

ENVIRONMENTAL IMPACT ASSESSMENT

for

US CAPITAL ENERGY BELIZE LTD.

Seismic Survey – Block 19



TOLEDO DISTRICT, BELIZE, C.A.



JUNE, 2007
AN ENVIRONMENTAL IMPACT ASSESSMENT
FOR A PROPOSED OIL EXPLORATION PROJECT

TOLEDO DISTRICT
BELIZE, C.A.

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PREPARED AND PRESENTED BY:



Tunich- Nah Consultants & Engineering
Belize, C. A.

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LIST OF ACRONYMS

Asl	Above Sea Level
BNE	Belize Natural Energy
BCNP	Blue Creek National Park
BOD	Biochemical Oxygen Demand
CARD	Community Initiated Agricultural Resources Development
CEC	Cation Exchange Capacity
CITES	Convention on International Trade in Endangered Species
COD	Chemical Oxygen Demand
CO₂	Carbon Dioxide
CSO	Central Statistical Office
CZMAI	Coastal Zone Management Authority and Institute`
Dbh	Diameter Breast Height
DMRB	Design Manual for Roads and Bridges
DoE	Department of the Environment
ECP	Environmental Compliance Plan
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ES	Environmental Statement
ESTAP	Environmental, Social and Technical Assistance Program
FD	Forest Department
FPMP	Forest Planning and Management Project

GoB	Government of Belize
GPD	Geology and Petroleum Department
Ha	Hectare
H₂O	Water
IRA	Index of Relative Abundance
IUCN	International Union for the Conservation of Nature
KCB	Ketchi Council of Belize
MBCP	Mesoamerican Biological Corridors Program
MNREI	Ministry of Natural Resources, Environment and Industry
MMMC	Maya Mountain Marine Corridor
NEAC	National Environmental Appraisal Committee
NEIC	National Earthquake Information Center
NGO	Non-Government Organization
NGC	National Garifuna Council
PGD	Petroleum and Geology Department
pH	Potential of Hydrogen
pppd	Per Person Per Day
ppt	Part Per Thousand
PSA	Production Sharing Agreement
REA	Rapid Ecological Assessment
SATIIM	Sarstoon Temash Institute for Indigenous Development
SAGE	Southern Alliance for Grassroots Empowerment
SI	Statutory Instruments

SIA	Social Impact Assessment
STNP	Sarstoon Temash National Park
ToR	Terms of Reference
TMWC	Toledo Maya Women's Council
TMCC	Toledo Maya Cultural Council
TIDE	Toledo Institute for Development and the Environment
TAA	Toledo Alcalde's Association
WHO	World Health Organization

PROJECT EXECUTIVE SUMMARY

1. Introduction

The company, US Capital Energy Belize Ltd. (hereafter referred to as US Capital Energy) has obtained a concession from the Government of Belize to undertake oil exploration in Toledo and South Stann Creek District, Belize. The company signed a Production Sharing Agreement with the government on January 22nd 2001

Concession Block 19 extends from the Sarstoon River which forms the southern boundary with Guatemala to just north of Seine Bight Village and San Pablo. For the purposes of this environmental assessment the study area is limited to the area south of the Moho River and north of the Sarstoon River with the western boundary defined by protected areas to the northwest and the Guatemalan border to the west. US Capital Energy Belize Ltd has had the concession for Block 19 since 2001. This concession covers an area of 322,250 ha (795,678 acres).

US Capital Energy at the behest of the environmental community and under the guidance of the Department of the Environment has identified the need for an environmental impact assessment study of their proposed development project. This study was undertaken between March and May, 2007 based on information available in the public domain at the time of writing.

1.1 Brief Description of the Project

The project plan calls for an exploratory phase involving a series of seismic surveys on land to be followed by exploratory drilling if the results of the seismic survey warrants further investigation. If drilling is successful and petroleum deposits are found, the company intends to embark on a third stage involving extraction, transport, storage and possible processing into refined products. This environmental statement addresses only the seismic activities associated with the exploration phase.

Seismic surveying is an essential part of the whole cycle of petroleum exploration and production and is applied for regional mapping, prospect mapping, reservoir delineation, seismic modeling, direct hydrocarbon detection and the monitoring of petroleum production.

US Capital Energy intends to undertake petroleum exploration using a series of seismic tests for the purpose of acquiring seismic data. During Phase 1, a full menu of exploration-related activities will be carried out. The main focus of activity will center on the cutting of nine (9) line transects which at present will be confined to the southern portion of the concession area. This activity was in progress when work was terminated following the court injunction on the project pending the production of an Environmental Impact Assessment (EIA). As a result of this, only short portions of some lines were completed while several others have not been started. The initial work schedule for the seismic study was to cover a period of approximately seven (7) months between March 1 and September 31, 2006.

2 Legal and Institutional Framework

This EIA for petroleum exploration on Block 19 has been carried out on the basis of national legislation and regulatory guidelines established for Belize. The legislation and guidelines specify the requirements for general environmental protection and sound use of natural resources as well as protection of individual environmental components such as air, surface waters and groundwater, soils, wildlife, and vegetation from anthropogenic impacts.

The need to undertake environmental assessments is governed by Belizean law. This Environmental Statement (ES) is therefore issued in accordance with the directives of the Belize *Environmental Protection Act* of 1992 and the requirements of subsequent revisions and amendments.

Under the Belize Environmental Impact Assessment Regulations 1995 (SI No. 107 of 1995)², an environmental impact assessment (EIA) is mandatory for all aspects of the petroleum sector including oil exploration, oil production and oil refining. During the production of this ES, this law was amended and oil exploration projects now fall under Category II in which an EIA is not mandatory, however, given the sensitive nature of the habitats and the existence of the Sarstoon Temash National Park (STNP) within the project area, the instructions to prepare and present an ES was given to the developer.

3 Summary Description of the Project Proposals

Actions and planned facilities	Indicators
Preparation of the Cutlines	
Length of cutlines	Within park = 74.9 km
Land-take of cutlines	Approximately 28ha within the STNP
General characteristics of the cutlines	Nine (9) cutlines will be run from NE to SW and NW to SE. Lines will be run along a straight grid and will be approximately 1.5m width. Trees over 7cm (3inches) will be left uncut along lines. Lines should be invisible from the air and should revert back to natural vegetation cover within 2 to 3 years.
Features of the Seismic Survey	
General characteristics of the seismic study	<p>The main characteristics of the 2D seismic study are:</p> <ul style="list-style-type: none"> • Charges will be placed every 50m along cut lines • Charges will contain 1kg of charge contained in a biodegradable casing • Holes will be drilled down to 7m and will be 7cm in diameter • Casing for drilled holes will not be used except where casing in is expected • Charges will be set off by wireless remote control for security purposes and to reduce field waste • Drills will be powered by air compressors placed in trucks or boats. Each compressor will be able to provide air for up to 2km. • Geophones will be placed in the truck or boat to record seismic waves • Drills and other equipment will be manually transported to the site by workers • After explosion, holes will be covered and unexploded devices removed • Survey will avoid sensitive habitats such as internationally important sites, rivers and streams and mangrove formations.

4 Baseline Environmental and Socio-economic Conditions

4.1 Characteristics and Current Condition of Vegetation Cover and Wildlife

Vegetation

The project area has eleven (11) natural ecosystem types, some of which are found over wide areas of the country, while others are more typical of the south or exclusively confined to the south or the study area. It appears that the extremely wet conditions in the park and the high acidity of the soils have combined to produce a unique set of growing conditions that have supported ecosystems not represented elsewhere in Belize. During a Rapid Ecological Assessment (REA), a total of 386 plant species were identified within the STNP and buffer zone region.

Because they are limited to the Toledo District or have almost exclusive coverage within the STNP, the following ecosystems found in the project area must be considered vulnerable to anthropogenic disturbances:

- Tropical evergreen broadleaf lowland forest over poor or sandy soils
- Tropical evergreen broadleaf lowland forest over calcium rich alluvium
- Tropical evergreen broadleaf lowland hill forest: Calophyllum variant
- Tropical evergreen broadleaf lowland swamp forest: Permanently waterlogged
- Tropical evergreen broadleaf lowland swamp forest: Seasonally waterlogged
- Tropical evergreen broadleaf lowland swamp forest: Manicaria variant

In addition to this, the ecosystem type, Tropical evergreen lowland peat shrubland with Sphagnum bears special mention since it is the sole representative of this ecosystem type in the Mesoamerican region and because it depends on a delicate environmental/ecological balance to survive.

Wildlife

The targeted and unsustainable harvesting of game species by local residents and from cross border incursions have left a distorted food web lacking in apex predators and larger mammals as game species are removed.

Among the known mammal population there are a number of at risk or vulnerable species. These include the Manatee which moves upstream to feed in the rivers and creeks of the project area, the Black Howler Monkey and Bairds Tapir. Although the presence of the five cat species of Belize cannot be confirmed, their presence should not be discounted given the size and quality of the habitat.

Bird species of concern include the Jabiru, Wood Stork, Muscovy Duck and the Ornate Hawk Eagle as well as the Great Currasow. Although there seems to be a general depletion of the fish population they could easily rebound with a sustainable harvesting program since the habitats remain good.

The Mojarra de Oro (*Cichlasoma bocourti*) a member of the Cichlid family is only known from a small area in eastern Guatemala and southern Belize including the project area with its presence confirmed in the Temash River. Because of its small range this specie should be considered vulnerable to habitat disturbances.

To the south the project area is cut off biologically from other natural areas of Guatemala by large swaths of deforestation in the interest of agriculture. To the north and west the STNP and the forested areas around it are isolated by extensive deforestation as a result of people in the buffer zone communities (from Graham Creek north and east to Barranco) clearing land for homesteads and agriculture. Only small and increasingly isolated primary forest enclaves survive in this area although this so called deforested area is actually secondary growth forest lying fallow until the next milpa cycle.

4.2 Water Resources

The results of the investigations reveal that there is no anomalous behavior in the Moho, Temash and Sarstoon watersheds. As is normally the case, conductivity, salinity, total dissolved solids and hardness increased downstream. Phosphates levels decreased while sulphates increased downstream. The increasing hardness is attributed to the calcareous nature of the terrains of the watersheds under consideration. High phosphate levels can be attributed to the high use of laundry detergents in the communities near the sampling sites.

Groundwater quality analyses by Trumach¹ indicate that the water alkalinity (309mg/L CaCo₃, pH 6.9) and hardness (>300mg/L CaCo₃) are associated with the carbonate

formation that is prevalent in the project area. The groundwater in the Moho River watershed exceeded the 400mg/L standard for alkalinity.

US Capital Energy will incorporate into contract specifications, a requirement that the construction of access roads, and modifications to existing roads include features to minimize erosion and sedimentation due to storm-water runoff.

4.3 Waste Generation

US Capital Energy will deal with waste in accordance with the local regulations. The company will be producing some field waste during the seismic phase. The company will create a waste differential system, assigning each class of waste to a different treatment category thereby facilitating the disposal process.

Waste produced during decommissioning will be applied only to the camp site since no other infrastructure will be built. Vehicles and other machinery such as compressors and generators will produce a small amount of waste in the form of used oil and worn parts. Used engine oil will be stored on site until a disposal procedure has been approved by DOE. The proponent will develop a waste management plan that will entail solid waste, liquid waste and hazardous waste for the subsequent phases of the project as part of its environmental management plan. An educational program will also be included in the waste management plan to educate staff and management in the handling and disposal of waste generated by the project.

4.4 Energy Generation

It is anticipated that the energy demand for the seismic phase will be minimal as it will only be required to power electrical equipment such as the compressor and for lighting. Since the seismic activities will be carried out in remote locations it will be necessary to provide power by both diesel and gasoline generators. The diesel generators will be used to power the seismic equipment including computer hardware and the respective camps (if they are required).

Once in operation, the project proponent will ensure that all the generators are properly serviced and that there is no spill on site. The generators will be enclosed by containment booms. The fuel will be stored in a 500 gallon tank with bonded secondary containment.

4.5 Geological and Hydrological Setting

Geological Setting

The *Coban Formation* is the oldest lithostratigraphic unit which is found only in the subsurface of the STNP and is encountered from 698 feet down to 9274 feet below the surface. Materials found included Limestone, dolomite and anhydrite (an evaporite mineral like gypsum).

The Coban formation is overlain by the *Campur Formation*, of the late Cretaceous (Campanian-Maastrichtian) period. The formation is comprised of dense, white, often thickly bedded and fossiliferous, limestones.

Apart from the small area of Campur Formation limestones at Midway Quarry the entire project area is covered by the Toledo Formation. The early Tertiary *Toledo Formation* (Paleocene-Eocene) is younger than the Campur Formation and comprises mainly thinly bedded siliciclastic sediments.

The proposed project site is located west of the Polochic Fault Zone which runs between the Honduran coast and Belize. This is a major fault system within the region, however it is generally inactive. Although located in the most seismically active area of the country, the project site itself is not located on a fault.

Hydrological Settings

The surface drainage systems (rivers and creeks) within the project area show both eutrophic and mesotrophic qualities depending on the season. The sedimentary rocks of the Toledo Formation (clays, sandstones, siltstones and limestone conglomerates) which covers most of the project area appear to form the only shallow aquifers in the project area. Limestone belonging to the Campur formation which is mostly underneath the Toledo Formation is dubious as a potential source for groundwater since water from reservoirs of this type tends to leak out due to rock porosity and underground channels.

4.6 Transportation

Access from Punta Gorda Town into the Southern region of the Block 19 concession area will be along the Southern Highway up to the village of Jacintoville. At Jacintoville the highway is joined by a dirt road with one branch leading to Barranco via Midway Village while the other branch passes through the villages of Conejo and Sunday Wood terminating in Crique Sarco on the bank of the Temash River.

US Capital Energy will use the existing road network as access road into the main areas of its concession. The majority of the cut lines will cross these roads and will be accessible from them. During Phase I (Exploration Phase) there will be the need to facilitate access for crews who will be working on the gathering of seismic data. In most cases equipment for the crews will be transported by tractor-drawn trailers (except in the park where vehicles are not allowed) with maximum use made of existing cut lines and logging roads.

Crews preparing the cut lines will commute to the work site on a daily basis and travel along the cut lines on foot. When the routes will allow them to go no further, crews will manually transport the portable drilling machines and other equipment to the site.

The presence of the Temash and Sarstoon Rivers will present an opportunity to move men and equipment by boat to connect to the cut lines. This mode of transport will be preferred while the crew is collecting data in the Sarstoon Temash National Park, which because of the high protection category conferred by its designation, should be minimally disturbed.

4.7 Noise and Vibration

This assessment examined the effect of seismic activity and drilling for all properties within 300m band of the cut lines and to compare this impact with existing noise levels at these locations in terms of a change in noise level and potential nuisance.

In general, cut lines have avoided communities and populated centres entirely, however cut line SA-06-15 passes through the north-western end of Midway Village (population 247) and cut line TE 06 03 passes through the SW end of Crique Sarco.

The communities in which the measurements were taken had relatively low ambient noise levels compared to a more urbanized setting and typical of a low technology rural environment. The high reading (L_{Amax}) was almost always attributable to motor vehicles passing on the road but these occurrences were infrequent and sporadic.

In assessing the noise level and potential nuisance, it is necessary to predict the noise levels due to the controlled explosions that will be used during the seismic testing and which may involve a large number of detonations being set off simultaneously according to the technical requirements of the site geologist.

The reason for the low noise level is on account of the fact that the hole for the charge is drilled down to a distance of approximately 7m after which the charge is placed and the hole above it compacted. As a result of this approach the noise from the explosion is muffled above ground and attenuated by the earth barrier and moisture within the ground.

4.8 Socio-economic Aspects

Socio economic impacts will include impact of cut lines on farmlands within Reservations, national lands, leased lands and private properties. In addition, impacts will be created by the set up and operation of camp sites and increased vehicular movement during seismic phase, degrading local roads and increased air pollution due to exhaust fumes and dust. The project will create temporary needs for housing at various sites and at nearby villages and increased population density in the area straining local resources and the capacity of village institutions to cope.

4.9 Cultural and Historical Aspects

The surveys did not produce any remains of archaeological and/or colonial remains. Although the surveys did not produce any remains of archaeological and/or colonial remains, the developers are to be mindful of remains that might be underground. Should any remains of archaeological and/or colonial occupation be unearthed, the operation should be suspended, and the information brought to the attention of the Institute of Archaeology for action and further instructions.

5.0 Proposals for Environmental Monitoring

During the seismic phase it will be necessary to carry out the following types of monitoring in coordination with the relevant land management and environmental protection agencies:

- Monitoring of the condition of surface and underground waters, including:
 - Monitoring of the drinking water quality;
 - Monitoring of potentially polluted underground water with the aid of a network of observation wells;
- Monitoring of vulnerable and at risk wildlife will follow in the subsequent EIA covering the drilling and extraction phases since few impacts to flora and fauna are expected during the seismic phase:

ⁱ Trumbach MSPH ENHS, Denise , ANALYSIS OF GROUNDWATER QUALITY AND MONITORING PROGRAM OF THE PUBLIC HEALTH BUREAU OF BELIZE, PAHO/MASICA/PROAGUA, PAHO/BLZ/94.1HPE, OCTOBER 1994