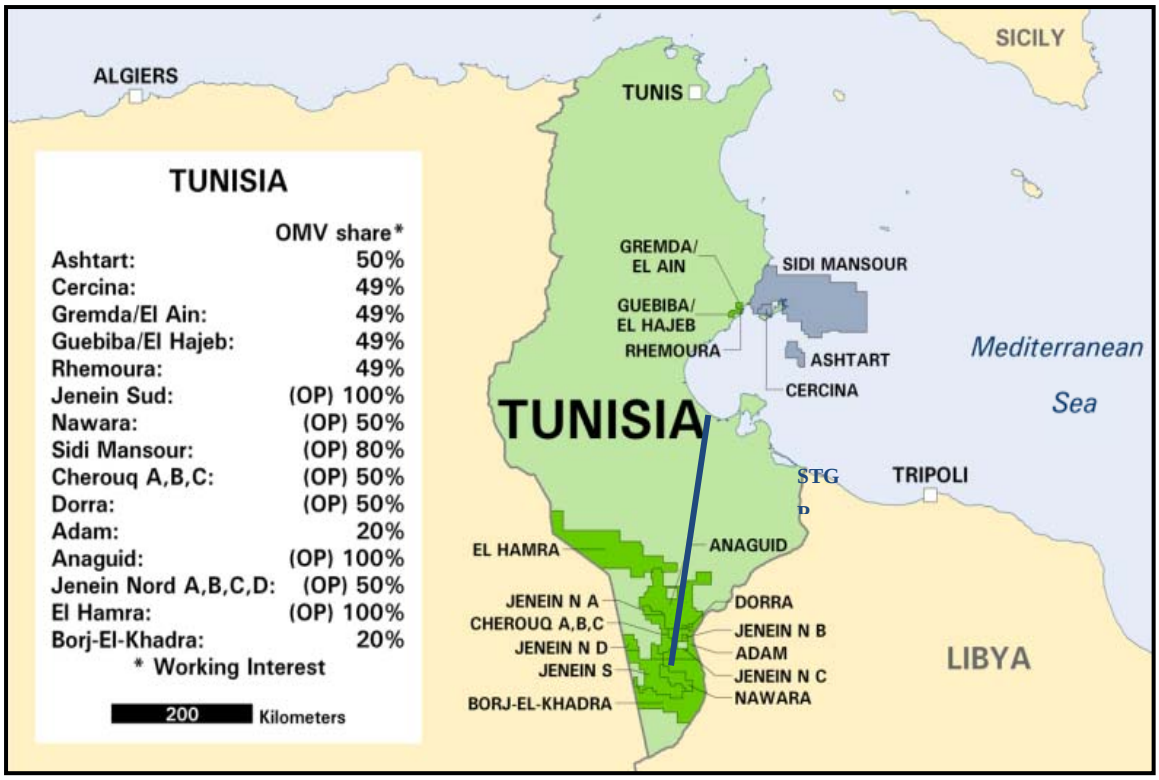

Figure 3.1 OMV Tunisia assets in Tunisia

OMV applies its group-wide standards and best-practice principles in health, safety, environment and quality on a continuous basis for all activities in Tunisia. OMV strive to engage their neighbors and all stakeholders and to minimize the impact on the environment and to enable sustainability in the sensitive areas of operations.

3.2 Presentation of the Contractors

In addition to OMV involvement in the project as the operator, this project will require the intervention of various contractors and service companies for the design, installation, construction and set up of the gas pipeline.

All engineering will be carried out by engineering companies. The construction of the gas pipeline will be performed by a highly experienced international company. Local companies will also be involved under the responsibility and supervision of the contractor.

3.3 Presentation of the Consulting Company

Environmental Assessment & Management "EAM s.a." was contracted by OMV to prepare the environmental impact assessment for the proposed project in line with the reference terms drawn by the ANPE for the Oil and natural gas transport equipment.

EAM has completed in excess of 400 Environmental Impact assessments for exploration

and production in oil and gas, power and chemicals.

EAM was granted the ISO 9001: 2008, ISO 14001:2004 and OHSAS 18001:2007 certifications (Integrated Management System) for the following activities: Environmental Impact Assessment, Hazard Assessment and Management of contaminated sites. These certifications demonstrate EAM's overall commitment to client satisfaction, provided by the efforts, perseverance and interest of all its personnel, and supported by the initiative and creative impetus of the management officers.

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4.0 PROJECT DESCRIPTION

4.1 Project Framework

The development project consists in the construction and operation of Nawara CPF, a condensate export pipeline and a gas export pipeline. This EIA is focused on the gas export pipeline (KP0 - KP52). The two other project components as well as the gas export pipeline (KP52 - KP370) will be the subject of three separate environmental impact assessments.

The Nawara CPF will be designed to provide separation, treatment and stabilization of the wells fluids (Nawara-1, Rytma-1, Fella-1, Khouloud-1, Benefsej-1, Benefsej Sud-1, Souroure-1, Ahlem-1 and Ahlem-2). The condensate will be exported via the existing TRAPSA oil pipeline to La Skhira oil terminal close to Gabes. The pre-treated gas will be transported to the processing center in Gabes.

The 52 km 24" pipeline will extend from Nawara CPF to a line valve station (KP52). It will be buried with the nominal burial depth of 1 m to top of pipe. It will be externally coated with three Polyethylene or polypropylene anticorrosion coating layers. An impressed current cathodic protection will be provided to the pipeline.

4.2 Pipeline Route Selection

Route selection for the pipeline route was based on the following general criteria:

- ✓ Minimize the length of the pipeline;
- ✓ Minimize crossing of roads or water courses;
- ✓ Minimize the impact on the environment;
- ✓ Avoid when possible and maintain a minimum safe distance from existing infrastructures.

It is worth noting that a big effort was provided for the selection the pipeline Right Of Way (ROW) in compliance with the above criteria (cf. Appendix I Plan of Development and Appendix II Project Approval by General Directorate for Energy). The selected route will significantly save land management of areas of ecosystem value and therefore significantly reduce the project's impacts on the biophysical and human environment. In fact, the selected ROW will go along Ain Amenas pipeline.

4.3 Project Location

The Nawara is located approximately 20 km west of the Libyan border. The pipeline takes start from Nawara CPF then follows the defined pipeline right of way. It crosses the National Road RN19 then goes along Ain Amenas pipeline leading to a tie-in point South

Tunisian Gas Project (STGP) facilities. Administratively, the project area falls within the delegation of Remada (Borj El Khadra Sector), Governorate of Tataouine (see Figure 4.1 Administrative Map of Study Area).

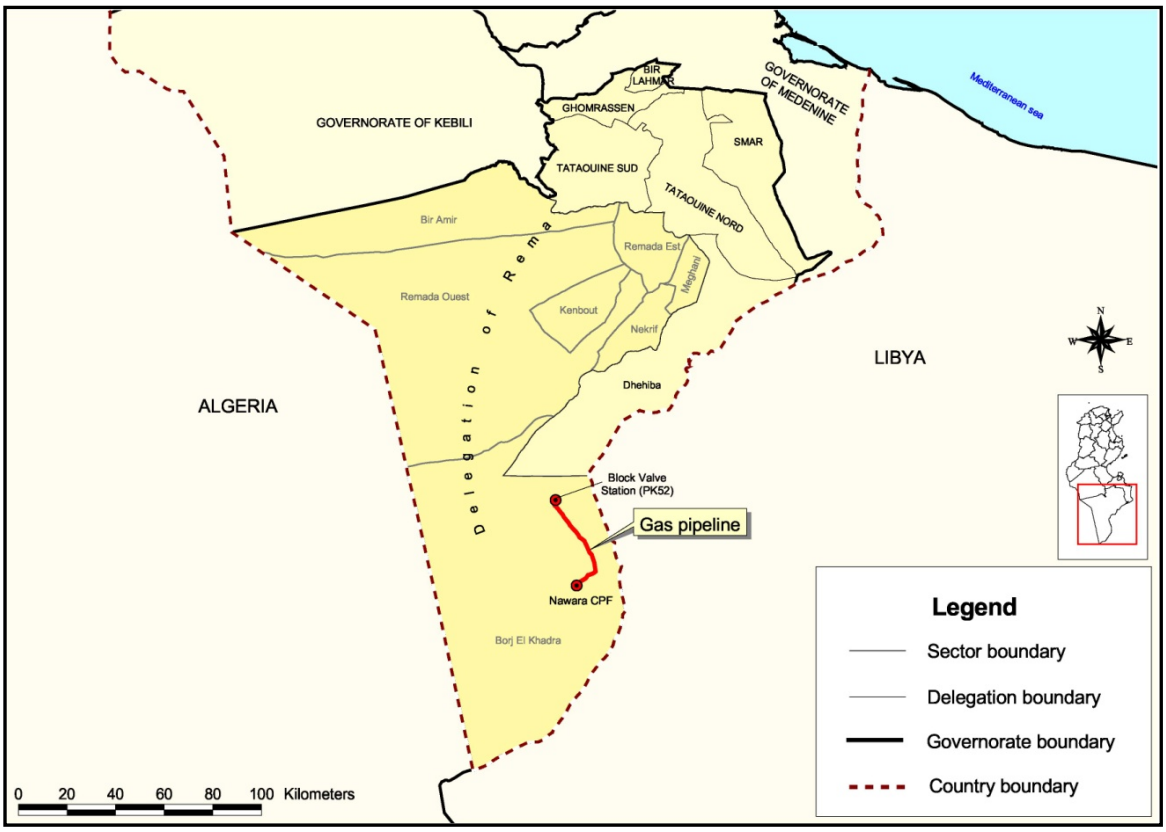


Figure 4.1 Administrative Map of Study Area

4.4 Project Planning

Two main phases characterise the installation of the proposed pipeline; an engineering phase and a construction phase.

The study phase includes the Front End Engineering and Design (FEED) which was initiated in 2011. Detailed engineering studies started in November 2013 and will be followed by material and services tendering, equipment ordering and procurement. The gas export pipeline installation will last approximately one year. Details of construction and operation of the proposed pipeline are as follow:

- ✓ Engineering (288 days) 17/4/2014 - 25/12/2015
- ✓ Supply (365 days) 3/7/2014 - 25/11/2015
- ✓ Construction (289 days) 11/2/2015 - 21/3/2016
- ✓ Test and commissioning (112 days) 26/11/2015 - 29/4/2016

4.5 Basic Data

4.5.1 Gas Characteristics

The export gas specifications are as follow:

- ✓ Waterdewpoint: -12°C
- ✓ Hydrocarbon dew point at 35 barg: +5°C
- ✓ CO_2 content: < 2.0 mole %

The table 4.1 below shows gas compositions for the OMV Nawara gases. Lean and rich compositions for both summer and winter cases are shown.

Table 4.1 OMV Nawara Feed Gas Compositions

Composition Mole %	MW	Lean Summer	Rich Summer	Lean Winter	Rich Winter
Nitrogen	28.01	0.3299	0.4620	0.3299	0.4621
CO_2	44.01	1.8004	1.8010	1.8005	1.8006
Methane	16.04	88.4009	83.5799	88.4199	83.6011
Ethane	30.07	5.3849	7.5409	5.3860	7.5430
Propane	44.10	2.4131	4.1910	2.4144	4.1918
i-Butane	58.12	0.4786	0.8558	0.4804	0.8600
n-Butane	58.12	0.6109	1.0085	0.6101	1.0122
i-Pentane	72.15	0.2725	0.3037	0.2631	0.2859
n-Pentane	72.15	0.1583	0.1544	0.1512	0.1436
n-Hexane	86.18	0.0076	0.0788	0.0071	0.0743
PC6A*	84.79	0.0959	0.0066	0.0894	0.0062
PS1A*	109.65	0.0405	0.0015	0.0413	0.0017
PS2A*	157.92	0.0000	0.0000	0.0001	0.0000
PS-1*	112.06	0.0007	0.0088	0.0007	0.0103
PS-2*	159.29	0.0000	0.0000	0.0000	0.0000
PS1S*	126.58	0.0005	0.0000	0.0005	0.0000
PS2S*	143.80	0.0002	0.0000	0.0002	0.0000
PS3S*	168.23	0.0001	0.0000	0.0001	0.0000
PS4S*	209.03	0.0000	0.0000	0.0000	0.0000
H2O	18.02	0.0051	0.0052	0.0051	0.0051
C7-C7*	125.00	0.0000	0.0020	0.0000	0.0021
C8-C9*	149.00	0.0000	0.0001	0.0000	0.0002

Notes

1. Water content is based on achieving a -12°C water dew point at 35-80 barg
2. The CO_2 concentration of OMV Nawara is adjusted to max 2%vol
3. No presence of salts, solids, sulphur compounds, or other unspecified impurities.
4. 100ng/m^3 of Mercury in the Mixed Feed stream

As can be seen there is no significant difference between summer and winter cases, so cases will only be considered for average rich and lean.

The pseudo-componenets data for the Nawara concession are tabulated in table 4.2.

Table 4.2 Pseudo Component Data

Component	NBP °C	MW	Liq Density kg/m^3	Tc °C	Pc bara	Vc m^3/kgmole	Acentricity
PC6A*	65.439	84.789	693	239.175	32.636	0.3500	0.2540
PS1A*	115.384	109.650	739	296.965	28.193	00.4410	0.3200
PS2A*	192.913	157.916	786	377.758	22.041	0.6260	0.4510
PS-1*	118.721	112.0058	716	293.0567	26.237	0.4700	0.3590
PS1S*	134.545	126.577	693	254.597	17.641	0.5820	0.6430
PS2S*	142.384	143.802	702	259.974	16.725	0.6030	0.6500
PS3S*	154.422	168.233	714	265.361	16.555	0.6350	0.6570
C7-C7*	145.327	125	725	317.483	23.253	0.5349	0.4205
C8-C9*	187.021	149	755	358.533	20.295	0.6390	0.4997

4.5.2 Pipeline Characteristics

Gas will be transported via 52 km pipeline from the Central Processing Facility located in Nawara concession to a line valve station (KP52). The design data of the pipeline are given below:

(i) Design Data

- Diameter : 24 inches
- Material : API 5L x 65
- External coating : 3 layers of Polyethylene or polypropylene / 3LPP
- Design code (standards) : NT 109.01 (Safety of structures for combustible gas transported by pipelines) and
  ASME B31.8 : Gas transmission and distribution piping systems
- Design Pressure : 111 barg
- Design Temperature : - 29°C / 85 °C
- Cathodic protection : yes

(ii) Maximum Flow : 10 mmscmd

(iii) Operating Conditions: 2.7 mmscmd@48 bar to 10 mmscmd@ around 100 bar

4.5.3 Leakage Detection System

The proposed gas pipeline will allow the export of gas from Nawara CPF to a tie-in point South Tunisian Gas Project (STGP) facilities. In order to limit the amount of piping that may need to be depressurized for tie-ins and maintenance, and to reduce the amount of gas that would be lost in the event of a line break, this gas export pipeline will contain two line Valve Stations (LVS): an intermediate one (KP20) and an other one in KP52.

4.6 Pipeline Construction

4.6.1 Generalities

The construction of the pipeline is presented as an assembly line composed of specific activities and forming a linear construction sequence. The route is usually divided into several elementary sections; each will be executed by a specialized team. All teams are equipped with the appropriate equipment and moving along the route at an average speed that corresponds to work progress.

This procedure involves a large special tool. The equipment related work includes laying operations mainly graders, cranes, excavators and trucks. In addition, several workshops will be needed such as welding and civil work.

The project will involve staff with sufficient knowledge of regulatory requirements to achieve a guaranteed pipeline in accordance with applicable regulations.

The pipeline and the various facilities will be designed, constructed and operated in compliance with applicable requirements. These are intended to prevent accidents and malfunctions of the pipeline and to ensure adequate protection for people.
The usual procedure for installing a pipeline includes layout of the work area, excavation, preparation of pipes, laying pipes, hydrostatic testing and site restoration. Details of these steps are presented below.

The contractor shall be responsible for locating identifying and marking all buried services to be crossed by pipeline or construction traffic.

Prior to undertaking any work adjacent to a crossing of a foreign pipeline, cable or other service, the contractor shall prepare a Work Permit detailing the proposed work procedure for the crossing and obtain approval from OMV.

Existing buried cables and pipelines shall be excavated by hand to confirm the location prior to mechanically excavating the adjacent areas. Location of all buried cables and pipelines shall be clearly marked.

In the event of locating an unidentified buried service the contractor shall immediately notify OMV and shall cease work in that area. Work shall not re-commence until permission from OMV is granted.

The contractor shall survey the location and depth of all buried service pipelines and structures and record on as-built drawings.

In the event of the contractor damaging any third party facilities, OMV shall be immediately notified and the contractor shall cease work in that area. The damaged service shall be repaired to the satisfaction of OMV.

The contractor shall notify OMV and obtain prior approval of any proposed connection, disconnection or interference with existing services.

It is important to mention that the operator had received an exemption for the application of ASME B31.8 ed 2010 on the spacing between block valves and the thickness of the pipe in desert area (cf Appendix III: Exemption for the application of ASME B31.8 ed 2010 and Appendix IV : Minutes of Meeting of Directorate for Security).

However, in the urban area (about 10 km from the Gas Treatment Plant in Gabes) NT109.01 Standard is adopted in its entirety.

4.6.2 Working Area Layout

To carry out different activities, it is necessary to clean out a sufficiently large work area around the pipeline route, as well as access tracks to ensure smooth transition from construction equipment and transportation.

The clean out consists mainly of a leveling of the area in order to properly set up the equipment and install the pipeline itself. The work strip will be cleared of any obstructions. It will be the same for the access tracks to allow movement of machinery and equipment necessary without any discomfort.

4.6.3 Excavation

The trenches will be completed using all-terrain excavators and rock breakers. The depth of the trench must present a good cover over the pipeline. Digging 'U' trenches will be achieved by getting a trench slightly deeper at the ridge and gradually deepening the trench in the vicinity of the crossing roads, and water courses.

4.6.4 Pipeline Preparation

The pipes are transported to the site and stored in a dedicated area. Pipes will be protected to avoid runoff and contact with water to prevent corrosion. Before their installation, they are aligned along the pipeline route to undergo various treatments.

Firstly, some sections will be folded if necessary to follow the contour of the trench. They are then aligned and welded by arc welding. The welding operation is an important step and governs the pipeline strength and quality. In addition, the overall progress of construction is virtually linked to the forward speed of the first welding phase.

The pipeline is then placed on brackets along the edge of the trench for inspection. The welds are subjected to full NDT, including X-ray examination, ultrasonic examination and Magnetic Particle Inspection (MPI) as identified by the Welding and NDT Specification. Any defect is repaired (if necessary welding can be removed and the

operation repeated). Once the welds validated, they will be coated with a protective layer. The other checks are carried out visually and are designed to detect manufacturing or coating defects and any defect or scratch that can be dangerous later.

After carrying out all the necessary repairs, the pipeline is covered with a corrosion protective layer. This first protective measure will be enhanced by a cathodic protection.

The import of radioactive material will be used in non-destructive test of welds, requires the prior authorization of the Ministry of Interior, Public Health, Industry and Transport.

The inspection agency shall provide a certificate of importation and use of the radioactive source. The radioactive source is transported in sealed containers of B (U) type specially designed to limit radioactive radiation.

On arrival at the port or airport, agents of the National Centre for Radiation Protection shall check the tightness of the container.

Prior delivery to the site, the radioactive source is transferred to a sealed container and placed in a vehicle equipped with flashing lights, beacon signaling danger and MSDS. The order of Interior and Transportation ministers dated 18 March 1999 sets the model for MSDS related to the transport of hazardous materials by road and instructions that must include particularly:

- ✓ The denomination of the substance and its class (radioactive material Class 7 in accordance with Article 13 of Law No. 97-37 of 02/06/1997);
- ✓ The nature of hazards presented by the material;
- ✓ The general guidelines to be applied in case of an accident or incident;
- ✓ First Aid;
- ✓ Identity, address and phone and fax number of the sender.

A copy of the MSDS should be posted in the vehicle cab in a visible and easily accessible location.

All weld defects will be repaired (if necessary welding can be removed and the operation renewed). Once validated, welds are covered with a protective layer. Other visual verifications are carried out to detect manufacturing or coating defects or any fault or scratch that could be dangerous later.

Finally, once the necessary repairs have been completed, sandblasting and pipeline cleaning procedures start prior to a coating with a Polyken protective layer against corrosion. The first anti-corrosive measures will be strengthened by an impressed current cathodic protection system.

4.6.5 Pipeline Coating

Pipes shall be supplied with an external coating which shall consist of:

- ✓ A layer of hard polymeric base adhesive;
- ✓ A multiple layer of high density polyethylene or polypropylene compound.

The three layer polyethylene or polypropylene coating system shall be suitable to withstand the design temperature of 85°C. The minimum thickness of final coating shall be 3 mm.

4.6.6 Pipeline Laying and Trenches Backfilling

Prior to the pipeline laying, it is necessary to ensure that it will not experience physical damage once installed, consequently, the trench is dried and cleaned. If the trench bottom is rocky, it will be filled with sand, sand bags or screened excavated soil.

The pipeline installation is carried out by a crane equipped with slings. Then the trench will be backfilled with the excavated material. It is also necessary to pay attention to the material used and if necessary use padding to protect the pipeline from rocks. The basement will be carefully compacted around and over the pipe. It should be noted that to preserve the soil, backfilling operations are never performed using topsoil.

In some particular cases, it is necessary to strengthen protection. If the pipeline goes under a road, concrete slabs will be placed over to protect from the vehicles loads and ensure uniform distribution of the load through the slab and soil, without being directed to the pipeline.

4.6.7 Crossing the road RN19

The pipeline route crosses the national road RN19 linking Tataouine to Remada. During the crossing of this infrastructure the pipeline will be buried at an optimal security depth and will be cased (see Figure 4.2 Cross Section of the Pipeline crossing Roads). To minimize traffic disturbance, warning signs and safety barriers will be installed. In addition, supervisors and guards will be hired to organize the traffic and ensure safety and smooth flow of traffic during day and night. All the preventive measures will be taken to avoid causing damage to road crossings.

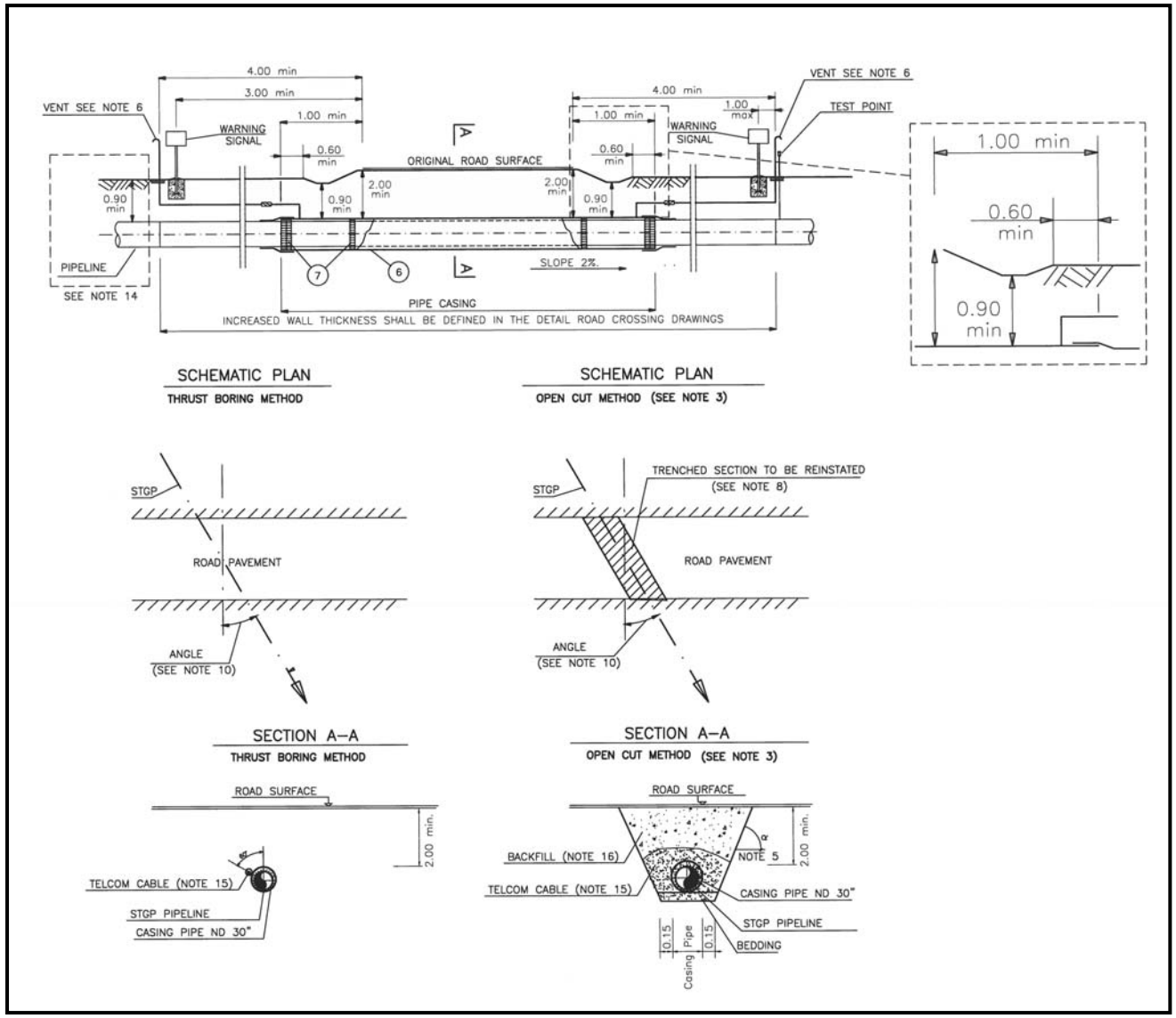


Figure 4.2 Cross Section of the Pipeline Crossing Roads

4.6.8 Hydrotest

Before commissioning, the pipeline will be subject to a hydrostatic test in accordance with the technical specifications required to check the integrity and rigidity of the pipeline.

Prior to the hydrostatic testing, it is necessary to carry out an internal cleaning of pipes using a cleaning pig. The scraping is a cleaning process that removes dirt, welding rods, stones, debris and other foreign bodies. During scraping, it is necessary to provide "scraper stations" for sending and arrival. These stations will be connected to the scraper ends by flanges to allow inspecting the pig at the arrival.

The water used to accomplish the hydrotest will be supplied from water well existing in Nawara concession whose drilling approval is going on with agricultural and hydraulic authorities. This water will have the same physico-chemical characteristics as the drinking water. It will be mixed with a corrosion inhibitor and an oxygen scavenger.

Sections between two successive valves will be subjected for at least six hours to resistance test at 150 % of the nominal service pressure. The test of each section will be made by a section of 32 km separated by temporary scrapers. These scrapers can clean the pipeline and control the water quantity introduced into the pipeline. Therefore, only the water in the first section is supposed to contain the waste existing in the pipeline. Assumed to be contaminated with welding debris and possibly grease, this water will be removed in evaporation pits.

After hydrostatic testing, the pipeline will be wiped to remove any residual water by injecting air or gas. Once the pipeline is dry, it will be purged with nitrogen before commissioning.

4.6.9 Restoration

At the end of operations, the sites will be restored to its initial state using debris generated during the construction phase. The access tracks will be saved for later use during the operation phase for periodic inspection.

4.7 Base Camp

The contractor will develop construction camps to accommodate 300 people for the workforce engaged in construction activities. Three base camps will be erected along the gas export pipeline route. The first one will be established near the CPF, the second at a half distance near the RN 19 road and the last near line valve station (KP52). These locations were chosen in order to minimize land acquisition, personnel and engines shifting and facilitate supplies. Base camps will be equipped with specific medicines for

treatment of different illnesses and the necessary equipment to handle an emergency.

4.8 Access to the Area

The project area is accessible through the existing roads and tracks leading to the project site (see Figure 4.3 Road Map of the Study Area).

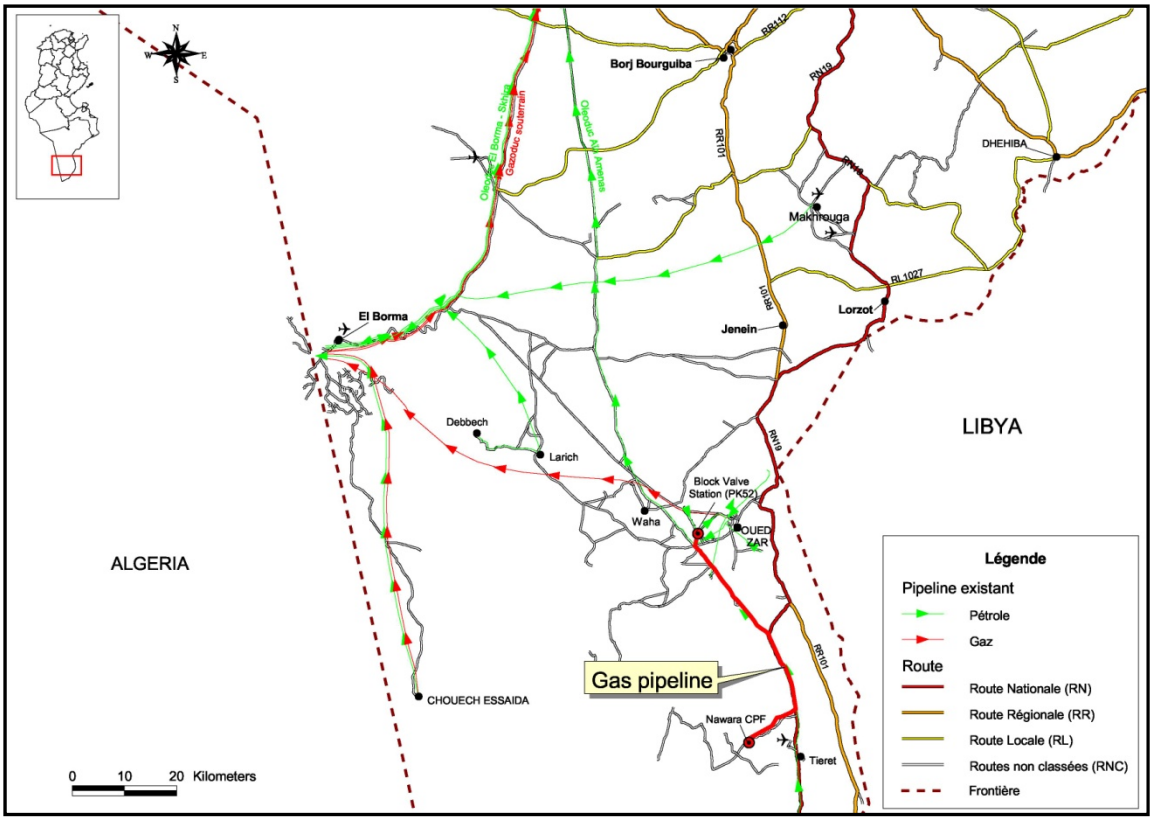


Figure 4.3 Road Map of the Study Area

4.9 Utilities

The construction of the pipeline requires water, power and fuel. The normal operations will not require any utility.

4.9.1 Water

Aquifer water will be supplied from water well existing in Nawara CPF.

4.9.2 Power

One 125 KVA-power generator will be used to provide the electricity required for base camp and equipment.

4.9.3 Fuel

Diesel is required to supply the camps power generation system, vehicles and construction equipment. Diesel will be trucked to the base camp by a fuel tanker of 10,000 liters from the existing gas station in Remada and stored in tanks with a total

capacity for 30 m^3. Daily diesel consumption is about 1000 liters. Oil tanks will be located far from workplace, habitations, open fire, ignition, and other causes of heating. A trench waterproofed with a polyethylene membrane will delimit the fuel storage area to avoid the contamination of underground water with the hydrocarbons in case of a leakage.

4.10 Safety

4.10.1 Communication

All necessary and efficient communication means will be available for work needs and workforce safety.

4.10.2 Medevac

The base camp will be equipped with specific medicines for treatment of different illnesses and the necessary equipment to handle an emergency.

4.10.3 Contingency Plan

Emergency procedures to cover all foreseeable emergency situations will be available, documented and displayed.

The contingency plan includes medevac, fire fighting and man lost search.

4.10.4 Training

A safety meeting will be held at the beginning of the work with all the crews. Work Procedures and first aid training will be explained during this meeting.

5.0 EXISTING ENVIRONMENT

The baseline analysis of the study area has been based on the bibliography and on certain collected field data.

For the needs of environmental analyses, all the environmental and socioeconomic sensibilities were set in their geographical context by a Geographic Information System (GIS).

5.1 Physical Environment

5.1.1 Geomorphology

The study area is located in the geomorphologic set of Dahar characterized by its outcrops. The Dahar is a wide plateau made up of Cretaceous outcrops and divided by many thalwegs generally oriented East to West and ranging in altitude from 300 to 550 m.

This dry land develops at the west and towards the south, having a purple and arid ribbon, sometimes 100 km wide. It is slowly inclined towards the Erg Sands at the West and ends at the East in a form of Djebels (often very abrupt ledge) over the oriental plains of El Ouara and of Jeffara, whose altitude varies between 100 and 200 m and slowly descend in the direction of the sea (see Figure 5.1 Spatiomap of the Study Area).

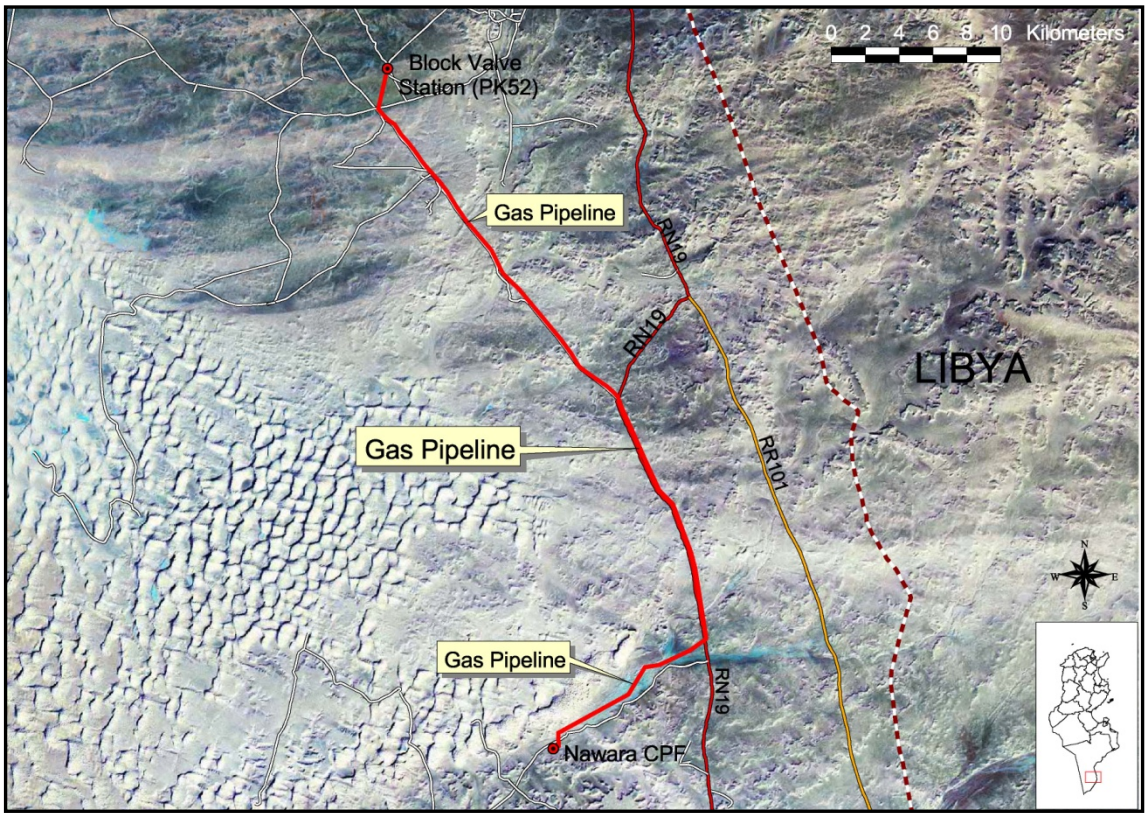


Figure 5.1 Spatiomap of the Study Area

5.1.2 Geology

All the sedimentary series which constitute the relief of the region belong to the Secondary era. They pass from the Upper Cretaceous to the Upper Silurian and descend into two directions at the west and the South west.

The upper Cretaceous constitutes the Dahar skeleton: It is made of limestone and marls. The medium and lower Cretaceous rise on the oriental front of Dahar: they are made of dolomites and sandy clay beds.

During the Cretaceous sedimentation, the source rocks reached the maturation depth. The migration of hydrocarbons to the reservoir rock (Acacus formation) was favoured by the general tilting of the platform down to the southwest.

Moreover, Triassic and Paleozoic sandstones are a productive area. The exploration was dense in the western central sector, near the large field of the El Borma. The northeast, the east and the far south zones are less explored and still have good potential, especially for the Paleozoic targets such as the Devonian, the Carboniferous and the Ordovician which are currently producing oil and gas in Algeria and Libya (Ben Ferjani A. *et al.*, 1990).

5.1.3 Pedology

The soils of the study area are fragile having a very coarse texture because of the dominance of quartz and silica crystals. The wind erosive processes affect these easily movable materials, which allow their transport over long distances.

In case of deflation, the soil is locally made of "fech fech" which are dusty gypsum based formations having a shallow and tender crust (Coque, 1962).

5.1.4 Hydrology

The natural conditions within the study area are characterized by a very low and irregular rainfall and by a hydrographical network having an intermittent flow. The surface waters are scarce or even negligible and the flow is endorheic.

5.1.5 Hydrogeology

Surface waters are rare even absent (cf. Appendix V Coring boreholes in the study area). The Continental Intercalaire of the Dahar is the only water resource in the study area (see Figure 5.2 Hydrogeological Map of the Study Area). This aquifer is subdivided in two parts: the Dahar eastern piedmont of C.I and the Dahar western piedmont of C.I. It covers an area of 600 000 km^2 extending over the south of Tunisia and the south of Algeria.

The upper aquifer of the Continental Intercalaire having an average thickness of 131 m, is of interest to all the domain of the extreme South of Tunisia. The groundwater flow is towards the West and the Northwest.

During the year 2008, the global exploitation of this aquifer was 10.2 Mm^3/year and its recoverable reserves are about 28.4 Mm^3/year (DGRE, 2008).

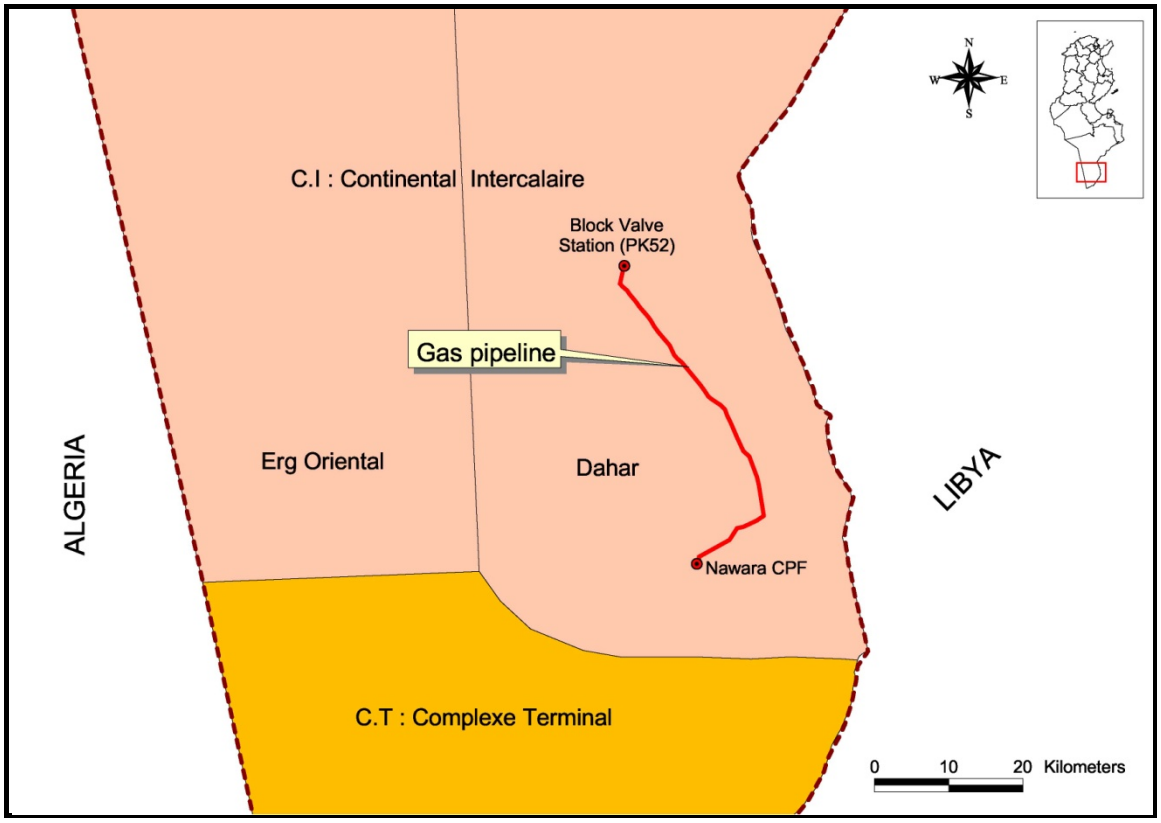


Figure 5.2 Hydrogeological Map of the Study Area

5.1.6 Weather Conditions

With reference to the scale of Emberger (1955), and given the weather characteristics, the study area as part of the southern Tunisia is classified as Mediterranean bioclimate of Saharian inferior stage with cool winter.

5.1.6.1 Temperature

The temperature, being variable with the season, is characterized by great amplitudes reflecting the continental aspect of the study area. As such, during the summer, July is the hottest month with an absolute maximum temperature of 50.1°C. Whereas, during the winter, January is the coldest month with an absolute minimum temperature of - 2.4°C.

The average annual temperature at El Borma is 22.6°C and the average minimum temperature is 4.3°C in January and the average maximum temperature is 41.7°C in July.

Table 5.1 Average, absolute Minimum and Maximum Temperatures Recorded at the El Borma met station during the Period from 2000 to 2009

Mois	J	F	M	A	M	J	J	A	S	O	N	D
Average Min T°C	4.3	5.7	10.5	14.7	19.5	22.7	25.4	25.3	22.6	18.0	11.1	6.5
Average Max T°C	17.3	19.3	25.3	29.4	33.5	38.5	41.7	40.8	36.6	31.4	23.7	18.5
Average T°C	10.8	12.5	17.9	22.0	26.5	30.6	33.5	33.1	29.6	24.7	17.4	12.5
Absolute min T°C	-2.4	-1.5	2.1	6.0	10.1	12.4	18.5	20.0	14.4	8.2	1.5	-2.2
Absolute max T°C	26.9	31.9	38.7	40.6	44.6	47.2	50.1	47.3	45.8	40.2	37.0	30.6

Source: INM., 2000-2009

The absolute minimum temperature recorded during the period 2000-2009 is -2.4°C, recorded on January 7th, 2005. While, the absolute maximum temperature is 50.1°C and recorded on July 26th, 2005.

5.1.6.2 Rainfall

Rainfall is very irregular with an annual average of approximately 51,4mm over the period 2000 -2009. Rainfalls are occasionally affected by disturbances of Saharian origin related to north-east fluxes. Rainfall is generally characterised by a low intensity events. The highest intensity was 19.6 mm and occurred mainly during autumn. A monthly average rainfall recorded at El Borma met station is presented in table 5.2.

Table 5.2 Monthly Average Rainfall Recorded at the El Borma met station during the Period 2001-2009

Mois	J	F	M	A	M	J	J	A	S	O	N	D	Total
Pluv. (mm)	5,7	3,4	9,8	3,1	4,9	0,3	0,0	0,0	1,8	14,6	3,2	4,5	51,4

Source: INM., 2000-2009

In El Borma, and during the period 2000-2009, the monthly rainfall recorded was 61.3 mm in October 2006.

5.1.6.3 Evapotranspiration

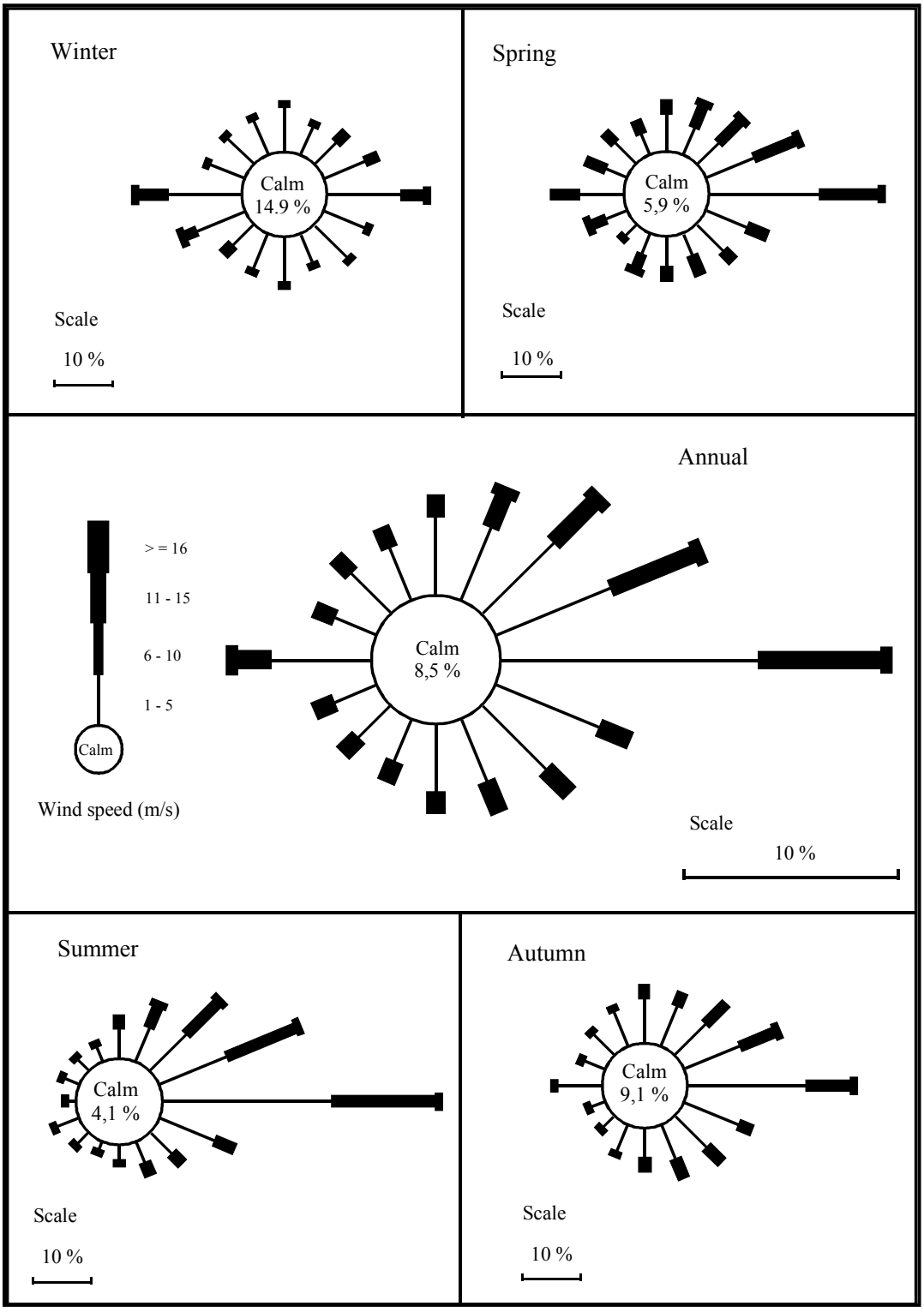
The dry season duration (6 to 9 months) and the frequent exposition of the region to dry winds increase considerably the potential of evapotranspiration, reaching 1119 mm in Remada and worsen the hydric deficiency.

5.1.6.4 Winds

Wind roses for the winter and autumn periods at El Borma monitoring station are presented in figure 5.3. These wind roses show that the dominant winds tend to be from the west and east during the winter period and from the east, north-east and south-east

during the autumn.

South-west winds tend to be associated with a significant temperature increase. This warm wind tends to operate as a limiting factor on the occurrence of many plant and animal species in the area.



Source: INM., 2000-2009

Figure 5.3 Annual Wind Roses within El Borma met station (2000-2009)

The south-west and north-east winds, due to the abrasive silicon and quartz grains carried by these winds, also result in damage to vegetation in the area.

Table 5.3 Wind Speed at El Borma Station (2000-2009)

DD	1-5 m/s	6-10 m/s	11-15 m/s	>=16 m/s	Total
N	3.0	0.8	+	+	3.8
NNE	3.7	1.3	0.1	+	5.1
NE	3.7	2.1	0.1	0.0	5.9
ENE	4.3	3.2	0.2	0.0	7.7
E	11.4	5.8	0.3	+	17.5
ESE	5.5	1.9	0.1	0.0	7.5
SE	4.8	2.0	0.1	+	6.9
SSE	3.8	1.6	0.1	+	5.6
S	3.6	1.5	0.1	+	5.2
SSW	2.9	1.0	0.1	+	4.0
SW	2.2	0.9	0.1	+	3.2
WSW	2.4	1.4	0.2	+	4.0
W	4.8	2.3	0.2	+	7.3
WNW	2.1	0.7	0.1	+	2.8
NW	2.6	0.6	0.1	+	3.3
NNW	2.1	0.6	+	+	2.7
Total	62.9	27.7	1.9	0.1	92.6

Source: INM., 2000-2009

5.1.6.5 Sandstorms

Sandstorms are very common in the study area. The number of days of sandstorms per month is given in table 5.4.

Table 5.4 Monthly number of sandstorm days in El Borma for the period 2000-2009

Month	J	F	M	A	M	J	J	A	S	O	N	D	Total
Nbr. of days	1	2	5	6	6	2	1	1	2	1	1	2	30

Source: INM., 2000-2009

The annual average number of days of sandstorms for the period 2000-2009 is 30 days. It varies from 1 to 6 days. The highest number of windy days was recorded during the spring season (March-April-May) with 19 days of sandstorms.

5.2 Biological Environment

The very marked dryness of the climate and of the soil avoids the installation of vegetation and animal settling process. This results into a low biological diversity. The number of animals and vegetation species remains in these situations low compared to the rest of the arid zone.

5.2.1 Flora

Dahar vegetation has hardly ever been studied, barring Houérou's works (1959-1969). In terms of plant life, the region was classified by Ferchichi (1997) as a transition area between the Mediterranean flora and Saharian-Arabian flora.

In terms of plant communities, the following ones were identified by Houérou (1959):

- ✓ Plant community of *Anthyllis sericea* ssp. *henoniana* and *Gymnocarpos decander;*
- ✓ Plant community of *Arthrophytum schmittianum* var. *prostratum* and *Arthrophytum scoparium* var. *scoparium;*
- ✓ Plant community of *Helianthemum confertum* var. *brachypodum* and *Calligonum comosum;*
- ✓ Plant community of *Calligonum azel* and *Calligonum arich*;
- ✓ Plant community of *Aristida pungens* and *Gensita saharae;*
- ✓ Plant community of *Ephedra* ssp. *alenda* and *Cornulaca monacantha*

Dahar is generally marked by a steppe cover with predominance to the West (along the eastern Grand Erg) of psammophilous species (*Helianthemum confertum*, *Oudneya africana*, *Calligonum comosum*…) and to the East (along Matmta Mountains) of xerophilous species (*Gymnocarpos decander*, *Helianthemum kahiricum*, *Artemisia herba-alba*). Depressions are marked by predominance of psammophytes such as *Retama raetam*, *Aristida pungens*, *Calligonum comosum, etc*.

Salt depressions are very rare in this region. Sandy or powdery limestone or gypsum Regs are covered with sparse vegetation where *Traganum nudatum* and *Cornulaca monacantha* are dominant.

Thanks to a relatively congenial milieu, Wadis and spraying areas house a rich and varied vegetation, mostly *Tamarix sp., Retama raetam, Pennisetum elatum, Aristida pungens, Calligonum comosum,* etc.

5.2.1.1 Description of the main existing species

The main existing species within the study area are listed in the paragraphs below:

Cornulaca monacantha Del.

The species belongs to the Chenopodiacean family. Its vernacular name is Hadd. It is branchy, prostrated and often padded due to the great pressure from animals. The leaves are thick, small in size and marked by their spiny tips. The blooms (1 to 3) are small in

size and generally appear clustered in autumn.

It is a purely Saharian species. It is found mostly on sandy steppes in the continental regions. In Tunisia, dense clusters of the species have been spotted in Djerid (Tozeur, Nefta) and close to Rjim Maatoug. It is also found in the easternmost part of the country (Borj El Khadhra).

Although it is relatively spiny, this species is highly appreciated by domestic and wild animals. In case of overgrazing, it takes various shapes, mostly a pad-like form, a sign of self-defence. In traditional medicine, it appears that it has purgative effects for men and animals. It is even thought to be used for the treatment of liver diseases in the western sub-Saharian region.

Photo of *Cornulaca monacantha Del*.

Retama raetam

It is a bright highly branched shrub which can reach up to 2 m in height. The leaves are small. The blooms are white, with stem. *Retama raetam* grows in autumn after the first rainfalls but most often in spring. It generally blossoms in February. In March the seedpods begin to appear and the seeds ripen in June.

The species is spread as from the humid bioclimatic stage to the Saharian stage. It colonizes the sand dunes and sand accumulations. In the study area, it is found in the

wadi beds and on the bright sandy accumulations.

This moderately palatable species is known mostly for its highly important role in soil fixing. In a good year, the species consumption peak concurs with the flowering stage. It is appreciated mostly by goats. They eat the flower stems and sometimes even the seedpods. In summer, the young stems and seedpods fall under the shrubs and are eaten by goats and ovine.

Photo of *Retama raetam*

5.2.2 Fauna

The specific diversity of vegetation and the vegetation cover are the factors influencing the diversity and the density of the existing animals. The animal species of the study area are linked to the existing plant communities.

5.2.2.1 Terrestrial Fauna

As in the case for the rest of the saharian zone, the wild fauna encountered in these zones is known for its adaptation to the ecological characteristics of this zone. The encountered species are few in number but ecologically well adapted to the natural conditions of the site. As such, for example, the lack of water points for animal consumption does not affect the biology of the animal species except during the summer season. This season however is characterized sometimes by very high temperatures causing the suffering to death of many species, in particular the gazelles.

The dune gazelle (*Gazella leptoceros*) whose color corresponds to sand's one (adaptation of these species to the site characteristics) is the most encountered mammal in the region.

Other mammals such as the wolf, the jackal and the fox exist in this zone. Their nutrition is based on dead sheep and cows pasturing in this region, as well on gazelles.
Among the rodents, the Thomas's gundi and the jerboa are the most abundant animals, in particular within the visible galleries in the Dahar formation level.

The reptiles in the saharian zones are very dangerous to mankind, because of their poisonous character. We stress in this case on the abundance of vipers with horns or sand viper, being extremely dangerous species. Another characteristic reptile of the study area must be mentioned. It is the sand boa (Eryx jaculus), which is also dangerous, just like the Naja (Naja haje). The desert varanus (gray varanus) is similarly a frequent species in the study area. Other inoffensive or less dangerous reptiles, in particular lizards, exist also in the zone.

The insects constitute another particularity of these saharian zones. Their abundance reflects the high density of scorpions and spiders.

5.2.2.2 Avifauna

Within the study area, the ornithological community is significantly diverse. For all seasons, a hundred migratory and sedentary species were inventoried which represents the quarter of the total Tunisian richness. This community is composed of sixty continental species, thirty waterbirds and some Raptors (Isenmann *et al*., 2005). Further, the study area is important for migratory birds during autumn and spring seasons. It's regarded as a bird migratory bridge linking African and European continents. It is also a very important area for some breeding Passeriformes.

Some bird species characterize the Southern Tunisia as *Tadorna ferruginea*, *Chlamydotis undulate*, *Cursorius cursor*, *Charadrius morinellus*, *Pterocles alchata*, *Bubo ascalaphus*, *Caprimulgus aegyptius*, *Alaemon alaudipes*, *Chersophilus duponti*, *Ramphocorys clotbey*, *Ermophila bilophaa* and *Scotocerca inquieta*.

5.2.2.3 Protected Species

According to Article 7 of the order of the Minister of Agriculture and Environment dated September 11th, 2012, relating to the organization of hunting activities during the season 2012-2013, hunting, destruction, capture, selling, buying, hawking and detention of the following species are prohibited by the law at all times :

- ✓ ***Mammals:*** stag, gazelles, buffalo, serval, mouflon with cuffs, lynx, cheetah, hyena, fennec, porcupine, bats, white hedgehog, Thomas's gundi, wildcat, otter, seal, saw, young wild boar and all young wild mammals.

- ✓ ***Birds***: African Bustard *Chlamydotis undulata*, Greater Flamingo, stork, Slender-billed Curlew, Marbled Teal, White-eyed Pochard, Purple Gallinule, Corn Grex, Shag Cormorant, Audouin's Gull, Eurasian spoonbill, night and diurnal bird of prey, eggs, nests and clutches for all wild birds.
- ✓ ***Reptiles and amphibians***: land, sea and freshwater Tortoises, desert lizard, tail whip, chameleon and frogs.

The export, the import and the transit of all the wild fauna species including any of their parts (mammals, birds, reptiles, amphibians, molluscs, insects, arachnids and annelids) are prohibited except upon a special authorization of the General Director of Forests.
The naturalization of the wild fauna species is submitted to the specifications approved by the decree of minister of the agriculture dated 28 March 2001.

5.3 Human Framework

5.3.1 Population

The study area is located in the sector of Borj El Khadra, delegation of Remada within the governorate of Tatouine. This delegation covers 27,830 km^2 which is 70.4% of the governorate of Tataouine. The Remada delegation has 9,977 inhabitants (INS, 2005) with a population density of approximately 0.25 inhabitants/km^2.

According to the results of a census conducted by the National Statistics Institute in 2004, the population of the Borj El Khadra sector is 83 inhabitants grouped in 19 houses and 19 households (INS, 2005). It principally consists of the military personnel at the frontier post of Borj El Khadra. The low population is due principally to the location of this sector within the Tunisian Sahara and the associated harsh desert conditions.

The area is also occupied by shepherds who are generally found in the area on a seasonal basis. They are generally not included in the census noted above and the exact size of this population is unknown.

5.3.2 Economic Activity

5.3.2.1 Demography

The study area is located in the sector of Borj El Khadra, delegation of Remada within the Governorate of Tatouine.

According to the results of a census conducted by the National Statistics Institute in 2004, the population of the Borj El Khadra sector was 83 inhabitants grouped in 19 houses and 19 households (INS, 2005). It mainly consists of the military personnel at the frontier

post of Borj El Khadra. The low population is largely due to the location of this sector within the Tunisian Sahara and the associated harsh desert conditions.

The area is also occupied by shepherds who are generally found in the area on a seasonal basis. They are generally not included in the census noted above and the exact size of this population is unknown.

5.3.2.2 Active Population

The distribution of the active population by branch of activity in the delegation of Remada, and the governorate of Tataouine is given in table 5.5.

Table 5.5 Distribution of the Active Population by Branch of Activity

		Governorate of Tataouine	Delegation of Remada	% of the delegation of Remada
Economic Activity	**Number of active population 15 years and more**	50 228	2779	-
	Activity rate %	47,7	42,4	-
Distribution of active population aged 15 years and more by branch of activity	**Agriculture and Fishing**	15198	595	25,1
	Manufacturing	1974	174	7,3
	Mining and Energy	833	87	3,7
	Building and public work	4944	280	11,8
	Trade	9065	322	13,6
	Transport and Communication	9574	871	36,8
	Education and Health	294	38	1,6
	Other services	41882	2367	100
	Undeclared	50 228	2779	-
	Total	47,7	42,4	-

Source: ODS., 2010

The number of active people aged 15 and more is 2779 and the activity rate is 42.4% in the delegation of Remada.

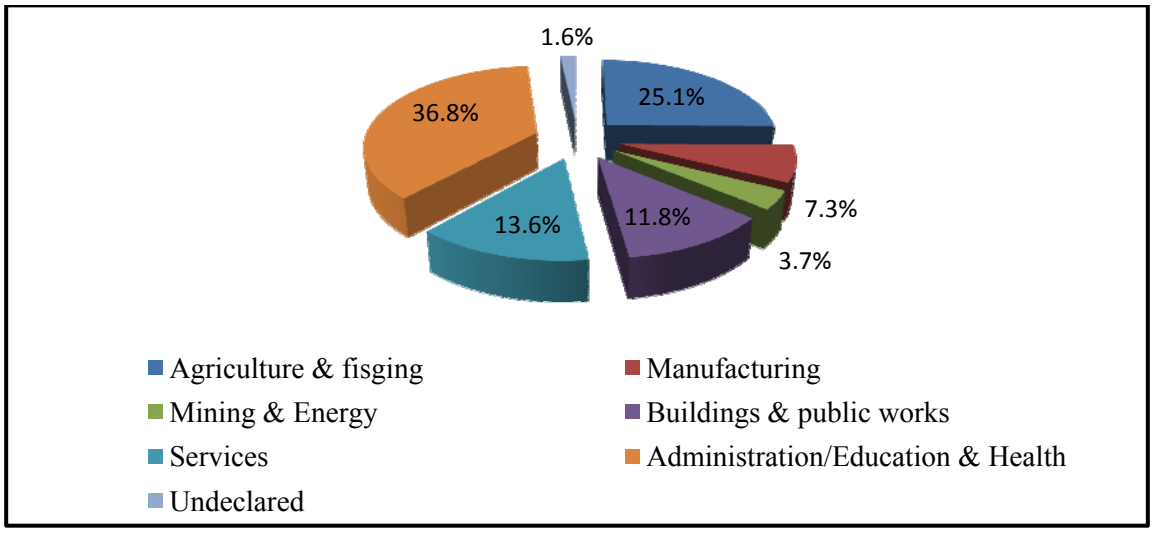


Figure 5.4 Distribution of Active Population by Branch of Activity within the Delegation of Remada

According to figure 5.4, mainly three sectors absorb the active population within the delegation of the study area (Remada) which are the administration/education and health branch (36.8%), followed by the agriculture sector (25.1%) and finally the services branch (13.6%).

According to the field survey, the working population in the hamlet of houses within Borj El Khadra region is 20 persons, among them 4 are unemployed.

5.3.2.3 Unemployment

The table 5.6 presents statistics of the unemployed persons aged 15 years and more and the rate of unemployment in the delegation of Remada, the governorate of Tataouine and in Tunisia.

Table 5.6 Unemployment Rate

Region	Number of unemployed 15 years and more	Unemployment Rate
Delegation of Remada	412	14.8%
Borj El Khadra sector*	4	-
Governorate of Tataouine	8,347	16.6%
Tunisia (2011 statistics)	704,900	18.3%

Source: ODS., 2010

** According to field survey, (EAM, February 2012)*

5.3.3 Socio-economic Activities

The main socio-economic activity in the governorate of Tataouine and particularly Borj El Khadra sector is agriculture and mainly breeding.

5.3.3.1 Agriculture

The agricultural area in the governorate of Tataouine is 1,706,991ha and the main crops are cereals, gardening, legume and arboriculture. The land use in Borj El Khadra region is based mainly on vegetables and fodder crops.

Land use in the study area is presented in figure 5.5 (see Figure 5.5 Land Use in the Study Area).

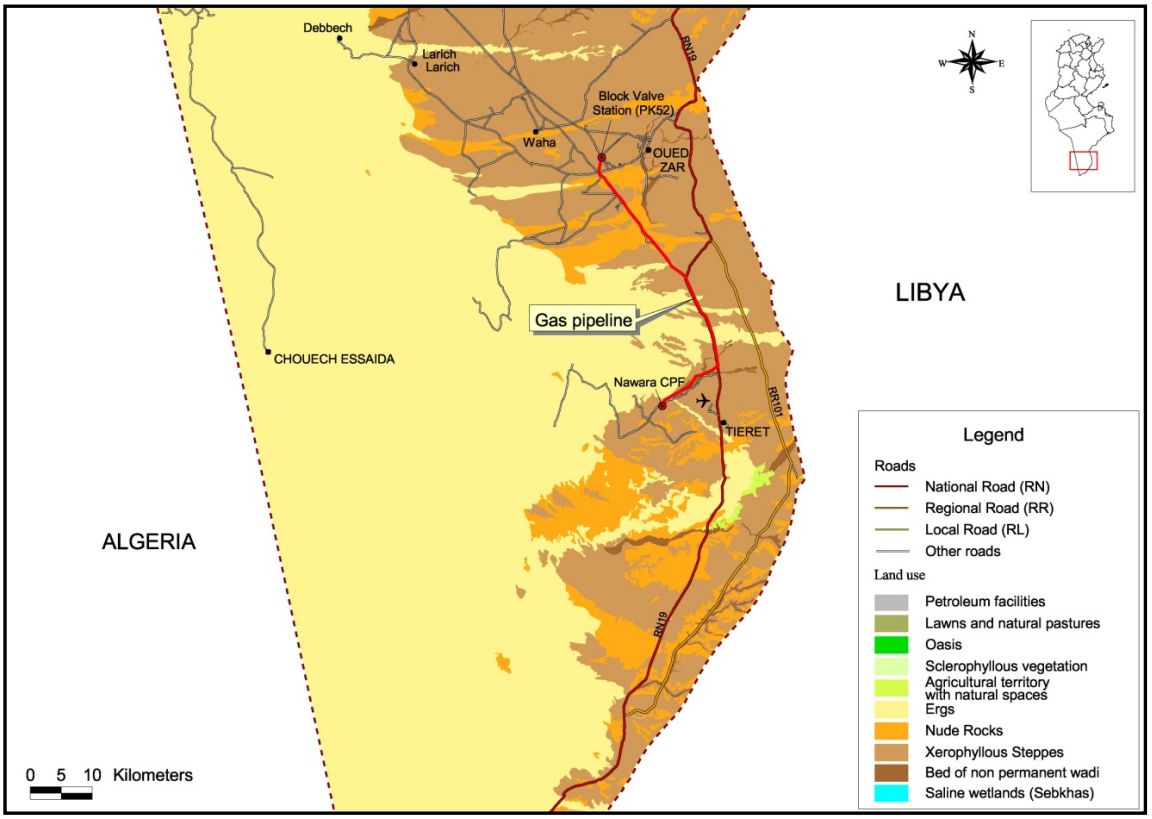


Figure 5.5 Land Use in the Study Area

Tables 5.7, 5.8 and 5.9 present the distribution of agricultural lands with their use as well as the distribution of dry and irrigated crops.

Table 5.7 Distribution of Land Use (ha)

Region	Agricultural Area	Pastures	Forests	Non Agricultural Area	Total
Remada	30.000	780.000	398	810.398	2.105.609
Governorate of Tataouine	200.000	1.500.000	7.747	1.707.747	2.181.445

Source : ODS., 2010

Table 5.8 Distribution of Arable Land (ha)

Region	Cereals	Gardening	Legume	Arboriculture	Total
Remada	6	232	-	3,860	4,098
Total Governorate of Tataouine	2,192	766	27	51,600	54,584

Source : ODS., 2010

Table 5.9 Distribution of Irrigated and Dry Annual Crops (ha)

Type of crop	Region		Cereal	Legume	Vegetables	Fodders
Dry	Delegation of Remada	Area (ha)	200	-	-	-
		Production (T)	70	-	-	-
	Governorate of Tataouine	Area (ha)	870	27	14	-
		Production (T)	322	62	62	-
Irrigated	Delegation of Remada	Area (ha)	12	-	232	950
		Production (T)	63	-	4,513	285,000
	Governorate of Tataouine	Area (ha)	188	-	765	365
		Production (T)	1,930	-	14,735	7,330

Source : ODS., 2010

Table 5.10 Distribution of Irrigated and Dry Arboriculture

Type of crop	Region		Olive trees	Dates	Almond trees	Pomegrenate trees	Fig trees	Other
Irrigated	Delegation of Remada	Area (ha)	2,065	-	186	-	207	-
		Production (T)	420	-	15	-	-	-
	Governorate of Tataouine	Area (ha)	44,355	145	1,584	-	1,710	-
		Production (T)	557	-	100	-	60	-
Dry	Delegation of Remada	Area (ha)	614	103	140	64	64	241
		Production (T)	506	15	40	35	170	580
	Governorate of Tataouine	Area (ha)	1,607	230	261	304	199	732
		Production (T)	1,029	30	100	410	310	1,330

Source : ODS., 2010

5.3.3.2 Livestock Breeding

Transhumance and pastoralism are considered to be the livelihood income of the local population.

Dahar is known to be a grazing area. It is used by herds of dromedaries and small

ruminants (ovine and goats) from neighbouring regions.

(i) Breeding of Dromedaries

The dromedary is a species adaptable to the harshest living conditions. It contributes to the valorisation and preservation of desert expanses marked by a thin vegetal cover and an extremely fragile ecosystem. In good years at least 50% of the national camel herd head during the springtime toward the Sahara and Dahar.

Table 5.11 Evolution of the number of camels in the governorate of Tataouine (1890 - 2009)

Years	**1890**	**1930**	**1990**	**1998**	**2009**
Number	3,100	9,860	16,000	20,000	25,000

Source : ODS, 2009

Due to the mobility of animals between the study area and the breeding ″residence rounds″, it is difficult to identify a specific round (grazing duration, sanitary prophylaxis) and assess Dahar own production.

The strategy of transhumance toward the Saharian rounds and Dahar seems to be a key component in the way camel breeding is conducted in the south of Tunisia.

The beginning and end of transhumance are further determined by the behaviour of animals; they prefer to go grazing in depressions looking for tender vegetation. Camel raisers shun certain rounds and choose milder and less windy destinations.

(ii) Breeding of Small Ruminants

The study of the various zoo-technical aspects of the breeding of small ruminants was conducted on the basis of the result of a survey of shepherds and data collection from the CRDA of Tataouine and the regional development departments.

Transhumance is a very old practice in Dahar round. It extends over a period of six months each year. It begins after the first autumn rainfalls and lasts in late spring. Watering locations determine the destination of transhumance.

Table 5.12 Estimation of the Number of Ovins and Caprins (× 1000 heads) using the Dahar

Gouvernorat	Ovins	Caprins	Total
Tataouine	298	232	530
Others	162	139	301
Total	**460**	**371**	**831**

The entire herds in the governorate of Tataouine are considered as using Dahar. The herds of small ruminants are made up of goats and ovine. An average herd is composed of 54 % of goats and 46 % ovine.

Livestock in the delegation of Remada consists of 60 000 head of sheep, 36,000 heads of goats and 1,800 heads of camels (ODS, 2010).

Within the Borj El Khadra sector, there are only 300 heads of livestock (200 cows and 100 sheep).

5.3.3.3 Tourism

Saharian tourism is being promoted at the national level. Indeed, the difficulties of the sector result from several factors of which the main are the accessibility of the sites, the improvement of the lodging and the rehabilitation of the access roads and the sites attraction such as Ksours and the Islamic and Roman ruins.

The study area is part of a military zone; therefore, its access is subject to a Desert Pass issued by the Governor of Tataouine.

With the difficult access and complete absence of settlements, the study area does not constitute a touristic zone.

5.3.3.4 Underground Resources

The largest underground resource is obviously oil, especially in the regions of El Borma, Makhrouga, El Arich, Chouech Essaida, Ech-Chouech, Oued Zar, Hammouda, Adam and Waha, which provide the major part of the Tunisian oil production (see Figure 5.6 Infrastructures within the Study Area).

5.3.4 Cultural and Archaeological Patrimony

Based on the available current knowledge, no single important cultural or archaeological site exists within the study area. In case of discovery of artefacts from the pre-historical or historical ages, arts or traditions, the operator will be asked to immediately inform the services in the ministry in charge of the patrimony or the nearest territorial authorities who will in turn inform the services in charge within a maximum of five days. The

authorities in charge will take all necessary conservation measures and will ensure themselves, if necessary, the supervision of the in-process works.

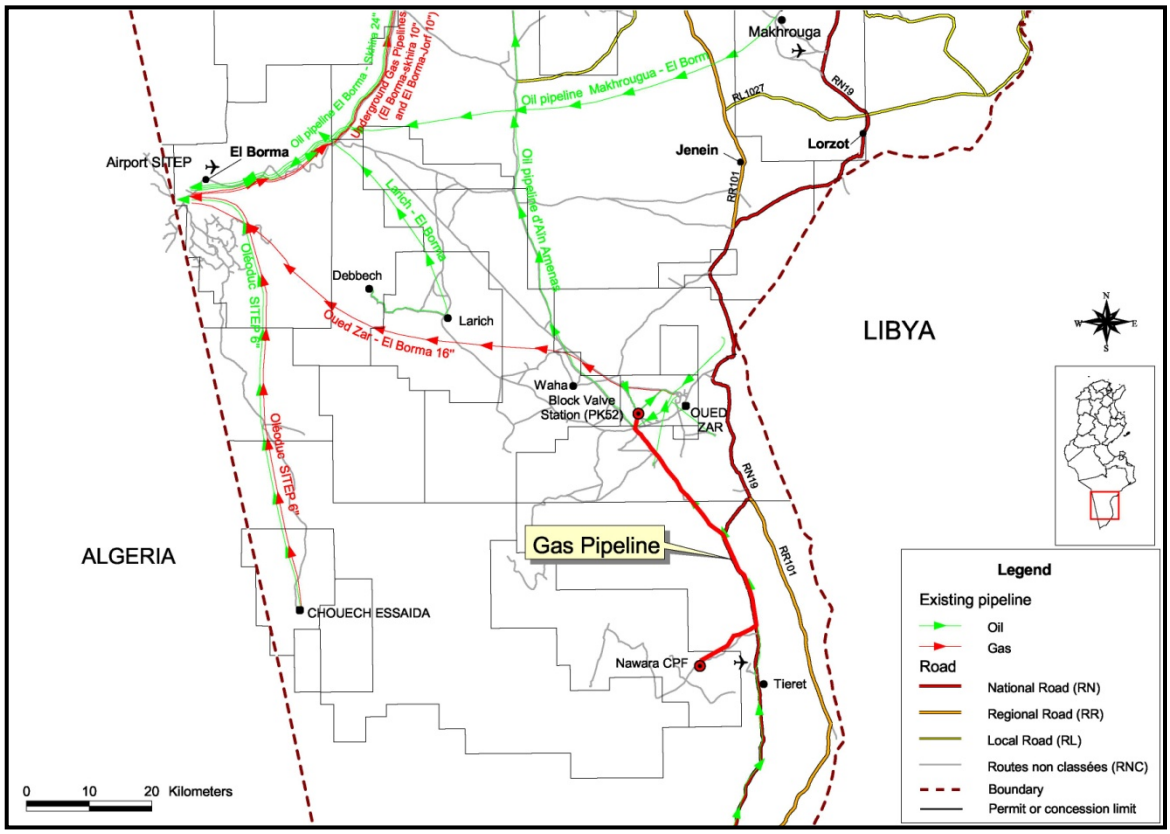


Figure 5.6 Infrastructures within the Study Area

However, according to a baseline survey carried out by EAM during the period between 22 and 25 April 2009, archaeological findings are present in the extended project area, near Nawara CPF.

Table 5.13 and Figure 5.7 represent a summary of the findings.

Table 5.13 Summary table of Archaeological Findings

Site	Type of Finding	Culture /Age	Coordinates	
			X	Y
1	No findings at Nawara well site	-	60 22 70	34 31 086
2	Flint debris, shaped earthen ware, ostrich egg fragments	Palaeolithic – Neolithic	60 11 96	34 31 024
3	Siliceous limestone points, blades, chipping chisels and scrapers; flint scrapers, rasps and points	Middle Palaeolithic	60 16 40	34 31 862
4	Flint points and blades	Middle Palaeolithic / Upper Palaeolithic	60 21 22	34 28 079

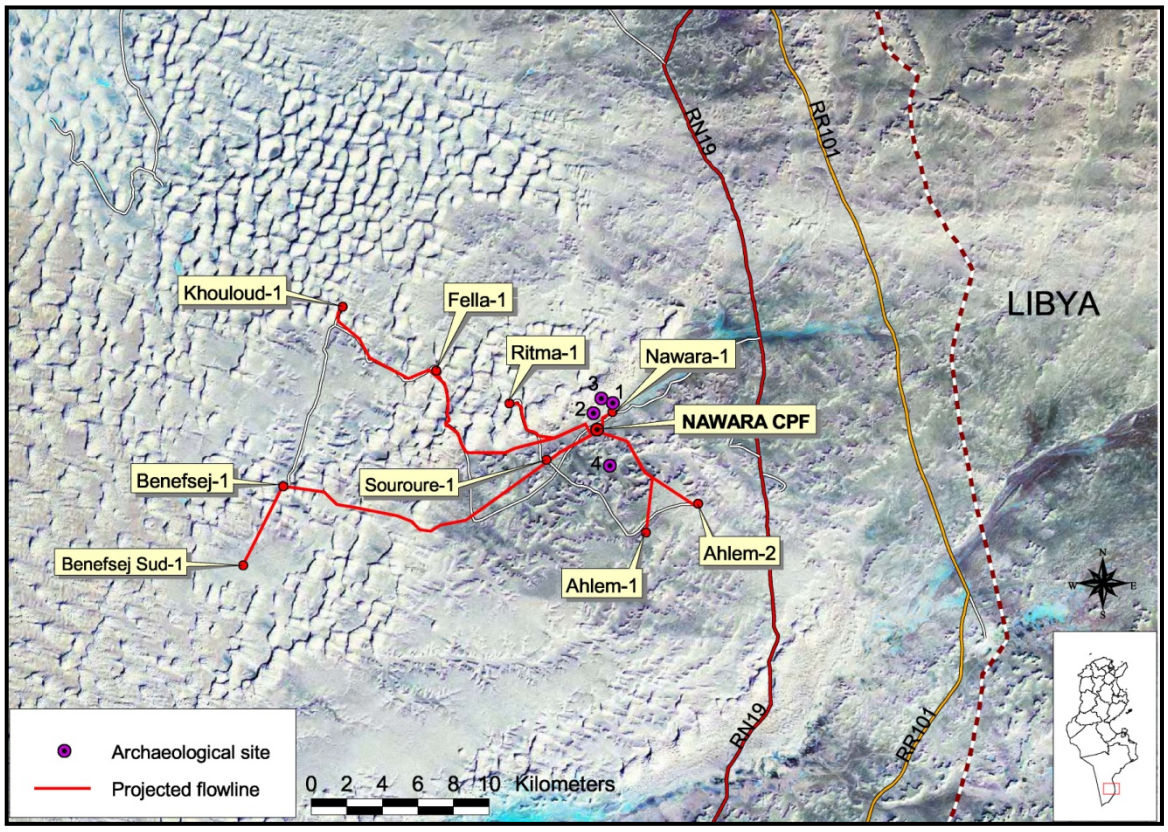


Figure 5.7 Archaeological Sites within the Study Area

5.3.4.1 Identification and Evaluation of Archaeological Artefacts

Nawara oilfield site is situated in an area of flat land which must have been used as a west-east landmark valley. The area lies between two hills, one to the South and the other to the North. Intensive exploration has been conducted in the study area in stages depending on the various topographical units.

Exploration of the oilfield's immediate surroundings did not reveal any traces of ancient culture (Photo no. 1a).

One kilometre to the west of the well, below the hill, rare evidences of existing Lithic material (especially flint lamellas) without any particular concentration were detected (Photo no. 1b). Two fragments of shaped ceramics and remains of ostrich eggs were also found but without any particular traces of usage (Photos no. 2 and no. 3). This material is typical of Neolithic cultures.

On the hill to the northeast of the Nawara field area, a deposit of siliceous limestone Lithic material cutting up is marked by the presence of relatively varied tools, such as points, blades, chipping chisels and scrapers, which belong to the Middle Palaeolithic Age (Photos no. 4 and no. 5).

On the same hill, in the outcrop of a flint intercalary layer traces of Lithic precrushing are made of flint debris and sporadic presence of relatively varied tools (Photo no. 6), mostly scrapers and rasps, as well as grossly chiselled points and cushion-edged blades belonging to the Mousterian culture.

Two to three kilometres to the south of the Nawara field at the bottom of the hill (Photo no. 7), scattered Lithic material is made of flint debris, including debris of Mousterian tools (single face points), and particularly more recent Capsian facies with cushion-edged, jogged and slanted truncation blades and microlites evolved into more complete geometrical forms (Photos no.8 and no.9).

Illustrations of the archaeological artefacts are given in photos 1 a-b, 2, 3, 4, 5, 6 7, 8 and 9.

1a

1b

2

3

4

5

6

7

8

9

5.3.4.2 Evaluation of the Archaeological Findings

Lithic tools found during the survey are marked by the Middle Palaeolithic Age, mostly Mousterian, which, in Africa, concurs with the Aterian (from Bir-el-Ater in Algeria) and is 40,000 to 20,000 years old. Among the flint or crystalline limestone tools traced back to this culture, points and rasps are most common. But the scrapers and chipping chisels as well as the two-faced retouch foliated pieces are found in great numbers and provide evidence of the evolution of Aterian into an Upper Palaeolithic Age.

On the hills scattered across the road linking SP3 Pumping Station to Nawara field, and on the hill to the northwest of Nawara field area, the lithic tool concentration is such that it constitutes pre-crushing sites, as proved by the commonly found debris and particularly simple and bipolar working edge nucleus. The site surface area is, however, very limited.

5.3.4.3 Conclusion

Based on the characteristics of the archaeological data obtained, it may be concluded that the Lithic artefacts scattered on the surface are of low significance. In fact, these tools are well-known in the Sahara and North Africa and, as such, they could be said to be commonplace.

By contrast, sites with a lithic material concentration, namely precrushing sites, all situated on hills, are of some importance, in view of their precise situation and the possibility of mapping certain operating chains of the Lithic industry but also the possibility of conducting an intersection operation and thus pinpointing the various stages

in the palaeoenvironmental evolution, identifying the various forms of adaptation.

However, it should be noted that a request dated November 4th, 2013 was presented by OMV to the National Heritage Institute to obtain an authorization for the realisation of the project in the area (cf Appendix VI Application for National Heritage Institute authorization).

5.3.5 Protected Areas

No natural protected areas or National Parks exist within the study area.

5.3.6 Landscape

It is a desert landscape characterized by the presence of outcrops of Dahar and regs.

6.0 PREDICTION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

The adopted methodology in the evaluation of the impacts of the gas export pipeline construction and operation is based on the appreciation of a synthesis indicator which constitutes the significance of the impact. This indicator gives a judgment on the importance of the gains and losses for the natural and human components of the environment related to the proposed activities. The established judgment represents the integrated result of three components, including the intensity, the extent and the duration of the impact.

Figure 6.1 graphically presents the main process allowing the impact evaluation.

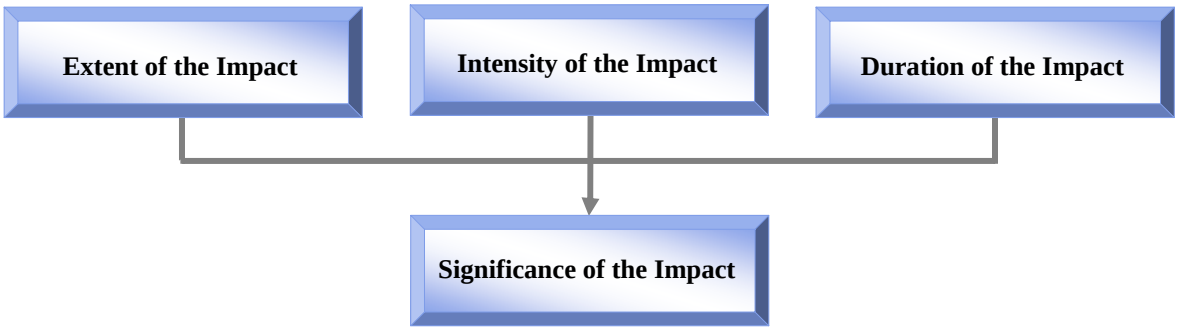
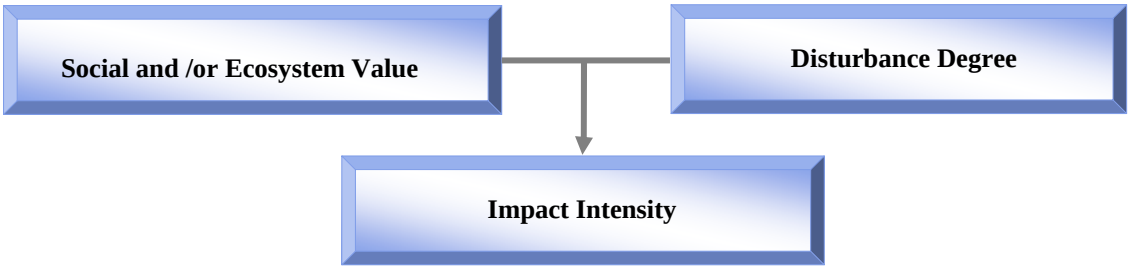


Figure 6.1 Procedure of Impact Evaluation

6.1 Intensity

The impact intensity shows the relative significance of the consequences attributable to the observed alteration of a component. It compiles the social and the ecosystem value of the component along with the anticipated disturbance degree of this component.



The combination of the disturbance degree and the value assigned to the component allows obtaining three levels of impact intensity: high, moderate and low.

- ✓ ***High***, when the impact highly modifies the quality or significantly limits the usage of a component presenting a main interest and exceptional qualities, whose conservation or protection are subject to a formal legislation or a general consensus ;
- ✓ ***Moderate***, when the impact reduces the quality or the usage of the component having

a certain social value and/or recognizable qualities without necessarily compromising its integrity ;

- ✓ ***Low***, when the impact modifies only in a little manner the quality, the usage or the integrity of an environmental component whose interest and quality do not constitute any growing concern.

6.2 Extent

The impact extent stands for the range or the spatial coverage of the effects generated by the intervention on the site. This concept refers either a distance or a surface over which the observed modifications felt by a component or else by the proportion of population being affected by these modifications.

The three levels, being considered in quantifying the impact extent are:

- ✓ ***Regional extent,*** when the impact affects a wide space or many components, being located within an important distance of the project or being felt by the whole population or by a large proportion of the population of the study area ;
- ✓ ***Local extent,*** when the impact affects a relatively limited space or a certain number of components located inside, nearby or at a certain distance from the project site, or when it is felt by a limited proportion of the population in the study area (i.e. a village) ;
- ✓ ***Pinpoint extent,*** when the impact affects only a very limited space or a component being located inside or nearby the project site, or it is felt only by a limited number of individuals of the study area.

6.3 Duration

The impact duration indicates its time extent, defined as being the period of time during which the imposed modifications will be felt by a component.

The used method distinguishes the following impacts:

- ✓ ***Permanent,*** whose effects are felt in a continuous manner during the service life of the equipment or even beyond ;
- ✓ ***Temporary,*** whose effects are felt during a limited time period, generally corresponding to the construction period.

6.4 Significance

The interaction between the intensity, the extent and the duration allows to define the significance level of the impact affecting a components affected by the project. Table 6.1 presents the grid for determining the impact significance. This presents five significance levels varying from very high to very low, considering the three determining factors of the impact: the intensity, the extent and the duration.

Table 6.1 Grid for Determination of Impact Significance

Intensity	Extent	Duration	Significance
High	Regional	Permanent	Very high
		Temporary	High
	Local	Permanent	High
		Temporary	Moderate
	Pinpoint	Permanent	High
		Temporary	Moderate
Moderate	Regional	Permanent	High
		Temporary	Moderate
	Local	Permanent	Moderate
		Temporary	Low
	Pinpoint	Permanent	Moderate
		Temporary	Low
Low	Regional	Permanent	Moderate
		Temporary	Low
	Local	Permanent	Low
		Temporary	Very Low
	Pinpoint	Permanent	Low
		Temporary	Very Low

In case the significance of the impact is considered moderate or high, the operator is inclined to consider, in the design phase, measures of control and / or mitigation to eliminate or reduce the impacts to acceptable level.

7.0 DISCUSSION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

This section of the report consists in debating potential impacts of the project in relation to the biophysical and socioeconomic environments. The discussion of potential impacts aims to assess these impacts qualitatively to establish the necessary measures required for their mitigation.

In the following we provide a description, analysis and evaluation of potential impact on biophysical environment that may occur during each stage of the project, such as:

- ✓ Construction phase;
- ✓ Operation phase, and;
- ✓ Decommissioning.

7.1 Impact of Pipeline Setting Up

The following sections cover the impacts associated to the offshore and onshore facilities installation. These impacts are regrouped in two categories as follows:

- ✓ Impacts linked to pipeline setting up;
- ✓ Impact of Hydrotest fluids discharge.

A great effort was provided for the selection the pipeline Right Of Way (ROW). The selected route will significantly maximize land management profitability and therefore significantly reduce the project's impacts on the biophysical and human environment.

7.1.1 Impact on the Biological Environment

The works inherent to the construction and pipelaying and the camps establishment cause a reduction of the vegetation cover and a destruction of a certain number of animal burrows. Besides flora disturbance, the movement of rolling stock and personnel along the pipeline route will also temporarily disturb the nearby fauna. Birds as well as mammals capable of moving long distances could find refuge in other similar sites. Only local populations represented by a few species of insects, reptiles and rodents will be affected.

Given that the area of construction and pipelaying activities constitutes a small part of a vast uniform area in terms of fauna and flora, and considering the absence of sensitive species in the study area that could potentially be damaged by these activities and the fact that the loss or the temporary decrease in population density does not modify the ecological balance, the impact intensity is considered low.

Because of the local extent and the limited duration of the construction and pipelaying activities, the impact significance is judged ***very low***.

7.1.2 Impact on Infrastructures

The infrastructures crossed by the pipeline are the road RN19 linking Tataouine to Remada and two tracks. All damages caused to these infrastructures will have non negligible consequences on the local and regional socioeconomic levels.

However, pipelaying during the crossing of these infrastructures will be performed in order to not compromise their uses.

The impact will have a short duration and local extent within the right of way of the pipeline, its significance is therefore ***very low***.

7.1.3 Impact on Road Traffic

The crossing of pipeline at the RN 19 requires diversion and traffic stopping. For this reason, due to the presence of heavy machinery involved in such work and for security reasons a traffic slowing (imposing a speed limit) is recommended during the construction period. In addition, supervisors and guards will be hired to organize the traffic and ensure safety and smooth flow of traffic during the day and night. The installation will have a very short duration (1-2 days) along a road which is not heavily attended. The significance of impact is described as ***very low***.

7.1.4 Impact of Excavating and Trenching

Pipeline construction activities such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment along the ROW may impact soil resources such as:

- ✓ Clearing removes protective vegetative cover and exposes the soil to the effects of wind which increases the potential for soil erosion ;
- ✓ Grading, spoil storage, and equipment traffic can compact soil, reducing porosity and percolation rates and increasing runoff potential. Soil compaction destroys soil structure, reduces pore space and the moisture holding capacity of the soil, and then increases runoff potential ;
- ✓ Construction activities can affect soil fertility and facilitate the dispersal and establishment of weeds.

In addition to erosion and compaction, construction activities such as grading, trenching, and backfilling can cause mixing of soil layers. Mixing of topsoil with subsoil changes the topsoil chemical and physical properties and lowers its fertility.

Contamination from spills or leaks of fuels and lubricants from construction equipment could also have an impact on soils. This impact is expected to be minor, because of the

typically low probability, volume, and extent of spills or leaks generated by pipeline construction projects.

To minimize impact on soils associated with the project, OMV will develop a construction plan that addresses the special issues adapted to construction in an arid environment.

Given the mitigation measures, the short duration (temporary), the local extent and the relatively flat morphology of the area, the significance of the impact is ***very low***.

7.1.5 Impact on Soil and Groundwater

The chemical composition of soil and therefore its quality can be damaged by uncontrolled releases or spills of oil, lubricants, hydrocarbons and other pollutants. Pollutants resulting from spills and releases can stay for long time in soils and can affect their ventilation, their fertility, carbon-nitrogen ratio and the organic matter cycle. These can lead to soil physic-chemical properties alteration which can effect vegetation as well as the surface and the groundwater quality. Besides, this may lead to the limitation of the safe use of groundwater resources.

However, the risk of groundwater contamination is unlikely because all the preventive measures will be included in contract terms with contractors. All locations where spills could occur will be equipped with the appropriate containment facilities. In addition, OMV will put systems in place to prevent soil contamination and will provide spill cleanup equipment and material. Any contaminated soil will be collected and sent to an approved treatment contractor.

Given the low probability risk of contaminants leak or spill, the limited duration of work, the local extent of the impact and the sensitivity of groundwater, the relative importance of impact is therefore considered ***low.***

7.1.6 Impact on Air Quality and impact related to GHG Emissions

During the construction phase, most of the atmospheric emissions should arise from fixed and mobile equipment (trucks, bulldozers, conveyers, forklift trucks and other machineries) and power generation sources. The atmospheric emissions will also be produced by the machines used for the site preparation and by the trucks transporting materials and heavy equipments to the site. Atmospheric emissions are moreover increased by the traffic of the vehicles used by the personnel working on site and by various operators reaching the site. That will be mainly constituted of NO_x, SO_2, CO, CO_2 and dust.

On the other hand, while construction involves demolition, digging, trenching, excavation, embankment, and stockpiling, atmospheric emissions should include significant fugitive emissions of dust and particles.

The parameter influencing the volume of emissions is the number, type, age of vehicles and engines used and the duration of the work. However, OMV is committed to plan the work, to shorten the duration and will ensure that the equipment meets international standards and remain regularly maintained. The work will be programmed and implemented according to the related rules of the best practices and will be adapted to specific conditions in the study area.

Atmospheric disturbances depend on prevailing weather conditions (winds, sunshine, humidity). Indeed, dust and gaseous pollutants are subject to atmospheric reactivity and especially aerodynamic processes that promote their dispersal over long distances and thus, will reduce their contents in ambient air.

This impact will therefore be particularly low, given the absence throughout the pipeline route of potentially sensitive human receptors (schools, high density urban area, etc.). The impacted area by air emissions will be local. The construction period is considered temporary. Therefore, the significance of the negative impact of pipeline installation work on the ambient air quality is considered ***very low***.

Similarly, because negligible amounts of CO_2 are emitted into the atmosphere, the limited duration of work, the regional extent of the area potentially affected and the absence of sensitive receptors, the significance of impact of contributing to increased GHG concentrations is ***low***.

7.1.7 Impact of Discharge of Hydrotest Fluids

The pipeline hydrotest is an important measure before commissioning. It involves filling the pipeline with fresh water after being degassed and filtered for performing the tests of strength and hydraulic sealing under the conditions set by the standard NT 109.01.

The hydrotest will be carried out using mainly fresh water.

It is important to note that hydrotesting of the pipeline is an important measure for avoiding and minimising risk associated with potential accidental releases of hydrocarbons. It is in itself a required preventive and mitigation measure.

Assumed to be contaminated with welding debris and possibly grease, this water will be removed in watertight evaporation pits.

Considering the short duration of discharge, the local extent and the quality of the hydrotest fluid, the impact significance will be ***very low***.

7.1.8 Socioeconomic Impacts of the Construction Phase

The proposed project will directly employ up to 300 people during the construction phase. Besides, most of the socio-economic impacts of the project are significantly positive especially on specific service sectors and in term of work supply. However, economic profits are modest with regards to the limited number of jobs and the short duration of the construction phase.

Consequently, the positive socio-economic impact intensity will be moderate, with local extent and short duration. The significance of this positive impact will, therefore, be ***low***.

7.2 Operational Impacts of the Pipeline

Selection of the site for the pipeline route was based on environmental sensitivities, economic considerations of pipeline construction costs and the extent that the site is being utilized for other activities such as land management. Therefore, no operational negative impact could be expected during the operation phase of this project. However, general types of hazard to persons, infrastructure and the environment could occur through operation and maintenance of the pipeline, such as an oil spill.

Depending on the release size and duration, thermal radiation levels may be of sufficient magnitude to cause fatal injury to people and structural damage to buildings and equipment and spillage may result in environmental damage.

These releases are likely to be primarily associated with:

- ✓ Mechanical failure, for example, due to corrosion, erosion, excessive stress, fatigue, object impact or collision;
- ✓ Human error, for example, due to system failure, inappropriate maintenance, or inadequate supervision and task planning.

Releases due to human error will be minimised by adequate training of all personnel and the application of work control procedures including a Permit- to-Work system.

Therefore, according to mitigating measures undertaken by the operator, the impact significance is ***very low***.

7.3 Pipeline Maintenance

The pipeline maintenance activities generate large quantities of wax and hydrocarbon residues at pig receiver. These residues classified as hazardous wastes can contaminate

the land at receiving facilities. However, OMV has planned adequate facilities to collect these residues. This waste will be transported toward a specialized and authorized center for treatment and disposal in conformity with the legislation in force.

Given the short duration of the impact of its local extent and the absence of sensitive receptors within the residues reception area, the significance of the impact will be ***very low***.

7.4 Socioeconomic Impact of the Operational Phase

Although the pipeline is not a labour intensive facility, during operations, the proposed project would provide some employment opportunities (skilled workers). The national revenue will increase by way of direct and indirect taxes, duties, etc. The Tunisian oil and gas infrastructure development will get an impetus with this growth and will provide a significant boost to the energy sector.

The high impact intensity is supported by the generated gains arising from the oil and gas production. The significance of the impact is considered ***very high***, reflecting the long-term positive effects of the project on the national economy.

7.5 Growth-Inducing Impacts

It is recognized that the availability of a new means of hydrocarbons transportation may be a contributing factor in stimulating economic growth and could result in the development of additional oil/gas production facilities. Additional processing capacity would be available, which could potentially accommodate future projects growth in the southern regions.

7.6 Decommissioning Impact

Decommissioning will be carried out at the end of the pipeline life, in accordance with prevailing legislation and industry best practicable technology available at the moment. As well as throughout any stage of this project, the overall approach applied to achieve straightforward decommissioning has been to give priority to designing the facilities and planning work activities in such a manner to avoid generation of hazards or environmental impacts.

All activities will be improved with such a manner to cause a minimum disturbance especially to the biophysical receiving environment. Therefore, necessary precautions and measures would be taken by OMV during decommissioning operations, such as:

- ✓ Informing and meetings with relevant regional and national authorities;
- ✓ Take use of the high-performance, useful and suitable specific machines and manage

the nature of works in order to reduce work duration, noise and atmospheric emissions;

- ✓ Choice of the adequate period of works;
- ✓ Inform relevant regional and national authorities;
- ✓ Elaborate procedural guidelines and provide equipments for clean up any and all fighting pollution as well as treating any existing pollution discovered at some stage in decommissioning.

The timing and activities undertaken during decommissioning will not be finalised until closer to the end of field life. Detailed decommissioning plan will be prepared and submitted to the relevant authorities prior to commencement of activities (Hydrocarbons Code). This plan will be prepared within 12 months at least prior to beginning. Proposed decommissioning phase duration are likely to extend over 6 to 12 months.

Decommissioning stage will be subject to an independent Environmental Impact Assessment (EIA).

The impact significance of facilities decommissioning will be ***vey low***. This is supported by the short duration and local scope of work and the precautions and measures to be taken by OMV during abandonment actitivities.

8.0 MITIGATION MEASURES

In developing the safeguards and mitigation measures, priority emphasis has been placed on selecting alternatives and designing facilities to avoid potential sources of environmental impact. Where it has not been possible to completely avoid potential for environmental impact, the likely effectiveness of proposed safeguards and mitigation measures have been identified.

OMV will apply safeguards and mitigation measures to ensure that all significant environmental effects associated with the proposed project will be avoided, reduced or compensated. Such measures should be consistent with the principles of ecologically sustainable development and in compliance with Tunisian legal requirements and OMV HSE guidelines.

The resultant impact level during the course of the development is determined to a large extent by safeguards and mitigation measures, both technological and managerial, that have been incorporated into several activities.

A comprehensive Environmental Management Plan (EMP), based on the ISO 14000 series principles, will be implemented to provide a systematic and structured approach to environmental management. This EMP is presented and discussed within Chapter 9, it involves a series of actions and a system of procedures to ensure health, safety and environmental protection.

The following section provides a description of the proposed safeguards and mitigation measures to be implemented in order to address these impacts for each phase of the project. The description covers the following activities associated with the current project:

- ✓ Construction phase;
- ✓ Operation phase, and;
- ✓ Decommissioning.

8.1 Mitigation Measures for the Construction Phase

For each phase of the project, the main measures to eliminate, reduce or offset environmental and socio-economic impacts that could arise during the construction period or continue beyond will be presented in the following sections.

Mainly safeguards and mitigation measures proposed for the pipeline construction will be related to:

- ✓ Atmospheric emissions and dust

- ✓ Noise reduction;
- ✓ Soil and groundwater protection;
- ✓ Protection of soil stability, prevention of erosion and preservation of natural drainage means ;
- ✓ Fauna and flora protection;
- ✓ Respect of socio-cultural traditions;
- ✓ Solid waste management.

Those topics will be described later in this section with the specific mitigation measures including:

- ✓ Specific mitigation measures for the pipeline construction;
- ✓ Minimisation of temporary construction campsites impacts;
- ✓ Providing equipment for fighting pollution;
- ✓ Decommissioning of construction phase.

8.1.1 Control of Contractors' Policy (CCP)

This policy should be prepared in support of the EMP to ensure that contractors adopt safe working practices and environmental measures in compliance with relevant statutory requirements and OMV's Management Standards and Guidelines. It covers all construction work carried out by contractor and sub-contractors employed on OMV contracts.

Contractor compliance will be assessed through a combination of site inspections and formal audits. Site inspections in the form of a walkthrough will be employed by OMV HSE personnel to assess management procedures adopted. Non compliance with the Code of Practice (or the policy) and other relevant statutory guidelines may result in immediate termination of the contract.

An audit programme developed as part of the EMP will monitor and evaluate implementation and compliance with the CCP. The audit will include auditing of the site procedures as well as reporting and documentation. All observed non-compliances will be reported to the Project Manager, and corrective actions including solutions and preventive actions will be taken.

The inspection and auditing results will be documented and used to indicate areas of non-compliance to allow for corrective measures to be implemented using an Action Tracking System.

OMV shall ensure that this policy and appropriate records are monitored and reviewed on a regular basis.

8.1.2 Atmospheric Emissions and Dust

Given the desert and arid character of the area, the various stakeholders will be asked to :

- ✓ limit work activities to only daylight hours;
- ✓ the use of engines and equipment during construction phase must respect international standards, in particular the recommendations of the European Union relating to the following permitted acoustic power levels:
  - 108 to 114 dB (A) for hammers and manual cement compactor;
  - 106 to 108 dB (A) for cable hydraulic lifting, loading machines, etc.

For atmospheric emissions and dust, key mitigation measures are:

- ✓ abatement of dust emission from stored materials, using covers, screens, water spraying, etc.;
- ✓ Dust emission from stockpiles, tracks or other fugitive sources will be avoided by water spraying ;
- ✓ Regular maintenance of the onsite mobile equipment and machines;
- ✓ Planning of the construction material supplies and the waste discharge in order to reduce dust emissions and taking care of the specific arid climatic conditions of the area in the qualification of works and the choice of equipment.

8.1.3 Protection of Water Resources

Being executed in a desert area known for its limited and scarce water resources, the project raises a number of issues related to water. It is therefore recommended that a *Water (Use, Treatment and Disposal) Management Plan* is prepared. Key elements of the plan should include the following:

- ✓ Minimization of water use;
- ✓ Disposal; and
- ✓ Inspection, auditing and reporting.

All personnel will be trained to reduce water usage and prevent its waste. No additional waste (non-sanitary) will be discharged to the wastewater system. Oily waste and other liquid hazardous wastes will be collected separately whenever possible for recycling or disposal in an appropriate licensed facility.

8.1.4 Infrastructures Protection

In order to avoid all amputation or disruption to traffic on the road RN 19, necessary precautions and mitigation measures will be taken by OMV during installation operations, such as:

- ✓ The adequate choice of works period (periods of minimum road traffic);
- ✓ Information and meetings with regional authorities (Governor of Tataouine and regional representatives of involved ministries: Equipment, Habitat and Land Use, Agriculture, Transport and Telecommunication, Industry, Environment, Interior, Defense, etc.) and state companies and agencies (ANPE, ANGed, ONAS, Civil Protection, etc.);
- ✓ The use of the high-performance specific machines and the most adapted ones to the nature of works (excavation of the trenches, pipelaying, backfilling, etc.) in order to reduce work duration;
- ✓ Site restoration.

8.1.5 Site Restoration

OMV will define the final destination of land after work completion: restoration, land turned back to their previous original status. Work will be limited to the pipeline ROW.

8.1.6 Fauna and Flora Protection

OMV shall minimise disturbance to flora and fauna. Hunting by OMV workforce and/or contractors and sub-contractors will be prohibited.

8.1.7 Minimisation of Temporary Construction Campsites Impacts

OMV shall define precisely the number and location of workers campsites, and the number of people accommodated. Campsites will be correctly managed in order to prevent any damage to the environment:

- ✓ Land occupation for campsites setting will be minimised ;
- ✓ Water intake for camp consumption will be sized and designed in order to avoid any detrimental effect on the local resource, and any conflict for freshwater demands ;
- ✓ Prohibit any storage and manipulation of hazardous substances;
- ✓ Black and sewage waters will be properly drained by a dedicated network and collected by septic tanks for treatment before being discharged, with respect to the national standard NT 106.02.
- ✓ Domestic waste will be managed according to the Waste Management requirements and collected into appropriate bins before elimination. Waste resulting from

campsites clean up will be transported and disposed properly in accordance to the waste management plan;

- ✓ Site restoration: At the end of the construction phase the campsites shall correctly cleaned up, all waste is removed, and sites are restored to their previous status.

8.1.8 Decommissioning of Construction Phase

After construction phase OMV shall ensure that area (access, campsites, etc.) is correctly cleaned up :

- ✓ No waste is remaining ;
- ✓ Permanent runoff drainage system is controlled as useful operational;
- ✓ The pipeline route map with appropriate co-ordinates will be provided by OMV and submitted to several relevant authorities.

8.2 Mitigation Measures for Operation Phase

Upon completion, OMV will communicate to the relevant authorities the exact location of the export pipeline. The operational phase does not require significant interventions except the usual measures of security and maintenance and regular inspection of equipment. The pipeline will be equiped with appropiate tools to record pressure, temperature and flow at both ends. The gathered information will be assessed and analysed using calculation tools to identify any leakage on the pipeline.

Regular inspection of pipeline will ensure that it is protected throughout the duration of the operation phase. Similarly, this will allow timely detection of any leakage of oil and thereby control the risk of pollution. In addition, regular inspection will cover the entire route of the pipeline and will include observations of the state and nature of habitats and species that regenerate or proliferate along the pipeline route.

In addition, the pipeline and related equipment will be equiped with warning signs and will be subject to regular inspection and monitoring under the supervision of OMV HSE.

Waxy and oily residues recovered at pig trap will be properly managed in accordance with the law n° 96-41 dated June 10, 1996, while giving priority to recycling and recovery procedure.

8.3 Mitigation Measures for Decommissioning Phase

Decommissioning will be carried out at the end of the field life, in accordance with prevailing legislation and industry best technology and practices available at that time.

A detailed decommissioning plan will be prepared and submitted within 12 months at

least to the relevant authorities prior to commencement of decommissioning activities. The plan should comply with Tunisian regulation in force and oil and gas industry best practices. The pipeline will be flushed, plugged and left in situ.

9.0 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Introduction

The Environmental Management Plan (EMP) aims to describe the measures, actions and means that will be implemented to eliminate or reduce to acceptable levels the significant impacts of the proposed project on the biophysical and socio-economic components as identified in the EIA. More specifically, the EMP should ensure:

- ✓ Protection of personnel's health and safety and prevention of environmental hazards;
- ✓ Compliance with the standards, regulations, know-how and best practices along with the use of appropriate technologies;
- ✓ Carrying out works according to principles of sound management and use of appropriate equipment and good practices;
- ✓ Inclusion of environmental risks monitoring and control measures, and the establishment of prevention and mitigation means in case of events that may present hazards to the health and environment.

The Environmental Management Plan of the proposed project is divided into eleven sections:

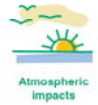
1. Impacts register;
2. Waste management plan;
3. Risk management plan;
4. Environmental monitoring;
5. Capacity-building and staff training;
6. Vehicles traffic plan;
7. Local recruitment plan;
8. Environmental communication;
9. Sites restoration plan
10. Environmental audit;
11. Cost of the EMP.

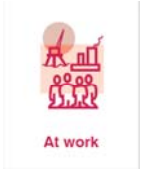
9.2 Impacts Register

Based on the findings of the EIA, national and international standards and best practices, the Impacts Register summarizes:

- ✓ Potential adverse impacts of the project on the environment;
- ✓ Mitigations for identified impacts;
- ✓ Responsibility for implementation and monitoring of adopted mitigation measures.

Table 9.1 Impacts Register of Pipeline Installation and Operation

Project Phase	Potential negative impacts	Mitigation measures	Responsibility	Cost (US$)
Construction phase	Air pollution 	✓ Use machinery and equipment of recent design, compatible with all modern standards in terms of emissions of gaseous pollutants. ✓ Use covers for dusty loads. ✓ Use water sprays to prevent airborne dust (maximizing recycling opportunities). ✓ Use wheel washers to prevent transfer of mud to public roads. ✓ Prevent "black smokes": ensure all vehicles engines are well maintained. ✓ Switch off engines when not in use.	EPC Contractor	Included in the project cost
	Noise nuisance 	✓ Use low noise engines and machines where practicable, to comply with the international standards. ✓ Install compressors, generators etc., as far as possible from workers' camps and offices. ✓ Use of silencers and other acoustic barriers if the noise thresholds are exceeded to prevent noise nuisance. ✓ Workers will use hearing protection wherever required.	EPC Contractor	Included in the project cost
	Traffic disturbance and risk of pipeline failure 	✓ Impose speed limits. ✓ Use crash barriers to separate pedestrians from vehicles in high risk areas. ✓ Schedule road traffic movements to avoid noise sensitive periods, periods of high pedestrian risk and maximum background traffic movement. ✓ Install temporary road signage and lighting. ✓ Schedule any disruptive works to coincide with periods of low road traffic and in liaison with relevant local authorities. ✓ Use machinery and techniques most suited to complete any disruptive works in the shortest possible time. ✓ Where necessary, arrange temporary traffic diversions. ✓ Take appropriate measures to restore the affected area following completion of crossing construction.	EPC Contractor	Included in the project cost

	Soil Disturbance 	✓ Before starting excavation activities, establish sufficiently detailed ecological, topographic and photographic records to judge the state of the quality of any remedial action required post construction. ✓ Avoid removal of existing vegetation where possible ✓ Use existing tracks as much as practical and restrict all vehicle access to designated routes. ✓ All construction personnel involved in site preparation shall be trained to observe the defined site boundaries. ✓ Designate permanent and temporary storage areas. ✓ Coordinate delivery/installation logistics in order to minimize amount of pipe storage space required. ✓ Follow the defined pipelines ROW as closely as possible.	EPC Contractor	Included in the project cost
	Water Pollution 	✓ Forbid disposal of lubricating oils, diesel fuel, etc. to the ground. ✓ Transfer used oils and lubricants by SOTULUB approved transporters. ✓ Appropriate containment facilities, clean-up equipment and materials will be in place to prevent site contamination and spill cleanup. ✓ Refuelling areas should be sealed with concrete and subject to strict control.	EPC Contractor	Included in the project cost
	Impact on Health, Safety & environment 	✓ Post-installation, clear ROW and surrounds of all rubbish, debris, and surplus/defective construction materials. ✓ Make appropriate provisions for the collection of wastes from the pipeline construction site, with the fundamental objective of keeping hazardous, inert industrial and domestic wastes separate. ✓ Establish a general policy of "waste minimisation" in the following order of priority: - Reduce production at source; - Reuse in the same process; - Recycle for use elsewhere. ✓ Only use disposal as the final option, and by incineration with energy recovery if feasible. ✓ Establish a "consignment notes" system to ensure wastes transferred to subcontractors are properly transported and disposed of off-site in the manner intended by company.	OMV or contractor	125 000

		✓ Ensure waste handling arrangements are sufficient for the entire length of the pipeline ✓ Provide suitable waste containers (with lids) at all major points of waste production. ✓ Forbid disposal of wastes by any other method than this on-site service. ✓ Provide suitable sanitary facilities for workers during pipeline installation.Do not store pipe outside designated lay down areas. ✓ Erect perimeter security fence and appropriate warning notices. ✓ Forbid access to unauthorized people.Elaboration of Health and safety procedures at project site ✓ Elaboration of an "Emergency Response Plan" ✓ Provision of medical (first aid, equipment care, drugs, etc.), and communication and transportation means ✓ Provision of firefighting equipment ✓ Provision of Oil spill response equipment ✓ Staff training in the Health, Safety & Environment aspects ✓ Display of instructions and markup of the project area		
	Ecological disturbance 	✓ Follow the defined pipelines ROW as closely as possible. ✓ Provide crossing points (unexcavated plugs) at locations deemed necessary to allow for access for vehicles, people, animals and water. ✓ Stockpile topsoil and subsoil separately, neatly, avoiding contamination, and replace accordingly. ✓ Import material for padding in preference to removal from the ROW. ✓ Where appropriate, plough to break-up and loosen all compacted soil when the construction work is finished. ✓ Seek beneficial uses for the excess excavated soils, on or off-site. If not possible, ensure disposal is to an approved site. ✓ Restore original contour of the land following backfilling. ✓ Take all reasonable measures to reinstate disturbed areas to the original condition. ✓ Where required, install drainage system with the aim of reducing soil erosion by rain water runoff.	EPC Contractor	Included in the project cost

Operation Phase	Pollution: leaks/minor spillages. Accidents: visibility. 	✓ Install appropiate tools to record pressure, temperature and flow at both ends of the pipeline. ✓ Carry out regular survey patrols driving along the pipeline right of way in order to detect any abnormal activities or damages. ✓ Install warning signs and posts as per the pipeline installation specification	OMV	10 000
	Waste: Arrival of wax and hydrocarbon residue at pig trap. 	✓ Ensure adequate measures are in place for the collection, transfer, processing and/or disposal of the residue.	OMV	10 000
	Impact on Health, Safety & environment 	✓ Elaboration of Health and safety procedures at project site ✓ Elaboration of an "Emergency Response Plan" for the operation phase including: firefighting plan, oil spill response plan, Medevac, etc. ✓ Staff training in the Health, Safety & Environment aspects ✓ Display of instructions and markup of the project area	OMV	30 000
Decommissioning Phase	Soil contamination & Noise Nuisance 	✓ Facilities abandonment following the rules of art and in accordance with the legislation in force to prevent any soil contamination ✓ Compliance with instructions for cleaning and treatment of any pollution found during facilities decommissioning phase ✓ Sites restoration as close as possible to their original state.	OMV	125 000

9.3 Waste Management Plan

9.3.1 Liquid Waste

Liquid wastes generated during the gas export pipeline installation are classified into three categories:

- ✓ lubricants and Used Filters;
- ✓ Sewage;
- ✓ Hydrotest fluids.

9.3.1.1 Used Lubricants

In order to reduce the soil contamination risk, no tune ups of any mobile equipment will be allowed on site during the construction phase. The lubricants changes and the used filters of fixed equipment on site will be recovered in special containers and delivered to SOTULUB. A register will be maintained by the contractor in order to facilitate the traceability of these waste products in conformity with the Decree no. 693-2002 of April 1st 2002. The maximum quantity recovered during the pipeline construction phase is estimated at 3000 liters.

9.3.1.2 Sewage

During the construction of pipelines, the personnel present on site will include up to 300 people. The sanitation waters are estimated at 50 l/day/person, therefore a maximum of 15 m^3/day. These effluents are admitted into the public sewage piping according to the standard NT 106.02. They will be evacuated by sump-pit towards Tataouine wastewater treatment plant.

9.3.1.3 Hydrotest Fluids

This water will have the same physico-chemical characteristics as the drinking water.

This water will be used for performing the tests of strength and hydraulic sealing under the conditions set by the standard NT 109.01.

Assumed to be contaminated with welding debris and possibly grease, this water will be removed in evaporation pits.

Both evaporation pits used for storage of this water will be watertight (permeability $<10^{-7}$ cm/sec) with a capacity of 9600 m^3 each (80x80x1, 5 m).

The design of evaporation pits shall take into account the following requirements:

- ✓ A liner will be installed so that the bottom and sides of the pit have a coefficient of permeability of no greater than 1 x 10^{-7} cm/sec.
- ✓ The materials for the liners will be selected after evaluation of the water quality to

be contained. Liners will be of sufficient strength and thickness to maintain the integrity of the pit.

- ✓ Careful installation measures (e.g. careful siting, berms) will be adopted to prevent natural surface drainage from entering the pit or breaching during heavy storms.
- ✓ Measures will be taken to prevent access by people, livestock and wildlife (including birds) to evaporation pits.
- ✓ At decommissioning, or at the completion of operations, the evaporation pit contents will be disposed of after testing and in accordance with the waste management plan. The pit area will be reinstated to its original state.

Evaporation Pit

9.3.2 Solid Waste

The generated solid wastes during the pipelaying activities will be subject to specific management plans allowing to reveal the potential for reduction at the source, a re-use, a recycling, a material or energy valuation and for estimating the elimination means.

Three types of solid wastes will be generated during the construction phase: household waste, industrial detritus, and inert waste.

9.3.2.1 Household Wastes

Estimated at 1 kg per person per day, these wastes could be separated in organic wastes which will be evacuated towards Tataouine public discharge and valuable or recyclable wastes such as cans, PET or PEHD bottles, cups, packaging films and bags, which will be delivered to the Ecolef recycling centre in Tataouine or to companies authorised by ME for waste collection or recycling.

9.3.2.2 Industrial Wastes

They include metallic scrap, cables, plastic material, insulation material, lumber, used spare parts, unremunerated packaging, etc. These wastes will be entrusted to companies authorised by ME for waste collection or recycling.

It is to notice that industrial wastes may contain hazardous waste which must be managed in conformity with the law n° 96-41.

Moreover, after use, the inspection agency of the pipeline welds must reapply to export the radioactive waste to the same exporting country. The radioactive source will be returned in the same conditions of storage and transport than those for imports.

9.3.2.3 Inert Wastes

In this category, we include the wastes from the demolition or construction works, which will mainly have a mineral nature and which will not be contaminated by dangerous substances.

9.3.3 Air Emissions

The air emissions during the construction will be mainly generated by the traffic of vehicles used by the personnel working on site or reaching the temporary workshops of various operators, by the machines used for the site preparation and by the vehicles delivering the material and heavy load equipment.

9.3.4 Noise Emissions

Noise pollution is generated by onsite machines and equipment, installation works (welding, grinding, cuttings, etc.), traffic related to equipment and personnel transport and commissioning tests of several components of the pipeline.

The contractor and its subcontractor will be responsible for the control of noise levels caused by their activities within the following limits (Table 9.2).

Table 9.2 Admissible Noise Level Limits during the Construction Phase

Hours	1hour dB L_{A10}	1hour dB L_{A1}
07h00 – 19h00	65	70
19h00 – 22h00	55	60

9.4 Emergency Response Plan

The pipeline installation presents risk of oil spills from construction engines. Prevention of incidents is an integral part of operational procedures of the contractor who will develop a specific plan for emergency response covering all exceptional situations that

may arise on site. Sufficient quantities of products, equipment to cope with pollution and fire and emergency resources needed to give first aid to accident victims are also provided.

OMV emergency response plan will be prepared by involving internal and external experts.

Finally, it is important to note that OMV has contracted a liability insurance to cover risks of damages caused to third parties estates because of his activity including notably the risks of damaging the environment.

9.5 Environmental Monitoring Program

Environmental monitoring is necessary to gauge the impact of operations on the site. By implementing appropriate plans with sufficient detail, it is possible to minimize and control waste generation, limit physical disturbances, and operate in a responsible manner. The environmental monitoring program will be implemented by the field crew consistent with the requirements of the Environmental Management Plan and including among others the monitoring of waste generated by the work and keeping a record book for waste tracking.

9.6 Capacity-building and Staff Training Plan

Staff training is an essential step to ensure the smooth implementation of the gas export pipeline installation and prevent all risks and nuisances which may affect the various components of the environment. The personnel engaged by the contractor should be aware of aspects relating to Health, Safety and Environment, and to site specifications and risks involved. A mandatory training program will be implemented by the contractor and supervised by OMV HSE manager to ensure the protection of personnel, facilities and environment in accordance with the regulations in force.

9.7 Vehicles Traffic Plan

This plan will include all actions to control the speed, itinerary, traffic schedules and application of penalties in case of violation, for all engines and vehicles involved in work such as vehicles, ambulances and trucks.

9.8 Local Recruitment Plan

The local recruitment plan will identify and maximize job profiles that can be filled by local people. It aims to define the mechanism and localities of recruitment and develop a system for monitoring staff.

9.9 Documentation & Environmental Communication

The environmental management process must be accompanied by monitoring tools designed to document and communicate the results of the implemented plans between the staff and the various responsibility levels involved in the project. Among these tools, reports, minutes and periodic official communications produced by the various involved parties which allow to document the undertaken actions, the non-compliance cases and measures taken to adjust them.

The following table outlines the different stakeholders' responsibilities in the preparation of documents and communications.

Table 9.3 Guidelines for Communication

Author	Addressee	Frequency	Situations Description
Contractor	OMV	Start of works	Presentation of training and HSE programs for review and approval
Contractor	OMV	Weekly	Waste management report
OMV	ANPE	End of work	Environmental report
OMV	ANPE	Abandonment of facilities	Abandonment report

9.10 Site Restoration

The site restoration will be executed as follows:

- ✓ Take the required measures to restore the affected areas following the installation of the pipeline;
- ✓ Leveling the ground in order to restore the site to its original state;
- ✓ After completion, clear the pipeline route of all trash, debris and excess materials.

9.11 Environmental Audit

Environmental audits shall be carried out in accordance with ISO 19011 – Guidelines for Quality and Environmental Management Systems Auditing.

Environmental internal audits are undertaken by persons independent of the work being audited. Environmental audits are carried out against OMV standards (policies, guidelines, procedures etc.) and Tunisian Environmental Regulations to assess environmental management performance in the area of air, water and noise emissions, waste, etc.

A schedule of environmental audits will be developed and will ensure that at least the following elements of the Environmental standard are audited:

- ✓ Implementation of mitigation measures;

- ✓ Waste management plan;
- ✓ Emergency response plan;
- ✓ Environmental monitoring;
- ✓ Capacity building and staff training plan;
- ✓ local recruitment plan;
- ✓ Vehicles traffic plan;
- ✓ Documentation and environmental communication;
- ✓ Site restoration.

9.12 Cost of the EMP

The project cost is estimated at 42 million US$. Costs associated with the Environmental Management Plan are estimated at US$ 500 000 assigned as follows:

✓ Staff and HSE consultants fees	50,000 $
✓ Used oil recovery and transfer to SOTULUB for regeneration	15,000 $
✓ Waste transportation to authorized landfills	50,000 $
✓ Safety equipment and signaling	150,000 $
✓ Preparation of the emergency response plan	30,000 $
✓ Oil spill response equipment	50,000 $
✓ Site restoration and rehabilitation	125,000 $
✓ Miscellaneous	30,000 $

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Appendices

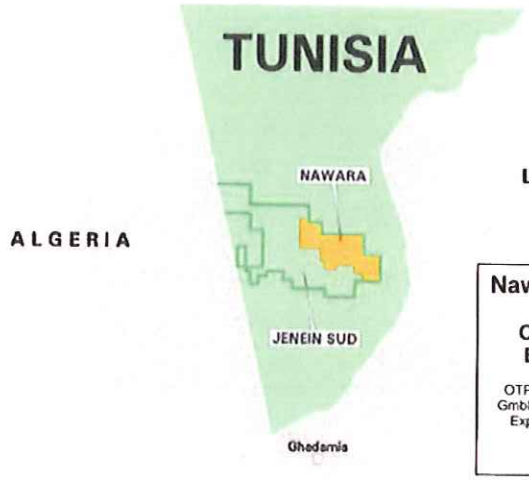
Appendix I Plan of Development

OMV

ETAP

Amendment #3 of
PLAN OF DEVELOPMENT

Nawara Concession



Nawara Concession

OTP (OP) 50%
ETAP 50%

OTP- OMV (Tunesien) Production GmbH is a 100% subsidiary of OMV Exploration & Production GmbH

Original filed November 2008

Rev No	Revision	Originator	Reviewed and Agreed	Approved	Approved
3	Issued for Submission	ADM Nawara C. Enzendorfer Date	Project Owner C. Cox Date 5/5/13	JV Representative OMV R. Oswald Date	JV Representative ETAP M. Akrout Date

Table of Content

1. Introduction

The original Plan of Development (POD) for the Nawara Concession was submitted to ETAP for approval on 20 February 2009 reflecting the status of the G&G evaluation as of December 2008. On this basis the Nawara production concession was granted in February 2010. ETAP decided to take their maximum share of 50% in the development JV. The aim of the original development scenario was to assure a gas delivery rate of 1.33 million m3/day through the South Tunisian Gas Project (STGP) gas transportation and treatment facilities for the domestic gas market.

In early 2011 OMV acquired all assets from Pioneer in South Tunisia. With this transaction OMV also gained additional capacity access to the STGP. Since the associated gas volumes to be recovered from the Pioneer oil assets were found to be not sufficient to fill the STGP capacity, it was decided to increase the Nawara plateau production rate to utilise the entire capacity share in the STGP. After extensive sub surface study work it has been concluded that an increase of the sales gas plateau rate to 2 million m3/day is sustainable with the discovered and prospected volumes in the Nawara concession.

Consequently, the design capacity of the Central Processing Facility (CPF) was increased to 2.7 million m3/day raw gas, which includes 10 % shrinkage for the LPG extraction and a 20% spare capacity to ensure the plant availability as per the envisaged sales gas contract.

An amendment to the POD ("Amendment #2"; attached as Appendix 4) describing these design changes was approved by ETAP and issued to DGE in mid-2012 together with the request to upgrade the market reservation to 2 million m3/day.

As of July 1 2012, OMV took over the coordination of the STGP consortium from eni (Steering Committee resolution dated 12 July 2012). The framework agreement governing the activities of the STGP consortium expired with end 2012 and eni opted not extending the agreement. This decision is documented in a final Steering Committee resolution from February 7, 2013 and a letter from eni dated 31 January 2012.

In the meantime the market reservation over 2 million m3/day has been granted to the Nawara Concession by DGE (letter dated 13 February 2013). Despite the fact that STGP had been given market access by STEG of 4 mn scm/d at Gabes (letter STEG dated 28 February 2008), no concessions other than Nawara have applied for a market reservation to utilize this STGP market access. This and the fact that eni had left the STGP Consortium led the Nawara JV decide to integrate the STGP facilities into the scope of the Nawara concession development to ensure the Nawara gas is developed efficiently for the benefit of all stakeholders.

2. Scope Changes to Original Development Concept

Following changes are applied to the original development concept to facilitate the integration of Nawara and STGP in a cost and schedule efficient way.

The field facilities within the NAWARA Concession required to pre-treat raw gas and condensate will remain widely unchanged to the original concept as described in the previous POD and its amendments. The installation of the water treatment unit and the Mercury removal filters have been deferred to the time when they become really required.

Export for the pre-treated rich gas was originally foreseen via a 24" gas pipeline from the Nawara Concession to the STGP inlet facilities in Hamouda ("Hamouda Receiving Station"). Since no other concessions than Nawara will provide gas into the pipeline for the foreseeable time, and the STGP Consortium is dissolved, the Hamouda Receiving Station will not be built but be replaced by a standard valve station.

The former Nawara export pipeline to Hamouda will be extended to a length of 370 km from the outlet of the Nawara CPF to Gabes. The discharge pressure at the CPF will be 47 bar and the arrival pressure in Gabes 35 bar. The pipeline routing will be along the previous STGP West route parallel to the existing Trapsa oil pipeline and STEG gas and liquid pipelines from El Borma to Gabes. The new pipeline will be able to transport up to 10 mn scm/d of gas without intermediate

compression, and thus will provide additional transportation capacity to cater for potential future gas discoveries or associated gas from oil discoveries in South Tunisia. This additional capacity will be made available to any upstream concession on a tariff basis and under the condition that they have to deliver gas at required inlet conditions as specified in the Basis of Design for Upstream Concessions document. The key specifications are: Water dew point -12 degC, HC dew point +10degC, CO2 content < 2%vol and a delivery pressure from the Nawara concession of 47 bar. The upstream concession(s) has to cover also any investments for additional compression requirements for the Nawara concession resulting from the higher pressure regime in the pipeline. Tie in points for third party gas delivery will be provided at any of the eleven valve stations along the pipeline route. The design pressure of the pipeline will be 111bar to accommodate the later capacity increase and associated compression.

In Gabes the rich gas will be treated further in a "fit for Nawara purpose" Gas Treatment Plant (GTP) of 2.7 million m3/day inlet capacity to produce commercial products: gas, propane and butane as per their respective specifications and stabilized light condensate. Commercial gas will be delivered to STEG gas grid at Gabes at 76 barg, the LPG products (propane and Butane) will be delivered to STIR via the SNDP storage facilities at Gabes.

In addition to Hydrocarbon processing, the GTP will also function as the control centre for the pipeline operations.

The Nawara CPF was initially planned as a standalone development. Following the acquisition of Pioneer assets in South Tunisia in early 2011, the project scope has been revised in order to maximise the synergies with the existing Cherouq facilities and the future oil developments by OMV in South Tunisia. A central operations, maintenance and infrastructure site will be built to provide services to OMV operated assets in South Tunisia and potentially also to Nawara. Details of this hub concept are described in chapter 6.

As mentioned already in Amendment #2, the project scope also includes the completion of three (3) wells which were drilled during the appraisal phase but were not completed yet. These are Ritma-1, Kholoud-1, Banefsej-1.

Furthermore, three (3) of the previously completed wells require re-completion since the completion was damaged by severe sand production during the well testing phase. The new completion design and workover concept has been presentd to ETAP and was already approved in late 2012. The concerned wells are Nawara-1, Ahlem-1 and Sourour-1.

Two (2) wells are ready for production already now without any further intervention. These are Fella-1 and Ahlem-2.

Further details about the facilities scope are given in chapter 6 of this amendment.

3. Operations and Maintenance Philosophy

All Operations and Maintenance (O&M) activities for the entire integrated system, Nawara CPF, Pipeline and GTP will be undertaken by one Production Operator who will be agreed and staffed by the Nawara JV partners.

The O&M philosophy for the Nawara CPF has been developed to support the design intent of optimized manning level based on a common and shared infrastructure and maintenance hub in Waha (warehouse, workshop, logistics, accommodation, etc.). It is envisaged that during commissioning and initial operations period the Nawara facilities will be manned until stable operating conditions are established. For this purpose a temporary camp will be provided in Nawara. Then the facility should be operated under the Optimally Manning concept, where the optimum number of people is employed in order to warrant safe operations and achievement of availability targets as required by the GSA.

As mentioned above, the GTP will also function as the control centre for the pipeline operations. This means that operations and maintenance of the 370km export pipeline will be managed and conducted from the GTP in Gabes.

4. Legal & Fiscal Frame of the Investment in NAWARA

The revised Nawara POD by integrating the former STGP facilities pipeline in this development plan, is considered to be under the legal and fiscal regime of the NAWARA Concession (each 50% share ETAP and OMV). This approach is consistent with existing laws and contracts and according current known legislation. It also allows the JV to go ahead with the development of the NAWARA Concession and bring the gas to the Tunisian customers as scheduled and without the necessity of further commercial negotiations.

Nawara will build the gas export pipeline to Gabes under article 75 of Hydrocarbons Code accommodating a capacity of up to 10 mn scm/d although Nawara would need only a capacity of 2.7 mn scm/d. This represents a significant pre-investment for the Nawara titleholders with an uncertain return since the availability of future gas discoveries in south Tunisia to fill the remaining capacity is highly uncertain at this point in time. Article 113.3 of the Hydrocarbons Code as modified by the law no. 2008-15 allows the titleholder to build and tax deduct an investment reserve up to 20% of it's taxable results on an annual basis in order to finance the setting up of pipelines. This tax incentive will allow OMV to commit in this amendment no. 3 of the PoD to the pre-investment in the oversized gas pipeline as well as to the oil export pipeline from the Nawara Concession to the Trapsa pipeline.

Any tariff charges to third party users of the pipeline from Nawara to Gabes (11 valve stations will be availbale along the pipeline for tie in) will be treated as income of the Nawara Concession. Same will be the case for thrird party use of any spare capacity in the GTP. The tariff will be determined in accordance with the terms of Article 82 of the Hydrocarbons Code and will be subject to DGE approval. Specifically, the tariff charge calculation will have to consider the development and operating costs of the facilities, a minimum economic lifetime of 15 years, the fiscal regime of the Nawara Concession and a rate of return for the investors of 10%.

Fiscal metering stations will be installed by the upstream concessions following the design specification as developed by the former STGP consortium. Their location shall be at the transfer point of wet rich gas streams into the pipeline (for the case of the Nawara concession, this will be at the outlet of the Nawara CPF).

Fiscal sales metering stations will be installed at the custody transfer points of sales products (i.e. at the GTP outlet for sales gas and LPG products).

5. Agreements required

In order to achieve the above described targets, the JV requested support from the Tunisian Government in obtaining right of way along the west route to Gabes and all other regulatory approvals required to build the pipeline.

The JV also asked the Government to protect the execution of the NAWARA/STGP development from adverse impacts resulting from strikes, sit-in's, and similar activities to the largest extend possible.

Notwithstanding that no formal confirmation for the above has been received by the government, it is the mutual understanding of both, the investors and the government, that such support and protection will be granted by the government when this Amendment # 3 of the Plan of Development will be approved and OMV & ETAP commit to the development of the facilities accordingly.

The following agreements need to be executed for the proposed concept:

1. Approval of NAWARA Amendment # 3 to POD (ETAP & DGE)
2. Gas Sales Contract NAWARA – STEG

3. Propane, Butane products Sales Agreements NAWARA – STIR
4. LPG Storage Agreement NAWARA - SNDP
5. Crude Transportation Agreement NAWARA – TRAPSA
6. Waha Infrastructure Hub Service Agreement – Cherouq Concession Holder

Furthermore, an agreement has to be reached about the operatorship of the facilities. Due to the nature of the Nawara – STEG Gas Sales Contract ("ship or pay"' "take or pay" regime), it is mandatory that the Nawara CPF, the pipeline and the GTP at Gabes will be operated by the same entity controlled by OMV & ETAP in order to avoid any conflict of interest.

Due dates for above agreements are as per the attached integrated schedule.

6. Facilities Development Details

6.1 Nawara CPF

Subsequent to the initial POD and its amendments # 1 and # 2, further engineering studies have been undertaken to define the basic concept for Nawara Development.

A brief summary of finalized selected concept is given below.

i. Gathering system from the 8 wells (Nawara-1, Ahlem-1, Ahlem-2, Sourour-1, Ritma-1, Fella-1, Khouloud-1, Benefsej-1)

ii. Central Processing Facilities located in Nawara for:

   a) Inlet manifold and test separator
   b) Condensate/Gas/Water Separation
   c) Gas Dehydration
   d) Gas Sweetening
   e) HC Dew pointing
   f) Condensate Stabilization
   g) Condensate Storage
   h) Produced water system
   i) Gas and Condensate Metering Units
   j) Utilities

iii. Condensate Export pipeline (6" approx. 10 km) to TRAPSA.

The CPF will be sized for the plateau production rate which corresponds to the current market reservation to be contracted with STEG (2.0 mn Sm3/d sales gas for Nawara Concession). The CPF plant design capacity will have a 10% margin for gas shrinkage due to processing in Nawara and Gabes and an additional 20% margin to cater for the take or pay clauses provided in the Gas Sales Agreement.

One single gas train is considered for rich and lean gas respectively. The design will consider all flexibility requirements for wide operational envelope for different lean and rich gas composition mixtures.

The Nawara CPF has been designed based on following production data.

		Operating Rate	Design Capacity
Gas Production	mn Sm3/d	2.2	2.7
Condensate Production	bpd	5,000	7,000
Peak liquid Production***	bpd	7,500	9,450
Sales Gas Rate (in Gabes)	mn Sm3/d	2.0	2.5
*** based on max. 25% water cut from all producing wells			

The battery limit of the CPF is on the upstream side the Flow vale of the well X-mas tree and on the down stream side the outlet flanges of fiscal metering stations for rich gas into the main pipeline and condensate into the TRAPSA pipeline. The gas export pressure at battery limit is 47 bar.

The CPF location has now been fixed at near Nawara-1 wellhead resulting from extensive studies carried out during pre-feasibility phase of the project.

6.2 Pipeline Nawara to Gabes

The pre-treated Gas in Nawara CPF will be routed via a 370 km buried gas pipeline to the Gas Treatement Plant in Gabes where it will undergo deep refrigeration in order to bring it to the sales gas specification.

The main Pipeline will include:

- 370 km of 24 ", 111 bar design pressure, Carbon steel pipeline; the pipeline is designed for a capacity of 10 MSCMD with an arrival pressure of 35 bars at Gabes GTP inlet.
- 370 km of single mode fiber optic cable, 48 core, including SDH network and telecom equipment allowing transport of process controls, safety, voice and video data;
- Pipeline SCADA system and leak detection equipment;
- 11 x Line Valve Stations 24" (LVS) – every 30 km, equipped with photovoltaic supplies, E&I equipment, CCTV, F&G, etc. ;
- ESDVs 24" down stream Nawara CPFand up-stream GTP Gabes;
- Impressed current cathodic protection (ICCP) stations along the pipeline (currently, every 60 km);
- 24" Pig Launcher up-stream the pipeline located in the boundary limit of Nawara CPF and Pig Receiver at GTP entrance (Gabes);

Tie-in of any potential future gas discoveries or associated gas from oil discoveries will be made to the closest line valve station where provisional tie-ins arrangements (both piping and fiber optic) are provided.

6.3 Gas Treatment Plant in Gabes

At the Gas Treatment Plant (GTP) the rich Nawara gas will be treated to produce 2.0 mn Sm3/d sales quality gas and associated LPG and condensate products to their respective required specifications.

In a first treatment step the gas will be cooled down with a mechanical gas refrigeration unit to establish the sales gas specifications as agreed in the Gas Sales Agreement. The gas will then be compressed and exported to STEG.

The liquid byproduct from the refrigeration unit (C3+) will be fractionated in dedicated columns to produce commercial Butane, Propane and a small amount of stabilized condensate.

The GTP plant will include:

a) Inlet Separation
b) Gas Refregeration
c) De-Ethanizer Unit
d) De-Propanizer Unit
e) De-Butanizer Unit
f) Sales gas Compression
g) Sales Gas Fiscal Metering Unit
h) LPG products Pumping units to SNDP
i) LPG products Fiscal Metering Units
j) Utilities (taking into consideration waste heat recovery)

The GTP will be designed based on:

		*Operating Rate**	*Design Capacity***
Sales Gas Production	mnSm3/d	***2.0***	***2.5***
Propane production	tons/d	***63***	***114***
Butane production	tons/d	***65***	***110***

Note:

* based on the average simulated volumes from the 100% Lean and 30% Lean/70% Rich mix

**based on simulated volumes from the 30% Lean/70% Rich gas mix

The upstream battery limit of the GTP is the inlet flange of the inlet slug catcher. Here the gas arrives at 35 bar. The down stream battery limits are the outlet flanges of fiscal sales gas and LPG product meters. Sales gas shall be exported at 76 barg.

6.4 Infrastructure Hub Waha

After the Pioneer acquisition it was proposed to develop a common Infrastructure and O&M Hub close to Waha in order to maximize synergies between all OMV operated assets in South Tunisia.

This infrastructure will be capable of providing a central control room, living and working spaces, and transportation support. The site will also be able to deliver operational support such as maintenance services, warehousing and common IT/communications systems.

Tiaret airport situated close to Nawara shall be upgraded to be capable to receive commercial aircrafts operating in country (such as the ATR 72 used by SITEP for El Borma) This will allow to maximize synergies, lower air transportation operating expenditure while still supporting both Waha and Nawara safe operations.

In light of the lower expectations in recovery and field life time from the STOD (South Tunesian Oil Development) project the concept was adjusted to be executed in 2 phases.

Phase 1 to be initiated already in 2013. Scope is to build a permanent camp and facilities in Waha (Cherouq Concession) to replace the current rented camp. In addition the airstrip in Tiaret (close to the TRAPS SP3) will be upgraded together with the road link between Tiarat and Waha. For start up and during the first year of production from Nawara, a temporary camp will be provided at Nawara location. The planning and execution of the Waha infrastructure upgrade is currently being supported by the project team but not part of the NAWARA project scope.

Phase 2 will be initiated after the first year of Nawara production. A decision will be made whether Nawara can be operated remotely from Waha or not. In the first case the Waha Infrastructure Hub will be expanded to accommodate the Nawara needs. In the latter case, the Nawara temporary camp will be replaced by a permanent one. The exact extend of the infrastructure required to support Nawara will be decided only after the first year of production during which the infrastructure will be provided by means of temporary, rented facilities. The expansion of infrastructure will form a new project all together and thus, the required funds for building a permanent camp in Nawara or upgrading the Waha infrastructure facilities are not part of the current Capex estimate. However, Opex for rental facilities (either from a contractor or from Waha) are included. All services Nawara will receive from the Waha Hub will be charged out through tariff payments. Refer to Agreement #6 in Chapter 5 of this amendment.

7. Community Relations and Social Responsibility

The development will be undertaken as per the structured approach of OMV community relations practices. OMV has conducted several social initiatives for the south of Tunisia in the past and is committed for the future (about one (1) million TDN for medical setup improvment at Tataouine hospital, cleaning equipment for Tataouine municipality, National Guard housing upgrade, Kembout water tank renewal, Automechanic shop, etc...).

OMV followed a clear and transparent process to derive community relation projects. The approach is as follows

1. Identification of stakeholders (project affected people, NGOs, governments, etc.)
2. Public consultation & disclosure of information
3. Assess & evaluate environmental & social impacts in all project phases
4. Necessary actions to manage the environmental & social impacts, e.g. health, safety & environment, action plan

The project has conducted a social baseline and needs assessment study on 2010 and is currently updating and extending its scope to cover Gabes and the STGP route areas. The environmental and social risk/opportunity is assessed as per the guideline of the IFC (International Finance Corporation member of the Wold Bank Group) and the African Development Bank (ADB) terms of references for community consultation, public disclosure, compensation and resettlement.

The goal of OMV and ETAP is to foster local content development and job creation. These requirements are already translated in the contracting strategy. EPCC tenderers shall demonstrate a commitment to maximise Tunisian content in, as a minimum, the form of Tunisian Contractors and Suppliers. Failure to demonstrate a genuine commitment to employing Tunisian companies will result in a disqualification. The JVP strive particular interest to the employment and capacity building in the South of Tunisia. A vocational training initiative in Tataouine to improve employability of local people in various industries has been lunched in 2012 with a budget totaling 6 million TDN. Further a wide consultation with local stakeholder and social society; training topics such as entrepreneurial skills, qualified welding, HSSE, and English language skills have been selected. The sponsorship project will last for 2 years and it is expected that the National Professional Training Agency will ensure sustainability in the future.

8. Capex, Opex and Economic Analysis

8.1 Input Assumptions

CAPEX : The total capital expenditure for the execution of the development scope starting May 2013 until first gas is USD 814 mn to be invested over the next three years (2013/2014/2015). After first gas, additional captal expenditures of USD 287 mn are required for drilling 23 additional wells and installation of Front End Compression at the CPF inlet. Underlying cost estimates are class 2 for CPF and pipeline and class 4 for GTP. Cost Details are listed in below table.

All Figures in USD million, 100%.

	2013	2014	2015	2016+	Total Field Life
CPF Nawara & upstream	36.1	144.9	144.9		325.9
24" Pipeline Nawara-Gabes	130.4	95.9	43.3		269.6
GTP and Compression Gabes	10.0	73.2	73.2		156.4
Work overs	0.0	14.3	17.3		31.6
Owner Cost	6.3	12.0	12.0		30.3
Future wells (23) and tie ins				255.6	255.6
Future FEC				31.0	31.0
Total	**183**	**340**	**291**	**287**	**1100**

Note: Nawara CPF includes a cost escalation for market increase of USD 39.2 mn.

OPEX: The estimated annual operating expenses during Plateau production are listed below. All Figures in USD million, 100%.

Opex – Nawara CPF	23.3
Opex - Pipeline and GTP	6.6
Escalation	3.8
Total annual Opex for the whole project	**33.7**

PAST COST: The past exploration cost spent on drilling and testing of 9 wells and engineering studies for the development projects is 194.7 USD.

PRODUCTS: The production profile for sales gas remained unchanged from the profile as provided in Amendment #2. Total estimated gas sales will be 510 bcf over a period of 25 years. Plateau length is estimated to be around 17 years.

The production volume for condensate has been increased slightly from 11 to 13.5 mn bbl to refelect the additional condensate recovery due to the deep cooling in the GTP.

The daily LPG production (and thus the total LPG recovery) has been reduced by 45% to reflect the lower recovery efficiency of a Mechanical Refrigeration versus the previously selected Turbo Expander technology and the leaner gas composition from the Nawara gas only versus the previous mix. Thus, the overall LPG recovery over 25 years dropped from 19 mn boe to 10.5 mn boe.

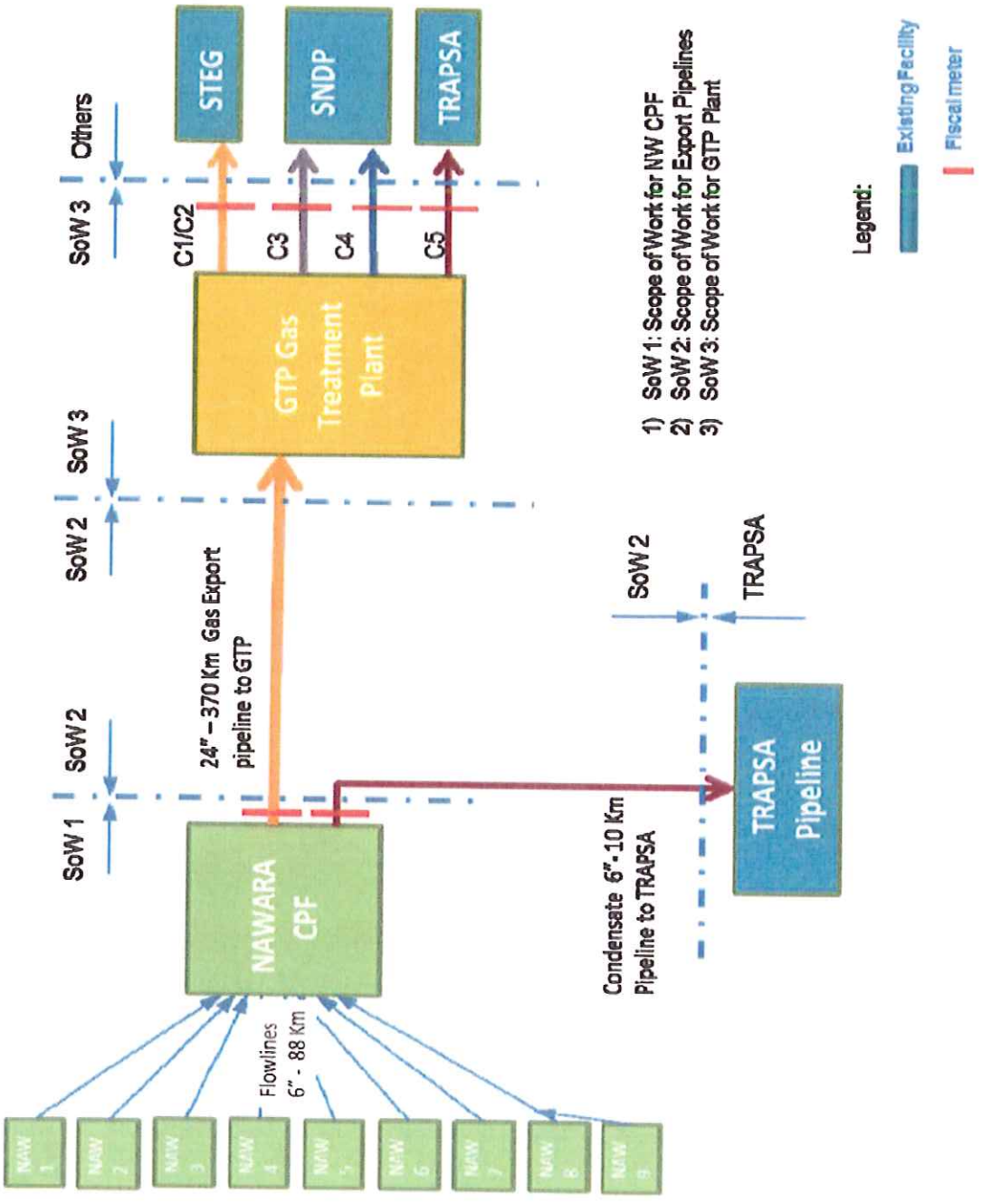
The above Capex estimate is based on a deterministic cost estimation methodology and includes contingencies for market price escalations and technical contingency (for scope which is not

100% defined yet). It does not include contingency to cover for probabilisticly determined project risks, as identified in the project risk register.

8.2 Economic Results

A summary of economic Key performance Indicators (KPI's) is provided in appendix 2.

Appendix 1: Sketch of Development Scope

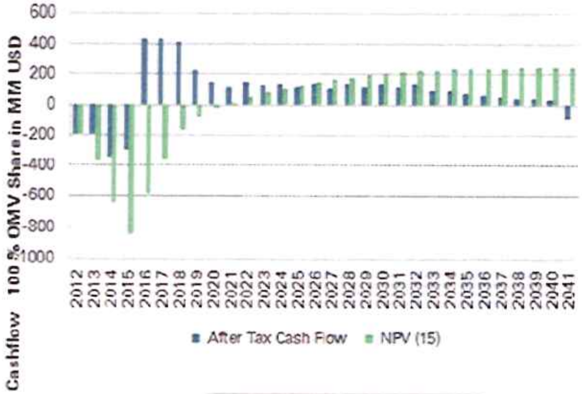


Appendix 2: Economic Analysis

Economics Summary — Nawara basecase - 100% w/o carry repayment (Full cycle) — Date: 13/03/13

OMV Cashflow

discounted to 1/1/2013



Prices

	LPG	Condensate	Gas
	USD/bbl	USD/bbl	USD/mscf
2013	65.99	101.00	11.67
2014	66.26	101.00	11.67
2015	69.73	101.00	11.67
2016	69.98	101.00	11.67
2017	69.98	101.00	11.67
2018ff	69.98	101.00	11.67

KPIs OMV Share 100%

NPV @ 10 %	MM USD	609.6
NPV @ 15 %	MM USD	241.0
Rate of Return	% p.a.	20%
DPI @ 10 %		0.6
Maximum Exposure	MM USD	1018.7
Capex	USD/boe	11.1
Opex	USD/boe	6.4
Payout @ 10%	years	7.5

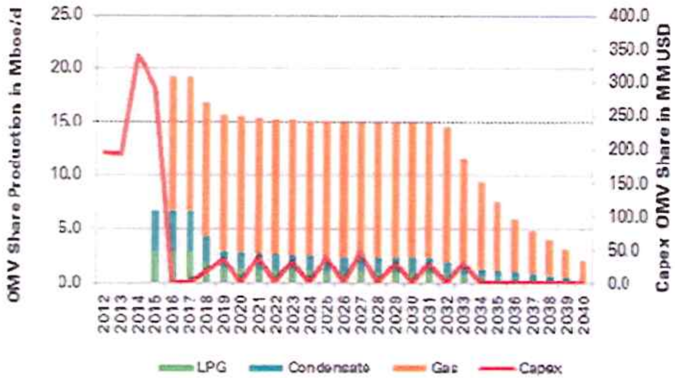
Costs OMV Share

Total CAPEX	MM USD	1305.3
Total OPEX	MM USD	749.4

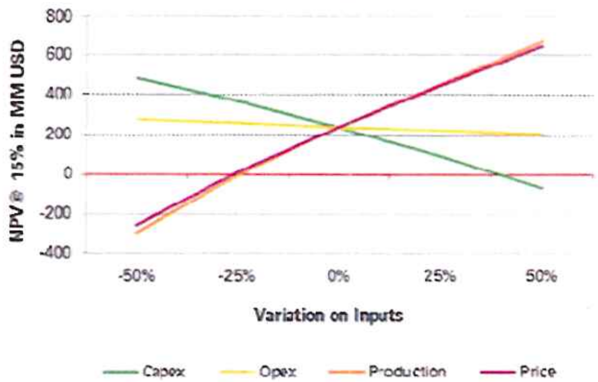
Production OMV Share

Total Liquids	MMSTB	24.0
Total Gas	BSCF	559.7
Total Equivalent	MMBOE	117.3

OMV Capex and Production



Sensitivities



Calculated by: Yosri Makhine

Reviewed by: Josef Donner

Appendix II Project Approval by General Directorate for Energy

République Tunisienne
Ministère de l'Industrie
Direction Générale de l'Energie
DI'PH/RB

Date 22 MAI 2013
Number A 09977

GM		HSSE	
EXP		HR	
PE		BDS	
OE		DEV	
FIN		STGP	
PROC		OA	
TPS/Ser		NOA	
[illegible]		[illegible]	

TRANSMISSION PAR TELEFAX

DESTINATAIRE : Mr Le Directeur Général
OMV

N° FAX : 70 168 201/202 71. 462. 555

Mr Le Président Directeur Général
de l'Entreprise Tunisienne d'Activités Pétrolières

N° FAX : 71 285 280

DATE : 21 Mai 2013

EXPEDITEUR : Direction Générale de l'Energie

N° FAX : 71 787 804

REFERENCE : DPPH

NOMBRE DE PAGE : 2
(Celle-ci incluse)

OBJET : Concession Nawara - Avenant n°3 au plan de développement.

REF. : Votre lettre en date du 8 Mai 2013

Par lettre en date du 8 mai 2013 déposée à la Direction Générale de l'Energie le 17 mai 2013 vous m'avez transmis pour approbation, deux exemplaires de l'Avenant n°3 au Plan de développement de la concession d'exploitation des hydrocarbures « Nawara ».

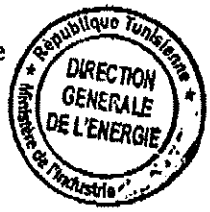
En réponse, j 'ai l'honneur de vous informer que la dit avenant n°3ne soulève pas d'objection de notre part tant qu'il n'est pas contraire ou incompatible avec les dispositions du Code des Hydrocarbures et des règlements pris pour son application.

Toute fois Nous vous rappelons qu'en ce qui concerne la constitution des réserves de réinvestissement prévue à l'article 113 du code des hydrocarbures pour le financement des dépenses des canalisations de transport du brut et du gaz de la concession Nawara, celle-ci doit faire l'objet d'une demande détaillée comportant les modalités de la constitution des dites réserves et la concession à partir de laquelle seront constitués ces réserves pour le présenter pour examen au Comité Consultatif des Hydrocarbures.

Meilleures salutations

Le Directeur Général de l'Energie

Rachid Ben Daly



Appendix III Exemption for the Application of ASME B31.8-2010

NA-OTP-STG-0000-PM-SPE-0001

Republic of Tunisia
Ministry of Industry and Technology

The Minister of Industry and Technology

To

Mr. President and General Manger of Entreprise Tunisienne d'Activités Pétrolières

Purpose: exemption application

Our ref:

- letters registered under n°1748, dated 23 November 2010, n°1948 dated 21 December 2010 and n°336 dated 25 March 2011
- minutes registered under n°670 dated 25 May 2011

Further to your above mentioned application and to the above mentioned additional information related to the South Tunisia Gas Project "STGP", requesting an exemption to the following provisions of the homologated standard NT 109.01, related to safety of combustible gas transportation facilities by pipes:

- paragraph 2.2 related to the thickness calculation,
- paragraph 4.14 (a), related to the regular maximum space of 20 km between the hatch sectioning for category A and B

and further to the above mentioned minutes, I have the honor to inform you that in accordance with the provisions of Article 43 of the ministerial order from the minister of national economy dated 15 August 1985, homologating the Tunisian standards related to safety of combustible gas transportation facilities by pipes, a favourable follow up has been granted to your demand, provided that:

- calculate the pipes thickness in accordance with the ASME B31.8-2010 code and with an additional extra corrosion thickness at least equal to 1.5mm,
- adopt a space between the hatches in accordance with the code ASMEB31.8-2010 following the areas classification,
- supply to the safety department a safety study related to this project,
- supply to the safety department, each 3 years, an inspection report on the pipe by intelligent pig.

It is necessary to have the safety department inspectors participating in the official tunisification tests in the manufacturing plant for such equipment and this pursuant to the provisions of Article 8 of the ministerial order of the minister of Industry dated 22 February 2000, approving the memorandum of obligations related to the agreement criteria of technical control organisms.

This translation has been made by Adly BELLAGHA, lawyer

Translation from French

محمد الكراي
مترجم محلف لدى المحاكم
10 نهج مصطفى مبارك 1000 تونس
Mohamed KARRAY
Interprète assermenté près les tribunaux
Sworn Interpreter
10, rue Mustapha M'barek - 1000 Tunis
☎ 322.695

Republic of Tunisia
Ministry of Industry and Technology

The Minister of Industry and Technology

To

Mr. Chairman and Managing Director of "Entreprise Tunisienne d'Activités Pétrolières"

Purpose: Exemption Application

Our ref:
- Letters registered under n°1748, dated 23 November 2010, n°1948 dated 21 December 2010 and n°336 dated 25 March 2011
- Minutes registered under n°670 dated 25 May 2011

Further to your above mentioned application and to the above mentioned additional information related to the South Tunisia Gas Project "STGP", requesting an exemption to the following provisions of the homologated standard NT 109.01, related to safety of combustible gas transportation facilities by pipes:

- Paragraph 2.2 concerning the thickness calculation,
- Paragraph 4.14 (a) appertaining to the regular maximum space of 20 km between the hatch sectioning for categories A and B

and further to the above mentioned minutes, I have the pleasure of informing you that in accordance with the provisions of Article 43 of the ministerial order issued by the Minister of National Economy dated 15 August 1985, homologating the Tunisian standards related to safety of combustible gas transportation facilities by pipes, a favourable follow up has been granted to your demand, provided that:

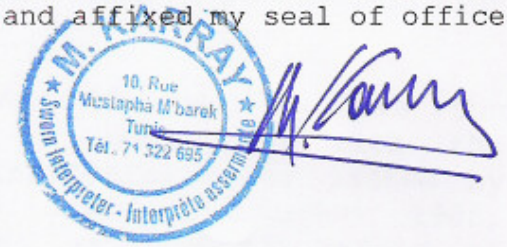
- the pipe thickness be calculated in accordance with the ASME B31.8-2010 Code and with an additional extra corrosion thickness of at least 1.5mm,

- a space between the hatches be adopted in accordance with the ASMEB31.8-2010 Code following the classification of the concerned areas,
- a safety study related to this project be submitted to the safety department,
- an inspection report covering the pipe by intelligent pig be submitted to the safety department, every 3 years.

It is necessary to have the safety department inspectors participate in the official Tunisification tests in the manufacturing plant for such equipment and this pursuant to the provisions of Article 8 of the ministerial order issued by the Minister of Industry dated 22 February 2000, approving the memorandum of specifications appertaining to the agreement criteria of technical control bodies.

Seal and signature:
Ministry of Industry and Technology
Abdelaziz Rassaa.

I, Mohamed KARRAY, Ph.D., Sworn Interpreter, do hereby certify that the above translation is in conformity with the original document.
In witness whereof I have hereunto set my hand and affixed my seal of office.



REPUBLIQUE TUNISIENNE
MINISTERE DE L'INDUSTRIE
ET DE LA TECHNOLOGIE

DEP → YME mondi
DP

Tunis le 7 SEPT. 2011

220

Le Ministre de l'Industrie et de la Technologie
A
Monsieur le Président Directeur Général de l'Entreprise Tunisienne d'Activités Pétrolières

Objet : Demande en dérogation.

N/Réf : - Courriers enregistrés sous le n°1748, en date du 23 Novembre 2010, n°1948, en date du 21 Décembre 2010 et le n°336, en date du 25 Mars 2011,
- Procès verbal enregistré sous le n°670, en date du 25 Mai 2011.

Suite à votre demande sus-indiquée et aux compléments d'informations sus-référencés, relative au projet du gaz du sud Tunisien « STGP », sollicitant une dérogation aux dispositions suivantes de la norme homologuée NT 109.01 relative à la sécurité des ouvrages de transport de gaz combustible par canalisation:

- Paragraphe 2.2 relatif au calcul d'épaisseur,
- Paragraphe 4.14.a) relatif à l'espacement maximal régulier de 20 km entre les vannes de sectionnement, pour les catégories A et B.

ETAP
Bureau d'Ordre Central
Le - 8 SEP. 2011
Arrivée
N° 2007

ETAP
DIRECTION ETUDES DE PRODUCTION
ET DE DEVELOPPEMENT
12 SEP. 2011
ARRIVEE N° 6761/M

et suite au procès verbal sus-indiqué, j'ai l'honneur de vous informer qu'en application de l'article 43 de l'arrêté du ministre de l'économie nationale du 15 aout 1985 portant homologation des normes tunisiennes relatives à la sécurité des ouvrages de transport de gaz combustible par canalisation, une suite favorable a été accordée à votre demande, sous réserve de ce qui suit:

- ✓ Calculer les épaisseurs du pipe conformément au code ASME B31.8-2010 et avec une surépaisseur de corrosion au moins égale à 1.5 mm,
- ✓ Adopter un espacement entre les vannes conformément au code ASME B31.8-2010 suivant les classifications des zones,
- ✓ Fournir à la direction de la sécurité une étude de sécurité relative à ce projet,
- ✓ Fournir à la direction de la sécurité un rapport d'inspection du pipe par pig intelligent chaque trois ans.

Il y a lieu de faire participer les inspecteurs de la direction de la sécurité aux épreuves officielles de tunisification en usine de ces équipements et les authentifier et ce en application de l'article 8 de l'arrêté du ministre de l'industrie du 22 février 2000 portant approbation des cahier des charges relatif aux critères d'agréments des organismes de contrôle technique.

Ministre de l'Industrie et de la Technologie

Signé: Abdelaziz RASSAA

Appendix IV Minutes of Meeting with Directorate for Security

Le 02 Avril 2013

Compte rendu de la réunion avec la Direction de Sécurité du 02 Avril 2013

Objet de la réunion : Projet Nawara & STGP : Présentation du projet

Etaient présents :

OMV/ETAP		Direction de la Sécurité	
Bernd Apelt	Chef de projet STGP	Riadh Ben Rejeb	Directeur de la Sécurité
Chedli Slama	Co-Chef de projet STGP	Adel Mahjoubi	S/Directeur de la Sécurité
Hassen Yahyaoui	Ingénieur civil STGP		
Mohsen El Amri	Consultant Aspect règlementaire STGP		

- Une présentation sommaire du projet Nawara /STGP a été faite par les représentants de OMV/ETAP. Un fichier électronique de 5 à 6 pages décrivant le dit projet sera transmis à la Direction de la Sécurité comme demandé.
- La Direction de Sécurité n'a pas émis de remarques particulières sur le site d'implantation du centre de traitement de gaz de Nawara (GTP) situé dans la zone industrielle de Gabes à condition de respecter les distances de sécurité (Voir plan d'emplacement Google Earth annexe) conformément à l'arrêté du ministre de l'industrie, de l'énergie et des petites et moyennes entreprises du 8 aout 2009, fixant les conditions d'exploitation des réservoirs contenant des gaz inflammables liquéfiés.
- L'équipe de projet OMV/ETAP a souligné que le site de traitement abritera un stockage opérationnel de deux jours de GPL d'un volume ne dépassant pas 200 Tonnes par jour soit un total de 400 Tonnes de GPL stocké. Le produit sera stocké dans des réservoirs sous talus conformément à l'arrêtée cité ci-dessus.
- La Dérogation aux dispositions de la norme homologuée NT 109-01 pour la conduite du gaz du projet STGP reliant le point de raccordement situé à Hammouda dans le sud Tunisien au centre de traitement de Gabes reste valable pour la nouvelle configuration du projet STGP qui concerne la Conduite de gaz de 374 Km reliant le champ de production de Nawara au centre de traitement de Gabes.

- Une étude de danger préliminaire basée sur les informations disponibles sera élaborée par OMV en vue d'obtenir un accord provisoire d'ouverture d'un établissement classé. La dite étude de danger sera actualisée et soumise à la Direction de Sécurité après la passation du contrat EPC pour l'ingénierie de détail, l'achat de matériel et la construction clef en main du centre de traitement (GTP) à Gabes et ce pour obtention de l'accord définitif.
- La direction sécurité recommande de faire participer plus d'un bureau de contrôle tunisien agrée aux différentes phases d'inspections du projet et de bonifier les bureaux accrédités dans les domaines A2 et A3 (line pipe, construction, etc...)

Pour OMV/ETAP

Slama Chedli

Christopher Cox

pp Apelt Bernd

Pour la Direction de Sécurité

Riadh Ben Rejeb

Appendix V Coring Boreholes in the Study Area

Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)			**coring boreholes N°**	CPF - SC1		
				Date :	08/2012		
Site :	Nawara-jnein south	**Spud Date :**	23/08/2012	**cheked by** :	W. HAMZA		
Client :	OMV	**Date :**	23/08/2012	**water level** :	Néant		
Investigation :	Coring borehole	**coring diameter :**	**Coordinates**	**X**	**Y**	**Z**	
Crew chief :	Nizar	101 mm		601352	3430195	329	

Depth	Thikness (m)	Lithologiy	Symbols	Samples	depthf m/TN	S.P.T. tests N1	S.P.T. tests N 2	S.P.T. tests N1+N2
					0			
		Fractured calcareous crust with witish gypsum .			1	28	R	R
2,00	2,00			EI11 (2,00 - 2,50)	2			
2,50	0,50	Beige to whitish clay tuff			3	33	R	R
		sandy tuff crust with gypsum		EI12 (4,00 - 4,50)	4			
4,50	2,50				5	R	R	R
				EI13 (6,00 - 6,50)	6			
					7	R	R	R
		yellow limestone.			8			
					9	R	R	R
				EI14 (9,50 - 10,00)	10			
					11	R	R	R
					12			
13,00	8,50				13	R	R	R
		yellow limestone altenated with fine intercalations of micro conglomeratic marl .			14			
15,00	2,00				15	34	41	75

Siège Social : Rue Ennasria, Immeuble Essafir - 4éme étage - **Appt. N°40** - 3027 Sfax-TUNISIE
Adresse Postale : B.P 35 - 3052 Sfax - TUNISIE / **Tél.** : + 216 74 403 139 - **Fax** : + 216 74 406 331
afric.soil@wanadoo.tn

Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)				**coring boreholes N°**		CPF - SC2
					Date :		08/2012
Site :	Nawara-jnein south	**Spud Date :**	24/08/2012		**cheked by :**		W. HAMZA
Client :	OMV	**Date :**	24/08/2012		**water level :**		Néant
Investigation :	Coring borehole	**coring diameter :**		**Coordinates**	**X**	**Y**	**Z**
Crew chief :	Nizar	101 mm			601412	3430251	328

Depth	Ethikness (m)	Lithology	Symbole	samples	Depth m/TN	S.P.T.tests N1	N 2	N1+N2
					0			
					1	29	R	R
		Calcareous with tuff and gypsum crust with sandy intercalations beige to reddish.		EI21 (2,00 - 2,50)	2			
					3	R	R	R
				EI22 (3,50 - 4,00)	4			
5.00	5.00				5	25	R	R
5.30	0.30	Sandy crust						
5.70	0.40	Calcareous crust		EI23 (6,00 - 6,50)	6			
					7	R	R	R
					8			
					9	R	R	R
		yellow limestone altenated with fine intercalations of micro conglomeratic marl .		EI24 (9,50 - 10,00)	10			
					11	R	R	R
					12			
					13	R	R	R
					14			
15.00	9.30				15			

Siège Social : Rue Ennasria, Immeuble Essafir - 4éme étage - **Appt. N°40** - 3027 Sfax-TUNISIE
Adresse Postale : B.P 35 - 3052 Sfax - TUNISIE / **Tél.** : + 216 74 403 139 - **Fax** : + 216 74 406 331
afric.soil@wanadoo.tn

Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)			**coring boreholes N°**	CPF - SC3		
				Date :	08/2012		
Site :	Nawara-jnein south	**Spud Date :**	26/08/2012	**cheked by :**	W. HAMZA		
Client :	OMV	**Date :**	26/08/2012	**water level :**	Néant		
Investigation :	Coring borehole	**coring diameter :**	**Coordinates**	**X**	**Y**	**Z**	
Crew chief :	Nizar	101 mm		601510	3430298	326	

Depth	thikness (m)	Lithology	Symbols	samples	depth m/TN	S.P.T. test N1	S.P.T. test N 2	S.P.T. test N1+N2
0					0			
				EI31 (1,00 - 1,50)	1			
					2	R	R	R
		sandy tuff with gypsum crust with some calcareous intercalations		EI32 (3,00 - 3,50)	3			
					4	25	R	R
				EI33 (5,00 - 5,50)	5			
6,00	6,00				6	R	R	R
		beige to yellowish sand with gypsum crust						
7,00	1,00			EI34 (7,00 - 7,50)	7			
		.beige to whitish sandy and calcareous crust			8	R	R	R
8,50	1,50				9			
		.Sandy crust with calay and gypsum beige to yellowish			10	R	R	R
11,00	1,50				11			
		Sandy crust with clay locally oxydated beige to greenish			12	R	R	R
13,00	2,00				13			
		yellow limestone altenated with fine intercalations of micro conglomeratic marl .			14	27	33	60
15,00	2,00				15			

Siège Social : Rue Ennasria, Immeuble Essafir - 4éme étage - **Appt. N°40** - 3027 Sfax-TUNISIE
Adresse Postale : B.P 35 - 3052 Sfax - TUNISIE / **Tél.** : + 216 74 403 139 - **Fax** : + 216 74 406 331
afric.soil@wanadoo.tn

Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)				**coring boreholes N°**		CPF - SC4
					Date :		08/2012
Site :	Nawara-jnein south	**Spud Date :**	27/08/2012		**cheked by** :		W. HAMZA
Client :	OMV	**Date :**	27/08/2012		**water level** :		Néant
Investigation :	Coring borehole	**coring diameter :**		**Coordinates**	**X**	**Y**	**Z**
Crew chief :	Nizar	101 mm			601351	3430298	326

Depth	thikness (m)	Lithology	Symbols	Samples	depth m/TN	S.P.T. tests N1	S.P.T. tests N 2	S.P.T. tests N1+N2
0					0			
		calcareous tuff with gypsum crust beige to whitish.						
2,00	2,00			EI41 (2,00 - 2,50)	2			
					3	19	22	41
		alternatinon of sandy tuff with gypsum and limestone crust		EI42 (4,00 - 4,50)	4			
					5	22	R	R
6,00	4,00			EI43 (6,00 - 6,50)	6			
					7	R	R	R
				EI44 (7,50 - 8,00)	8			
					9	R	R	R
		yellow limestone altenated with fine intercalations of micro conglomeratic marl .			10			
					11	R	R	R
					12			
					13	R	R	R
14,20	8,20				14			
		beige to greenish oxydated clay with locally marl				23	R	R
15,00	0,80				15			

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Adresse Postale : B.P 35 - 3052 Sfax - TUNISIE / **Tél.** : + 216 74 403 139 - **Fax** : + 216 74 406 331
afric.soil@wanadoo.tn

Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)				**coring boreholes N°**		CPF - SC5
					Date :		08/2012
Site :	Nawara-jnein south	**Spud Date :**	29/08/2012		**cheked by** :		W. HAMZA
Client :	OMV	**Date :**	29/08/2012		**water level** :		Néant
Investigation :	Coring borehole	**coring diameter :**		**Coordinates**	**X**	**Y**	**Z**
Crew chief :	Nizar	101 mm			601472	3430374	325

depth	thikness (m)	Lithology	Symbole	sampless	depth m/TN	S.P.T. tests N1	S.P.T. tests N 2	S.P.T. tests N1+N2
0,30	0,30	vegetal terrain						
						18	19	37
						23	R	R
						21	25	46
						24	R	R
						R	R	R
				EI51 (6,00 - 6,50)				
						R	R	R
				EI52 (8,00 - 8,50)				
		fine sand with tuff and gypsum locally calcareous with some alluvial intercalations beige to whitish				23	27	50
						21	23	44
				EI53 (12,00 - 12,50)				
				EI54 (13,50 - 14,00)				
15,00	14,70							

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Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)			**coring boreholes N°**	CPF - SC6		
				Date :	08/2012		
Site :	Nawara-jnein south	**Spud Date :**	31/08/2012	**cheked by :**	W. HAMZA		
Client :	OMV	**Date :**	31/08/2012	**water level :**	Néant		
Investigation :	Coring borehole	**coring diameter :**	**Coordinates**	**X**	**Y**	**Z**	
Crew chief :	Nizar	101 mm		611420	3430374	325	

Depth	Thikness (m)	Lithology	Symbole	samples	depth m/TN	S.P.T. tests N1	S.P.T. tests N 2	S.P.T. tests N1+N2
0,30	0,30	reddish dune and silicious sand						
						17	15	32
						15	25	40
						28	R	R
						R	R	R
						22	23	25
				EI61 (6,00 - 6,50)				
						24	26	40
				EI62 (8,00 - 8,50)				
		beige to whitish fine sand with tuff ,gravel and gypsum locally calcareous				R	R	R
						20	21	41
				EI63 (12,50 - 13,00)				
						R	R	R
				EI64 (14,50 - 15,00)				
15,00	14,70							

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Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)			**coring boreholes N°**	CPF - SC7		
				Date :	09/2012		
Site :	Nawara-jnein south	**Spud Date :**	08/09/2012	**cheked by :**	W. HAMZA		
Client :	OMV	**Date :**	08/09/2012	**water level :**	Néant		
Investigation :	Coring borehole	**coring diameter :**	**Coordinates**	**X**	**Y**	**Z**	
Crew chief :	Nizar	101 mm		601350	3430348	325	

Depth	Thikness (m)	Lithology	Symbols	samples	depth m/TN	S.P.T. tests N1	S.P.T. tests N 2	S.P.T. tests N1+N2
0					0			
		reddish dune sand silicious and locally rocky						
1					1	11	10	21
1,30	1,30							
2				EI71 (2,00 - 2,50)	2			
3		beige to whitish fracturated tuff with limestone locally gravel .			3	42	R	R
4					4			
5					5	R	R	R
5,50	4,20			EI72 (5,50 - 6,00)				
6					6			
7					7	R	R	R
8					8			
9		beige to whitish fracturated tuff with limestone crust locally alluvial.			9	R	R	R
10				EI73 (10,00 - 10,50)	10			
11					11	R	R	R
12				EI74 (12,00 - 12,50)	12			
13					13			
14					14	R	R	R
15					15			
15,00	9,50							

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Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)				**coring boreholes N°**		CPF - SC8
					Date :		09/2012
Site :	Nawara-jnein south	**Spud Date :**	09/09/2012		**cheked by :**		W. HAMZA
Client :	OMV	**Date :**	09/09/2012		**water level :**		Néant
Investigation :	Coring borehole	**coring diameter :**		**Coordinates**	**X**	**Y**	**Z**
Crew chief :	Nizar	101 mm			601235	3430425	326

Depth	Thikness (m)	Lithology	Symbols	Samples	depth m/TN	S.P.T. tests N1	N 2	N1+N2
0					0			
1		tuff lightly sandy beige to reddish			1			
2					2	23	25	48
3.00	3.00			EI81 (2,50 - 3,00)	3			
		beige to whitish tuff with sand locally alluvial.			4	35	R	R
5.00	2.00			EI82 (5,00 - 5,50)	5			
					6	R	R	R
					7			
					8	25	R	R
		beige to whitish tuff with sand locally calcareous with gypsum lightly gravel.			9			
				EI83 (9,50 - 10,00)	10	31	R	R
				EI84 (11,00 - 11,50)	11			
					12	R	R	R
					13			
					14	R	R	R
15.00	10.00				15			

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Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)			**coring boreholes N°**	CPF - SC9		
				Date :	09/2012		
Site :	Nawara-jnein south	**Spud Date :**	10/09/2012	**cheked by** :	W. HAMZA		
Client :	OMV	**Date :**	10/09/2012	**water level** :	Néant		
Investigation :	Coring borehole	**coring diameter :**	**Coordinates**	**X**	**Y**	**Z**	
Crew chief :	Nizar	101 mm		601383	3430513	327	

Depth	thikness (m)	Lithology	Symbols	Samples	depth m/TN	S.P.T. tests N1	S.P.T. tests N 2	S.P.T. tests N1+N2
0,30	0,30	. reddish dune siliceous sand.						
						18	22	40
						21	23	44
		. beige to whitish fine sand with tuff and gypsum locally alluvial.		EI91 (2,50 - 3,00)				
						28	R	R
4,80	4,50					R	R	R
		. beige to whitish fracturated calcareous with tuff with gypsum crust		EI92 (5,50 - 6,00)				
6,00	1,20					25	27	52
		beige to whitih fine sand with tuff and gypsum and gravel locally calcareous with some alluvial intercalations.		EI93 (8,50 - 9,00)				
						R	R	R
				EI94 (11,50 - 12,00)				
						R	R	R
						R	R	R
15,00	9,00							

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Coring boreholes

According to the Norm NF P94 - 116

N° Job : AS 151 -2012

Project :	Geotechnical Survey for Nawara Gathering system and CPF (CPF site)				**coring boreholes N°**		CPF - SC10
					Date :		09/2012
Site :	Nawara-jnein south	**Spud Date :**	12/09/2012		**cheked by :**		W. HAMZA
Client :	OMV	**Date :**	12/09/2012		**water level :**		Néant
Investigation :	Coring borehole	**coring diameter :**		**Coordinates**	**X**	**Y**	**Z**
Crew chief :	Nizar	101 mm			601135	3430637	328

Depth	Thikness (m)	Lithology	Symbols	samples	depth m/TN	S.P.T. tests N1	S.P.T. tests N 2	S.P.T. tests N1+N2
0					0			
		reddish siliceous dune sand			1	15	17	32
2,00	2,00			EI101 (2,00 - 2,50)	2			
		. beige to whitish fine sand with tuff and gypsum locally alluvial.			3	18	22	40
3,50	1,50				4			
		beige to reddish tuff with clay and gravel			5	23	21	44
6,00	2,50			EI102 (5,50 - 6,00)	6			
					7	28	25	53
					8			
		beige to whitish fine sand with tuff and gypsum and gravel locally calcareous with some alluvial intercalations			9	25	R	R
				EI103 (10,00 - 10,50)	10			
					11			
					12	R	R	R
				EI104 (13,00 - 13,50)	13			
					14			
					15	R	R	R
15,00	9,00							

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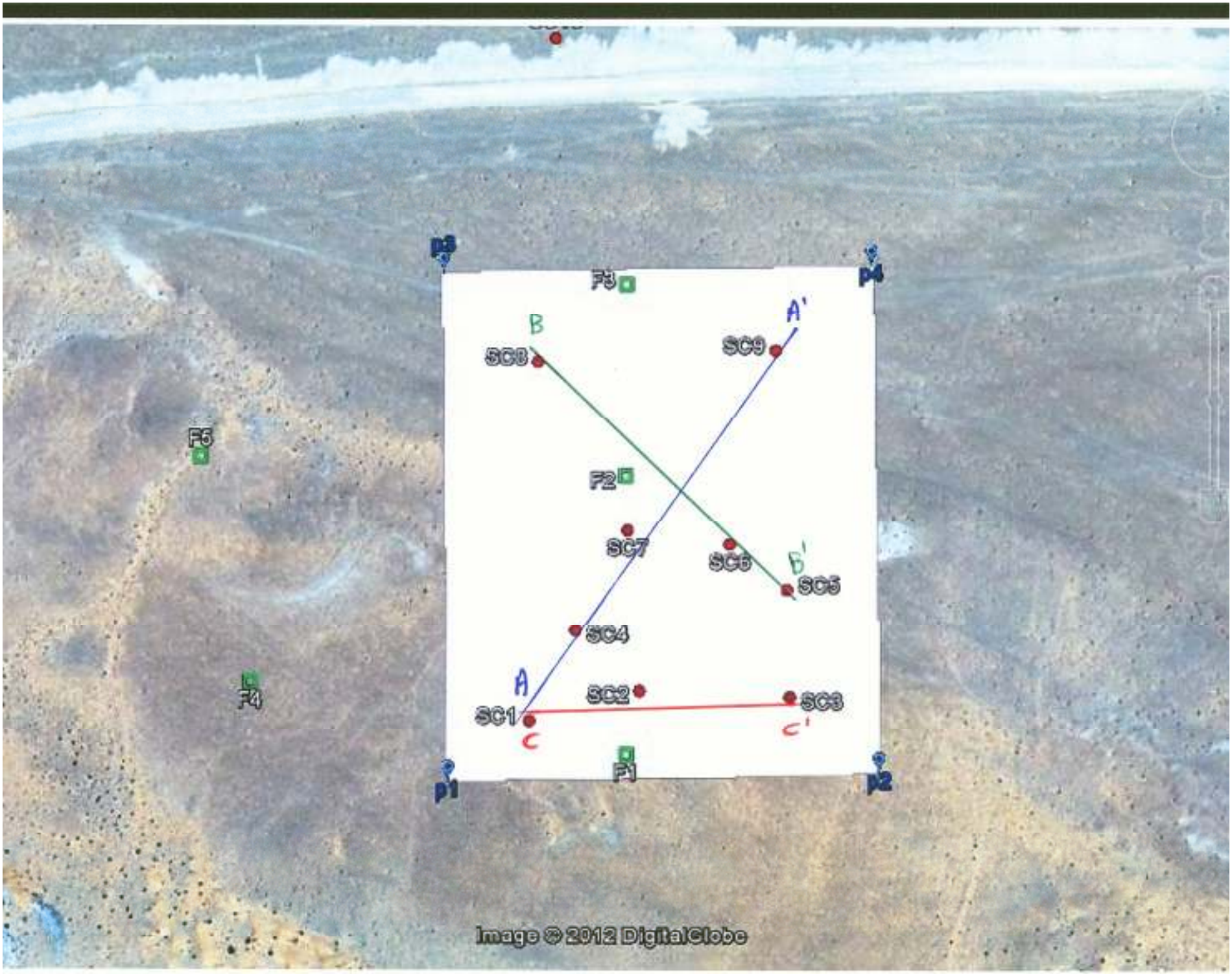
P3
P4
P5
P1
P2
F3
F5
F2
F4
F1
A'
B
SC8
SC9
SC7
SC6
B'
SC5
SC4
A
SC2
SC3
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C'
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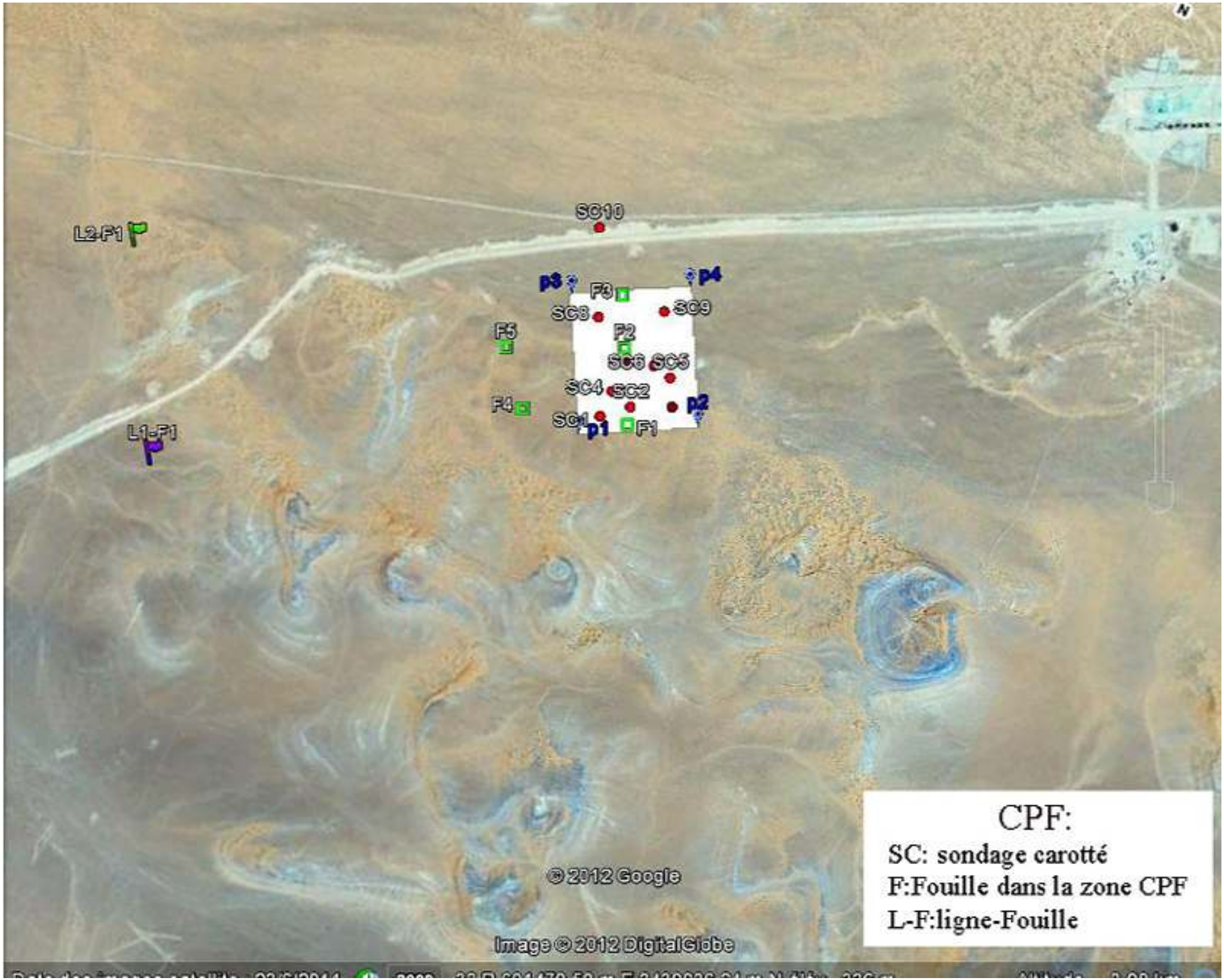
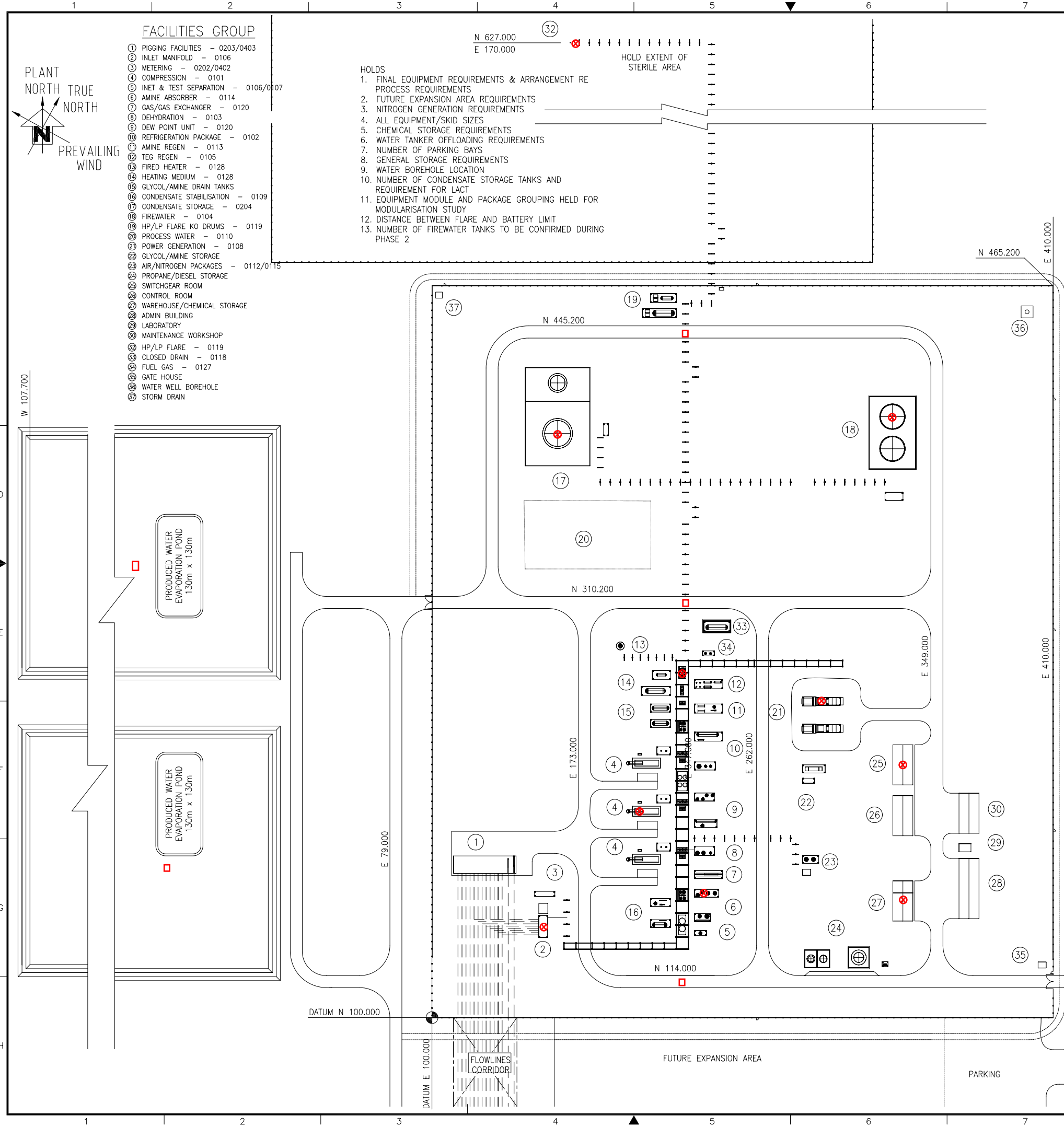

L2-F1
SC10
P3
P4
F3
SC8
SC9
F5
F2
SC6
SC5
SC4
SC2
F4
P2
SC1
P1
F1
L1-F1
© 2012 Google
Image © 2012 DigitalGlobe
CPF:
SC: sondage carotté
F:Fouille dans la zone CPF
L-F:ligne-Fouille



LEGEND – (SEE DRG.No. NA-PEL-CPF-0000-ME-DRW-0001 FOR EQUIPMENT LOCATION)

INLET MANIFOLD UNIT – 0106		WATER TREATMENT UNIT – 0110	
0106-XX-0100	INLET MANIFOLD – HP & TEST HEADER	0110-V-2002	PRODUCED WATER FLASH DRUM
0106-XX-0376	INLET MANIFOLD MP & LP HEADER	0110-P-2003A/B	PRODUCED WATER FEED PUMPS
0106-V-1001	TEST SEPARATOR	0110-XX-057	EVAPORATION POND
INLET SEPARATOR UNIT – 0107		0110-X-2006	PRODUCED WATER TREATMENT PACKAGE
0107-V-1101	INLET SEPARATOR	CONDENSATE STABILISATION UNIT – 0109	
AMINE ABSORBER UNIT – 0114		0109-E-1201	PRE-HEATER
0114-V-1401	AMINE ABSORBER K.O. DRUM	0109-V-1202	WATER/CONDENSATE SEPARATOR
0114-C-1403	AMINE ABSORBER COLUMN	0109-C-1204	CONDENSATE STABILISATION COLUMN
0114-F-1402	MERCURY REMOVAL KIT	0109-E-1205	CONDENSATE REBOILER
0114-F-1408	AMINE ABSORBER FILTER COALESCER	0109-E-1206	CONDENSATE/CONDENSATE HEAT EXCH'R
0114-E-1409	SWEET GAS COOLER	0109-P-1213A/B	OFF-SPEC CONDENSATE RECYCLE PUMPS
AMINE REGENERATION UNIT – 0113		0109-E-1202	START-UP HEATER
0113-XX-013	AMINE REGEN FLASH DRUM	CONDENSATE STORAGE – 0204	
0113-XX-014	AMINE REGEN LEAN/RICH EXCHANGER	0204-T-1208/09	CONDENSATE STORAGE TANKS
0113-XX-015	AMINE REGEN STRIPPER COLUMN	0204-E-1207	CONDENSATE RUN DOWN COOLER
0113-XX-016	AMINE REGEN CONDENSER	EXPORT PUMPS – 0201	
0113-XX-017	AMINE REGEN CONDENSATE DRUM	0201-P-1211A/B	CONDENSATE EXPORT PUMPS
0113-XX-018A/B	AMINE REGEN REFLUX PUMPS	0201-P-1211C	CONDENSATE EXPORT PUMP (FUTURE)
0113-XX-020A/B	AMINE REGEN LEAN SOLUTION BOOSTER PUMPS	CONDENSATE METERING – 0202	
0113-XX-021	AMINE REGN LEAN SOLUTION COOLERS	0202-J-1212	CONDENSATE METERING PACKAGE
0113-XX-022A/B	MECHANICAL FILTERS	CONDENSATE PIPELINE – 0203	
0113-XX-023A/B	CARBON FILTERS	0203-SP-1701	EXPORT CONDENSATE PIG LAUNCHER
0113-XX-024A/B	MECHANICAL FILTERS	HP/LP FLARE UNIT – 0119	
0113-XX-026A/B	AMINE REGEN LEAN SOLUTION PUMPS	0119-XX-059	HP FLARE KO DRUM
0113-XX-027	ANTIFOAM TANK	0119-XX-060A/B	HP FLARE KO DRUM PUMP
0113-XX-028	AMINE REGEN REBOILER	0119-XX-061	HP FLARE STACK/TIP
AMINE STORAGE – 0123		0119-XX-062	IGNITION PACKAGE
0123-XX-029	AMINE STORAGE TANK	0119-XX-063	LP FLARE KO DRUM
0123-XX-030	AMINE STORAGE TANK MIXER	0119-XX-064A/B	LP FLARE KO DRUM PUMP
0123-XX-031A-D	AMINE TRANSFER PUMPS	0119-XX-065	LP FLARE STACK/TIP
0123-XX-032	AMINE DRAIN VESSEL	0119-XX-067	CO2 VENT STACK
0123-XX-033	AMINE DRAIN VESSEL HEATER	HEATING MEDIUM SYSTEM – 0128	
0123-XX-034A/B	AMINE DRAIN PUMPS	0128-XX-068	HEATING MEDIUM FIRED HEATER
DEHYDRATION UNIT – 0103		0128-XX-069A/B/C	HEATING MEDIUM CIRCULATION PUMP
0103-F-1410	TEG CONTACTOR FILTER COALESCER	0128-XX-070	HEATING MEDIUM EXPANSION DRUM
0103-D-1406	TEG CONTACTOR	0128-XX-071	HEATING MEDIUM SUMP PUMP
0114-E-1411	EXPORT GAS/SWEET GAS HEAT EXCHANGER	0128-XX-072	HEATING MEDIUM DRAIN SUMP
0114-V-1405	SWEET GAS KO DRUM	0128-XX-073	HEATING MEDIUM DUMP COOLER
TEG REGENERATION UNIT – 0105		COOLING SYSTEM – 0102	
0105-XX-035	LEAN GLYCOL AIR COOLER	0102-XX-0122	REFRIGERANT RECEIVER DRUM
0105-XX-036	GLYCOL REGEN CONDENSER	0102-XX-0123	1ST STAGE SUCTION DRUM
0105-XX-038	GLYCOL/GLYCOL HEAT EXCHANGER	0102-XX-0125	CONDENSER (AIR COOLER)
0105-XX-03039A/B	GLYCOL PARTICLE FILTER	0102-XX-0126	1ST STAGE COMPRESSOR
0105-XX-040	GLYCOL CHARCOAL FILTER	0102-XX-0127	2ND STAGE COMPRESSOR
0105-XX-041A/B	LEAN GLYCOL PUMP	POWER GENERATION UNIT – 0108	
0105-XX-042	REGENERATION COLUMN	0108-XX-074	GAS TURBINE GENERATOR
0105-XX-043	GLYCOL FLASH DRUM	0108-XX-076	GAS TURBINE GENERATOR
0105-XX-044	GLYCOL SURGE DRUM	0108-XX-079	EMERGENCY DIESEL GENERATOR
0105-XX-047	GLYCOL REBOILER	0108-XX-080	DIESEL FILTER/COALESCER
GLYCOL STORAGE – 0126		0108-XX-081	DIESEL STORAGE TANK
0126-XX-051	GLYCOL DRAINS VESSEL	0108-XX-082	DIESEL TRANSFER PUMP
0126-XX-052A/B	GLYCOL DRAINS PUMP	CLOSED/OPEN DRAINS SYSTEM – 0118	
0126-XX-053	GLYCOL STORAGE TANK	0118-XX-083	CLOSED DRAIN TRANSFER PUMP
0126-XX-054A/B	GLYCOL TRANSFER PUMPS	0118-XX-084	CLOSED DRAINS VESSEL
0126-XX-120	GLYCOL STORAGE TANK HEATER	INSTRUMENT AIR UNIT – 0115	
DEW POINT UNIT – 0120		0115-XX-085	AIR COMPRESSOR
0120-E-1501	EXPORT GAS/DRY GAS HEAT EXCHANGER	0115-XX-086	PLANT AIR RECEIVER
0120-E-1502	DRY GAS CHILLER	0115-XX-087	AIR DRIER PACKAGE
0120-V-1503	COLD SEPARATOR	0115-XX-088	INSTRUMENT AIR RECEIVER
OFF-GAS COMPRESSOR UNIT – 0101		FIREWATER UNIT – 0104	
0101-V-1301A/B/C	1ST STAGE OFF-GAS COMP SUCTION SCRUBBER	0104-XX-089	FIREWATER STORAGE TANK
0101-K-1302A/B/C	1ST STAGE OFF-GAS COMP	0104-XX-090	FIREWATER STORAGE TANK
0101-E-1306A/B/C	1ST STAGE OFF-GAS COMP DISCH COOLER	0104-XX-091	FIREWATER JOCKEY PUMP
0101-V-1307A/B/C	2ND STAGE OFF-GAS COMP SUCT SCRUBBER	0104-XX-092	DIESEL FIREWATER PUMP PACKAGE
0101-K-1308A/B/C	2ND STAGE OFF-GAS COMP	0104-XX-093	ELECTRIC FIREWATER PUMP PACKAGE
0101-E-1309A/B/C	2ND STAGE OFF-GAS COMP DISCH COOLER	FUEL GAS UNIT – 0127	
0101-P-1303A-D	CONDENSATE RECYCLE PUMPS	0127-XX-095	FUEL GAS HEATER
EXPORT GAS METERING UNIT – 0402		0127-XX-096	HP FUEL GAS KO DRUM
0402-J-1504	EXPORT GAS FISCAL METERING PACKAGE	0127-XX-097	FUEL GAS FILTER/SEPARATOR
GAS PIPELINE – 0403		0127-XX-098	LP FUEL GAS KO DRUM
0403-SP-1801	EXPORT GAS PIG LAUNCHER	NITROGEN UNIT – 0122	
AQUIFER, FRESH WATER, POTABLE & DEMINERALISED WATER – 0117		0122-XX-620	NITROGEN GENERATOR PACKAGE
INCLUDES:–	AQUIFER FILTERS, AQUIFER STORAGE TANK, AQUIFER WATER PUMPS,CHLORINATION UNIT, PW STORAGE TANK,PW PUMPS, PW RO TREATMENT PACKAGE, STERILISATION UNIT, CHEMICAL DOSING, DEMIN WATER POLISHING, DEMIN WATER PUMPS, DRINKING WATER TREATMENT, SEWAGE PUMPS & WASTE WATER TREATMENT PACKAGES	0122-XX-630	NITROGEN RECEIVER
		CHEMICAL (PROCESS) – 0121	
		0121-XX-117	CHEMICAL INJECTION PACKAGE
		0121-XX-118	CHEMICAL INJECTION PACKAGE

NOTES
1. SEE DRG. No.NA-PEL-CPF-0000-ME-DRW-0001 FOR PROCESS AREA EQUIPMENT NUMBERING
2. THIS PLOT PLAN IS PRELIMINARY AND PRODUCED FOR COST ESTIMATION PURPOSES. TO BE FURTHER DEVELOPED DURING PHASE 2.

10 0 20 40 60 80 100 METRES
1:1250 SCALE BAR

REV	DESCRIPTION	ORIG	DRWN	CK'D	APP'D	DATE
001	ISSUED FOR INFORMATION	MF	MF	DAH	DAH	27.04.2012
000	ISSUED FOR REVIEW	MF	MF	DAH	DAH	23.03.2012
A01	ISSUED FOR IDC	MF	MF	DAH	DAH	30.02.2012

LEGEND
- Trial Pit
- BoreHole

CPF boreHole and Pit location

Petrofac

PETROFAC JOB NO. : JU09570A
ORIGINAL DWG SIZE : A1
SCALE : 1:1250

OVERALL PLOT PLAN CPF SITE AT NAWARA

CLIENT: OMV (TUNESIEN) PRODUCTION GMBH
ELECTRONIC FILE : NA-PEL-CPF-0000-ME-DRW-0002 REV 001.dwg
DWG.NA-PEL-CPF-0000-ME-DRW-0002 SH.1 of 1 REV001

S:\Projects\JU09570A OMV Nawara FEED\6.0 ENGINEERING\6.7 Cad\Layout\NA-PEL-CPF-0000-ME-DRW-0002 REV 001.dwg

Appendix VI Application for National Heritage Institute authorization

greenLab
Laboratoire d'analyses environnementales, agricoles et industrielles

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Tél. : +216 71 942 518 - 71 942 528, Fax : +216 71 942 604
E-mail: contact@greenlab.com.tn, Site web: http://www.greenlab.com.tn

RAPPORT D'ESSAIS

Identification : 01/1116/0613

Date de réception : 25/06/13

Green Lab 50, Rue de l'Artisanat Charguia II, 2035 TUNIS

1- DEMANDEUR

OMV South Tunisia Ltd
Imm Waterside, Impasse Turkana
Les Berges du Lac 1053, Tunis
Tél. : +216 71 162 000
Fax : +216 71 162 555

2- DESCRIPTION DE(s) L'OBJET(s) SOUMIS A L'ESSAI

- Deux échantillons d'eau de forage :

- Echantillon n°1 : Eau de forage : Acose well
- Echantillon n°2 : Eau de forage : Waha well

- Un échantillon d'eau de forage pétrolier : : After filter

3- ESSAI(s) DEMANDE(s)

pH, Résidu Sec, Chlorures, Cuivre, Fer, Manganèse, Zinc, Arsenic, Cadmium, Plomb, Sélénium, Antimoine, Argent, Aluminium, Bore, Etain, Chrome, Molybdène, Cobalt, Baryum, Béryllium, Nickel, Titane, Mercure, Indice des hydrocarbures.

4- METHODE(S) D'ANALYSE(s)

Essai (s)	Méthode (s)	Référence (s)
pH	Electrochimie	NF T 90-008 (2001)
Résidu Sec	Gravimétrie	NF EN 90-029 (2002)
Chlorures	Titrimétrie	NF ISO 9297 (2000)
Cuivre, Fer, Manganèse, Zinc, Arsenic, Cadmium, Plomb, Sélénium, Antimoine, Argent, Aluminium, Bore, Etain, Chrome, Molybdène, Cobalt, Baryum, Béryllium, Nickel, Titane	Digestion avec l'eau régale	NT ISO 15587-1 (2009)
	Spectrométrie d'émission atomique ICP	NT ISO 11885 (2007)
Mercure	Spectrométrie d'émission atomique ICP avec système d'hydrures	PERKIN ELMER (2008)
Indice des hydrocarbures	- Extraction Liquide/ Liquide au solvant - Chromatographie en Phase Gazeuse	NF EN ISO 9377-2 (2000)

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RAPPORT D'ESSAIS

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5- RESULTAT(s)

Essai (s)	Unité	Date d'exécution	OMV Eau de forage		Limites admissibles de la norme NT 106.02	
			Acose well	Waha well	Canalisation publique	DPH [1]
pH	-	25/06/13	7,70 à 24,0°C	7,05 à 23,8°C	6,5 à 9	6,5 à 8,5
Résidu Sec	g/L	26/06/13	4,61	6,61	-	
Chlorures	g/L	29/06/13	1,94	2,68	700	600
Indice des hydrocarbures	mg/L	27/06/13	0,15	0,13	10	2
Aluminium	mg/L	02/07/13	0,282	0,230	10	5
Cadmium	mg/L		<0,0027	<0,0027	0,1	0,005
Cobalt	mg/L		<0,0070	<0,0070	0,5	0,1
Cuivre	mg/L		<0,0097	<0,0097	1	0,5
Fer	mg/L		0,281	4,45	5	1
Plomb	mg/L		<0,010	<0,010	1	0,1
Manganèse	mg/L		0,049	0,218	1	0,5
Nickel	mg/L		<0,010	0,422	2	0,2
Zinc	mg/L		<0,0059	4,16	5	5
Chrome total	mg/L		<0,0071	<0,0071	CrVI : 0,5 CrIII : 2	CrVI : 0,01 CrIII : 0,5
Etain	mg/L		0,071	<0,025	2	2
Arsenic	mg/L	12/07/13	< 0,0071	< 0,0071	0,1	0,05
Sélénium	mg/L	12/07/13	<0,025	<0,025	1	0,05
Bore	mg/L	08/07/13	0,764	0,866	2	2
Molybdène	mg/L	12/07/13	< 0,0079	< 0,0079	5	0,05
Baryum	mg/L	08/07/13	<0,040	<0,040	10	0,5
Argent	mg/L	02/07/13	<0,0070	<0,0070	0,1	0,05
Béryllium	mg/L	12/07/12	< 0,0007	< 0,0007	0,05	0,01
Antimoine	mg/L	02/07/13	0,048	<0,025	0,2	0,1
Titane	mg/L	08/07/13	0,009	0,004	0,01	0,001
Mercure	µg/L	01/07/13	0,316	0,741	10	1

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