

## Chapter 2

### Environmental Management Actions

#### 2.0 INTRODUCTION

This Chapter summarizes various actions and measures that have been devised to suitably address the Project's key potential environmental impacts. Further details pertaining to certain environmental actions/measures presented in this Chapter's three Tables can be found in the Appendices to this Volume of this EMP as well as in Volumes 2-6 of this EMP.

#### 2.1 BACKGROUND/METHOD

In order to completely and yet succinctly present the environmental management measures/actions associated with the construction and operations phases of the Project, the following set of thirty two biophysical, socioeconomic, and health topics that spans all of the Project's components within the Republic of Cameroon was defined:

- **Biophysical Topics (15)**
  - Air Emissions
  - Sewage/Wastewater Discharges
  - Hydrotesting
  - Surface Water and Groundwater Protection
  - Surface Water and Groundwater Consumption
  - Loss of Groundwater Recharge Areas
  - River/Stream Flow Disruption
  - River/Stream Bed and Bank Disturbances
  - Soil
  - Vegetation
  - Freshwater Fish
  - Wildlife
  - Marine Discharges
  - Surfzone/Seabed Disturbances
  - Marine Flora and Fauna

- **Socioeconomic Topics (10)**
  - Migration to the Project Area
  - Cameroonian Business Opportunities and Revenues
  - Employment
  - Education and Training
  - Housing
  - Land Use
  - Sacred and Cultural Sites
  - Semi-Sedentary and Transhumant Cattle Movements
  - Fishing Resources
  - Indigenous Peoples
  
- **Health Topics (7)**
  - Respiratory Diseases
  - Sexually Transmitted Diseases
  - Vector-Borne Diseases
  - Water-Borne Diseases
  - Food-Borne Diseases
  - Occupational Exposures
  - Accidents/Injuries

A tabular format was then developed to present the construction and operations phase environmental management actions that are currently planned for each of these key biophysical, socioeconomic, and health topics. The following template is used for the Environmental Actions Tables appearing in this Chapter:

## Topic

### POTENTIAL IMPACTS

- A summary of identified potential impacts associated with that particular topic.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Items incorporated into the Project design for the purpose of avoiding or appropriately mitigating the identified potential impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Actions, in addition to Project design features, to be undertaken by and are the responsibility of COTCO to appropriately mitigate identified potential impacts. These actions are presented according to the Project phase(s) that they are associated with.</li> </ul>	<ul style="list-style-type: none"> <li>• Measurement activities to be undertaken by and are the responsibility of COTCO aimed at:               <ul style="list-style-type: none"> <li>- Evaluating the effectiveness of the planned key Project design features and mitigation actions, and/or</li> <li>- Assuring Project integrity and quality.</li> </ul> </li> </ul> <p>These activities are presented according to the Project phase(s) that they are associated with.</p>	<ul style="list-style-type: none"> <li>• A summary of Project-related actions that will be undertaken by and are the responsibility of the Republic of Cameroon.</li> </ul>

As is stated above, accountability for the actions appearing in this Chapter's Environmental Actions Tables is as follows:

- Actions listed in the "Project Design Features", "Mitigation Plans", and "Monitoring Plans" columns are the responsibility of COTCO; and
- Actions listed in the "Republic of Cameroon Responsibilities" column are the responsibility of the Republic of Cameroon.

Successful execution of the EMP requires that the specific actions presented in this Chapter's Tables are undertaken by the defined responsible party.

In addition to the BP/SE/H-related requirements and specifications that are contained in Volume 2 of this EMP, a host of documents, most notably those that comprise the environmental documentation for the Chad Export Project, were consulted extensively during the preparation of the Environmental Actions Tables included in this Chapter. A review of the Project's BP/SE/H

requirements and specifications reveals that a vast array of actions and measures related to biophysical, socioeconomic, and health matters have been defined. In certain cases, however, actions and measures not appearing in these technical documents have been included in the Environmental Actions Tables in this Chapter so as to assure that they present a full complement of environmental management actions for the Project.

As the Project progresses through detailed engineering, construction, and into its operations phase, however, changes in its scope are bound to occur. Accordingly, it may be necessary to modify or delete some of the cited actions to properly reflect changes in the Project. Similarly, it may be necessary to add new actions to appropriately address new or unforeseen Project situations as/when they are encountered. In either case, all modifications or augmentations of the environmental management actions that are the responsibility of COTCO will be accomplished by adhering to the Change Management Process outlined in Chapter 3.

Additional background information concerning selected health matters of relevance to the Project can be found in Appendix C of this Volume of this EMP as well as a document entitled "Cameroon Public Health" - this report is part of the Supporting Documents component of the Project's environmental documentation.

## 2.2 EXPLANATORY NOTES

The following explanations/definitions will facilitate the use of the Environmental Actions Tables appearing in this Chapter.

**Operations Phase:** That phase of the Project that entails operating and maintenance activities.

**COTCO:** Cameroon Oil Transportation Company, S.A. = the Cameroonian company that will construct, operate, maintain, and decommission the Cameroon Transportation System whose shareholders are an affiliate of each Consortium member, the Republic of Cameroon, and the Republic of Chad.

**Transportation System:** Comprised of the following elements:

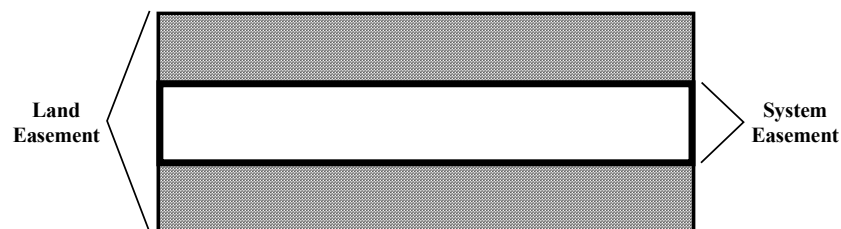
- A ~1070 km (665 mile) long pipeline running from the Central Treating Facility in southern Chad to a marine terminal located just off the Cameroonian Atlantic coast;
- Pump Station #1 (located in Chad at the Central Treating Facility);
- Pump Stations #2 and #3 (located in Cameroon);
- A pressure reducing station located ~1 km inland from the Cameroonian Atlantic coast in the vicinity of the marine terminal;
- Pipeline valve stations located at regular intervals along the pipeline;

- A marine terminal consisting of an offshore Floating Storage and Offloading vessel and its fixed mooring unit;
- An administrative office located in Douala that contains the Oil Traffic Control Centre; and
- Ancillary facilities/equipment such as telecommunications systems.

**Cameroon Transportation System:** That portion of the Transportation System (see above) that is located wholly within the Republic of Cameroon and is owned by COTCO.

**Land Easement:** A corridor corresponding to a strip of land generally 30 meters in width (extendible to 60 meters at river crossings and 50 meters in difficult areas such as those involving access to the sea, slopes, other natural obstacles, and road/railroad crossings) and to locations encompassing ancillary facilities and which is allocated to construction, operations, and maintenance activities associated with the Cameroon Transportation System. After construction activities, the portion of the **land easement** which is not part of the *system easement* (see below), referred to as “Relinquished Areas” and which are subject to servitudes of utilization for COTCO, will be returned to its former usages. As can be seen in Figure 2.1 (below), the width of the **land easement** is larger than the width of the *system easement*.

**System Easement:** A corridor corresponding to a strip of land 10-15 meters in width entirely located within the *land easement* that encompasses the pipeline as well as ancillary facilities of the Cameroon Transportation System. Rights granted to COTCO over the *land easement* will be retained over the **system easement** and the land within the **system easement** will be returned to its former agricultural or other usages provided they are compatible with the operations and maintenance requirements of the Cameroon Transportation System. As can be seen in Figure 2.1 (below), the width of the **system easement** is smaller than the width of the *land easement*.



**Figure 2.1 Land Easement versus System Easement**

**TABLES**  
**BIOPHYSICAL TOPICS**

## Biophysical Topic #1 Air Emissions

### POTENTIAL IMPACTS

- Venting of hydrocarbons.
- NO<sub>x</sub>, SO<sub>2</sub>, and particulates emissions from power plant engines, pipeline crude oil pump engines, and pipeline crude oil heaters located at Pump Stations #2 and #3.
- Emissions from Project waste incinerators.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements for power plant engines, crude oil pump engines, crude oil heaters, and waste incinerators such that NO<sub>x</sub>, SO<sub>2</sub>, and particulates emissions from these units are compliant with World Bank ambient air quality standards for onshore oil and gas developments.</li> <li>• Generation of Project requirements for the FSO vessel's domestic garbage incinerator such that it is compliant with MARPOL requirements.</li> <li>• During Project design, update of the Environmental Assessment's air dispersion modeling of emissions generated by various units located at Pump Stations #2 and #3 to verify compliance with World Bank ambient air quality criteria.</li> <li>• Update of air dispersion modeling if equipment is changed/added that significantly increases air emissions at Pump Stations #2 and/or #3.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Incineration of only domestic garbage in camp domestic garbage incinerators.</li> <li>- Transport of other construction phase wastes that are amenable to incineration to a Project waste incinerator.</li> <li>- Preparation and COTCO review/approval of Contractors' construction phase Waste Management Plans.</li> <li>- Development and implementation of a Project Waste Management Plan (see Volume 5 of this EMP) that includes operating procedures for Project waste incinerators.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Waste Management Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of Contractors' waste management practices and facilities.</li> </ul> </li> <li>• <u>At start-up</u>:               <ul style="list-style-type: none"> <li>- Stack testing of pump station crude oil pump engines and heaters, waste incinerators, and power plant engines to verify modeled air dispersion of NO<sub>x</sub>, SO<sub>2</sub>, and particulates emissions.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Timely granting of any air emissions permits/licenses required by the Project.</li> <li>• Monitor start-up stack tests of pump station crude oil pump engines and heaters and waste incinerators located within Cameroon.</li> <li>• Review, and in case of non-compliance, verify data from start-up stack tests of pump station crude oil pump engines and heaters and waste incinerators located within Cameroon, including results from updated air dispersion modeling.</li> <li>• Provide administrative supervision and technical inspection of Project waste management practices and facilities located within Cameroon during the construction and operations phases of the Project.</li> <li>• Enforce MARPOL requirements regarding domestic garbage incinerators onboard marine vessels operating within Cameroonian waters.</li> </ul>

**Biophysical Topic #2**  
**Sewage/Wastewater Discharges**

**POTENTIAL IMPACTS**

- Construction phase:
  - Treated sewage/gray water discharges from construction camps.
- Operations phase:
  - Treated sewage/gray water discharges from personnel quarters and offices located at Pump Stations #2 and #3.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of a Project specification for packaged sewage/gray water treatment units such that effluents from these units are compliant with World Bank liquid effluent quality standards for onshore oil and gas developments.</li> <li>• Generation of a Project specification for septic tank/weeping tile systems.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Chlorination of treated sewage effluents for a minimum of 30 minutes prior to discharge to achieve a residual chlorine content of 2-5 mg/L.</li> <li>- Discharge of treated effluents to:                   <ul style="list-style-type: none"> <li>+ perennial surface water bodies provided at least a 100:1 dilution of the effluent is attainable; or</li> <li>+ surface absorption/evaporation systems (e.g., ponds, sprinklers) provided soil erosion does not occur; or</li> <li>+ subsurface absorption systems.</li> </ul> </li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Preparation and COTCO review/approval of Contractors' construction phase Waste Management Plans.</li> <li>- Development and implementation of a Project Waste Management Plan (see Volume 5 of this EMP).</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Waste Management Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Weekly testing (kit) of treated effluents from packaged sewage/gray water treatment systems.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of Contractors' sewage/gray water treatment practices and equipment.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Timely granting of any effluent discharge permits/licenses required by the Project.</li> <li>• At their discretion, inspect sewage/gray water treatment systems at:               <ul style="list-style-type: none"> <li>- Construction camps located in Cameroon during the construction phase of the Project;</li> <li>- At permanent Project facilities located in Cameroon during the operations phase of the Project.</li> </ul> </li> </ul>

## Biophysical Topic #3 Hydrotesting

### POTENTIAL IMPACTS

- Consumption of water resources.
- Contaminants in discharged hydrotest water.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project procedures for pipeline hydrotesting practices.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Preferential use of surface water when pressure testing portions of the Cameroon Transportation System. If surface water use is not possible, one or more groundwater wells will be used to provide the required hydrotest water. Refer to Biophysical Topic #5 (Surface Water and Groundwater Consumption) for details regarding the use of groundwater wells.</li> <li>- Internal cleaning of portions of the Cameroon Transportation System undergoing pressure testing using pigs/scrapers prior to hydrotesting.</li> <li>- Preferential discharge of hydrotest water from onshore pipeline pressure tests onto land surfaces <i>versus</i> directly into watercourses.</li> <li>- Discharge of hydrotest water from onshore pipeline pressure tests in a manner that limits soil erosion, stream/river bottom scour, and the suspension of sediments.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Testing (kit) of hydrotest water from onshore pipeline pressure tests prior to surface discharge.</li> <li>- COTCO surveillance of Contractors' pipeline hydrotesting activities/practices.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Witness pressure tests of the Cameroon Transportation System's pipeline.</li> <li>• Witness the discharge of pipeline hydrotest water.</li> </ul>

**Biophysical Topic #3**  
**Hydrotesting (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Use of biodegradable, non-toxic corrosion inhibitors to treat seawater employed for pressure testing the marine portion of the Cameroon Transportation System.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Recovery and appropriate treatment of hydrotest water.</li> </ul> </li> </ul>		

**Biophysical Topic #4**

**Surface Water and Groundwater Protection**

**POTENTIAL IMPACTS**

- Potential impacts of the Project on groundwater and surface water quality due to:
  - Construction and operation of the Cameroon Transportation System;
  - Management of Project wastes;
  - Location and operation of the Project's engineered waste landfills, including their designated solid hazardous waste cells;
  - Storage of dangerous/hazardous/toxic materials;
  - Small spills of fuels, chemicals, lubricants, *etc.* during the development and operations phases of the Project; and
  - Oil spills during the operations phase of the Project.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for:                             <ul style="list-style-type: none"> <li>- Design and construction of engineered solid waste landfills;</li> <li>- Design and construction of cells for solid hazardous wastes within the engineered solid waste landfills;</li> <li>- Design and installation of the Cameroon Transportation System;</li> <li>- Design and selection/construction of hazardous/dangerous/toxic materials storage areas/units; and</li> <li>- Design and construction of crude oil storage tanks and tankfarms.</li> </ul>                             Specific Project design features pertaining to these activities/facilities are presented in the items below.                         </li> <li>• Burial of the onshore portion of the Cameroon Transportation System's pipeline to safeguard against third party damage.</li> </ul> <p align="right">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:                             <ul style="list-style-type: none"> <li>- Where/when appropriate, land treatment or composting of biodegradable waste materials.</li> <li>- Transport of solid wastes that are amenable to landfilling to a Project engineered waste landfill.</li> <li>- Appropriate and expeditious response to oil spills and leaks/spills of dangerous/hazardous/toxic materials (<i>e.g.</i>, chemicals, fuels, certain wastes).</li> <li>- At those locations where construction/upgrading and/or maintenance of Project facilities could cause increased peak stormwater flows in small, unnamed tributaries and drainages:</li> </ul> </li> </ul> <p align="right">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:                             <ul style="list-style-type: none"> <li>- Institution of groundwater monitoring programs (<i>i.e.</i>, chemical composition [quality] plus level) around Project engineered waste landfills.</li> <li>- COTCO surveillance of Contractors':                                     <ul style="list-style-type: none"> <li>+ pipeline installation activities;</li> <li>+ engineered Project solid waste landfill construction activities; and</li> <li>+ waste management practices and facilities.</li> </ul> </li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:                             <ul style="list-style-type: none"> <li>- Monitoring of internal corrosion of the Cameroon Transportation System's pipeline.</li> <li>- Continuation of the groundwater monitoring programs around the Project's engineered waste landfills.</li> </ul> </li> </ul> <p align="right">continued ...</p>	<ul style="list-style-type: none"> <li>• Timely granting of any waste management-related permits/licenses required by the Project.</li> <li>• Provide administrative supervision and technical inspection of Project waste management practices and facilities located within Cameroon during the construction and operations phases of the Project.</li> <li>• At their discretion, participate in the regular fly-overs of the system easement.</li> <li>• Review the General Oil Spill Response Plan.</li> <li>• Participate in periodic reviews of the General Oil Spill Response Plan.</li> <li>• At their discretion, participate in oil spill response training exercises and drills.</li> </ul> <p align="right">continued ...</p>

**Biophysical Topic #4**

**Surface Water and Groundwater Protection (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• External coating and cathodic protection of the Cameroon Transportation System’s pipeline.</li> <li>• Placement of appropriate block valve/check valve combinations on the Cameroon Transportation System’s pipeline in the vicinities of major river crossings.</li> <li>• Placement of Emergency Shutdown Devices at the Cameroon Transportation System’s key valve stations, Pump Stations #2 and #3, and the pressure reducing station.</li> <li>• Provision of the Project’s engineered solid waste landfills with the following features:               <ul style="list-style-type: none"> <li>- A compacted clay liner or a suitable synthetic liner composite;</li> <li>- A leachate collection system;</li> <li>- Groundwater monitoring wells; and</li> <li>- For solid hazardous waste cells within a landfill, an additional (synthetic) liner and a leachate monitoring system.</li> </ul> </li> <li>• Storage of fuels, solvents, chemicals, hazardous wastes, and other dangerous/hazardous/toxic materials in bermed areas underlain with a liner or in some other area/facility equipped to contain leaks/spills and prevent the contamination of the underlying/surrounding soil.</li> <li>• Location of crude oil storage tanks within bermed tank farms.</li> </ul> <p align="right">continued ...</p>	<ul style="list-style-type: none"> <li>+ implementation of appropriate drainage control measures (e.g., conveyance of stormwater flows through man-made erosion-resistant channels, construction of temporary stormwater retention, detention, or sedimentation basins); and</li> <li>+ implementation of appropriate erosion and sediment loading/control measures (e.g., mulching, seeding, trench plugs, sand bags, geotextiles, hay bales, rip-rap, vertical slit fences draped with filter cloth).</li> </ul> <ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Disposal of only non-leachable, non-hazardous solid wastes (i.e., tires, some plastics, metal, glass, concrete, insulation) in camp domestic garbage dumps.</li> <li>- Preparation and COTCO review/approval of Contractors’ construction phase Waste Management Plans.</li> <li>- Development and implementation of a Project Waste Management Plan (see Volume 5 of this EMP) that includes operating procedures for Project engineered waste landfills.</li> <li>- Preparation and COTCO review/approval of Contractors’ construction phase Spill Response Plans.</li> <li>- Development of a comprehensive General Oil Spill Response Plan.</li> </ul> </li> </ul> <p align="right">continued ...</p>	<ul style="list-style-type: none"> <li>- Monitoring of the operation and integrity of the Transportation System <i>via</i> a Surveillance Control and Data Acquisition System located in the Oil Traffic Control Centre in Douala that features:               <ul style="list-style-type: none"> <li>+ pressure, temperature, density, and volumetric sensors at the pump stations and the pressure reducing station;</li> <li>+ pressure and temperature sensors at selected valve stations; and</li> <li>+ a computerized leak detection system.</li> </ul> </li> <li>- Visual monitoring of the system easement <i>via</i> regular fly-overs and periodic foot patrols.</li> <li>- Periodic reviews of the General Oil Spill Response Plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide administrative supervision and technical inspection of the construction and operation of the Cameroon Transportation System.</li> <li>• Inspect construction camp domestic garbage dumps, Project engineered solid waste landfills, and dangerous/hazardous/toxic material storage areas.</li> <li>• Review, and in case of non-compliance, verify data from groundwater monitoring programs associated with Project engineered solid waste landfills.</li> <li>• Approve the welding operating modes used during the construction of the Cameroon Transportation System and verify their control.</li> </ul>

**Biophysical Topic #4**

**Surface Water and Groundwater Protection (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Provision of large volume crude oil storage tanks with:               <ul style="list-style-type: none"> <li>- Internal and external protective coatings;</li> <li>- A cathodic protection system;</li> <li>- A leak detection system; and</li> <li>- Gas blanketing.</li> </ul> </li> <li>• Generation of a Project specification for erosion and sediment control/mitigation.</li> <li>• Incorporation of site-specific erosion and sediment control measures into Cameroon Transportation System environmental alignment sheets (see the Handbook that comprises Appendix F of Volume 1 of this EMP as well as Volume 6 of this EMP).</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Waste Management Plan.</li> <li>- Institution of the General Oil Spill Response Plan that features:                   <ul style="list-style-type: none"> <li>+ a three-tiered response strategy (<i>i.e.</i>, local, regional, international) regarding the sourcing of equipment and personnel;</li> <li>+ location of appropriate oil spill response and clean-up equipment at strategic positions along the Transportation System;</li> <li>+ response strategies for the most credible spill scenarios;</li> <li>+ oil spill clean-up-related waste management procedures;</li> <li>+ regularly scheduled training exercises/drills; and</li> <li>+ notification procedures at the organizational level for different sizes of spills.</li> </ul> </li> </ul> </li> </ul>		

Biophysical Topic #5

## Surface Water and Groundwater Consumption

**POTENTIAL IMPACTS**

- Potential adverse impacts of Project surface and groundwater consumption on the water supplies of local inhabitants/communities.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Location of Project groundwater source wells so as to avoid adversely affecting existing individual/community wells.</li> <li>• Where possible, completion of Project groundwater source wells at depths greater than those of existing individual/community wells.</li> <li>• Generation of Project requirements for groundwater source wells and the withdrawal of water from surface water bodies.</li> <li>• Conformance of installed Project groundwater source wells to AWWA A100 standards.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Limiting of Project surface water withdrawals to no more than 10% of a surface water body's flow/volume.</li> <li>- Placement of water intake hoses in surface water bodies so as to avoid known fish spawning locations.</li> <li>- Provision of appropriately sized screens on intake hoses placed in surface water bodies to prevent the entrainment of fish.</li> <li>- Whenever and wherever practical, turning over of Project groundwater source wells that are no longer needed to local inhabitants/communities.</li> <li>- Provision of an alternate water supply to local inhabitants/communities if Project groundwater consumption is found to have had an adverse impact on their normal water sources.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Surveying of local surface water and groundwater usage practices prior to commencing Project-related surface water or groundwater withdrawals.</li> <li>- Monitoring of the status of local water resources <i>via</i> regular consultations with local individuals/communities after Project groundwater source wells have been installed.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of surface water and groundwater withdrawal and use practices of Contractors, particularly during the dry season and periods of heavy water use (<i>i.e.</i>, impacts on aquifer level).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Where and when necessary, assist in facilitating meetings between COTCO representatives and local individuals/communities to discuss water resource-related matters.</li> </ul>

**Biophysical Topic #6**

**Loss of Groundwater Recharge Areas**

**POTENTIAL IMPACTS**

- Loss of groundwater recharge areas due to:
  - Consumption of land by Project roads, other infrastructure, Pump Stations #2 and #3, the pressure reducing station, valve stations, and the system easement;
  - Soil compaction due to Project construction activities;
  - Potential loss of wetlands areas; and
  - Removal of vegetation.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements regarding:                             <ul style="list-style-type: none"> <li>- General pipeline construction practices;</li> <li>- Widths for the Cameroon Transportation System land and system easements; and</li> <li>- Land reclamation.</li> </ul> </li> <li>• Location of Project roads, other infrastructure, Pump Stations #2 and #3, valve stations, the pressure reducing station, and the Cameroon Transportation System's pipeline in a manner that:                             <ul style="list-style-type: none"> <li>- Balances Project costs with biophysical and socioeconomic issues/considerations;</li> <li>- Satisfies the hydraulics requirements of the Transportation System;</li> <li>- Limits passage through wetland areas; and</li> <li>- Preferentially utilizes lands already impacted by human activities.</li> </ul> </li> </ul> <p align="right">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:                             <ul style="list-style-type: none"> <li>- Land reclamation on construction- and maintenance-disturbed lands featuring topsoil removal/storage/replacement to facilitate the establishment of appropriate vegetation or utilization of one or more alternate techniques (<i>e.g.</i>, scarification, surface texturing, mulching, fertilizing, seeding, seedling planting) to control soil erosion and facilitate the establishment of appropriate vegetation.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:                             <ul style="list-style-type: none"> <li>- COTCO surveillance of:                                     <ul style="list-style-type: none"> <li>+ Contractor construction activities; and</li> <li>+ Contractor land reclamation activities and practices.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the construction phase of the Project:                             <ul style="list-style-type: none"> <li>- Monitor construction activities.</li> <li>- Inspect land reclamation activities and practices at Project work sites.</li> </ul> </li> </ul>

Biophysical Topic #6

**Loss of Groundwater Recharge Areas (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• During construction, restriction of the width of the Cameroon Transportation System land easement to:                             <ul style="list-style-type: none"> <li>- 60 m at river crossings;</li> <li>- 50 m at road/railroad crossings, areas with sloping terrains, and areas where natural obstacles exist;</li> <li>- 30 m, except in difficult areas.</li> </ul> </li> <li>• Limitation of the use of additional land for construction camps, staging areas, <i>etc.</i></li> <li>• During operations, restriction of the width of the system easement to 10-15 m.</li> <li>• Sizing of Project roads, storage yards, pump stations, <i>etc.</i> to limit physical land usage.</li> <li>• Limited construction of new Project roads - <i>i.e.</i>, preferential utilization of existing, upgradable roads for Project purposes.</li> <li>• Incorporation of site-specific erosion and sediment control measures into Cameroon Transportation System environmental alignment sheets (see the Handbook that comprises Appendix F of Volume 1 of this EMP as well as Volume 6 of this EMP).</li> </ul>			

**Biophysical Topic #7**  
**River/Stream Flow Disruption**

**POTENTIAL IMPACTS**

- Temporary watercourse flow disruption due to the construction/upgrading/maintenance of Project roads/bridges and the installation and maintenance of the Cameroon Transportation System’s pipeline that potentially:
  - Significantly reduces downstream flow;
  - Creates an upstream area of still water (*i.e.*, a reservoir);
  - Creates habitat for disease-bearing insects; and
  - Creates a barrier to the passage of fish and/or other aquatic organisms.
- Potential permanent watercourse flow disruption caused by Project roads/bridges that:
  - Significantly reduces downstream flow;
  - Watercourse bottom scour;
  - Creates an upstream area of still water (*i.e.*, a reservoir);
  - Creates habitat for disease-bearing insects;
  - Creates a barrier to the passage of fish and/or other aquatic organisms; and
  - Adversely alters or reduces habitat for fish and other aquatic organisms.
- Increased peak flows and sediment loads in small unnamed tributaries or drainages in the immediate vicinity of cleared areas.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements for road/bridge/pipeline construction/upgrading practices at watercourse crossings to limit water flow-related impacts.</li> <li>• Preferential selection of watercourse crossing locations where adverse flow disruption situations are not likely to occur.</li> <li>• Limited construction of new Project roads/bridges - <i>i.e.</i>, preferential utilization of existing, upgradable roads/bridges for Project purposes.</li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Planning and execution of Project road/bridge/pipeline construction/upgrading and maintenance activities at watercourse crossings to:                   <ul style="list-style-type: none"> <li>+ occur during the dry season; and/or</li> <li>+ limit the time that equipment is physically working within a watercourse.</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic visual assessments of flow effectiveness at watercourse crossings involving Project roads/bridges and the Cameroon Transportation System’s pipeline, particularly at the height of the rainy season.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of Contractor construction activities at watercourse crossings.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the construction phase of the Project:               <ul style="list-style-type: none"> <li>- Provide administrative supervision and technical inspection for the activities associated with the construction/upgrading of Project roads/bridges and the installation of the Cameroon Transportation System’s pipeline at watercourse crossings.</li> </ul> </li> </ul>

**Biophysical Topic #7**

**River/Stream Flow Disruption (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Limitation of the size of new Project road/bridge watercourse crossings as well as those for the Cameroon Transportation System's pipeline.</li> <li>• Orientation of new Project road/bridge watercourse crossings as well as those for the Cameroon Transportation System's pipeline to be nearly perpendicular to the axis of the watercourse channel.</li> <li>• Provision of new and upgraded Project roads and bridges with appropriately sized culverts and/or other devices at watercourse crossings to adequately convey stream/river flow.</li> <li>• Generation of a Project specification for erosion and sediment control/mitigation.</li> <li>• Assessment of watercourse scour potential in support of pipeline design efforts.</li> </ul>	<p>If Project road/bridge/pipeline construction/upgrading and maintenance activities at watercourse crossings is necessary during the rainy season, the time that equipment is physically working within a watercourse will be limited.</p> <ul style="list-style-type: none"> <li>- Use of appropriate measures (<i>e.g.</i>, culverts, ditches) where/when necessary to limit temporary flow disruption at watercourse crossings during road/bridge/pipeline construction/upgrading and maintenance activities and:               <ul style="list-style-type: none"> <li>+ maintain laminar water flow; and</li> <li>+ avoid the creation of still water areas.</li> </ul> </li> <li>- At those locations where construction/upgrading and/or maintenance of Project facilities could cause increased peak rainwater flows in small, unnamed tributaries and drainages:               <ul style="list-style-type: none"> <li>+ implementation of appropriate drainage control measures (<i>e.g.</i>, conveyance of stormwater flows through man-made erosion-resistant channels, construction of temporary stormwater retention, detention, or sedimentation basins); and</li> <li>+ implementation of appropriate erosion and sediment loading/control measures (<i>e.g.</i>, mulching, seeding, trench plugs, sand bags, geotextiles, hay bales, rip-rap, vertical slit fences draped with filter cloth).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic visual assessments of the system easement at watercourse crossings to assure that the Cameroon Transportation System's pipeline remains buried in the stream/river bottom.</li> </ul> </li> </ul>	

**Biophysical Topic #8**  
**River/Stream Bed and Bank Disturbances**

**POTENTIAL IMPACTS**

- Physical disturbances of watercourse beds and banks due to the construction/upgrading/maintenance of Project roads/bridges and the installation and maintenance of the Cameroon Transportation System’s pipeline that could adversely impact water potability and/or aquatic organisms (especially fish) *via*:
  - Disruption/alteration of the bottom of a watercourse;
  - Significant increases in watercourse turbidity; and
  - Adverse alteration or reduction of habitat.
- Watercourse bank erosion due to the construction/upgrading/maintenance of Project roads/bridges and the installation and maintenance of the Cameroon Transportation System’s pipeline.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements for road/bridge/pipeline construction/upgrading practices at watercourse crossings to limit river/stream bed- and bank-related impacts, including requirements for:               <ul style="list-style-type: none"> <li>- Widths of the Cameroon Transportation System land and system easements;</li> <li>- Erosion and sediment loading control/mitigation; and</li> <li>- Land reclamation.</li> </ul> </li> <li>• Preferential selection of watercourse crossing locations to be where unstable watercourse bed/bank situations are not likely to occur.</li> <li>• Limitation of the size of new Project road/bridge watercourse crossings as well as those for the Cameroon Transportation System’s pipeline.</li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Planning and execution of Project road/bridge/pipeline construction/upgrading and maintenance activities at watercourse crossings to:                   <ul style="list-style-type: none"> <li>+ occur during the dry season; and/or</li> <li>+ limit the time that equipment is physically working within a watercourse.</li> </ul> </li> </ul> <p>If Project road/bridge/pipeline construction/upgrading and maintenance activities at watercourse crossings is necessary during the rainy season, the time that equipment is physically working within a watercourse will be limited.</p> <ul style="list-style-type: none"> <li>- Limitation of rock blasting within watercourse channels during Project road/bridge/pipeline construction/upgrading and maintenance activities.</li> </ul> <p style="text-align: right;">continued ...</p> </li></ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Turbidity monitoring (kit) where significant, recognizable incremental increases in watercourse turbidity are caused by construction/maintenance activities involving Project roads/bridges and the Cameroon Transportation System’s pipeline.</li> <li>- Periodic visual assessments of Project road/bridge/pipeline watercourse crossings regarding the effectiveness of implemented sediment loading and erosion control measures.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of:                   <ul style="list-style-type: none"> <li>+ Contractor construction activities at watercourse crossings; and</li> <li>+ Contractor sediment loading and erosion control activities at or near watercourse crossings.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the construction phase of the Project:               <ul style="list-style-type: none"> <li>- Provide administrative supervision and technical inspection for the activities associated with the construction/upgrading of Project roads/bridges and the installation of the Cameroon Transportation System’s pipeline at watercourse crossings.</li> </ul> </li> </ul>

**Biophysical Topic #8**

**River/Stream Bed and Bank Disturbances (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Orientation of new Project road/bridge watercourse crossings as well as those for the Cameroon Transportation System's pipeline to be nearly perpendicular to the axis of the watercourse channel.</li> <li>• Incorporation of site-specific erosion and sediment control measures into Cameroon Transportation System environmental alignment sheets (see the Handbook that comprises Appendix F of Volume 1 of this EMP as well as Volume 6 of this EMP).</li> </ul>	<ul style="list-style-type: none"> <li>- Implementation of appropriate erosion control and sediment loading control measures (<i>e.g.</i>, mulching, seeding, trench plugs, sand bags, geotextiles, hay bales, rip-rap, vertical slit fences draped with filter cloth) at watercourse crossings where/when required when constructing/upgrading/maintaining Project roads/bridges and the Cameroon Transportation System's pipeline.</li> <li>- Stream/river fording requirements for Project vehicles and construction/maintenance equipment.</li> </ul>		

## Biophysical Topic #9

# Soil

### POTENTIAL IMPACTS

- Reduced fertility or physical loss of soil due to:
  - Consumption of land by Project roads, other infrastructure, Pump Stations #2 and #3, valve stations, the pressure reducing station, and the system easement;
  - Removal/loss of soil associated with Project site preparation activities;
  - Erosion; and
  - Removal of vegetation associated with Project site preparation activities.
- Soil contamination due to oil spills and small leaks/spills of dangerous/hazardous/toxic materials (*e.g.*, chemicals, fuels, certain wastes).

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Location of Project roads, other infrastructure, Pump Stations #2 and #3, valve stations, the pressure reducing station, and the Cameroon Transportation System's pipeline in a manner that:               <ul style="list-style-type: none"> <li>- Balances Project costs with biophysical and socioeconomic issues/considerations;</li> <li>- Satisfies the hydraulics requirements of the Transportation System; and</li> <li>- Preferentially utilizes lands already impacted by human activities.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Performance of land clearing activities in a manner that limits topsoil disturbances (<i>e.g.</i>, keeping the blade of a bulldozer just above ground level when clearing vegetation from the land easement).</li> <li>- Land reclamation on construction- and maintenance-disturbed lands featuring topsoil removal/storage/replacement to facilitate the establishment of appropriate vegetation or utilization of one or more alternate techniques (<i>e.g.</i>, scarification, surface texturing, mulching, fertilizing, seeding, seedling planting) to control soil erosion and facilitate the establishment of appropriate vegetation.</li> <li>- (Temporary) storage of removed topsoil at appropriate sites in a manner that maintains its fertility (<i>i.e.</i>, storage of removed topsoil for &lt; 6 months, protection of topsoil stockpiles from surface drainage).</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic on-the-ground visual assessments of implemented soil erosion control and land reclamation measures at Project work sites.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of:                   <ul style="list-style-type: none"> <li>+ Contractor construction activities;</li> <li>+ Contractor topsoil removal and stockpiling practices; and</li> <li>+ Contractor soil erosion control and land reclamation activities and practices.</li> </ul> </li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Regular fly-overs of the system easement to visually assess implemented soil erosion control and land reclamation measures.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Inspect dangerous/hazardous/toxic material storage areas during the development and operations phases of the Project.</li> <li>• During the construction phase of the Project:               <ul style="list-style-type: none"> <li>- Provide administrative supervision and technical inspection of construction activities, including topsoil removal and stockpiling practices and soil erosion control measures; and</li> <li>- Monitor land reclamation activities and practices at Project work sites.</li> </ul> </li> <li>• During the operations phase of the Project:               <ul style="list-style-type: none"> <li>- Assess the effectiveness of implemented soil erosion control and land reclamation measures at Project work sites.</li> </ul> </li> </ul>

**Biophysical Topic #9**  
**Soil (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements for road/bridge/pipeline construction/upgrading practices to limit soil-related impacts, including requirements for:               <ul style="list-style-type: none"> <li>- Widths of the Cameroon Transportation System land and system easements;</li> <li>- Land clearing;</li> <li>- Erosion control/mitigation; and</li> <li>- Land reclamation.</li> </ul> </li> <li>• Limited construction of new Project roads - <i>i.e.</i>, preferential utilization of existing, upgradable roads for Project purposes.</li> <li>• During construction, restriction of the width of the Cameroon Transportation System land easement to:               <ul style="list-style-type: none"> <li>- 60 m at river crossings;</li> <li>- 50 m at road/railroad crossings, areas with sloping terrains, and areas where natural obstacles exist;</li> <li>- 30 m, except in difficult areas.</li> </ul> </li> <li>• Limitation of the use of additional land for construction camps, staging areas, <i>etc.</i></li> <li>• During operations, restriction of the width of the system easement to 10-15 m.</li> </ul> <p style="text-align: right; margin-right: 20px;">continued ...</p>	<ul style="list-style-type: none"> <li>- Implementation of appropriate temporary or permanent soil erosion control measures (<i>e.g.</i>, mulching, seeding, trench plugs, sand bags, geotextiles, hay bales, rip-rap) where/when required.</li> <li>- Appropriate and expeditious response to oil spills and small leaks/spills of dangerous/hazardous/toxic materials (<i>e.g.</i>, chemicals, fuels, certain wastes).</li> </ul>		

**Biophysical Topic #9**  
**Soil (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• At the exits to Pump Stations #2 and #3, burial of the Cameroon Transportation System's pipeline to a greater than normal depth (<i>i.e.</i>, 1.3 m <i>versus</i> 1.0 m nominally) to safeguard soil structure and soil microfauna/microflora from undesirable thermal effects.</li> <li>• Sizing of Project roads, storage yards, pump stations, <i>etc.</i> to limit physical land usage and the concomitant need for soil disturbance/removal.</li> <li>• Storage of fuels, solvents, chemicals, hazardous wastes, and other dangerous/hazardous/toxic materials in bermed areas underlain with a liner or in some other area/facility equipped to contain leaks/spills and prevent the contamination of the underlying/surrounding soil.</li> <li>• Location of crude oil storage tanks within bermed tank farms.</li> <li>• Provision of large volume crude oil storage tanks with:               <ul style="list-style-type: none"> <li>- Internal and external protective coatings;</li> <li>- A cathodic protection system;</li> <li>- A leak detection system; and</li> <li>- Gas blanketing.</li> </ul> </li> <li>• Incorporation of site-specific erosion and sediment control measures into Cameroon Transportation System environmental alignment sheets (see the Handbook that comprises Appendix F of Volume 1 of this EMP as well as Volume 6 of this EMP).</li> </ul>			

## Biophysical Topic #10 Vegetation

### POTENTIAL IMPACTS

- Temporary or permanent loss of vegetation due to:
  - Consumption of land by Project roads, other infrastructure, Pump Stations #2 and #3, valve stations, the pressure reducing station, and the system easement;
  - Vegetation removal associated with Project site preparation activities;
  - Removal of topsoil associated with Project site preparation activities; and
  - Soil erosion.
- Increased/unauthorized/unlawful timber and/or other vegetation harvesting along the system easement due to induced access.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements for road/bridge/pipeline construction/upgrading practices to limit vegetation-related impacts, including requirements for:               <ul style="list-style-type: none"> <li>- Widths of the Cameroon Transportation System land and system easements;</li> <li>- Land clearing;</li> <li>- Erosion control/mitigation; and</li> <li>- Land reclamation.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During both phases of the Project:               <ul style="list-style-type: none"> <li>- Performance of Project land clearing activities at temporary sites in a manner that:                   <ul style="list-style-type: none"> <li>+ limits topsoil and root disturbances (e.g., keeping the blade of a bulldozer just above ground level when clearing vegetation from the land easement); and</li> <li>+ leaves large trees in place to provide shade, seed, and root stock for natural revegetation.</li> </ul> </li> <li>- Land reclamation on construction- and maintenance-disturbed lands featuring topsoil removal/storage/replacement to facilitate the establishment of appropriate vegetation or utilization of one or more alternate techniques (e.g., scarification, surface texturing, mulching, fertilizing, seeding, seedling planting) to control soil erosion and facilitate the establishment of appropriate vegetation.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During both phases of the Project:               <ul style="list-style-type: none"> <li>- Periodic on-the-ground visual assessments of implemented soil erosion control, land reclamation, and land access inhibition measures at Project work sites.</li> <li>- Periodic reviews of the Project's Induced Access Management Plan for the Cameroon Transportation System land/system easement, including assessments of the effectiveness of implemented induced access inhibition measures.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a compliance monitoring system regarding the Project's policy dealing with the gathering/harvesting of valued/medicinal plants and trees by workers.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• Enforce timber harvesting regulations and quotas in the Project area and deter the unauthorized harvesting of timber and/or other vegetation.</li> <li>• Work with COTCO to devise the Project's Induced Access Management Plan for the Cameroon Transportation System land/system easement.</li> <li>• Work with COTCO to implement the Project's Induced Access Management Plan for the Cameroon Transportation System land/system easement, especially regarding the control of induced impacts.</li> <li>• Participate in periodic reviews of the Project's Induced Access Management Plan for the Cameroon Transportation System land/system easement.</li> <li>• At their discretion, participate in the regular fly-overs of the system easement.</li> </ul> <p style="text-align: right;">continued ...</p>

**Biophysical Topic #10**  
**Vegetation (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Location of Project roads, other infrastructure, Pump Stations #2 and #3, valve stations, the pressure reducing station, and the Cameroon Transportation System's pipeline in a manner that:               <ul style="list-style-type: none"> <li>- Balances Project costs with biophysical and socioeconomic issues/considerations;</li> <li>- Satisfies the hydraulics requirements of the Transportation System;</li> <li>- Preferentially utilizes lands already impacted by human activities; and</li> <li>- Endeavours to limit entry into those areas where rare/endangered vegetative communities are known to exist.</li> </ul> </li> <li>• Re-establishment of existing natural vehicular access barriers and the creation of additional barriers as appropriate at key locations along the system easement, especially in the vicinity of identified sensitive areas.</li> <li>• During construction, restriction of the width of the Cameroon Transportation System land easement to:               <ul style="list-style-type: none"> <li>- 60 m at river crossings;</li> <li>- 50 m at road/railroad crossings, areas with sloping terrains, and areas where natural obstacles exist;</li> <li>- 30 m, except in difficult areas.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>- Prohibition of Project workers from gathering/harvesting medicinal or valued plants and trees:               <ul style="list-style-type: none"> <li>+ when on Project work sites;</li> <li>+ during work hours; or</li> <li>+ while residing in Project field work site housing.</li> </ul> </li> <li>- Provision of environmental sensitivity training (including Project expectations regarding the gathering/harvesting of medicinal/valued plants and trees and the associated personal consequences [<i>i.e.</i>, disciplinary action]) to all workers.</li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development of an Offsite Environmental Enhancement Program (see Volume 4 of this EMP).</li> <li>- Contribution of \$US 2.9 million (1740 million FCFA) to an Environmental Foundation (see Volume 4 of this EMP) to provide defined long-term financial support for approved projects/programs associated with the Offsite Environmental Enhancement Program.</li> <li>- Establishment and maintenance of buffer zones around identified sensitive areas to limit Project impacts on these areas and the vegetation communities they support.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>- COTCO surveillance of:               <ul style="list-style-type: none"> <li>+ Contractor construction activities;</li> <li>+ Contractor soil erosion control and land reclamation activities and practices; and</li> <li>+ established buffer zones to assure that Project-related encroachment on identified environmentally sensitive areas is avoided.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Regular fly-overs of the system easement to:                   <ul style="list-style-type: none"> <li>+ visually assess implemented soil erosion control and land reclamation measures; and</li> <li>+ assess the effectiveness of implemented access inhibition measures.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Work with COTCO to develop the Offsite Environmental Enhancement Program (see Volume 4 of this EMP).</li> <li>• Work with COTCO to implement the Environmental Foundation Plan (see Volume 4 of this EMP).</li> <li>• During the construction phase of the Project:               <ul style="list-style-type: none"> <li>- Provide administrative supervision and technical inspection of construction activities, including land clearing and vegetation removal activities/practices and the implementation of soil erosion control measures;</li> <li>- Monitor land reclamation activities/practices at Project work sites.</li> </ul> </li> <li>• During the operations phase of the Project:               <ul style="list-style-type: none"> <li>- Assess the effectiveness of implemented soil erosion control and land reclamation measures at Project work sites.</li> </ul> </li> </ul>

**Biophysical Topic #10**  
**Vegetation (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Limitation of the use of additional land for construction camps, staging areas, <i>etc.</i></li> <li>• During operations, restriction of the width of the system easement to 10-15 m.</li> <li>• Limited construction of new Project roads - <i>i.e.</i>, preferential utilization of existing, upgradable roads for Project purposes.</li> <li>• Sizing of Project roads, storage yards, pump stations, <i>etc.</i> to limit physical land usage and the concomitant need for land clearing and/or vegetation removal.</li> <li>• Incorporation of site-specific erosion and sediment control measures as well as vegetation management and protection measures into Cameroon Transportation System environmental alignment sheets (see the Handbook that comprises Appendix F of Volume 1 of this EMP as well as Volume 6 of this EMP).</li> </ul>	<ul style="list-style-type: none"> <li>- In identified sensitive areas, preferential use of the Cameroon Transportation System land easement and/or existing roadways to access Project work sites versus constructing new, temporary access roads.</li> <li>- Development and implementation of the Project's Induced Access Management Plan (see Appendix D of Volume 1 of this EMP) for identified sections of the Cameroon Transportation System land/system easement to address potential vegetation-related induced access impacts.</li> <li>- Active control of access to identified sensitive areas by employing one or more of the following measures:               <ul style="list-style-type: none"> <li>+ vehicle barriers and/or guards on work site access roads and where the Cameroon Transportation System's land easement intersects existing roads;</li> <li>+ reinstatement of natural barriers along the Cameroon Transportation System's land/system easement (<i>e.g.</i>, removal of temporary bridges required during construction); and/or</li> <li>+ establishment of new, artificial barriers as appropriate (<i>e.g.</i>, rock/rubble mounds, fences).</li> </ul> </li> <li>- Location of construction camps outside of identified sensitive areas.</li> </ul> <p style="text-align: right; margin-right: 20px;">continued ...</p>		

**Biophysical Topic #10**  
**Vegetation (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Consultations with timber concessionaires, whose existing concessions are intersected by the Cameroon Transportation System's land easement, regarding Project schedule and plans so that the timber concessionaires can recover the type(s) of timber covered by their concessions.</li> <li>- Stockpiling of non-economically recoverable felled timber from the Cameroon Transportation System's land easement to allow for its use by local inhabitants. The stockpiles will be placed along the sides of the land easement.</li> </ul>		

## Biophysical Topic #11

# Freshwater Fish

### **POTENTIAL IMPACTS**

- Impacts on freshwater fish due to:
  - Construction/upgrading/maintenance of Project roads/bridges and the installation and maintenance of the Cameroon Transportation System's pipeline resulting in or potentially resulting in:
    - + temporary or permanent watercourse flow disruption;
    - + temporary or permanent disruption/alteration of the bottom of a watercourse, especially in fish spawning areas;
    - + significant increases in watercourse turbidity;
    - + adverse alteration or reduction of habitat; and
    - + disruption during fish spawning periods.
  - Oil spills and small leaks/spills of dangerous/hazardous/toxic materials (e.g., chemicals, fuels, certain wastes).

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements for road/bridge/pipeline construction/upgrading practices at watercourse crossings to limit water flow-and bed/bank disturbances-related impacts.</li> <li>• Limited construction of new Project roads - <i>i.e.</i>, preferential utilization of existing, upgradable roads for Project purposes.</li> <li>• Preferential selection of watercourse crossing locations to avoid known fish spawning areas.</li> <li>• Limitation of the size of Project new road/bridge watercourse crossings as well as those for the Cameroon Transportation System's pipeline.</li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:           <ul style="list-style-type: none"> <li>- Planning and execution of Project road/bridge/pipeline construction/upgrading and maintenance activities at watercourse crossings to:               <ul style="list-style-type: none"> <li>+ avoid known fish spawning periods; and/or</li> <li>+ limit the time that equipment is physically working within a watercourse.</li> </ul> </li> </ul> <p>If Project road/bridge/pipeline construction/upgrading and maintenance activities at watercourse crossings is necessary during the rainy season, the time that equipment is physically working within a watercourse will be limited.</p> <p style="text-align: right;">continued ...</p> </li></ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:           <ul style="list-style-type: none"> <li>- Periodic visual assessments of flow effectiveness at watercourse crossings involving Project roads/bridges and the Cameroon Transportation System's pipeline, particularly at the height of the rainy season.</li> <li>- Periodic on-the-ground visual assessments of Project road/bridge/pipeline watercourse crossings regarding the effectiveness of implemented sediment loading and erosion control measures.</li> </ul> <p style="text-align: right;">continued ...</p> </li></ul>	<ul style="list-style-type: none"> <li>• Enforce freshwater fishing regulations in the Project area.</li> <li>• At their discretion, participate in the regular fly-overs of the system easement.</li> <li>• Review the General Oil Spill Response Plan.</li> <li>• Participate in periodic reviews of the General Oil Spill Response Plan.</li> <li>• At their discretion, participate in oil spill response training exercises and drills.</li> <li>• During the construction phase of the Project:           <ul style="list-style-type: none"> <li>- Monitor the construction/upgrading of Project roads/bridges and the installation of the Cameroon Transportation System's pipeline at watercourse crossings.</li> </ul> </li> </ul>

**Biophysical Topic #11**  
**Freshwater Fish (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Orientation of new Project road/bridge watercourse crossings as well as those for the Cameroon Transportation System's pipeline to be nearly perpendicular to the axis of the watercourse channel.</li> <li>• Provision of new and upgraded Project roads and bridges with appropriately sized culverts and/or other devices at watercourse crossings to adequately convey stream/river flow and allow for the passage of fish and other aquatic organisms.</li> <li>• Incorporation of site-specific erosion and sediment control measures as well as fisheries protection measures into Cameroon Transportation System environmental alignment sheets (see the Handbook that comprises Appendix F of Volume 1 of this EMP as well as Volume 6 of this EMP).</li> </ul>	<ul style="list-style-type: none"> <li>- Use of appropriate measures (<i>e.g.</i>, culverts, ditches) where/when necessary to limit temporary flow disruption at watercourse crossings during road/bridge/pipeline construction/upgrading and maintenance activities.</li> <li>- Limitation of rock blasting within watercourse channels during Project road/bridge/pipeline construction/upgrading/maintenance activities.</li> <li>- Implementation of appropriate erosion control and sedimentation loading control measures (<i>e.g.</i>, mulching, seeding, trench plugs, sand bags, geotextiles, hay bales, rip-rap, vertical slit fences draped with filter cloth) at watercourse crossings where/when required when constructing/upgrading/maintaining Project roads/bridges and the Cameroon Transportation System's pipeline.</li> <li>- Stream/river fording requirements for Project vehicles and construction/maintenance equipment.</li> <li>- Prohibition of Project workers from fishing:               <ul style="list-style-type: none"> <li>+ when on Project work sites;</li> <li>+ during work hours; or</li> <li>+ while residing in Project field work site housing.</li> </ul> </li> </ul> <p style="text-align: right; margin-right: 20px;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a compliance monitoring system regarding the Project's fishing policy for workers.</li> <li>- COTCO surveillance of:                   <ul style="list-style-type: none"> <li>+ Contractor construction activities at watercourse crossings; and</li> <li>+ Contractor sediment loading and erosion control activities at watercourse crossings.</li> </ul> </li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Regular fly-overs of the system easement to visually assess implemented turbidity loading and soil erosion control measures at watercourse crossings.</li> <li>- Periodic reviews of the General Oil Spill Response Plan.</li> </ul> </li> </ul>	

**Biophysical Topic #11**  
**Freshwater Fish (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Provision of environmental sensitivity training (including Project expectations regarding fishing and the associated personal consequences [<i>i.e.</i>, disciplinary action]) to all workers.</li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Preparation and COTCO review/approval of Contractors' construction phase Spill Response Plans.</li> <li>- Preparation of a comprehensive General Oil Spill Response Plan.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Institution of the General Oil Spill Response Plan that features:                   <ul style="list-style-type: none"> <li>+ a three-tiered response strategy (<i>i.e.</i>, local, regional, international) regarding the sourcing of equipment and personnel;</li> <li>+ location of appropriate oil spill response and clean-up equipment at strategic positions along the Transportation System;</li> <li>+ response strategies for the most credible spill scenarios;</li> <li>+ regularly scheduled training exercises/drills; and</li> <li>+ notification procedures at the organizational level for different sizes of spills.</li> </ul> </li> </ul> </li> </ul>		

## Biophysical Topic #12

# Wildlife

### POTENTIAL IMPACTS

- Temporary or permanent loss of wildlife due to:
  - Consumption of land (*i.e.*, loss of habitat) by Project roads, other infrastructure, Pump Stations #2 and #3, valve stations, the pressure reducing station, and the system easement;
  - Vegetation removal associated with Project site preparation activities; and
  - Habitat fragmentation due to Project-related land clearing and land consumption.
- Increased/unauthorized hunting/poaching along the system easement due to induced access.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements for road/bridge/pipeline construction/upgrading practices to limit wildlife-related impacts, including requirements for:               <ul style="list-style-type: none"> <li>- Widths of the Cameroon Transportation System land and system easements;</li> <li>- Land clearing;</li> <li>- Land reclamation; and</li> <li>- Project-related vehicular traffic.</li> </ul> </li> <li>• Location of Project roads, other infrastructure, Pump Stations #2 and #3, valve stations, the pressure reducing station, and the Cameroon Transportation System's pipeline in a manner that:               <ul style="list-style-type: none"> <li>- Balances Project costs with biophysical and socioeconomic issues/considerations;</li> <li>- Satisfies the hydraulics requirements of the Transportation System;</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Performance of Project land clearing activities at temporary sites in a manner that:                   <ul style="list-style-type: none"> <li>+ limits topsoil and root disturbances (<i>e.g.</i>, keeping the blade of a bulldozer just above ground level when clearing vegetation from the land easement); and</li> <li>+ leaves large trees in place to provide shade, seed, and root stock for natural revegetation.</li> </ul> </li> <li>- Prohibition of Project workers from hunting:                   <ul style="list-style-type: none"> <li>+ when on Project work sites;</li> <li>+ during work hours; or</li> <li>+ while residing in Project field work site housing.</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic on-the-ground visual assessments of implemented land reclamation and land access inhibition measures at Project-work sites.</li> <li>- Periodic reviews of the Project's Induced Access Management Plan for the Cameroon Transportation System land/system easement, including assessments of the effectiveness of implemented induced access inhibition measures.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a compliance monitoring system regarding the Project's hunting policy for workers.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• Enforce hunting and wildlife anti-poaching regulations in the Project area.</li> <li>• Work with COTCO to devise the Project's Induced Access Management Plan for the Cameroon Transportation System land/system easement.</li> <li>• Work with COTCO to implement the Project's Induced Access Management Plan for the Cameroon Transportation System land/system easement, especially regarding the control of induced impacts.</li> <li>• Participate in periodic reviews of the Project's Induced Access Management Plan for the Cameroon Transportation System land/system easement.</li> <li>• At their discretion, participate in the regular fly-overs of the system easement.</li> </ul> <p style="text-align: right;">continued ...</p>

**Biophysical Topic #12**  
**Wildlife (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>- Preferentially utilizes lands already impacted by human activities; and</li> <li>- Endeavours to limit entry into those areas where rare/endangered wildlife species/communities are known to exist.</li> <li>• Re-establishment of existing natural vehicular access barriers and the creation of additional barriers as appropriate at key locations along the system easement, especially in the vicinity of identified sensitive areas.</li> <li>• During construction, restriction of the width of the Cameroon Transportation System land easement to:               <ul style="list-style-type: none"> <li>- 60 m at river crossings;</li> <li>- 50 m at road/railroad crossings, areas with sloping terrains, and areas where natural obstacles exist;</li> <li>- 30 m, except in difficult areas.</li> </ul> </li> <li>• Limitation of the use of additional land for construction camps, staging areas, etc.</li> <li>• During operations, restriction of the width of the system easement to 10-15 m.</li> <li>• Limited construction of new Project roads - <i>i.e.</i>, preferential utilization of existing, upgradable roads for Project purposes.</li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>- Prohibition of Project workers from possessing firearms, snares, traps, and other hunting equipment:               <ul style="list-style-type: none"> <li>+ when on Project work sites;</li> <li>+ during work hours; or</li> <li>+ while residing in Project field work site housing.</li> </ul> </li> <li>- Prohibition of the purchase or serving of "bushmeat" or wild game by Project kitchens.</li> <li>- Prohibition of Project workers residing in Project field work site housing from purchasing or possessing "bushmeat".</li> <li>- Provision of environmental sensitivity training (including Project expectations regarding hunting and the associated personal consequences [<i>i.e.</i>, disciplinary action]) to all workers.</li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development of an Offsite Environmental Enhancement Program (see Volume 4 of this EMP).</li> <li>- Contribution of \$US 2.9 million (1740 million FCFA) to an Environmental Foundation (see Volume 4 of this EMP) to provide defined long-term financial support for approved projects/programs associated with the Offsite Environmental Enhancement Program.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>- COTCO surveillance of:               <ul style="list-style-type: none"> <li>+ Contractor construction activities;</li> <li>+ Contractor land reclamation activities and practices; and</li> <li>+ established buffer zones to assure that Project-related encroachment on identified environmentally sensitive areas is avoided.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Regular fly-overs of the system easement to:                   <ul style="list-style-type: none"> <li>+ visually assess implemented land reclamation measures; and</li> <li>+ assess the effectiveness of implemented access inhibition measures.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Work with COTCO to develop the Offsite Environmental Enhancement Program (see Volume 4 of this EMP).</li> <li>• Work with COTCO to implement the Environmental Foundation Plan (see Volume 4 of this EMP).</li> <li>• During the construction phase of the Project:               <ul style="list-style-type: none"> <li>- Monitor construction activities, including land clearing and vegetation removal at Project work sites; and</li> <li>- Inspect land reclamation activities/practices at Project work sites.</li> </ul> </li> <li>• During the operations phase of the Project:               <ul style="list-style-type: none"> <li>- Assess the effectiveness of implemented land reclamation measures at Project work sites.</li> </ul> </li> </ul>

**Biophysical Topic #12**  
**Wildlife (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Sizing of Project roads, storage yards, pump stations, <i>etc.</i> to limit physical land usage and the concomitant need for land clearing and/or vegetation removal.</li> <li>• Design of Project roadways to provide clear line-of-sight for drivers.</li> <li>• Incorporation of site-specific wildlife information into Cameroon Transportation System environmental alignment sheets (see the Handbook that comprises Appendix F of Volume 1 of this EMP as well as Volume 6 of this EMP).</li> </ul>	<ul style="list-style-type: none"> <li>- Establishment and maintenance of buffer zones around identified sensitive areas to limit Project-related impacts on these areas and the wildlife communities they support.</li> <li>- In identified sensitive areas, preferential use of the Cameroon Transportation System land easement and/or existing roadways to access Project work sites versus constructing new, temporary access roads.</li> <li>- Development and implementation of the Project's Induced Access Management Plan (see Appendix D of Volume 1 of this EMP) for identified sections of the Cameroon Transportation System land/system easement to address potential wildlife-related induced access impacts.</li> <li>- Active control of access to identified sensitive areas by employing one or more of the following measures:               <ul style="list-style-type: none"> <li>+ vehicle barriers and/or guards on work site access roads and where the Cameroon Transportation System's land easement intersects existing roads;</li> <li>+ reinstatement of natural barriers along the Cameroon Transportation System's land/system easement (<i>e.g.</i>, removal of temporary bridges required during construction); and/or</li> <li>+ establishment of new, artificial barriers as appropriate (<i>e.g.</i>, rock/rubble mounds, fences).</li> </ul> </li> </ul> <p style="text-align: right; margin-right: 20px;">continued ...</p>		

**Biophysical Topic #12**  
**Wildlife (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Location of construction camps outside of identified sensitive areas.</li> <li>- In identified sensitive areas:               <ul style="list-style-type: none"> <li>+ strict COTCO enforcement of Project vehicular speed limits on roadways;</li> <li>and</li> <li>+ limiting or prohibiting of nighttime Project vehicular traffic on roadways.</li> </ul> </li> </ul>		

**Biophysical Topic #13**  
**Marine Discharges**

**POTENTIAL IMPACTS**

- Construction phase:
  - Treated sewage/gray water discharges from Contractor vessels; and
  - Non-sewage-type discharges (*e.g.*, bilges) from Contractor vessels.
- Operations phase:
  - Treated sewage/gray water discharges from the FSO vessel and support vessels;
  - Non-sewage-type discharges (*e.g.*, bilges) from the FSO vessel and support vessels; and
  - Ballast water discharges from export tankers calling on the FSO vessel.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for the sewage/gray water and bilge water treatment units onboard the FSO vessel such that discharges from these units are compliant with MARPOL effluent quality standards.</li> <li>• Establishment of segregated seawater ballast tanks onboard the FSO vessel.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Preparation and COTCO review/approval of Contractors' construction phase Waste Management Plans.</li> <li>- Development and implementation of a Project Waste Management Plan (see Volume 5 of this EMP) that includes FSO vessel-specific waste management practices/procedures (<i>i.e.</i>, compliance of on-board domestic garbage disposal practices with MARPOL requirements).</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Communications with export tankers calling on the FSO vessel regarding ballast water discharge expectations in the immediate vicinity of the marine terminal (<i>i.e.</i>, no discharges of ballast water permitted unless it meets MARPOL Clean Ballast requirements [<math>&lt; 15</math> mg/L oil]).</li> <li>- Continued implementation (and modification when necessary) of the Project's Waste Management Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of:                   <ul style="list-style-type: none"> <li>+ sewage/gray water and bilge water treatment practices and equipment onboard Contractor vessels; and</li> <li>+ Contractors' waste management practices.</li> </ul> </li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Regular testing (kit) of treated effluents from the sewage/gray water treatment system onboard the FSO vessel.</li> <li>- Regular oil and grease testing (kit or some other type of portable field device) of treated bilge water discharged from the FSO vessel.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Enforce the requirements of MARPOL regarding marine discharges of treated sewage/gray water, bilges, and ballast and the disposal of domestic garbage from vessels operating within Cameroonian waters.</li> <li>• Inspect the sewage/gray water and bilge treatment systems onboard vessels operating within Cameroonian waters, including the FSO vessel.</li> </ul>

**Biophysical Topic #14**  
**Surfzone/Seabed Disturbances**

**POTENTIAL IMPACTS**

- Physical disturbances of the seabed and the surfzone resulting from the installation and maintenance of the marine portion of the Cameroon Transportation System (*i.e.*, the pipeline and the FSO vessel's mooring facility) that could potentially adversely impact marine organisms due to:
  - Alteration or reduction of habitat; and
  - Erosion.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of Project requirements for the installation of the marine portion of the Cameroon Transportation System regarding surfzone easement erosion mitigation and reclamation measures.</li> <li>• Installation of the marine portion of the Cameroon Transportation System's pipeline on top of the sea floor without trenching except in the immediate nearshore area - <i>i.e.</i>, at water depths equal to or less than 7 m (MSL), the pipeline will be placed in a minimally-sized trench that provides 0.3 - 1.0 m of cover.</li> <li>• Selection of the path for the marine portion of the Cameroon Transportation System's pipeline and a location for the FSO vessel's single point mooring facility in a manner that avoids known rocky outcrops and other areas that provide hard substrate for marine flora and fauna.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Limitation of the use of rock blasting when installing the marine portion of the Cameroon Transportation System.</li> <li>- Utilization of suitable techniques to appropriately reclaim the Cameroon Transportation System's system easement in the surfzone and protect the reclaimed area from erosion (<i>e.g.</i>, <i>via</i> the use of rip-rap).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic visual assessments of implemented surfzone erosion control and reclamation measures associated with the marine portion of the Cameroon Transportation System's pipeline.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of:                   <ul style="list-style-type: none"> <li>+ Contractor activities related to the installation of the marine portion of the Cameroon Transportation System; and</li> <li>+ Contractor's erosion control/reclamation activities/practices in the surfzone.</li> </ul> </li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic inspections of the marine portion of the Cameroon Transportation System.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Monitor the installation of the marine portion of the Cameroon Transportation System.</li> </ul>

**Biophysical Topic #15**  
**Marine Flora and Fauna**

**POTENTIAL IMPACTS**

- Physical disturbances of the seabed and the surfzone resulting from the installation and maintenance of the marine portion of the Cameroon Transportation System (*i.e.*, the pipeline and the FSO vessel's mooring facility) that could potentially adversely impact marine organisms due to alteration or reduction of habitat.
- Impacts of oil spills on marine organisms.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Installation of the marine portion of the Cameroon Transportation System's pipeline on top of the sea floor without trenching except in the immediate nearshore area - <i>i.e.</i>, at water depths equal to or less than 7 m (MSL), the pipeline will be placed in a minimally-sized trench that provides 0.3 - 1.0 m of cover.</li> <li>• Selection of the path for the marine portion of the Cameroon Transportation System and a location for the FSO vessel's single point mooring facility in a manner that avoids known rocky outcrops and other areas that provide hard substrate for marine flora and fauna.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Limitation of the use of rock blasting when installing the marine portion of the Cameroon Transportation System.</li> <li>- Preparation and COTCO review/approval of Contractors' construction phase Spill Response Plans.</li> <li>- Preparation of a comprehensive General Oil Spill Response Plan.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Institution of the General Oil Spill Response Plan that features:                   <ul style="list-style-type: none"> <li>+ a three-tiered response strategy (<i>i.e.</i>, local, regional, international) regarding the sourcing of equipment and personnel;</li> <li>+ location of appropriate oil spill response and clean-up equipment in the immediate vicinity of the Marine Terminal;</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of Contractor activities related to the installation of the marine portion of the Cameroon Transportation System.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic inspections of the marine portion of the Cameroon Transportation System.</li> <li>- Periodic reviews of the General Oil Spill Response Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Review the General Oil Spill Response Plan.</li> <li>• Participate in periodic reviews of the General Oil Spill Response Plan.</li> <li>• At their discretion, participate in oil spill response training exercises and drills.</li> <li>• Monitor the installation of the marine portion of the Cameroon Transportation System.</li> </ul>

**Biophysical Topic #15**  
**Marine Flora and Fauna (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>+ response strategies for the most credible marine spill scenarios;</li> <li>+ procedures for treating or disposing of spill-contaminated materials;</li> <li>+ oil spill clean-up-related waste management procedures;</li> <li>+ regularly scheduled training exercises/drills; and</li> <li>+ notification procedures at the organizational level for different sizes of spills.</li> </ul>		

**TABLES**  
**SOCIOECONOMIC TOPICS**

**Socioeconomic Topic #1**  
**Migration to the Project Area**

**POTENTIAL IMPACTS**

- Migration to the Project area by people in search of jobs, to establish businesses, and/or to be near family members employed by the Project.
- Secondary impacts associated with establishment of unauthorized settlements.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Reduction of potential adverse effects due to migration of individuals to the Project area in search of employment and business opportunities through measures described for Employment, Housing, and Land Use.</li> <li>• Generation of and adherence to Project specifications related to employment, health, and socioeconomic interactions.</li> <li>• Selection of Project camp site locations to limit impacts on surrounding communities.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Prohibition of Project workers from hunting, fishing, or gathering/harvesting medicinal/valued plants and trees:                   <ul style="list-style-type: none"> <li>+ when on Project work sites;</li> <li>+ during work hours; or</li> <li>+ while residing in Project field work site housing.</li> </ul> </li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Institution of an ongoing program of community consultation with the Republic of Cameroon, local village leaders and elders to:                   <ul style="list-style-type: none"> <li>+ minimize the potential for villages to relocate near temporary roads;</li> <li>+ outline Project needs so that communities can prepare for the potential influx of workers; and</li> <li>+ discuss potential impacts of contractor demobilization in their communities.</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Monitoring of local inflationary pressures, population growth, the establishment of unauthorized settlements, changes in land values, and demands on existing infrastructure in areas around work camps and permanent operation sites.</li> <li>- Monitoring of the development of new towns and villages and changes in land values in areas along Project-improved roadways.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Recording of new settlements, logging, <i>etc.</i> along the system easement during regularly scheduled monitoring, and notifying Government bodies of such observations.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Assist COTCO in informing the public of the Project employment, housing, and business solicitation policies.</li> <li>- Consult with local community authorities when necessary.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Assume the usual responsibility of controlling the new Cameroon/Chad border crossing over the Mbéré River.</li> </ul> </li> </ul>

Socioeconomic Topic #1

**Migration to the Project Area (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>• During the <u>operations phase</u> of the Project:                             <ul style="list-style-type: none"> <li>- Provisions for ongoing consultation with the Republic of Cameroon, local village leaders and elders concerning:                                     <ul style="list-style-type: none"> <li>+ possible positive and negative impacts of a long-term operations workforce in communities near permanent Project facilities; and</li> <li>+ induced access impacts and proposed mitigations along the system easement.</li> </ul> </li> </ul> </li> </ul>		

Socioeconomic Topic #2

## Cameroonian Business Opportunities and Revenues

### POTENTIAL IMPACTS

- Extent of Cameroonian business participation in the economic benefits of the Project.
- In most instances, the demand for goods and services will be significantly less during the Project's operations phase than during the construction phase.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements regarding the solicitation and purchasing of goods and services from Cameroonian businesses.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Implementation of a program to stimulate involvement of Cameroonian businesses in the Project by:                   <ul style="list-style-type: none"> <li>+ working with the Republic of Cameroon, agencies, business groups, and NGOs to communicate to Cameroonian businesses the locations, types, and amounts of goods and services required by the Project as well as quality, reliability, availability, and delivery terms;</li> <li>+ identifying Cameroonian businesses potentially capable of providing goods and services to the Project; and</li> <li>+ preferentially utilizing Cameroonian businesses capable of providing the Project with required goods and services over foreign suppliers provided they are competitive with regard to price, quality, reliability, availability, and delivery terms.</li> </ul> </li> <li>- Distribution of Project purchasing among qualified Cameroonian suppliers to:                   <ul style="list-style-type: none"> <li>+ discourage discriminatory pricing; and</li> <li>+ prevent dependence on Project purchases for continued business viability.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Surveillance of Contractors' goods and services purchasing practices with regard to Cameroonian content.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Undertake periodic analyses of the Project's goods and services purchasing practices with regard to Cameroonian content.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Cooperate with COTCO representatives in identifying Cameroonian businesses potentially capable of providing goods and services required by the Project.</li> <li>- Cooperate with COTCO representatives to make Cameroonian businesses aware of the locations, types, and amounts of goods and services required by the Project, as well as quality, availability, and competitive delivery terms.</li> <li>- Ensure that customs regulations, taxes, and other business-related laws and regulations are enforced.</li> <li>- Encourage private sector development.</li> </ul> </li> </ul>

**Socioeconomic Topic #3**

**Employment**

**POTENTIAL IMPACTS**

- Job availability for Nationals.
- Fairness and transparency of the Project’s recruitment and hiring process.
- Equitable distribution of jobs.
- Transition to longer-term maintenance and operations jobs that are substantially fewer in number *versus* construction phase jobs.
- Availability of suitable banking services to Project workers.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Conformance with the Convention of Establishment regarding the provision of fair employment opportunities to Nationals and implementation of a training and recruitment plan.</li> <li>• Design of the recruitment and hiring processes for the construction and operations phases of the Project to be as fair and open as possible.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:                             <ul style="list-style-type: none"> <li>- Development and implementation of annual training and recruitment plans as required by the Convention of Establishment.</li> <li>- Reasonable distribution of Project jobs among qualified Nationals, giving priority among candidates to local citizens of communities most affected by the Project.</li> <li>- Creation and compilation of lists of local candidates eligible for employment from communities most affected by Project land needs.</li> <li>- Development and implementation of regional awareness programs detailing job opportunities for residents.</li> <li>- Development and implementation of employment plans outlining procedures to meet stated employment expectations and contract requirements.</li> <li>- Acceptance of job applications only at COTCO’s head office in Douala and at Project offices in designated cities and towns - no hiring of workers will occur at Project work sites.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:                             <ul style="list-style-type: none"> <li>- Establishment of a monitoring system to track Project worker hiring and performance.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:                             <ul style="list-style-type: none"> <li>- COTCO surveillance of Contractors’ hiring practices.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:                             <ul style="list-style-type: none"> <li>- Participate with COTCO in disseminating information concerning job opportunities, terms of employment, and the recruitment process.</li> <li>- Issue documents and permits necessary for employment, in accordance with applicable regulations and laws.</li> <li>- Review COTCO’s annual training and recruitment plans which identify long-term job skills needed by the Project as submitted.</li> <li>- Continue the policy of promoting training in technical areas.</li> </ul> </li> </ul>

**Socioeconomic Topic #3**  
**Employment (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Verification of location of permanent residence for Project workers.</li> <li>- Encouragement of the development of local banking services for Project workers at locations where they are paid if not already available.</li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Provision of on-the-job training as Project schedule and requirements dictate to advance worker skills.</li> <li>- Discourage competition between Contractors for local employees.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Institution of an employment management system similar to that used during the construction phase featuring:                   <ul style="list-style-type: none"> <li>+ hiring strategies for each skill level; and</li> <li>+ use of a database to record and track Project worker information.</li> </ul> </li> <li>- Initial recruitment of workers from qualified individuals engaged in the construction of the Project's permanent facilities.</li> <li>- Provision for the expatriate proportion of the workforce to diminish over time as Nationals acquire specialized technical and managerial skills and expertise.</li> </ul> </li> </ul>		

**Socioeconomic Topic #4**  
**Education and Training**

**POTENTIAL IMPACTS**

- Education and training is required by Project workers, especially Nationals.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements related to the education and training of Project workers.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of annual recruitment and training plans as required by the Convention of Establishment.</li> <li>- Provision of basic knowledge and training to Project workers necessary to allow them to perform their duties in a safe and professional manner.</li> <li>- Provision of on-the-job training as Project schedule and requirements dictate to advance worker skills.</li> <li>- Development and provision of training courses and orientations to Project workers, as appropriate for their jobs.</li> <li>- Provision of additional training to Project workers regarding environmental issues, safety, health, craft training, cross-cultural awareness, and fire prevention and protection.</li> <li>- Provision of orientations to inform Project workers of Project policies, the violation of which might affect continued employment.</li> <li>- Development and implementation of a training tracking system to ensure Project workers receive required initial and refresher training.</li> <li>- Payment of Project workers (prevailing wage) while engaged in training.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of Contractors' Project worker education and training programs.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic reviews of Project worker training records to identify training gaps and opportunities.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Continue the policy of promoting education in technical areas.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Review COTCO's Training Plan as submitted.</li> </ul> </li> </ul>

**Socioeconomic Topic #4**  
**Education and Training (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development of annual training and recruitment plans as required by the Convention of Establishment that feature:                   <ul style="list-style-type: none"> <li>+ knowledgeable instructors;</li> <li>+ new worker training;</li> <li>+ an on-the-job training program to prepare workers for advancement to higher skill levels or supervisory positions, where required;</li> <li>+ appropriate refresher training courses;</li> <li>+ individualized training records; and</li> <li>+ a process to measure the effectiveness of all training programs.</li> </ul> </li> </ul> </li> </ul>		

**Socioeconomic Topic #5**

**Housing**

**POTENTIAL IMPACTS**

- Types of accommodations to be provided to Project workers.
- Transportation of Project workers not living in work site-located Project housing to and from the work site.
- Impacts on local communities as a result of the location of the Project’s construction camps and permanent facility quarters.
- Housing of Project workers in local communities.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Adoption of an employment approach that encourages the maintenance of the family living status of National Project workers.</li> <li>• Construction and maintenance of temporary and permanent Project personnel accommodations in a manner that is consistent with appropriate international standards.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:                             <ul style="list-style-type: none"> <li>- Hiring of most unskilled Project workers from local communities within a one-hour drive of a Project work site who will continue to live in their own homes with their families.</li> <li>- Provision that Project workers, whose community of permanent residence is within a one-hour drive of a Project work site will:                                     <ul style="list-style-type: none"> <li>+ continue to live with their own families;</li> <li>+ be transported to and from the work site; and</li> <li>+ be provided with a lunch on workdays.</li> </ul> </li> <li>- Provision that COTCO's National workers, working on construction of the pipeline or at permanent facilities sites, whose permanent residence is more than a one-hour drive from a Project work site:                                     <ul style="list-style-type: none"> <li>+ may be housed in private accommodations in nearby communities;</li> <li>+ be transported to and from the work site;</li> <li>+ be provided with a lunch on workdays; and</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:                             <ul style="list-style-type: none"> <li>- COTCO monitoring of:                                     <ul style="list-style-type: none"> <li>+ Contractors’ housing practices for Project workers; and</li> <li>+ impacts of Project housing practices on local communities where Project workers are housed.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:                             <ul style="list-style-type: none"> <li>- Grant necessary authorizations and permits in a timely manner.</li> </ul> </li> </ul>

**Socioeconomic Topic #5**  
**Housing (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>+ be provided a housing allowance.</li> <li>OR</li> <li>+ be housed in single-status Project work camps; and</li> <li>+ be provided three meals per day.</li> <li>- In consultation with COTCO, Contractor determination of housing arrangements for Nationals.</li> <li>- Housing of expatriates in on-site single-status Project work camps.</li> <li>- Following of procedures set forth in the Compensation Plan (see Volume 3 of this EMP), in the unlikely event that construction of fixed facilities or the Cameroon Transportation System requires resettlement.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Housing of professional/craft Project employees in on-site single-status camp-style accommodations as per business organization requirements.</li> <li>- Provision that Nationals filling non-professional/non-craft Project worker positions will live with their families in their own domiciles in towns and villages in the vicinity of the Project's permanent facilities.</li> <li>- Provision of transportation to and from the work site to Project workers living in their own domiciles in surrounding towns and villages as necessary.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>		

**Socioeconomic Topic #5**  
**Housing (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Provision of accommodations on-board the FSO vessel for rotational operations personnel.</li> <li>- Provision of transportation to and from shore and the FSO vessel to rotational operations personnel.</li> </ul>		

**Socioeconomic Topic #6**

**Land Use**

**POTENTIAL IMPACTS**

- Project-related changes in land uses, including the following types of temporary and permanent land uses :
  - Short term (one growing season or less to two years) changes in land use; primarily within the Cameroon Transportation System’s land easement or associated with infrastructure improvements resulting in dislocation of some perennial crops and seasonally used structures and associated facilities, but no displacement of households.
  - Long-term changes of land use (~30 years) primarily due to restrictions associated with digging or plowing more than 60 cm in depth in the 10 to 15 meter-wide system easement.
  - Permanent loss of land (~30 years) for construction and operation of permanent Project facilities or infrastructure improvements.
- Potential for permanent land losses resulting in limited loss of economic viability.
- Temporary or permanent loss of the use of resources due to land use changes directly caused by the Project.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Adherence to principles set forth in applicable Cameroon legislation, as well as the Convention of Establishment, as to the disposition of lands used by the Project.</li> <li>• During construction, restriction of the width of the Cameroon Transportation System land easement to:                             <ul style="list-style-type: none"> <li>– 60 m at river crossings;</li> <li>– 50 m at road/railroad crossings, areas with sloping terrains, and areas where natural obstacles exist;</li> <li>– 30 m, except in difficult areas.</li> </ul> </li> <li>• During operations, restriction of the width of the system easement to 10-15 m.</li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:                             <ul style="list-style-type: none"> <li>– Provision not to interfere with prior users of traditionally used lands to resume their former activities on the Cameroon Transportation System's land easement provided such activities are compatible with the operations and maintenance requirements of the Cameroon Transportation System.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:                             <ul style="list-style-type: none"> <li>– Monitoring of increases in land values as a result of constructing or upgrading Project facilities and infrastructure.</li> <li>– Regular monitoring of COTCO’s compensation-related activities to ensure compliance with the Compensation Plan (see Volume 3 of this EMP).</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:                             <ul style="list-style-type: none"> <li>– Monitoring of the system easement regarding adverse changes in land uses and reporting any infringements and concerns to Republic of Cameroon officials.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Allow prior users of traditionally used lands to resume their former activities on the Cameroon Transportation System’s land easement provided such activities are compatible with the operations and maintenance requirements of the Cameroon Transportation System.</li> <li>• During the <u>construction phase</u> of the Project:                             <ul style="list-style-type: none"> <li>– Identify land owners and occupants for land easement acquisition.</li> <li>– Put at the disposal of the Project the land easement in accordance with applicable legislation.</li> <li>– Implementation of the Project’s Compensation Plan (see Volume 3 of this EMP).</li> </ul> </li> </ul>

**Socioeconomic Topic #6**  
**Land Use (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Sizing of Project roads, storage yards, pump stations, <i>etc.</i> to limit physical land usage.</li> <li>• Limited construction of new Project roads - <i>i.e.</i>, preferential utilization of existing, upgradable roads for Project purposes.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Reclamation of those construction-disturbed lands not required for permanent Project facilities or the operation/maintenance of the Cameroon Transportation System using one or more technique(s) (<i>e.g.</i>, scarification, surface texturing, mulching, fertilizing, seeding, seedling planting) so that these lands can be returned to their prior uses.</li> <li>- Implementation of the Project's Compensation Plan (see Volume 3 of this EMP).</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Provision of compensation for physical land damages resulting directly from Project-related maintenance and operations activities. The process by which damage-related compensation will be determined and paid will be similar to that utilized during the construction phase.</li> </ul> </li> </ul>		

**Socioeconomic Topic #7**  
**Sacred and Cultural Sites**

**POTENTIAL IMPACTS**

- Several ethnic groups practicing different religions live in the Project area.
- A wide range of sacred and cultural sites exist in the Project area including:
  - Burial sites;
  - Locations of important medicinal plants and sacred trees;
  - Archaeological, historical, and paleontological sites; and
  - Churches or mosques.
- Special religious and cultural issues arising as a result of the employment of a multi-ethnic workforce.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Preferentially, redesign and/or relocate Project facilities/components to limit disturbances to significant, known sacred and cultural sites.</li> </ul>	<p><b>Note:</b> A document entitled "Management Plan for Cultural Properties" has been prepared for the Project. This document, which is included as an appendix in the Base Document of this EMP (see Volume 1 Appendix E), outlines the approach that the Project has adopted regarding the identification and management/treatment of archaeological, historical, and paleontological sites.</p> <ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:           <ul style="list-style-type: none"> <li>– Implementation of the Project's Management Plan for Cultural Properties (see Appendix E of Volume 1 of this EMP).</li> <li>– Notification of appropriate Republic of Cameroon authorities if archaeological, historical, or paleontological sites are discovered as per legislative requirements.</li> <li>– Seek appropriate professional advice/expertise to deal with discovered cultural properties as necessary.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>operations phase</u> of the Project:           <ul style="list-style-type: none"> <li>– Record locations of any newly created sacred and cultural sites discovered during regular periodic walkovers of the system easement.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate relations with the Ministries of Culture, Advanced Education, and Scientific Research and Technology concerning Project-related responsibilities that pertain to cultural properties.</li> <li>• During the <u>construction phase</u> of the Project:           <ul style="list-style-type: none"> <li>– Assist COTCO in their consultations with village, spiritual, or religious leaders and individuals during the Project's final design stage to discuss appropriate measures to minimize the disturbance of ancestral remains, sacred areas, and burial sites that cannot be avoided.</li> <li>– Provide assistance in relocation of sacred sites.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>

**Socioeconomic Topic #7**  
**Sacred and Cultural Sites (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Work around discovered sites of significant archaeological, historical, and paleontological value until treatment plans are devised.</li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Provision to make a best effort to identify and evaluate sacred, cultural, archaeological, historical, and paleontological sites that might be affected by the Project as per World Bank directives.</li> <li>- Consultation with village, spiritual or religious leaders, and individuals to:                   <ul style="list-style-type: none"> <li>+ identify sacred, cultural, and archaeological sites to be avoided;</li> <li>+ negotiate special handling procedures if disturbances cannot be avoided; or</li> <li>+ negotiate compensation for unavoidable disturbances.</li> </ul> </li> <li>- Provision to compensate for disturbances to cultural properties or sacred sites in the form of assistance in relocation, in-kind compensation, and/or cash, as appropriate in accordance with the Compensation Plan (see Volume 3 of this EMP).</li> <li>- Payment of compensation, if necessary, to purchase items needed for ceremonies and to relocate sacred items, where need is substantiated.</li> <li>- Provision of training to Project workers in cross-cultural differences.</li> </ul> </li> </ul> <p style="text-align: right; margin-right: 20px;">continued ...</p>		<ul style="list-style-type: none"> <li>- Pay compensation due for disturbances to burial sites in accordance with commonly applied rates as set forth in the Compensation Plan (see Volume 3 of this EMP).</li> </ul>

**Socioeconomic Topic #7**  
**Sacred and Cultural Sites (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Provision of Project on-site work camps with prayer rooms, washrooms, and other facilities as necessary to satisfy the religious needs and customs of the workforce.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Avoid disrupting any known sacred, cultural, archaeological, historical, or paleontological site to the extent practical.</li> <li>- Consultation with local village, spiritual or religious leaders, and individuals to:                   <ul style="list-style-type: none"> <li>+ provide information about the types of maintenance-related ground disturbing activities;</li> <li>+ identify sacred, cultural, archaeological, historical, and paleontological sites when planning ground-disturbing maintenance activities; and</li> <li>+ discourage the creation of new sacred and cultural sites in areas permanently occupied by the Cameroon Transportation System's system easement.</li> </ul> </li> <li>- Payment of compensation for the disturbance of sacred, cultural, archaeological, historical, or paleontological sites existing prior to the construction phase of the Project.</li> </ul> </li> </ul>		

Socioeconomic Topic #8

## Semi-Sedentary and Transhumant Cattle Movements

### POTENTIAL IMPACTS

- Project construction activities may interfere with the seasonal movements of transhumant cattle herds.
- Project land needs and construction activities may disrupt local water and pasturage sources.
- Existing herder-farmer conflicts may be exacerbated by Project-related activities.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Design and scheduling of Project activities to limit potential affects on seasonal movements, pasturage, or water sources for semi-sedentary, nomadic, and transhumant movements of cattle.</li> <li>• When and where necessary during construction of the Cameroon Transportation System's pipeline:               <ul style="list-style-type: none"> <li>- Avoidance of creating extended continuous rows of spoil or lengths of open trench that may interfere with the passage of livestock.</li> <li>- Provision of gaps in rows of spoil at designated intervals to coincide with features such as obvious livestock routes.</li> <li>- Design of pipeline crossings to accommodate peak cattle crossings.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Announcements of the dates and locations of construction sites <i>via</i> veterinarians, pastoralist organizations, and through traditional leaders.</li> <li>- Hiring of temporary help to assist families in moving herds through construction zones.</li> <li>- Collection of information concerning numbers, timing, and location of major transhumant migratory routes crossing construction zones and near camps.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Provision of information to pastoralists and others on locations and importance of sensitive environmental resources within the Cameroon Transportation System's land/system easement in an attempt to:                   <ul style="list-style-type: none"> <li>+ discourage the use of the easement to move cattle; and</li> <li>+ encourage the use of prior routes.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Monitoring of the use of the land/system easement by pastoralists and others who move cattle herds.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of Contractors' interactions with transhumants.</li> <li>- COTCO surveillance of Contractors' cattle movement provision actions.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Participate in disseminating information on the location and timing of Project construction sites and activities to aid herders in planning alternative routes and timing of their crossings.</li> <li>- Consult with local community authorities when necessary to minimize the risk of social conflicts which might arise between farmers and pastoralists.</li> <li>- Monitor COTCO's mitigation and monitoring measures regarding potential impacts to transhumants.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Consult with local community authorities when necessary to minimize the risk of social conflicts which might arise between sedentary farmers and pastoralists.</li> <li>- Control the use of the system easement.</li> </ul> </li> </ul>

**Socioeconomic Topic #9**  
**Fishing Resources**

**POTENTIAL IMPACTS**

- Potential disruption of fresh and salt-water fishing and fishing harvests due to Project activities.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• See measures described in the Biophysical section under “Freshwater Fish.”</li> <li>• Locate and maintain buoys to mark the marine pipeline’s sub-sea location.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>– Prohibition of Project workers from fishing:                   <ul style="list-style-type: none"> <li>+ when on Project work sites;</li> <li>+ during work hours; or</li> <li>+ while residing in Project field work site housing.</li> </ul> </li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>– Development and implementation of a compensation approach for fishing harvest losses and gear damages/losses that are defensibly attributable to Project-related activities based on the following main principles:                   <ul style="list-style-type: none"> <li>+ substantiation of loss claims;</li> <li>+ payment of loss claims only to individuals holding genuine rights to specific impacted fishing areas;</li> <li>+ payment of harvest loss-type claims in cash or in-kind based on the local market rate for the type(s) of fish included in a claim; and</li> <li>+ payment of gear loss/damage-type claims in cash or in-kind based on the going local market rate for repair or replacement of the gear included in a claim.</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>– Development and implementation of a compliance monitoring system regarding the Project’s fishing policy for workers.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Application of the provisions in Article 8 of the Forest, Fauna, and Fishing Code (94/01, 20 January, 1994).</li> </ul>

**Socioeconomic Topic #9**  
**Fishing Resources (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Initiation of a public information and education program about the location and implications of the marine exclusion zone.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continuation of the compensation for fishery-related damages which can be defensively attributed to Project-related routine maintenance and/or emergency activities.</li> </ul> </li> </ul>		

**Socioeconomic Topic #10**  
**Indigenous Peoples**

**POTENTIAL IMPACTS**

- Potential disruption of Bakola Pygmy settlements by Project activities.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements regarding socioeconomic interactions with Pygmies, as with other Cameroonians.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Prohibition of Project workers from hunting, fishing, or gathering/harvesting medicinal/valued plants and trees:                   <ul style="list-style-type: none"> <li>+ when on Project work sites;</li> <li>+ during work hours; or</li> <li>+ while residing in Project field work site housing.</li> </ul> </li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development of an Indigenous Peoples Plan (see Volume 4 of this EMP).</li> <li>- Contribution of \$US 600,000 (360 million FCFA) to an Environmental Foundation (see Volume 4 of this EMP) to provide defined long-term financial support for approved projects/programs associated with the Indigenous Peoples Plan.</li> <li>- Consultation with Pygmies potentially affected by the Project.</li> <li>- Provision of compensation to Pygmies for impacts to temporary camps or structures.</li> <li>- Implementation of the Project's Compensation Plan (see Volume 3 of this EMP), including appropriate compensation measures for Pygmies such as cash, in-kind replacements for temporary and permanent losses incurred as a result of Project activities.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- COTCO surveillance of Contractor activities in Pygmy-inhabited areas.</li> <li>- Regular monitoring of compensation-related activities to ensure compliance with the Compensation Plan (see Volume 3 of this EMP) regarding Pygmies and World Bank guidelines.</li> <li>- Continuance of monitoring after completion of compensation activities to verify that appropriate compensation was paid and that Compensation Plan objectives were met.</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Monitoring and reporting of observations of new settlements, logging, <i>etc.</i> to Republic of Cameroon officials during periodic line fly-overs and walkovers of the system easement.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Work with COTCO to develop the Indigenous Peoples Plan (see Volume 4 of this EMP).</li> <li>• Work with COTCO to implement the Environmental Foundation Plan (see Volume 4 of this EMP).</li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Payment of compensation due to Pygmies for crops and improvements situated within the land easement allocated to the Project in accordance with applicable Cameroon legislation.</li> </ul> </li> </ul>

**Socioeconomic Topic #10**  
**Indigenous Peoples (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Active control of access to identified Pygmy-inhabited areas intersected by the Cameroon Transportation System's land easement by employing one or more of the following measures:               <ul style="list-style-type: none"> <li>+ vehicle barriers and/or guards on work site access roads and where the land easement intersects existing roads;</li> <li>+ reinstatement of natural barriers along the land easement (<i>e.g.</i>, removal of temporary bridges required during construction); and</li> <li>+ establishment of new, artificial barriers as appropriate (<i>e.g.</i>, rock/rubble mounds, fences).</li> </ul> </li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Maintenance of artificial barriers along the system easement to limit induced access to forests used by Pygmies.</li> <li>- Limitation of activities in the area inhabited by Pygmies to periodic surveillance of the system easement and routine maintenance which may be needed at watercourse crossings, <i>etc.</i></li> </ul> </li> </ul>		

**TABLES**  
**HEALTH TOPICS**

Health Topic #1  
**Respiratory Diseases**

**POTENTIAL IMPACTS**

- Person-to-person transmission of respiratory diseases among Project workers through personal contact, while residing in worker housing, or during crowded public and/or private transportation.
- Spread of respiratory diseases to communities in the Project development area by Project workers.
- Principal disease of major concern: tuberculosis.
- Other diseases of concern:
  - Meningococcal meningitis, influenza, and leprosy.
- Dust from Project-related activities.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for:               <ul style="list-style-type: none"> <li>– Project medical facilities;</li> <li>– The provision of preventative and responsive healthcare services to Project workers regarding respiratory diseases;</li> <li>– Project work camp accommodations and permanent Project quarters; and</li> <li>– Project catering facilities.</li> </ul> </li> <li>• Adherence to Project medical practices and established medical treatment protocols for respiratory diseases.</li> <li>• Administration of appropriate immunizations to non-immune workers, <i>e.g.</i>, MMR, DPT, influenza, meningococcal, <i>etc.</i></li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>– Issuance of individual respiratory protective equipment to Project workers that is appropriate to their specific job requirements and provision of appropriate training regarding the proper usage and maintenance of this equipment.</li> <li>– Prohibition of cooking in Project living quarters.</li> <li>– Application of appropriate dust control measures (<i>e.g.</i>, watering, use of dust control agents) on Project roads and active construction/maintenance sites.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>– Development and implementation of a Project Health Plan that features transmission prevention strategies regarding respiratory diseases.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>– Periodic assessments of housing facilities, medical practices, and catering services.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>– Development and implementation of a respiratory health surveillance program for Project workers that includes:                   <ul style="list-style-type: none"> <li>+ fever surveillance; and</li> <li>+ monitoring of workers potentially exposed to significant communicable respiratory diseases as part of their work activities and/or location of habitation.</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• Maintain the existing community-based Epidemiological Information Systems (EIS) and Sentinel Surveillance Systems (SSS) for respiratory diseases (<i>e.g.</i>, influenza, measles, mumps, TB).</li> <li>• Continue existing immunization programs for respiratory diseases for the local populace in the Project development area, <i>e.g.</i>, MMR, DPT, influenza, meningococcal meningitis, TB, <i>etc.</i></li> <li>• Review and comment on the Project's Health Plan.</li> <li>• Inspect Project work sites and work camp accommodations.</li> <li>• Provide regulatory surveillance and technical inspection of dust control practices on Project roads and construction sites.</li> </ul>

Health Topic #1

**Respiratory Diseases (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Inclusion of a worker health education / awareness program in the Project's Health Plan that features a module regarding respiratory diseases, their hazards, and acquisition prevention tactics.</li> <li>- Development and implementation of a workplace tuberculosis (TB) management program for the Project that features the following key elements: pre-employment testing for prospective Project workers, "DOTS"-type treatment for Project workers, and regular health surveillance of Project workers.</li> <li>- Development and implementation of Project housing inspection protocols.</li> <li>- Development and implementation of sanitation requirements for Project laundry services.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Health Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Development and implementation of a Project worker Epidemiologic Information System (EIS) and a Sentinel Surveillance Systems (SSS) to:               <ul style="list-style-type: none"> <li>+ track and monitor Project worker respiratory disease clinical data and diagnoses;</li> <li>+ evaluate possible outbreaks of communicable respiratory diseases; and</li> <li>+ evaluate Project strategies regarding respiratory diseases.</li> </ul> </li> <li>- COTCO surveillance of:               <ul style="list-style-type: none"> <li>+ Contractors' healthcare provision practices and facilities, especially as they apply to respiratory diseases; and</li> <li>+ Contractors' dust control practices.</li> </ul> </li> </ul>	

Health Topic #2  
**Sexually Transmitted Diseases**

**POTENTIAL IMPACTS**

- Acquisition of sexually transmitted diseases by Project workers.
- Exacerbation of the existing sexually transmitted diseases situation in the Project development area.
- Principal diseases of major concern include:
  - HIV/AIDS;
  - Curable STDs such as syphilis, urethritis, gonorrhea, *etc.*; and
  - Hepatitis B, C, and D.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for:               <ul style="list-style-type: none"> <li>– Project medical facilities; and</li> <li>– The provision of preventative and responsive healthcare services to Project workers regarding STDs.</li> </ul> </li> <li>• Adherence to Project medical practices and established medical treatment protocols for curable STDs.</li> <li>• Design of medical facilities to accommodate blood-borne pathogens control.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>– Provision of condom use education and availability to Project workers.</li> <li>– Management of Project medical facilities to control blood-borne pathogens exposure. This will be accomplished <i>via</i> the rigorous use of “universal precautions”.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>– Development and implementation of a Project Health Plan that features STD acquisition/transmission prevention strategies for Project workers.</li> <li>– Inclusion of a worker health education/awareness program in the Project’s Health Plan that features a module regarding STDs, their hazards, and acquisition/transmission prevention tactics. The topic of HIV/AIDS will feature prominently in this worker training program.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>– Periodic assessments of medical practices and facilities to evaluate the effectiveness of the Project’s STD prevention and treatment program.</li> <li>– Periodic medical monitoring examinations for the workforce.</li> <li>– Regular assessments regarding the availability of condoms to Project workers.</li> <li>– Periodic independent assessments of compliance with the Project’s blood-borne pathogens/infection control program.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• Maintain the existing community-based Epidemiological Information Systems (EIS) and Sentinel Surveillance Systems (SSS) for STDs, particularly for HIV/AIDS</li> <li>• Continue existing HIV/AIDS prevention programs and coordinate efforts with Project programs.</li> <li>• Target high risk community groups for special HIV/AIDS intervention and education as part of existing programs, e.g., truckers, commercial sex workers, sexually active young people.</li> <li>• Continue existing efforts to promote social marketing activities for condoms and STD treatment in the community.</li> <li>• Review and comment on the Project’s Health Plan.</li> </ul>

Health Topic #2

**Sexually Transmitted Diseases (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Establishment of a STD screening and treatment program for prospective Project workers that features strict confidentiality. If an individual is determined to possess one or more STD(s), he/she will be informed regarding this diagnosis.</li> <li>- Development and implementation of an active intervention program for Project workers regarding curable STDs.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Health Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a Project worker Epidemiologic Information System (EIS) and a Sentinel Surveillance System (SSS) to:                   <ul style="list-style-type: none"> <li>+ track and monitor Project worker STD clinical data and diagnoses;</li> <li>+ identify and evaluate potentially significant increases in STD rates; and</li> <li>+ evaluate Project strategies regarding STDs.</li> </ul> </li> <li>- COTCO surveillance of Contractor's health care provision practices and facilities, especially as they apply to STDs.</li> </ul> </li> </ul>	

**Health Topic #3**  
**Vector-Borne Diseases**

**POTENTIAL IMPACTS**

- Acquisition of vector-borne diseases by Project workers.
- Creation of conditions that exacerbate the existing vector-borne diseases situation in the Project development area.
- Principal diseases of major concern include:
  - Malaria - transmitted through the bite of an infected mosquito;
  - Bilharzia (Schistosomiasis) - transmitted through fresh water contact with snails;
  - River Blindness (Onchocerciasis) - transmitted through the bite of a black fly;
  - Sleeping Sickness (Trypanosomiasis) - transmitted through the bite of a tsetse fly;
  - Yellow fever - mosquito-borne; and
  - Trachoma - transmitted by flies.
- Other diseases of concern include:
  - Visceral and cutaneous leishmaniasis - transmitted through the bite of an infective sand fly;
  - Rift Valley fever - transmitted through direct contact with infected animals or aerosol from infected animal feces;
  - African tick typhus - transmitted by crushing infected lice at bite sites;
  - Louse and flea-borne typhus - transmitted through infective lice/fleas;
  - Plague - transmitted through infected fleas;
  - Bancroftian filariasis - mosquito-borne;
  - Loiasis - transmitted through the bite of a tabanid fly (deerfly);
  - Arboviral fevers - mosquito-borne;
  - West Nile and Sindbis fevers - mosquito-borne;
  - Hemorrhagic fevers.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for:               <ul style="list-style-type: none"> <li>– Project medical facilities;</li> <li>– The provision of preventative and responsive healthcare services to Project workers regarding vector-borne diseases;</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>– Performance of vector control activities in the immediate vicinities of the Project's permanent facilities and construction camps, including:                   <ul style="list-style-type: none"> <li>+ avoiding the creation of incremental vector habitat;</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>– Periodic independent assessments of the Project's malaria and vector-borne disease control programs.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• Maintain the existing community-based Epidemiological Information Systems (EIS) and Sentinel Surveillance Systems (SSS) for vector-borne diseases, particularly for malaria and hemorrhagic fevers.</li> </ul> <p style="text-align: right;">continued ...</p>

Health Topic #3

**Vector-Borne Diseases (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>- Project work camp accommodations and permanent Project quarters; and</li> <li>- The acquisition, treatment, and storage of water for drinking, bathing, and washing/laundry purposes.</li> <li>• Adherence to Project medical practices and established medical treatment protocols for malaria and other vector-borne diseases.</li> <li>• Acquisition of drinking/bathing/washing water for camps and permanent Project quarters from groundwater sources.</li> <li>• Issuance of treated bed nets, clothing and bedding to workers housed in work site camp environments.</li> <li>• Use of insect/vermin screens and traps for work camp facilities and permanent Project quarters.</li> <li>• Laboratory confirmation of selected clinical diagnoses of vector-borne diseases using appropriate testing methodologies.</li> </ul>	<ul style="list-style-type: none"> <li>+ removal/alteration of existing vector habitat;</li> <li>+ selective use of pesticides; and</li> <li>+ rodent trapping/removal.</li> <li>- Focal applications of Abate (Temephos) where necessary for black fly control.</li> <li>- Provision of appropriate personal protective equipment to Project food handlers (e.g., gloves, aprons, hair nets).</li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a Project Health Plan that features acquisition prevention and treatment strategies regarding vector-borne diseases.</li> <li>- Inclusion of a worker health education/awareness program in the Project's Health Plan that features a module regarding vector-borne diseases, their hazards, and acquisition prevention strategies.</li> <li>- Development and implementation of a Malaria Control Program for the Project that adheres to standard international guidelines (e.g., WHO).</li> <li>- Development and implementation of a Viral Hemorrhagic Fever protocol for the Project that adheres to standard international guidelines (e.g., CDC).</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>- Periodic inspections of Project work site (i.e., camp) housing for compliance with the malaria control program, e.g., bed nets, standing water.</li> <li>- Periodic surveillance of the Project work areas for standing pools of water, insects, vermin, etc.</li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a medical surveillance program for Project workers regarding vector-borne disease status (special emphasis on malaria).</li> <li>- Development and implementation of a Project worker Epidemiologic Information System (EIS) and a Sentinel Surveillance System (SSS) to:                   <ul style="list-style-type: none"> <li>+ track and monitor Project worker vector-borne disease clinical data and diagnoses;</li> <li>+ detect and evaluate outbreaks of vector-borne diseases (e.g., malaria, hemorrhagic fevers); and</li> <li>+ evaluate Project strategies regarding vector-borne diseases (special emphasis on malaria).</li> </ul> </li> <li>- Development and implementation of inspection and audit programs for watercourse crossings, Project laundry practices and housing sanitation, proper use of screens and traps, etc.</li> <li>- COTCO surveillance of Contractors' healthcare provision practices and facilities, especially as they apply to malaria and other vector-borne diseases.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Review and comment on the Project's Health Plan.</li> <li>• Inspect Project work sites and work camp accommodations.</li> </ul>

Health Topic #3

**Vector-Borne Diseases (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Development and implementation of a water snail control program where warranted.</li> <li>- Development and implementation of cleaning protocols and schedules for Project facilities that adhere to international standards.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Health Plan.</li> </ul> </li> </ul>		

**Health Topic #4**  
**Water-Borne Diseases**

**POTENTIAL IMPACTS**

- Acquisition of water-borne diseases by Project workers.
- Exacerbation of the existing water-borne diseases situation in the Project development area.
- Principal diseases of major concern include:
  - Typhoid fever;
  - Paratyphoid fever;
  - Cholera; and
  - Amebic dysentery.
- Other disease of concern: Guinea worm.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for:               <ul style="list-style-type: none"> <li>– Project medical facilities;</li> <li>– The provision of preventative and responsive healthcare services to Project workers regarding water-borne diseases;</li> <li>– The acquisition, treatment, and storage of water for drinking, bathing, and washing/laundry purposes;</li> <li>– Packaged sewage/gray water treatment systems; and</li> <li>– Engineered Project solid waste landfills.</li> </ul> </li> <li>• Adherence to Project medical practices and established medical treatment protocols for water-borne diseases.</li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>– Development and implementation of a Project Health Plan that features acquisition prevention strategies regarding water-borne diseases.</li> <li>– Inclusion of a worker health education/awareness program in the Project's Health Plan that features a module regarding water-borne diseases, their hazards, and acquisition prevention tactics.</li> <li>– Development and implementation of sanitation requirements that address water treatment, storage, flood control, waste management, and drainage designs.</li> <li>– Development and implementation of sanitation programs for catering facilities.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>– Daily potable water quality testing (e.g., pH, residual chlorine content).</li> <li>– Inspection and assessment of Project water storage areas, waste management facilities and practices, and flood control measures.</li> <li>– Periodic independent assessments of the Project's potable water treatment and sewage/gray water treatment and discharge practices and facilities.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>– Development and implementation of a medical surveillance program for Project workers regarding water-borne diseases. Special attention will be given to Project food services workers.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• Maintain the existing community-based Epidemiological Information Systems (EIS) and Sentinel Surveillance Systems (SSS) for water-borne diseases.</li> <li>• Monitor the Project's potable water inspection program.</li> <li>• Review and comment on the Project's Health Plan.</li> <li>• Inspect Project work sites and work camp accommodations.</li> </ul>

Health Topic #4

**Water-Borne Diseases (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Administration of appropriate immunizations for water-borne diseases to non-immune workers.</li> <li>• Acquisition of drinking/bathing/washing water for camps and permanent Project quarters from groundwater sources.</li> </ul>	<ul style="list-style-type: none"> <li>• During the <u>operations phase</u> of the Project:                             <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Health Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Development and implementation of a Project worker Epidemiologic Information System (EIS) and a Sentinel Surveillance System (SSS) to:                             <ul style="list-style-type: none"> <li>+ track and monitor Project worker water-borne disease clinical data and diagnoses;</li> <li>+ detect and evaluate outbreaks of water-borne diseases (e.g., cholera, typhoid fevers); and</li> <li>+ evaluate Project strategies regarding water-borne diseases.</li> </ul> </li> <li>- Worker surveillance to prevent the use of river/stream water as a venue for bathing.</li> <li>- COTCO surveillance of Contractors' healthcare provision practices and facilities, especially as they apply to water-borne diseases.</li> </ul>	

**Health Topic #5**  
**Food-Borne Diseases**

**POTENTIAL IMPACTS**

- Acquisition of food-borne diseases by Project workers caused by pathogens such as *Salmonella*, *Enterotoxigenic E. coli*, *Campylobacter jejuni*, *Vibrio cholerae*, and *shigella*.
- Exacerbation of the existing food-borne diseases situation in the Project development area.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for:               <ul style="list-style-type: none"> <li>- Project medical facilities;</li> <li>- The provision of preventative and responsive healthcare services to Project workers regarding food-borne diseases; and</li> <li>- Project catering facilities and services.</li> </ul> </li> <li>• Adherence to Project medical practices and established medical treatment protocols for food-borne diseases.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Provision of Project food handlers with specialized personal protective equipment (e.g., gloves, aprons, hair nets).</li> <li>- Oversight of catering operations by a qualified dietary specialist (food service sanitarian).</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a Project Health Plan that features acquisition/transmission prevention strategies regarding food-borne diseases.</li> <li>- Inclusion of a worker health education/awareness program in the Project's Health Plan that features a module regarding food-borne diseases, their hazards, and acquisition/transmission prevention tactics. Special/additional training will be given to food handlers.</li> <li>- Development and implementation of a food-borne illness response plan and investigation procedures.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic reviews of all food service operations associated with Project worker living quarters.</li> <li>- Periodic random testing of food materials and prepared dishes, food preparation machinery, and counter tops.</li> <li>- Periodic inspection and evaluation of in-country food vendors/abattoirs that supply food to Project facilities.</li> <li>- Periodic independent assessments of Project food services/sanitation programs, activities, and their compliance with standards.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a Project worker Epidemiologic Information System (EIS) and a Sentinel Surveillance System (SSS) to:                   <ul style="list-style-type: none"> <li>+ track and monitor Project worker food-borne disease clinical data and diagnoses;</li> <li>+ detect and evaluate outbreaks of food-borne diseases (e.g., salmonellosis); and</li> <li>+ evaluate Project strategies regarding food-borne diseases.</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• Conduct regulatory inspections of local food suppliers and abattoirs.</li> <li>• Conduct regulatory inspections of the sanitation status of the Project's food service operations.</li> <li>• Review and comment on the Project's Health Plan.</li> </ul>

Health Topic #5

**Food-Borne Diseases (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Development and implementation of cleaning protocols and sanitation standards for Project catering facilities that meet appropriate international standards.</li> <li>- Development and implementation of a Project food sanitation program that addresses food sources, food protection, transportation, storage, preparation, handling, and disposal.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Health Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Development and implementation of medical surveillance programs for all Project food handlers that feature:               <ul style="list-style-type: none"> <li>+ baseline and periodic serologic communicable disease status, e.g., hepatitis;</li> <li>+ periodic skin screening examinations; and</li> <li>+ fever surveillance.</li> </ul> </li> <li>- COTCO surveillance of Contractors' food service facilities and food handling practices.</li> </ul>	

**Health Topic #6**  
**Occupational Exposures**

**POTENTIAL IMPACTS**

- Exposure of Project workers to hazardous/dangerous/toxic materials.
- Exposure of Project workers to excessive levels of noise.
- Encounters of Project workers with snakes, scorpions, *etc.*

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for:               <ul style="list-style-type: none"> <li>- Project medical facilities;</li> <li>- The provision of preventative and responsive healthcare services, including emergency procedures, to Project workers; and</li> <li>- Industrial hygiene and safety.</li> </ul> </li> <li>• Adherence to Project medical practices and established medical treatment protocols for snake bites, scorpion stings, chemical exposures, and other types of workplace exposure-related situations.</li> <li>• Proper design and operation of hazardous/dangerous/toxic materials storage areas.</li> <li>• Establishment of air traffic control plans for frequency and duration of Project air traffic for noise control.</li> <li>• Maintenance of appropriate medical supplies at Project medical facilities, <i>e.g.</i>, anti-venoms, available for snake bite treatment.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Provision of personal protective equipment (<i>e.g.</i>, disposable coveralls, gloves, safety goggles, respiratory protection devices, hearing protection devices) to all workers that is appropriate to their specific job requirements as well as training regarding the proper use and maintenance of this equipment.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a Project Occupational Health and Safety Plan that features specific strategies regarding the prevention/mitigation of occupational exposures.</li> <li>- Inclusion of a worker health education/awareness program in the Project's Occupational Health and Safety Plan that features a module regarding the prevention/mitigation of occupational exposures to hazardous/dangerous/toxic materials and snakes, scorpions, and other harmful arthropods, reptiles, and mammals.</li> <li>- Development and implementation of insect/snake control programs.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic reviews and assessments covering Project safety and industrial hygiene practices and programs.</li> <li>- Investigation and review of all reported injuries and occupational illnesses.</li> <li>- Periodic assessment of safety, occupational health, and industrial hygiene training records.</li> <li>- Inspection and assessment of chemical control practices, usage of personal protective equipment, noise control measures, waste management practices, <i>etc.</i></li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a Project industrial hygiene program to identify and monitor potential occupational exposure areas such as:                   <ul style="list-style-type: none"> <li>+ hazardous/dangerous/toxic materials storage areas; and</li> <li>+ high noise areas.</li> </ul> </li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• Conduct regulatory inspections of Project work sites regarding occupational health and safety matters.</li> <li>• Review and comment on the Project's Occupational Health and Safety Plan.</li> </ul>

Health Topic #6

**Occupational Exposures (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Development and implementation of a Project Waste Management Plan (see Volume 5 of this EMP).</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Occupational Health and Safety Plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Development and implementation of a epidemiological monitoring program for Project workers to:               <ul style="list-style-type: none"> <li>+ routinely track clinical data for occupational diseases in the workforce; and</li> <li>+ detect and evaluate outbreaks of occupational exposure conditions (e.g., heat stress).</li> </ul> </li> <li>- Development and implementation of a medical surveillance program for workers exposed to high levels of noise and/or hazardous/dangerous/toxic materials.</li> <li>- Development and implementation of a "near miss" investigation program.</li> <li>- COTCO surveillance of Contractors' occupational exposures management practices.</li> </ul>	

**Health Topic #7**  
**Accidents/Injuries**

**POTENTIAL IMPACTS**

- Traffic/roadway accidents and injuries.
- Industrial accidents.

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
<ul style="list-style-type: none"> <li>• Generation of and adherence to Project requirements for:               <ul style="list-style-type: none"> <li>- Industrial hygiene and safety;</li> <li>- Project medical facilities; and</li> <li>- The provision of responsive healthcare services, including emergency procedures, to Project workers in the event of accidents/injuries.</li> </ul> </li> <li>• Incorporation of worker safety devices (e.g., guards, rails) that meet international standards into Project facilities.</li> <li>• Establishment of appropriate road safety signage along Project roadways.</li> <li>• Provision of construction safety signage, signals, and barricades around all construction areas.</li> </ul>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Provision of special education to workers regarding safe vehicular, equipment, boat, and aircraft operation.</li> <li>- Provision of personal protective equipment (e.g., hard hats, safety boots, safety glasses/goggles) to all workers that is appropriate to their specific job requirements as well as training regarding the proper use and maintenance of this equipment.</li> <li>- Provision of cross cultural training for all workers.</li> <li>- Informing Project workers that:                   <ul style="list-style-type: none"> <li>+ alcohol use is not permitted during work shifts; and</li> <li>+ possession of alcohol is prohibited within the confines of Project work sites.</li> </ul> </li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of a Project Occupational Health and Safety Plan that features specific strategies regarding the prevention of accidents.</li> <li>- Inclusion of a worker health education/ awareness program in the Project's Occupational Health and Safety Plan that features a module regarding the prevention of accidents.</li> </ul> </li> </ul> <p style="text-align: right;">continued ...</p>	<ul style="list-style-type: none"> <li>• During <u>both phases</u> of the Project:               <ul style="list-style-type: none"> <li>- Periodic assessments of safety programs and training records.</li> <li>- Periodic assessments of vehicular activity data.</li> </ul> </li> <li>• During the <u>construction phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Development and implementation of accident, injury, and "near miss" investigation procedures at all Project work sites and facilities.</li> <li>- Development and implementation of a random vehicular safety inspection program.</li> <li>- Development and implementation of a monitoring program for Project workers to:                   <ul style="list-style-type: none"> <li>+ routinely track data for accidents/injuries; and</li> <li>+ evaluate possible clustering of accidents/injuries.</li> </ul> </li> <li>- COTCO surveillance of Contractors' safety programs.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Conduct regulatory inspections of Project work sites regarding safety matters.</li> <li>• Review and comment on the Project's Occupational Health and Safety Plan.</li> </ul>

Health Topic #7  
**Accidents/Injuries (continued)**

PROJECT DESIGN FEATURES	MITIGATION PLANS	MONITORING PLANS	REPUBLIC OF CAMEROON RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>- Development and implementation of Project safety programs that comply with appropriate international standards.</li> <li>- Development and implementation of accident, injury, and "near miss" investigation procedures.</li> <li>- Development and implementation of a construction equipment maintenance program.</li> <li>- Development and implementation of a system to analyze work task risks and define required mitigation measures for that work task (<i>i.e.</i>, a "work permit system").</li> <li>- Development and implementation of emergency response plans and drills.</li> <li>• During the <u>operations phase</u> of the Project:               <ul style="list-style-type: none"> <li>- Continued implementation (and modification when necessary) of the Project's Occupational Health and Safety Plan.</li> </ul> </li> </ul>		