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## CHAPTER 5

### WASTE MANAGEMENT

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#### Overview

Belize Natural Energy Limited will be producing waste as a result of its proposed activities. This process will involve the construction of access roads and drilling pad, installation and operation of the drilling rig and exploitation or production process which will include the installation of the pipeline.

The main wastes of environmental concerns associated with oil and gas production are the field waste, domestic waste and the drilling waste. The wastes will be categorized according to the different phases and include both solid waste and liquid waste. Drilling or Operation waste will refer to the waste produced during the drilling process which includes the installation of the drilling rig, its operation, the production process and its subsequent decommissioning.

#### 5.2 Waste Classification

An essential component in the management of waste is the proper mechanism to classify the waste produced. BNE intends to create a differential system, assigning each class of waste to a different treatment category. The waste produced by the proponent will be categorized as follows:

1. Field waste (Waste Category I)
2. Domestic and Liquid Waste (Waste Category II)
3. Drilling Waste (Waste Category III)

The proposed BNE projects will be producing solid waste in both its drilling and production phases. These wastes will be categorized according to the above nomenclature and will consist of further sub categories. It is important to note that waste produced as category III will be managed adequately at each of the sites. This and other disposal alternatives will be discussed further in this chapter.

#### 5.3 Waste Category I - Field Waste

It is difficult to predict how much field waste will be produced as a result of the developmental drilling phase. Suffice to say that during this stage; almost all of the field waste will come primarily from the land clearing process. This will involve the construction of the access roads, site expansion as well as the installation of the required pipelines, most notably the San Marcos pipeline. The remaining field waste will be produced as a result of the installation of the infrastructure required for the production process. This includes any concrete works at the well sites.

All of the well sites will require a road to access the site. The two San Marcos wells, however, will require the construction of a road measuring 1.36 km. This is largely due to the site inaccessibility. The impact will be minimal as the proposed route is classified as agricultural land. The Spanish Lookout wells will also require a road access; nevertheless, these access roads will be similar to the other wells in the area. In both instances, minimal land clearing will be taking place (See Chapter 8).

Less than 1 acre of cleared land will be required for site expansion and well installation. This will involve the removal of the top soil in order to fill the area with site base materials. Minimal land clearing will also take place during the pipeline installation. This is inclusive of the San Marcos wells where the proposed pipeline route is mostly farm lands with small tracks of forest. It is anticipated that 3.4 acres will be cleared for the 1.4 km pipeline.

It is commonly assumed in building construction that between 5-10% of all building materials will eventually be discarded as waste and purchasers will normally allow for this. Beside the usual scraps and discards common to construction sites generally, the development must also get rid of wrappings and packing, which will be considerable given the amount of building materials and finishing which will be imported.

Construction waste will include concrete wastes, casing materials, piping and wires among others. It is estimated that 1 – 1.5 yd<sup>3</sup> of compact waste materials could be produced on an average construction work day. This volume will gradually decrease as the phase nears its completion.

During the decommissioning process, all the impacted areas (access roads, development well, pipelines route) will be reclaimed to their original state. Access roads, if so desired by the land owner, can remain as is and serve other uses. The decommissioning of the developmental wells will result in minimal waste production as all the equipment can be resold. The pipeline removal is optional as it entails the re-disturbance of an impacted area.

#### **5.4 Category II – Domestic Waste**

BNE will be producing domestic waste whilst undertaking the drilling and production phases. This waste, according to the Belize Solid Waste Management Project (Stantec, 2000) and the Central Statistical Office, 2000, estimate that domestic waste is comprised of organic (60%), while the remaining consists of metals, plastics; glass, other waste (5%) and paper comprises 20%. The following sections summarize the production capacities at the well sites during the different process and which is summarized in Table 5.1.

#### 5.4.1 Domestic Waste produced during Drilling

During the drilling phase, very little domestic waste will be produced as indicated in table 5.1, the volume of domestic waste produced by the different crews will range from 30 to 39 lbs/person/day. A factor of 3.0 (National District Average) was used as the workers are only temporary.

#### 5.4.2 Domestic Waste produced during Site Operation

The volume of waste produced upon production of the wells will be nil at the sites as the production operations will occur at the Iguana Creek Facility. No BNE personnel will be stationed at the well sites.

**Table 5.1** Domestic Waste generated during Development

#	Infrastructure	Phase	Average Workers	Wastewater Production	
				Unit (lbs/p/day)	Domestic Waste (lbs/p/day)
A	Development and Site Construction	Drilling	10	3.0	30
		Drill Site Prep	13	3.0	39
		Facility Const.	10	3.0	30
<b>Total</b>			<b>33</b>		<b>99 lbs/day</b>

### 5.5 Category II - Liquid Waste

The liquid waste generated at the project sites will be limited to only domestic liquid wastes. Other liquid waste produced during the drilling process has been classified as drilling waste for the purpose of this EIA. The following sections summarize the nature of the wastewater.

#### 5.5.1 Domestic Liquid Waste Produced during Drilling

Little domestic waste will be produced in this phase. Domestic liquid waste in this section is simply characterized as typical wastewater produced by a household and which includes personal hygiene and other uses. It is uncertain to calculate the daily wastewater volume, but needless to say BNE will utilize portable toilets and waste carted away by tanker trucks to an approved disposal site.

Indirect liquid waste associated with the project includes storm water runoffs and emergency cases such as a fire outbreak and the miscellaneous water use such as washing and rinsing of equipment.

#### 5.5.2 Domestic Liquid Waste Produced During Exploitation

No direct liquid waste will be produced during this stage as no on site personnel will be kept on site. The pipeline once completed will be maintained only by frequent inspection.

## **5.6 Category III –Drilling Waste**

The drilling waste that is produced as a result of the developmental (drilling) stage will be limited to the drilling muds (bentonite), borehole and water. The latter is used to facilitate the drilling process and to fracture the well. The following summarizes the drilling waste.

### **5.6.1 Waste produced during Drilling**

Dewatering of the drilling mud (mud and water) and its recycling will occur at the Iguana Creek facility. The produced water, when it is associated with the crude oil production, will also be separated at the Iguana Creek Facility where it will be temporarily stored in four 500 bbl tanks, before it is transferred by pipeline to the Mike Usher #6 well to be injected back into the geology formation. As such, wastewater produced is not expected to adversely impact the receiving environment.

### **5.6.2 Hazardous Waste Produced During Drilling**

It is anticipated that the only source of hazardous waste produced during the drilling process will come from spills and contaminated soils. BNE has implemented a set of mitigative measures to deal with this issue if this takes place. BNE will place spill contingency kits to contain and control the spills. The absorbent materials along with any contaminated soil will be classified as hazardous materials. . It is also difficult to predict the volumes that will be produced that are classified under this category. It is also imperative to surmise this important point in the ECP, as this volume can be obtained yearly.

### **5.6.3 Decommissioning Waste**

As described earlier, most of the decommissioning waste will include valuable equipment (pumping jack, ancillaries, and pipes) that can be resold. Therefore, during the decommission phase, it is estimated that no potential impact will result.

## **5.7 Disposal Options**

BNE will explore and evaluate disposal alternatives and options in order to address this important issue. Being an environmentally oriented company, BNE will seek to address each issue according to the best available technology in Belize. The following sections describe the alternatives that will be evaluated and implemented in order to safely address this issue of concern.

### **5.7.1 Solid Waste Disposal Options**

The solid waste disposal options for BNE are an important and integral part of the overall environmental management scope. In considering the options or alternatives, the

company seeks to have an overall objective: to carry out this activity in a safe and environmentally friendly manner. The following bullet points describe such disposal alternatives and options.

(i) **Category I:**

As mentioned before, very little field waste will be produced on site. Much of this will be left on site or used as landfill for either the company's purposes or if so required by the villagers in improving their land. This waste will consist mainly of cleared vegetation cover mixed along with some soil matter, construction rubble along with scraps. If so desired, the field waste and some construction waste (combustibles) will simply be transported to the dump site as these would pose no direct adverse effect on the land, water or air. All the non combustibles waste will be used as fill material and/or taken to the designated village dumpsite as well. In the case of the pipeline, the field waste will simple be allowed to settle along the cleared route and serve as nutrients for other nearby vegetation.

(ii) **Category II:**

The domestic waste produced during both phases will vary depending on the different sub-phases of each particular phase. In terms of the solid waste, the variation will be in the order of 3 lbs per day to 6 lbs per day or less than a cubic foot per day. In considering the volume, all waste produced as a result of these activities will be dealt with properly and includes the disposal of the waste at a designated dumpsite in the villages or central facility. Further processing of the waste can be applied by BNE and this would include solid waste classification either into organic or inorganic, combustibles and non combustibles or whatever nomenclature designated by the relevant authorities. Nevertheless, BNE will exercise all its possibilities to best suite the operation.

(iii) **Category III:**

The waste disposal option for that produced during the operation phase is outline in the Environmental Impact Assessment report for the Iguana Creek Facility.

### **5.7.2 Liquid Waste Disposal Options**

Some liquid waste, remaining drilling mud will be produced on site during the drilling process. Domestic liquid waste will also be produced as a result of the operating crew and staff. This will be addressed as follows:

(i) **Category I:**

The domestic waste generated by drilling phase will be properly managed by BNE. This includes the treatment of gray water produced. During the drilling phase, portable latrines from service providers will be used. Wastewater collected in the portable latrines will be dealt with by the service contractor.

(ii) **Category II:**

Hazardous liquid waste will be separated by an oil water separator and a dewatering unit located in the Storage Facility. No hazardous liquid waste will be produced during operation.

**5.8 Waste Management Procedures**

BNE will develop a waste management plan that will entail solid waste, liquid waste and hazardous waste. These management tools will be a part of the environmental management system. The following are points that will be a part of the waste management plan.

**5.8.1 Collection Overview**

The collection waste produced on site will be divided and varied at times to best suite the waste generation process. Nevertheless, the issue of collection of these wastes will be carried out. In the case of solid waste, all the waste will be transported to the dumpsite for disposal. Carting out of the solid waste will be done whenever possible or when a complete load has been accumulated.

Liquid waste will be dealt with in the same nature and will be under more strict conditions. Oil water separator as well as a water settlement pond is at the Iguana Creek site that will be used to treat any water that may be contaminated with oil residue. The water quality of which will be monitored to meet the required standards.

**5.8.2 Educational Program**

An educational program will also be included in the waste management tool. This program will inform and educate the staff and management as to the collection, handling and disposal of the waste generated as a result of operation as well as its importance. This educational program will be expanded also to encompass new employees as well as visitors and contractors to the site. It is important to reach and communicate with every one associated with the company in some sort and fashion.

**5.8.3 Reporting Requirements and Compliance Monitoring.**

All relevant information will be made available to the pertinent authorities such as the Department of the Environment (DOE), Public Health Department (PHD), Central Statistical Office (CSO) and the Geology and Petroleum Department (GPD) to name a few. Belize Natural Energy Limited will ensure that all contractual obligations, if any, are fulfilled at all times, and any guidelines and the monitoring of these guidelines and practices will be done internally, wherever possible. Any gross violations requiring notification to the enforcement authorities will be done as soon as possible.