# Proposal for:

# Behchokò Landfarm Remediation 2011


***Prepared for:***
Behchokò Community Government
PO Box 68
Behchoko, NT
X0E-0Y0

***Prepared by:***
Aboriginal Engineering Ltd.
PO Box 133
Unit 20 Stanton Plaza, 100 Borden Drive
Yellowknife, NT
X1A-2N1

April 8, 2011
Proposal No.: 75-62-NT-11

# TABLE OF CONTENTS

# 1 INTRODUCTION

Aboriginal Engineering Ltd. (AEL) is pleased to offer to the Community Government of Behchokò the following proposal for the Environmental Remediation of the Petroleum Hydrocarbon (PHC) Landfarm situated on the old Behchokò Landfill site.

AEL is highly experienced in environmental work, including performing detailed Environmental Site Assessments (ESA), developing remediation plans, and carrying out remediation work. Project team members are aware of the importance of conducting environmental assessments that are scientifically and statistically defensible. As such, AEL will ensure a Quality Assurance and Quality Control program for the project is in place prior to performing Work.

# 2 OBJECTIVES

In the fall of 2004, AEL was contracted to build a landfarm at the Behchokò landfill. The landfill site the landfarm is situated on has reached the end of its life-cycle and its capacity and as a result has been closed down and barriers have been erected for a no entry zone. A new landfill site was proposed, approved and has since been relocated to a lot adjacent to the old landfill site. This new site has a new access road and the landfarm area within the old site is not accessible.

One of the disadvantages discussed when the landfarm site was first being analyzed for the location of the landfarm was that it could potentially interfere with the closure of the dump if the soils within the landfarm do not meet the GNWT industrial standards within its lifetime. That scenario is now upon us as the landfarm has not successfully remediated anymore contaminated soil that it was designed for, as the suggested maintenance activities that was outlined by AEL was not followed.

AEL has now been contacted by the Community Government of Behchokò to provide a proposal to remediate the landfarm. AEL has proposed a comprehensive solution with the following soil remediation approach which will be discussed further below.

Further below is a brief summary of the past uses of the landfarm that led to its current state.

# 3 SITE DESCRIPTION

The landfarm is an engineered landfarm that was constructed using intermediate plastic clay (CI) for both the base and berms which has very low permeability to ensure containment. In order to minimize permeability, lifts were used, with care taken to maximize their compaction. After the landfarm was completed on Wednesday, October 6th, 2004, the contaminated soil from the proposed location of the Water Treatment Plant Facility was placed in the landfarm enclosure for remediation. This process was completed on October 12th 2004. The landfarming process requires regular maintenance in order to be effective; suggested maintenance activities were outlined in the final report.

During the course of the landfarm's operation, third parties have altered the site and the suggested maintenance activities were not followed; both actions have negatively affected the landfarms effectiveness. The enclosed area inside the berms has been filled with various unknown hydrocarbon contaminated materials. There is standing water in the enclosed area of the landfarm and the contaminated water is almost cresting over the berms and the landfarm is unable to contain all the new material. This was seen during AEL's initial assessment of the site in May of 2009. Also in May 2009, an excavator was sent to the landfarm site by the community and began adding a one metre layer of sand to the existing berms in order to increase the landfarms freeboard (the vertical distance between the top water level and the crest of the berm). This increased the freeboards height, but sand is not an appropriate material to prevent hydrocarbon leaching.

# 4 PAST PROJECT SUMMARY

In the fall of 2004 a water treatment plant facility was proposed in Behchokò and Aboriginal Engineering Ltd. (AEL) was contracted to do an analysis of the site for potential soil contamination prior to its construction. An initial investigation of the site of the Water Treatment Plant Facility showed hydrocarbon contamination which AEL had removed. To remediate the discovered contamination, a landfarm was constructed on the Community of Behchokò Landfill site and the contaminated material was transported to it for remediation.

The construction of the landfarm was completed in the fall of 2004, with the contaminated material being placed in it right away. AEL recommended actions to be undertaken by the government agency responsible for maintaining the landfarm at the end of the final report issued for the project. In the landfill constructions final report, maintenance activities were outlined that needed to be followed to ensure satisfactory remediation of the contaminated soil. None of the suggested activities were followed, and the landfarm fell into disarray, eventually becoming a dumping ground for more hydrocarbon contaminated material and physical debris. It appears that third parties have been using the facility as a dumping ground for various waste, many Petroleum Hydrocarbon (PHC) related, as well as contaminated water. Undertaking these actions at the recommended intervals would have both: (1) increased the rate of biological mineralization of the PHC soil constituents; and (2) decreased the risk of PHC impacted run-off leaving the limits of the landfarm.

The landfarm has now reached a critical point as it has been filled past its designed capacity, with standing water located on the site ready to crest over its berms. In an attempt to control such overflow, sand had been placed on top of the berms by the community; however, sand is a somewhat permeable substance that is not effective against preventing water spread.

In May of 2009, AEL had soil and water samples processed by Taiga Environmental Laboratory to determine the extent of contamination. The results of tests showed higher than acceptable concentration levels in both the soil and water samples (results are shown in tables below).

## 4.1 Past Laboratory Analysis

In May of 2009, samples were sent to Taiga Environmental Laboratory (Taiga Lab) for independent analysis. Taiga Lab is accredited by the Canadian Analytical Laboratories Association (CALA) as a testing lab for specific tests registered with CALA.

All samples analyzed had their locations mapped and a detailed topographic map of the berms was also drawn up.

### 4.1.1 Past Soil Sample Results

In May of 2009, samples were sent to Taiga Lab for analysis.

The samples analyzed and summarized in the table 1 below was tested for Extractable Hydrocarbons in soil, and the analysis determined the carbon range of C11 to C40 in the sample. C11 to C40 detects that gasolines, kerosenes, gas oil (furnace oil and diesel oil), and lubricating oils and greases are in the sample.

The results for soil samples are as follows:

Table 1: Soil Sample Results (Petroleum Hydrocarbons)

| Sample ID | Test Parameter | Result (mg/kg) | Method Detection Limit (mg/kg) | Analysis Date | Analytical Method |
|---|---|---|---|---|---|
| 001-701 | Extractable Hydrocarbons in Soil | 271 | 10 | 25-May-09 | CCME CWS-PHC |
| 002-702 | Extractable Hydrocarbons in Soil | 496 | 10 | 25-May-09 | CCME CWS-PHC |
| 003-703 | Extractable Hydrocarbons in Soil | <10 | 10 | 25-May-09 | CCME CWS-PHC |
| 004-704 | Extractable Hydrocarbons in Soil | 1440 | 10 | 25-May-09 | CCME CWS-PHC |
| 005-705 | Extractable Hydrocarbons in Soil | 46 | 10 | 25-May-09 | CCME CWS-PHC |
| 006-706 | Extractable Hydrocarbons in Soil | <10 | 10 | 25-May-09 | CCME CWS-PHC |
| 007-707 | Extractable Hydrocarbons in Soil | 1930 | 10 | 25-May-09 | CCME CWS-PHC |
| 008-708 | Extractable Hydrocarbons in Soil | 346 | 10 | 25-May-09 | CCME CWS-PHC |
| 009-709 | Extractable Hydrocarbons in Soil | 3890 | 10 | 25-May-09 | CCME CWS-PHC |
| 010-710 | Extractable Hydrocarbons in Soil | 2560 | 10 | 25-May-09 | CCME CWS-PHC |
| 011-711 | Extractable Hydrocarbons in Soil | 1290 | 10 | 25-May-09 | CCME CWS-PHC |
| 012-712 | Extractable Hydrocarbons in Soil | 19100 | 10 | 25-May-09 | CCME CWS-PHC |

# 5 REGULATORY FRAMEWORK

The following guidelines and standards will be applied to the site.

- Canadian Council of the Ministers of the Environment (CCME) Canadian Soil Quality Guidelines for the Protection of Environment and Human Health (1999, last updated 2007)

- CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG, last updated 2007)
- CCME Canadian Sediment Quality Guidelines (1999, updated 2002)
- CCME Canada Wide Standards for Petroleum Hydrocarbons in Soil (PHC CWS in Soil, updated 2008) will be applied to results obtained from the site.
- Environmental Guideline for Contaminated Site Remediation (GNWT, Environment and Natural Resources, November 2003)
- Environmental Guideline for General Management of Hazardous Waste (GNWT, Environment and Natural Resources, February 1998)

Canadian Council of Ministers of Environment (CCME) has established Canada-Wide Standards for Petroleum Hydrocarbons in Soil (PHC CWS) in which they have classified PHC into 4 Fractions which is now a remedial standard which will be applied to the site. The 4 Fractions are further broken down into carbon ranges. An accredited lab will determine carbon ranges in a sample submitted and the carbon ranges detected during analysis are associated with certain petroleum products.

Below are the 4 fractions with their associated lab analysis parameter that was standardized by CCME.

**Table 2: Four Fractions standardized by (PHC CWS)**

| Carbon Range | Lab Analysis |
|---|---|
| C6-C8 | BTEX analysis |
| C5-C12 | Purgeable Hydrocarbons |
| C11-C20 | Common Polyaromatic Hydrocarbons (PAHs) |
| C11-C40+ | Extractable Hydrocarbons |

'Total Petroleum Hydrocarbon' parameter requested at a lab will determine if all of the products listed above are present in the sample.

Below are the carbon ranges with their associated PHC product that a lab will be able to detect.

- **Carbon Range** — **Petroleum Product**
- C1-C6 — natural gas, liquefied gas, fuel gas, solvents
- C5-C12 — gasolines
- C7-C16 — kerosenes
- C8-C22 — gas oil (furnace oil, diesel oil)
- C16-C40 — lubricating oils and greases
- C20-C60+ — heavy fuels (waxes + bottoms, waxes, road oils, asphalt)

The Canada-Wide Standards for Petroleum Hydrocarbons in Soil specifies standards for assessment and management of PHC contaminated sites. These standards is based on the assessment and consistent management of risks posed to human, plants, animals and environmental processes under four common uses of land (agricultural, residential/parkland, commercial, and industrial). The standard is laid out in 3 tiers, which incorporate different amounts of site specific information. Environmental and human health protection goals do not change between the tiers. Tier 1 levels are used when the proponent accepts the base assumptions and parameters. Tier 2 levels may be generated and used when site conditions exist that significantly modify the exposure and risk scenarios. Tier 3 levels are based on site-specific assessment and management of risks. Additional site specific information available at Tiers 2 and 3 is used to manage risks through more precise knowledge of actual or potential exposure.

For the remediation of the landfarm soils, AEL will adhere to the Tier 1 levels for the different land uses as recognized in Table 3: Summary of Tier 1 Levels (mg/kg) for surface soil as stated further below.

Upon contract award, AEL will collect soil and water samples collected from within the landfarm and submit to Taiga Lab for PHC characterization. AEL will request for the soil sample to be analyzed for the CCME Package which includes the following parameters: Percent Moisture content, BTEX and F1-BTEX, Fraction 2, Fraction 3, Fraction 4, and Gravimetric Heavy Hydrocarbons (C34-C50+). These preliminary test results will be used to determine which Tier 1 Levels for surface soil to adhere to. Once characterized, AEL will start landfarming and perform periodic field testing with the PetroFLAG analyzer at specified intervals for the PHC fraction(s) predetermined as a result of the characterization sample results. For every 10 field samples analyzed, one confirmation sample will be sent to Taiga Lab to be analyzed for the Total Petroleum Hydrocarbon testing parameter. One duplicate sample for every 10 samples analyzed will also be field analyzed with the PetroFLAG analyzer, this will be a random sample within a lot of 10 samples. The field testing results will determine if biodegrading of the soil contaminant has gone below the guideline limits specified in Table 3 below. The QA/QC

## 5.1 Tier 1: Numerical Levels for Different Land Uses

The environmental and human health protection goals of the Landfarm site are stated in the Tier 1 levels for different land uses in the table below.

**Table 3: Summary of Tier 1 Levels (mg/kg) for surface soil**

| Land Use | Soil Texture | Fraction 1 (C6-C8) | Fraction 2 (C5-C12) | Fraction 3 (C11-C20) | Fraction 4 (C11-C40) |
|---|---|---|---|---|---|
| Agricultural | Course-grained soil | 30[b] | 150 | 300 | 2800 |
| | Fine-grained soil | 210 (170[a]) | 150 | 1300 | 5600 |
| Residential/Parkland | Course-grained soil | 30[b] | 150 | 300 | 2800 |
| | Fine-grained soil | 210 (170[a]) | 150 | 1300 | 5600 |
| Commercial | Course-grained soil | 320 (240[a]) | 260 | 1700 | 3300 |
| | Fine-grained soil | 320 (170[a]) | 260 (230[a]) | 2500 | 6600 |
| Industrial | Course-grained soil | 320 (240[a]) | 260 | 1700 | 3300 |

| | | | | | |
|---|---|---|---|---|---|
| | Fine-grained soil | 320 (170[a]) | 260 (230[a]) | 2500 | 6600 |

**a** = Where applicable, for protection of potable groundwater
**b** = Assumes contamination near residence
**Course** = course-textured soil having a median grain size of >75 µm as defined by ASTM
**Fine** = fine-textured soil having a median grain size of ≤ 75 µm and defined by ASTM
**( )** = Levels within parentheses do include protection of groundwater, and levels without parentheses do not include consideration of the soil-to-groundwater contamination pathway

# 6 REMEDIATION METHODOLOGY

AEL has the following remediation approach to propose with respect to the landfarm situated on the old landfill in Behchokò.

AEL proposes to remediate the PHC impacted soils in-situ within the existing landfarm situated at the old landfill area in Behchokò. The in-situ method of landfarming PHC impacted soils will reduce concentrations of petroleum constituents through biodegradation. This will be achieved through biodegradation. This involves disturbing the contaminated soils by excavating contaminated soils and reapplied back onto the ground surface of the landfarm to stimulate aerobic microbial activity within the soils through aeration and/or the addition of mineral, nutrients, and moisture. The enhanced microbial activity results in degradation of adsorbed petroleum product constituents through microbial respiration.

Landfarming has been proven effective in reducing concentrations of nearly all the constituents of petroleum products and range from those with significant volatile fractions, such as, gasoline, to those that are primarily non-volatile, such as heating and lubricating oils. Therefore is AEL's preferred method of soil remediation of petroleum hydrocarbon contaminated soils.

## 6.1 Application

As there are various PHC substances within the landfarm and petroleum products generally contain different constituents that possess a wide range of volatility, AEL identifies that in general, gasoline, kerosene, and diesel fuels contain constituents with sufficient volatility to evaporate from a landfarm.

Lighter petroleum products such as gasoline will be removed by evaporation during landfarm aeration processes and, to a lesser extent, degraded by microbial respiration. This phase of PHC is usually at the surface of the soil.

The mid-range hydrocarbon products (e.g. diesel fuel, kerosene) contain lower percentages of lighter more volatile constituents than does gasoline. Biodegradation of these petroleum products is more significant than evaporation. This phase of PHC is usually at the middle of the different soil layers.

Heavier non-volatile petroleum products such as heating oil and lubricating oils do not evaporate during landfarm aeration; the dominant method that breaks down these petroleum products is biodegradation. However, heavier phase petroleum constituents such as those found in heating and lubricating oils, and, to a lesser extent, in diesel fuel and kerosene, require a longer period of time to degrade than do the constituents in gasoline. The heavier phase of PHC is usually at the bottom of the landfarm soil layers and does not easily volatize. As a result of the different PHC impacted soil layers within the landfarm, the below enhanced remediation method will be proposed.

## 6.2 Operation Principles

The soil within the landfarm will naturally contain large numbers of diverse micro-organisms including bacteria, algae, fungi, protozoa, and actinomycetes. In well drained soils, which are most appropriate for landfarming (AEL will build a sump within the berm of the landfarm to promote drainage), these organisms are generally aerobic (presence of air) verses anaerobic (the absence of air and in which microbial decay is halted or greatly slowed, these environments are typically water logged or deeply buried under very fine grained sediments and lead to the preservation of organic materials). Of these organisms, bacteria are the most numerous and biochemically active group, particularly at low oxygen levels.

The effectiveness of AEL's landfarming depends on parameters that may be grouped into 3 categories:

1. Soil characteristics
2. Constituent characteristics
3. Climatic conditions

Soil texture affects the permeability, moisture content, and bulk density of the soil. To ensure that oxygen addition (by rototilling with the Allu bucket as stated further below), nutrient distribution, and moisture content of the soils can be maintained within effective ranges, texture of the soil will be taken into consideration. For example, soils which tend to clump together (such as clays) are difficult to aerate and result in low oxygen concentrations. It is also difficult to uniformly distribute nutrients throughout these soils. They also retain water for extended periods following a precipitation event.

The volatility of contaminants proposed for treatment by landfarming is important because volatile constituents tend to evaporate from the landfarm, particularly during tilling or plowing operations, rather than being biodegraded by bacteria.

The existing landfarm situated within the old landfill in Behchokò is uncovered and, therefore, exposed to climatic factors including rainfall, snow, and wind, as well as ambient temperatures. Rainwater that falls directly onto, or runs onto, the landfarm area will increase the moisture content of the soil and cause erosion. During and following a significantly precipitation event, the moisture content of the soils may be temporarily in excess of that required for effective bacterial activity. On the other hand, during periods of drought, moisture content may be below the effective range and additional moisture may need to be added. Erosion of landfarm soils can occur during windy periods and particularly during tilling or plowing operations. Wind erosion will be limited by applying moisture periodically and ensuring over saturation has not occurred to inhibit biodegradation.

AEL has taken into account all the operation principles stated above and has designed a remediation plan that will be implemented in the manner stated in the System Design and Implementation plan stated below.

## 6.3 System Design and Implementation

AEL's Landfarm System Design and Implementation will include: site preparation (clearing and grading); berm inspection; leachate collection and treatment systems; soil pre-treatment methods (shredding, blending and amendments for fluffing, pH control); and enclosures.

AEL acknowledges that access to the landfarm is an issue as well as a barrier was placed at the entrance to the landfill for a no access zone to the old landfill. In order to access heavy equipment to the landfarm area and a laydown area for the treated clean soil, AEL proposes to clear an area within the landfarm for a heavy equipment turn-around-area and a laydown area within a portion of the landfarm.

Also the physical debris will be removed from within the landfarm.

Once work has been started on the landfarm, AEL would like to propose putting up a perimeter fence around the landfarm area in order to stop future tipping of materials into the landfarm whether they are hazardous or non-hazardous material. AEL has drawn up a proposed landfarm design, as follows.


PROPRIETARY INFORMATION: THIS DRAWING IS THE PROPERTY OF THE COMMUNITY GOVERNMENT OF BEHCHOKO AND IS NOT TO BE LOANED OR REPRODUCED IN ANY WAY WITHOUT THE PERMISSION OF THE COMMUNITY GOVERNMENT OF BEHCHOKO.

STAMP/SEAL

APPROVED FOR CONSTRUCTION

| | | |
|---|---|---|
| CLIENT PROJECT MGR. | ENGINEERING MGR. | R.E.J. PROJECT MGR. |
| PROJECT NAME: BEHCHOKO LANDFILL DESIGN | | |
| PROJECT NO. 75-62-NT-11 | ACTIVITY NO. | PACKAGE CODE |
| Scale N.T.S. | | D/M/Y |
| | drn. bchll | April 7, 2011 |
| | chk. | |

COMMUNITY GOVERNMENT OF BEHCHOKO

SUBJECT: Existing Landfarm Layout at Existing Old Landfill Site

DRAWING NO. 75-62-NT-11-01 REV 0

AEL will construct a sump collection system on a corner of the perimeter berm of the landfarm for a leachate collection system. The leachate collected in the sump will be pumped to the treatment system. The standing water within the landfarm will also be pumped out to an oily water separator in which it will separate the oil from the water. The water will then be directed to a carbon treatment system in order to remove contaminants and heavy metals from the water and the oil will be captured and sent off for disposal at a hazardous waste disposal facility in Yellowknife (KBL Environmental Ltd). Once the water has gone through the treatment train, AEL will send composite samples of the treated water to Taiga Lab for testing of the discharge criteria parameters as well as the CCME Guidelines for Freshwater Aquatic Life. If testing has determined that the sample cannot be discharged, AEL will run the water through the treatment train again and analysis will be done to determine discharge.

AEL proposes to landfarm the PHC impacted soils within the existing landfarm as it is an engineered landfarm built with intermediate plastic clay to stop leaching, as this will cut down on cost significantly as building of the landfarm is already done.

Landfarming will be proposed to reduce the petroleum hydrocarbon levels in soil via volatilization, biodegradation, and photo degradation. Landfarming is a bioremediation treatment process that will be performed in the upper soil zone. Fertilizer will be mixed and blended into the soils and periodically turned over or tilled to aerate the mixture. AEL's land treatment is designed to optimize degradation of the PHC impacted soils with the use of organisms that degrade the PHC. We will monitor the remedial work and control the following variables affecting bacterial growth which can result in greater concentrations of bacteria and consequently, increased rates of degradation.

- Nutrient levels
- Moisture content
- Oxygen supply

To support bacterial growth, AEL will ensure that the pH level of the soil will be within the 6 to 8 range, with a value of about 7 (neutral) being optimal. Soils with pH values outside this range prior to landfarming will require pH adjustment prior to and during landfarming operations. Soil pH within landfarm will be raised through the addition of lime and lowered by adding elemental sulphur.

Soil microorganisms require moisture for proper growth. Excessive soil moisture, however, restricts the movement of air through the subsurface thereby reducing the availability of oxygen which is also necessary for aerobic bacterial metabolic processes. In general, AEL will ensure that the soils will be moist but not wet or dripping wet. The ideal range for soil moisture that AEL will ensure the soils are in is between 40 and 85 percent of the water-holding capacity (field capacity) of the soil or about 12 percent to 30 percent by weight. Periodically, moisture will be added to the landfarming operations because soils become dry as a result of evaporation, which is increased during aeration operations (to be done with Allu bucket attached to excavator).

Microorganisms require inorganic nutrients such as nitrogen and phosphorus to support cell growth and sustain biodegradation processes. Nutrients may be available in sufficient quantities in the site soils, but, more frequently, nutrients need to be added to landfarm soils to maintain bacterial populations, as such, AEL will add the required formula.

AEL's pH adjustment and nutrient supply methods will include periodic application of liquid fertilizers, lime and/or sulphur to be applied to the soils by spray method to blend soils with the liquid amendments. The frequency of the nutrients supplied to the soils and their application will be modified during landfarming operation on as needed basis, depending on field testing.

Regular monitoring of the landfarm will be achieved to ensure optimization of biodegradation rates, to track constituent concentration reductions, migration of constituents into soils beneath the landfarm, and groundwater quality. This will be achieved with the following procedures.

Moisture content, oxygen level, nutrients, pH, and bulking of the soil will be controlled during this process by the procedures stated below.

1. Apply additives using mixing techniques to achieve at least 90% contact between soils and additives
2. Add inorganic nutrients to obtain a mass ratio of 100:10:1 hydrocarbon: nitrogen: phosphorus
3. Increase the porosity of the soil as much as possible for better aeration
4. Adjust soil pH with either lime, alum, or phosphoric acid as required

AEL will propose to use an ALLU bucket (as pictured below) that will be attached to a 325 Excavator. This ALLU bucket will improve the mix and aeration of the contaminated material, saving time by doing several steps in one, such as; screen, crush, pulverize, aerate, blend, mix, separate, carry, feed and loadall in one step operation.

# 7 PRICE PROPOSAL

AEL's price for landfarming petroleum hydrocarbon contaminated soils is as follows:

| Item | Unit Price | Unit | Qty. | Total |
|---|---|---|---|---|
| Mobilization Cost | $5,000.00 | lump sum | 1 | $5,000.00 |
| Construct Access | $2,500.00 | lump sum | 1 | $2,500.00 |
| Supply and Install Gate | $20,000.00 | lump sum | 1 | $20,000.00 |
| Debris Pick-up (inside landfarm) | $5,000.00 | lump sum | 1 | $5,000.00 |
| Treat Contaminated Water in Landfarm and Discharge | $150.00 | $m^3$ | 100 | $15,000.00 |
| Test Contaminated Water from Landfarm | $300.00 | each sample | 20 | $6,000.00 |
| Operate Excavator and Allu Bucket | $350.00 | per hour | 150 | $52,500.00 |
| Supply Allu Bucket | $65,000.00 | lump sum | 1 | $65,000.00 |
| Parts for Allu Bucket-Replacement | $5,000.00 | each | 1 | $5,000.00 |
| Testing of Soils | $300.00 | per sample | 50 | $15,000.00 |
| Removal of Treated Soils and Capping of Landfarm | $5.00 | $m^3$ | 3000 | $15,000.00 |
| Demobilization | $1,000.00 | lump sum | 1 | $1,000.00 |
| Engineering | $25,000.00 | lump sum | 1 | $25,000.00 |
| Final Report | $2,500.00 | lump sum | 1 | $2,500.00 |
| **Sub-Total** | | | | **$234,500.00** |
| **Total with 15% Contingency** | | | | **$269,675.00** |