NEWFOUNDLAND SOILTEC INC.

PROJECT REGISTRATION FOR ENVIRONMENTAL ASSESSMENT

Projects Title: Drilling Mud & Cuttings Treatment, Soil Washing, and Enhanced Bioremediation

Submitted To: Director; Environmental Assessment Division
Department of Environment and Conservation
P. O Box 8700, St. John's, NL, A1B 4J6

Prepared By: Newfoundland Soiltec Inc.

P.O Box 8421, Stn A, St. John's, A1B 3N9, Newfoundland

November 1st, 2013

TABLE OF CONTENTS

1. General Information

1.1 Proponent

i. **Name of Corporate Body:** Newfoundland SOILTEC Inc.

ii. **Address:** P.O Box 8421, Stn A, St. John's, NL, A1B 3N9

iii. **Chief Executive Officer:**

Name: Robert Giovannini
Telephone: 709-364-7645
Email: Bob@rjgconstruction.com

iv. **Name:** Wayne Turpin
Position: Manager
Telephone: 709-685-9606
Email: Wayne.Turpin@soiltec.ca

v. **Principal Contact person for purposes of Environmental Assessment:**

Name: Abdul Zubair
Position: Environmental Coordinator
Telephone: 709-764-5526
Email: Abdul@soiltec.ca

1.2 The Undertaking

i. ***Name of Undertaking:***

Offshore drilling Mud and Cuttings Treatment, Soil Washing, and Enhanced Bioremediation

ii. ***Purpose:***

The purpose of this undertaking is to develop a local, Newfoundland-based, and effective treatment technology that will be able to treat non-hazardous offshore drilling muds and cuttings. Presently, drilling muds and cuttings are transported out of Newfoundland due to lack of treatment or disposal options for offshore drilling wastes within the province. SOILTEC therefore, intends to develop environmentally friendly, cost effective and efficient treatment technologies for offshore drilling muds and cuttings. The muds will be treated by "Stabilization" with some patented formulated additives which will bind the hydrocarbon content of the mud and prevent it from leaching thereby stabilizing it, and making it environmentally safe for disposal.

The offshore drill cuttings will be treated by washing with some patented surfactants using the soil washing equipment (unit) that will have the capacity to physically mix the drill cuttings with the surfactants, and transfer the hydrocarbon and other contaminants contained therein from the solid phase (cuttings) into the liquid phase (waste-wash water). To achieve the complete remediation of the cuttings, the resulting waste water will be treated for re-use and/or disposal subject to site conditions. If installed, the washing equipment which will be operated at the rate of 50 150 ton/hour, apart from washing the offshore drilling cuttings, will also be used for the washing/treatment of Bunker C contaminated soil.

Also, Newfoundland SOILTEC, as part of its commitment to meeting the increasing needs to accelerate clean-up activities across the province, wishes to introduce into its operations

Advanced Bioremediation Processes, through the use of Nano-Rem® Bioremediation formulations for hydrocarbon impacted soils. This Advanced Bioremediation Process will allow SOILTEC to treat hydrocarbon contaminated soils faster than the traditional remediation processes, which are often uneconomical and time consuming, thereby leaving our facility with a stockpile of soils to be treated. The Advanced Bioremediation has proven to be effective in remediating hydrocarbons in the soil with emphasis on performance, cost-effectiveness, ease of use, environmental safety and returning nature back to its original condition.

2.0 Description of the Undertaking

2.1 Geographical Location

The proposed expanded facility is located on Trans-Canada Highway near Paddy's Pond, in St. John's, NL. Figure 1 below provides the aerial view of the site, while figure 2 shows the site plan.

Figure 1: Aerial view of SOILTEC facility

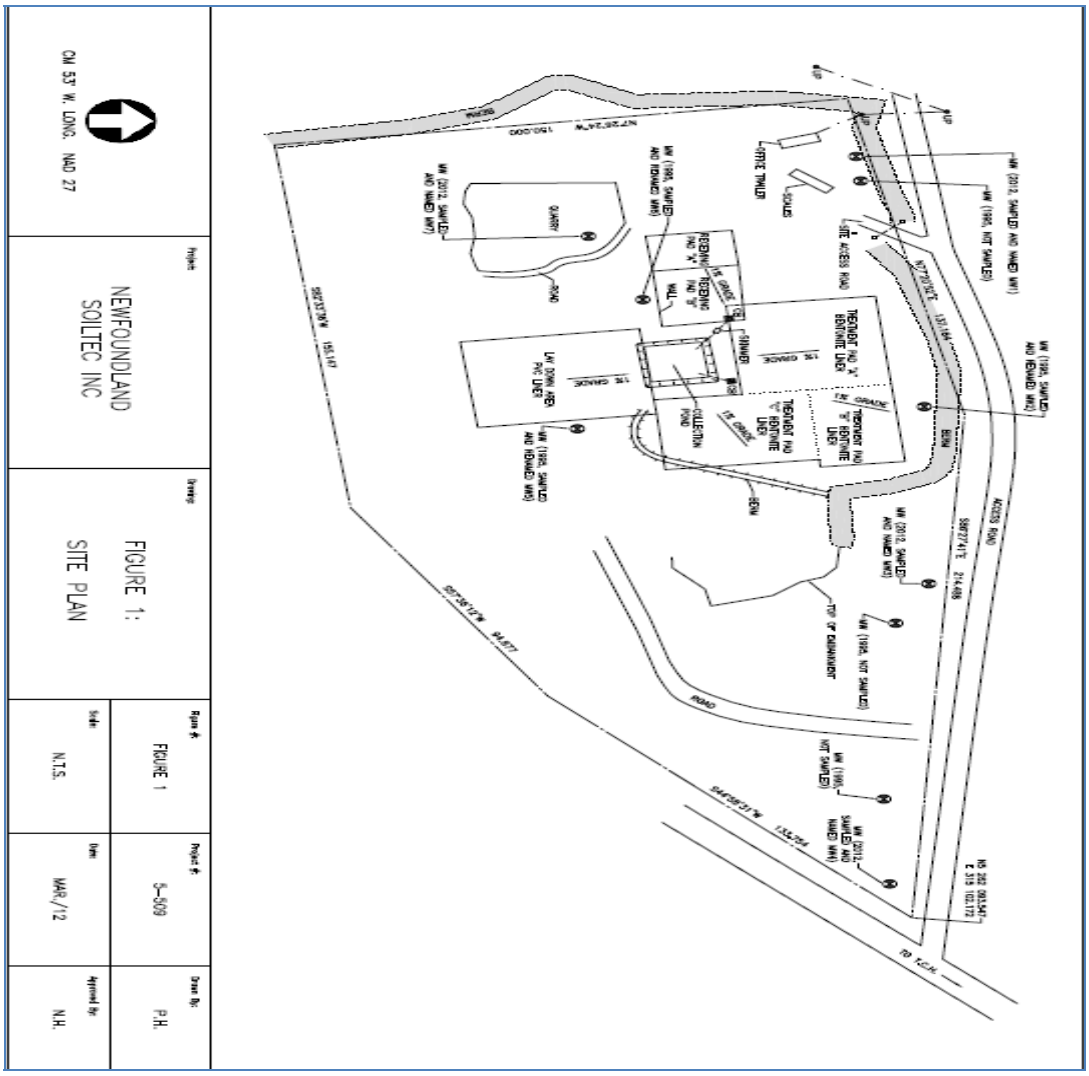

Figure 2: General Site Plan

2.2 Physical Features

SOILTEC site is located in an industrial area, off the Trans-Canada Highway, and is used for the remediation of hydrocarbon impacted soil. The facility is accessible via a gravel access road off the Trans-Canada Highway near Paddy's Pond, in St. John's, NL. The general terrain is level, with surface water flow expected to be towards the north. There are roadside ditches separating the access road from the facility, and gravel berms have been established along the perimeter.

The receiving pad is constructed of concrete (with drains), and has a rated capacity of 3000 - 4000 tonnes. The three (3) treatment pads are constructed using a geomembrane type liner system. Stockpiled areas are used to store soil, once the treatment process has been completed. On-site drainage for contaminated soil is via ditching and piping to a lined storage pond. The storage pond is approximately 15 m × 15 m × 1.5 m deep. Support facilities include a truck weigh scale, office trailer, three excavators, loaders, dump trucks, and other heavy equipment vehicles. The site also has a large soil screener and four (4) new monitoring groundwater wells to obtain up to-date information on the existing groundwater conditions of the property (flow direction and groundwater quality).

The site is located in an industrial area with another soil treatment facility adjacent to it and quarry sites within 3 km radius of the site. The underlying native soil present onsite is fine sand with some silt. Based on the groundwater monitoring conducted on the facility recently, the water table is about 7 m.

There is no vegetation within the visible axis of the facility as the facility is surrounded by another soil treatment plant and quarry sites.

2.3 Construction

I. ***Soil washing unit*****:** A new treatment pad will be constructed for the installation of the soil washing equipment. This pad which will be lined with geomembrane liner material to protect the underlying groundwater. Figure 3 shows a typical soil washing system. The unit will take approximately two weeks to assemble, and will consist of equipments such as:

- Feed hopper with belt conveyor
- 24" × 80' Conveyor to Conditioner
- 44" × 25 SS Coarse Conditioner
- 6' × 14' DD OH Horizontal Screen W/ Motor, Base, Media
- 10 × 8/100 Pump & Motor Package etc.

Figure 3: A Typical Soil Washing System of 50 to 150 Ton/Hour Capacity

II. ***Wastewater tank***: A wastewater tank will be constructed and installed near the soil washing equipment to collect the effluents coming from the soil and cuttings washings. The storage tanks would require a lined concrete berm and base, to prevent underground water pollution in case of a leak.

Figure 4: The wastewater Tank

III. ***Stabilization Equipment***: High powered agitation mobile drilling mud stabilization equipment will be assembled and installed at another treatment pad. When assembled, the unit will have the capacity to mix drilling mud with patented stabilization formulations which can stabilize the fine-grained (underflow) muds into a solidified, non-mobile, non-hazardous, and non-toxic material, which can be safely disposed.

IV. **Enhanced Bioremediation***:* The application of Nano-Rem® enhanced bioremediation formulation requires no construction, as this is just an amendment to the traditional bioremediation process which SOILTEC has always carried out on hydrocarbon impacted soils.

2.4 Operation

I. **Soil Washing of Bunker C Contaminated Soil and Drilling Cuttings**: The operation of the Soil washing equipment for Drill Cuttings and Bunker C contaminated soil follow the same protocol, which are enumerated in the following steps:

- Soils are screened to remove large debris and boulders using a physical screener (i.e., Grizzly, Vibratory, or Rotational);
- The soils/cutting are then introduced into the soil washing system via a control feed hopper onto a weighted conveyor belt;
- The soils/cuttings exit the conveyor into the entry point of the soil washing chamber (4 to 5m long), equipped with paddles and corkscrew mixing apparatus, which churn and advance the soils along the axis of the chamber. Water and surfactants are introduced into the soils at this step;
- The soils/cuttings are mixed (washed) in the soil-washing chamber with a residence time of 30 to 60 seconds, depending on rate of soil/cuttings washing process;

- The washed soils/cuttings, and associated wastewaster exits the mixing chamber arriving onto a multi-stack soil shaker, where the soils receive a final water rinse and are physically separated by grain size. The coarser soils retained by shaker gravity exit the soil washing plant on to a conveyor;

- The finer gain soils and associated wastewater are pumped through a hydro-cyclone to separate the sand fraction from the finer soil textures, which is deposited onto a final sand screen shaker to dry the sands before they exit the shaker on to a conveyor;

- The wastewater, containing petroleum contamination and the cuttings or finer grain soils that passed through the final shaker, are then pumped into a wastewater holding tank for subsequent physical, and chemical treatment for reuse as recycled water;

- Treated soil/cuttings exiting the soil washing plant are tested to confirm clean-up. These soils may be recycled as aggregates in concrete, road base material to daily cover for a landfill.

II. **Wastewater Treatment**: Wastewater pumped from the soil washing plant will be subjected to multiple treatments to avoid pollution of the surrounding environment by the effluent water. The wastewater will first pass through Geotube® dewatering membranes, which has the tendency of retaining the wastes while allowing the water to pass through it. The second water treatment will involve pumping the water from the Goetubes® to the wastewater tanks, where the already treated water will be further subjected to "*Clarification Process"* with the aid of some patented formulated chemical agents that have the capacity to bind suspended solids and petroleum hydrocarbons present in the wastewater to form a stable precipitate. A leachability (TCLP) test will confirm if the filtered precipitate is safe for disposal (non-leachable, with less than 1000 ppm TPH), while the clarified water will be recycled and re-used for washing.

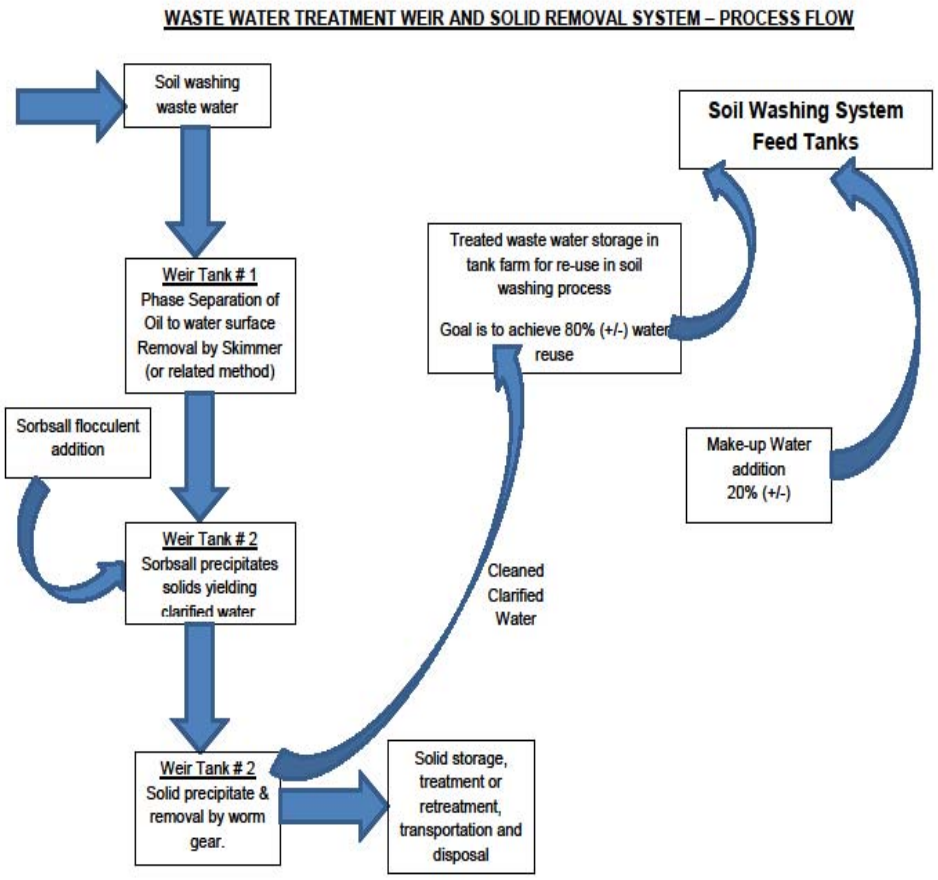

Figure 5: Flow Diagram for Wastewater Treatment

III. Stabilization of the drilling mud: Fine grained drilling muds will be subjected to stabilization in a high-powered, thoroughly-mixing equipment to be assembled in one of the lined treatment pads.

The following steps will be involved:

- Materials will be pumped from the mud collection pond to the stabilization equipment through the feed conveyor;
- Sample product will be analyzed prior to treatment to determine stabilization agent mix requirement;
- The stabilization agent will be injected into the equipment;

- The diesel-powered equipment will mix the fine grained mud with the stabilization agent thoroughly at a very high speed in its mixing chamber, until the mud solidifies;
- The solidified muds will exit the stabilization equipment and be taken off to disposal site after having carried out the Leachability (TCLP) testing to ensure that the product cannot leach, nor does its Total Petroleum Hydrocarbon (TPH) content exceed the allowable disposal limit of 1,000 ppm.

IV. Enhanced Bioremediation*:* This involves the application of Nano-Rem® formulations that naturally impacts and stabilizes soil chemistry to maximize microbial metabolism to remove a broad range of petroleum contaminants. The contaminated soil will be built into a pile on a lined bed of Pad "A", and periodically turned over or tilled with the excavator to aerate the soil while the Nano-Rem® formulations is applied on the soil at required intervals.

Soil conditions will often be controlled to optimize the rate of hydrocarbon degradation. The conditions that will be normally controlled include:

- Moisture content (usually by irrigation or spraying).
- Aeration (the soil is mixed and aerated).
- Amendments - applying the Nano-Rem® formulations.

The Nano-Rem® formulations will be sprayed on the contaminated soil regularly depending on the hydrocarbon concentration. When the desired level of treatment is achieved, the lift/pile is removed and a new treatment lift/pile is constructed.

2.5 Pollution Prevention and Waste Management

The potential environmental pollution/impacts of the proposed expansion and installations, and the corresponding mitigation measures that will be implemented include:

- **Liquid Effluents:** Generally, wastewater (wash water) management is one of the challenges of operating/adopting soil washing treatment technology. Traditionally, the effluents (waste water containing hydrocarbon and small amounts of fines) are sent to the receiving ponds, where the oil will be skimmed or treated before the water is subsequently disposed. This has in many instances led to the contamination of the underlying groundwater aquifer and sometimes, poor management of the water in the pond.

  With the introduction of a combination of efficient and integrated wastewater management and treatment approaches, SOILTEC will minimize the chances of effluent pollution by installing "Geotube® Dewatering Technology materials" and erecting wastewater receiving tanks (Water Clarification) for the soil and drill cuttings effluent water treatment. The wastewater will be passed through the Geotube® Dewatering membranes before being pumped to the receiving tanks where it will undergo an additional treatment (*Clarification).* Once cleaned, the water will be re-used for subsequent soil and cuttings washing (treatment). The resulting filtered (clarified) suspended material will undergo TCLP test to confirm it is non-leachable and environmentally safe, prior to disposal.

- **Solid Waste Materials**: The solidification and stabilization process for the treatment drilling muds will produce solidified, non-polluted, non-leachable and non-hazardous solid waste materials. The drilling muds from the offshore are normally classified as low-toxicity drilling muds. They consist of mineral based oils that have low health, environmental and ecological risks.

  SOILTEC will be receiving drilling muds from Crosbie Industrial Services Limited, which would have been converted to an underflow; following a stabilization/solidification process through Crosbie's approved treatment processes at their Logy Bay road facility. Therefore, the muds to be received at SOILTEC would have been subjected to some preliminary treatments at Crosbie facility leading to underflow mud materials. The material would have also been tested for Leachable Organics Content and Metal Scan by Crosbie before subsequent disposal at our facility.

To ensure that the treated mud will not pollute the surrounding environment, SOILTEC will as required, confirm that the stability of the stabilized mud by conducting the TCLP and TPH testing before disposing the material at landfill sites.

SOILTEC will also ensure that all personnel are trained and competent to perform the overall coordination and operation of these equipments (soil washing and stabilization).

- **Air Emissions**: The soil washing and stabilization equipments have little potentials of creating dusts because the whole process takes place in a closed mixing chamber, and this minimizes the possibility of dust release. However, emissions will be monitored for a period of 3 months upon commissioning to ensure particulate release, if any, is carefully monitored and controlled.

  Exhaust gases from heavy equipment and vehicles during the construction and operational phase of the project will be controlled by vehicle maintenance and by turning off the vehicles when engines are not running.

- **Noise Pollution**: Noise from the operations will be limited to heavy equipment use, vehicle traffic and the screener. The site is surrounded by a stockpile of soil and this will limit the noise.

Potential causes of resource conflicts are described below:

- Vehicle traffic on the access road (off Trans-Canada Highway) into the facility will increase due to dump trucks travelling to and from the site. Trucks will mostly bring in contaminated soils and take out treated soils at an estimated average of 5 - 7 trucks per business day.

- Considering the adjacent land use, local topography, and the fact that site is located at an industrial area and surrounded by another soil treatment facility, and a quarry site is located about 1 km away, the general aesthetic issues related to site infrastructures and operations will not likely constitute a problem. Furthermore, the site location is not part of a regional or local viewpoint of interest for the local population or tourists.

- Negative impacts of the operations on the nearby soil treatment facility are considered negligible since the neighboring site is not fully operational all year round.

2.6 Occupations

Newfoundland SOILTEC uses and applies employment equity policy and program on all its projects to address employment equity relative to but not limited to age and gender. SOILTEC engages in proactive employment practices to increase the representation of four designated groups: women, people with disabilities, aboriginal peoples and visible minorities.

SOILTEC has instituted positive policies and practices for hiring, training, retention and promotion of members of the designated groups. Positive policies and practices, for example, asking all job candidates the same interview questions, or advertising a job widely, and in places where it is likely to reach female or minority applicants.

The following table presents information related to occupations

TABLE 1: Occupations

Number	Occupation	Direct hire / Contract	National Occupational Classification 2011
Installation (Assembly of the Soil Washing Unit) Phase			
3	Technician	Direct hire	2231
1	Civil/Environmental Engineer	Direct hire	2131
3	Heavy Equipment Operator	Direct hire	7521
5	Labourers	Direct hire	7611
1	Concrete Truck Driver	Direct hire	7511
1	Electrician	Contract	7241
Operation Phase			
1	Office Clerk	Direct hire	1241
3	Heavy Equipment Operators	Direct hire	7521
3	Labourers	Direct hire	7611
1	Technician / Site Supervisor	Direct hire	2231

3. Approval of the Undertaking

SOILTEC would like to amend its current Certificate of Approval for its St. John's facility to include the use of aforementioned treatment processes for offshore wastes (drilling muds and

cuttings), Bunker C contaminated soil and the introduction of enhanced bioremediation processes for soil treatment. SOILTEC will be in contact with Mr. Paul Rideout and Mr. Roman Krska, both of the Department of Environmental Pollution and Conservation.

4. Schedule

The earliest date for the installation of the Soil Washing unit and the Stabilization equipment is January 2014, while the application of the Enhanced Bioremediation Processes is scheduled to start in the spring of 2014. The reasons for the selection of this date include:

- The need to quickly wash and ship out the Bunker C contaminated soil inherited at the site by the new management. This is to create space and increase our receiving capacity;
- The increasing need to have a Newfoundland based environmental company that can deal with offshore wastes (muds and cuttings), which are normally shipped out of the province.

5. Funding

These projects do not depend upon a grant or loan of capital funds from a government agency. The estimated capital costs for the construction and installation of the soil washing and stabilization units is estimated at $1.2 Million.

November 1st, 2013

Date

Chief Executive Officer

6. CONCLUSION

SOILTEC is committed to ensuring that the proposed expansion and installation project is managed with utmost professionalism with great concern for environment, as well as the health and safety of the employees that will construct, assemble, install and operate the equipments.

We are focused on meeting and exceeding the expectations of the concerned stakeholders while we continue to strive to ensure a cleaner and safer environment in the Province.

Sincerely,

Abdul Zubair
Environmental Coordinator
Newfoundland Soiltec Inc.

APPENDIX I

SOILTEC'S CERTIFICATE OF APPROVAL

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Environment and Conservation
Pollution Prevention Division

File No. 813.000.156 A&B

Mr. Wayne Turpin
RJG Construction Ltd.
162 Duckworth Street, Suite 300
St. John's NL
A1C 1G2

October 01, 2013

Dear Mr. Turpin:

Re: Extension of Certificate of Approval No. WMS-10-05-007 – Newfoundland Soiltec

This is in response to your request for an extension of your operations and treatment of contaminated soil at the facility which is covered under the Certificate of Approval WMS-10-05-007.

The Department with the issuance of this letter, authorizes an extension to your facility until December 31, 2013.

By way of this letter, you are to follow the terms and conditions of the above-noted Certificate of Approval until December 31, 2013, or until a new/renewed Certificate of Approval is issued - whichever occurs first.

If you have any questions or comments please contact Craig Bugden at (709) 729-6483.

Sincerely yours,

Derrick Maddocks, P. Eng,
Director

Cc: File
Manager of Operations (SNL, St. John's)

P.O. Box 8700, St. John's, NL, Canada A1B 4J6 t 709.729-2556 f 709.709-6969

APPENDIX II

2013 GROUNDWATER MONITORING REPORT FOR SOILTEC FACILITY

MONITOR WELL SAMPLING
NEWFOUNDLAND SOILTEC INC. PROPERTY
ST. JOHN'S, NL
JUNE 24, 2013

AFN ENGINEERING INC.

Mailing Address: 29 Brad Gushue Crescent, St. John's, NL, A1H 0A3
Ph: (709) 748-7175
Fax: (709) 368-6377

24 June 2013 AFN Project #5-588

Newfoundland Soiltec Inc.
Trans-Canada Highway
St. John's, NL
A1B3N9

Attention: Mr. Wayne Turpin

RE: MONITOR WELL SAMPLING – NEWFOUNDLAND SOILTEC INC. PROPERTY (ST. JOHN'S)

AFN Engineering Inc. (AFN) was retained by Mr. Wayne Turpin in June, 2013, to collect groundwater samples from existing monitoring wells located at Newfoundland Soiltec Inc.'s property near Paddy's Pond in St. John's, NL. The purpose of the program was to document concentrations of petroleum hydrocarbons in groundwater at: (i) historical monitoring well locations; and (ii) newer monitoring well locations constructed in March of 2012.

1.0 General

The Site is located in a commercially developed area off the Trans-Canada Highway, and is used for the remediation of hydrocarbon impacted soil. The Site is organized into receiving, treatment and stockpile areas. Support facilities include a truck weigh scale, and office trailer. The Site is operational all year round for receiving materials, however, it is understood that the treatment process is generally not undertaken in the winter months due to low temperatures.

A general description of the operations at this property is included in the report entitled, "Report of Groundwater Conditions - Newfoundland Soiltec Property, Trans-Canada Highway, St. John's, NL, March 2012 (AFN Engineering Inc.).

The site plan from the previous March, 2012 report (showing monitor well locations), is attached. Monitor well locations are described as:

MW1 (new well installed in 2012): adjacent to site trailer (north side)
MW2 (old well installed in 1995): north of treatment pad area
MW3 (new well installed in 2012): northeast of treatment pad area
MW4 (new well installed in 2012): northeast corner of property
MW5 (old well installed in 1995): south of treatment pad area
MW6 (old well installed in 1995): south of receiving pad area
MW7 (new well installed in 2012): southwest of receiving pad area

2.0 Guidelines

The analytical results for the groundwater samples were compared to the following guidelines:

- Atlantic PIRI RBCA

The Site is commercial in nature and soil conditions, based on previous field observations, are considered to be coarse grained. There are no potable wells associated with the Site. Based on these characteristics, the Site is classified as a commercial/non-potable/coarse grained site.

3.0 Observations

During the current program, only three (3) monitor wells were sampled (MW3, MW6 and MW7). Samples from these wells were submitted to Maxxam Analytics Inc., for 24-hour turnaround analysis. No free product was present in these wells at the time of sampling.

The other four (4) monitor wells on the property were not sampled for the following reasons:

- MW1 was dry (no water).
- MW2 was dry or clogged (no water).
- MW4 was inaccessible, due to heavy equipment and stockpiling operations adjacent to it.
- MW5 was not located (possibly beneath heavy equipment or stockpiled fill material).

Prior to collecting samples, the monitor wells were either purged dry or a minimum of three (3) casing volumes of water was pumped out using dedicated Waterra tubing and foot valves. The water table was then allowed to recover to approximately 80% of the original static level before

collecting the samples. A new pair of nitrile gloves was used when developing and sampling each monitor well. Water samples were placed directly in laboratory supplied bottles, and then stored in a cooler on ice until delivered to the laboratory.

4.0 Analytical Results

The analytical groundwater results for petroleum hydrocarbons (in table format, as Table 1) are attached. The Maxxam certificate of analysis is also attached. Results are summarized as follows:

- Toluene was present in MW3 (with a measured concentration of 0.0019 mg/L). The Tier I RBSL for toluene is 20 mg/L.
- Petroleum hydrocarbons in the C16 to C32 range were detected in MW3. The total concentration of 0.21 mg/L was less than the Tier I RBSL of 20 mg/L.
- No BTEX/TPH concentrations were detected in the groundwater sample collected from MW6.
- Concentration of petroleum hydrocarbons in MW7 were less than 0.10 mg/L. The laboratory reported that there was no resemblance to petroleum products in the fuel oil range at MW7 location.

4.0 Closure

This letter report was prepared exclusively for the purposes, project and Site location(s) outlined in the report. The report is based on information provided to, or obtained by AFN as indicated in the report, and applies solely to Site conditions existing at the time of the Site investigation(s). AFN's report represents a reasonable review of available information within an agreed work scope, schedule and budget. It is therefore possible that currently unrecognized contamination or potentially hazardous materials may exist at the Site(s), and that the levels of contamination or hazardous materials may vary across the Site(s). Further review and updating of the report may be required as local and Site conditions, and the regulatory and planning frameworks, change over time.

This report was prepared by AFN for the sole benefit of our Client (NL Soiltec Inc.). Any use which a third party (e.g., a party other than our Client) makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. AFN accepts no

responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

ATTACHMENTS

1. Figure 1
2. Table 1
3. Laboratory Certificates

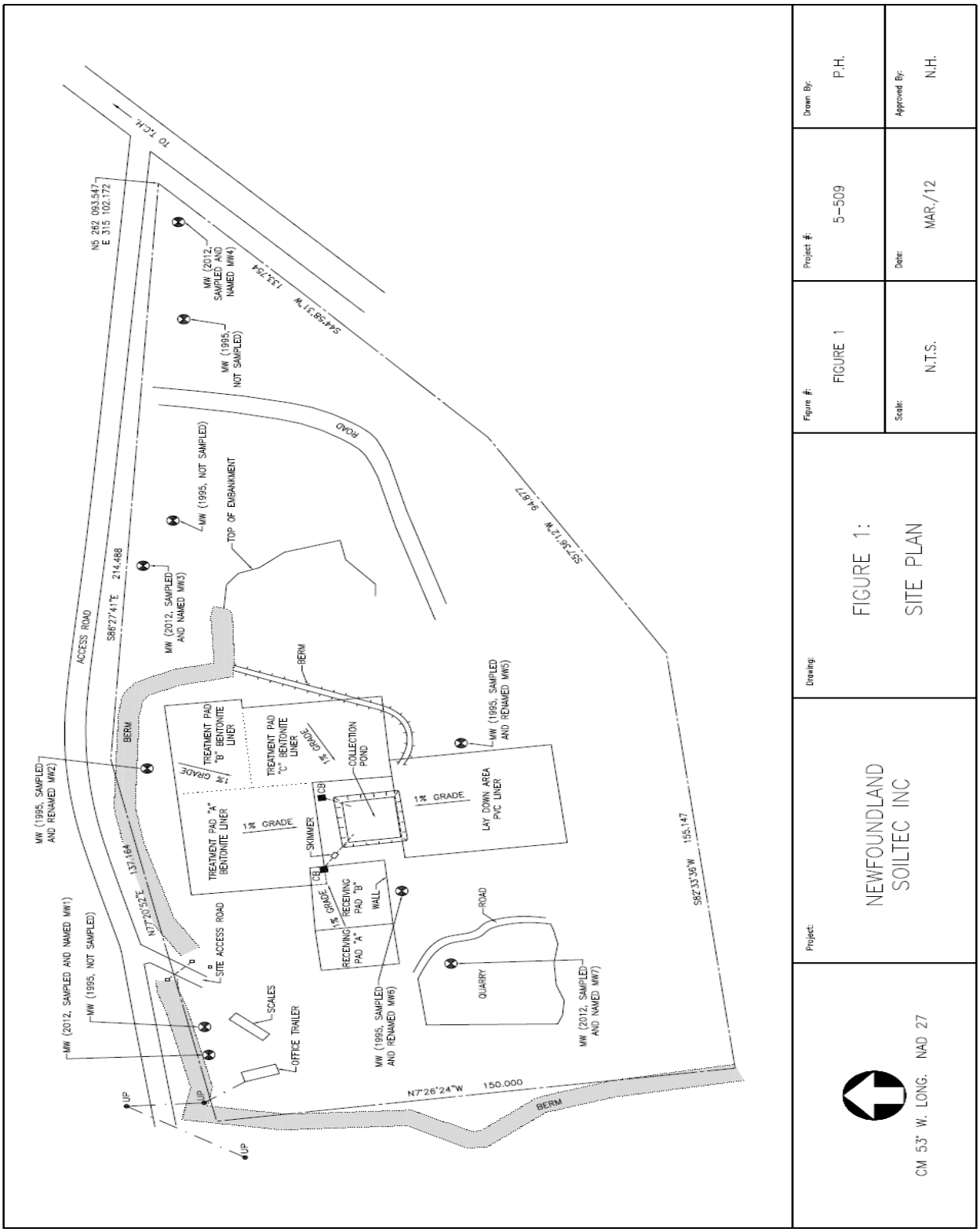
TO T.C.H.
N5 262 093.547
E 315 102.172
MW (2012, SAMPLED AND NAMED MW4)
MW (1995, NOT SAMPLED)
S44°58'31"W 135.754
ROAD
MW (1995, NOT SAMPLED)
TOP OF EMBANKMENT
N55°58'12"W 94.877
MW (2012, SAMPLED AND NAMED MW3)
S86°27'41"E 214.488
ACCESS ROAD
BERM
MW (1995, SAMPLED AND RENAMED MW2)
MW (1995, SAMPLED AND RENAMED MW5)
TREATMENT PAD "B" BENTONITE LINER
TREATMENT PAD "C" BENTONITE LINER
1% GRADE
COLLECTION POND
TREATMENT PAD "A" BENTONITE LINER
1% GRADE
SKIMMER
CB
CB
1% GRADE
LAY DOWN AREA PVC LINER
1% GRADE
RECEIVING PAD "B"
WALL
RECEIVING PAD "A"
ROAD
MW (2012, SAMPLED AND NAMED MW1)
MW (1995, NOT SAMPLED)
N77°20'32"E 137.164
SITE ACCESS ROAD
SCALES
OFFICE TRAILER
MW (1995, SAMPLED AND RENAMED MW6)
QUARRY
MW (2012, SAMPLED AND NAMED MW7)
S82°33'36"W 155.147
N7°26'24"W 150.000
BERM
UP
UP
UP
CM 53° W. LONG. NAD 27
Project:
NEWFOUNDLAND SOILTEC INC
Drawing:
FIGURE 1: SITE PLAN
Figure #:
FIGURE 1
Scale:
N.T.S.
Project #:
5-509
Date:
MAR./12
Drawn By:
P.H.
Approved By:
N.H.

Table 1
Groundwater Results - BTEX/TPH
Newfoundland Soiltec Inc. Property
Trans Canada Highway - St. John's, NL
June, 2013

Sample Location	Sample Date	BTEX Concentrations (mg/L)				Total Petroleum Hydrocarbon Concentrations[2] (mg/L)					Resemblance
		Benzene	Toluene	E. Benzene	Xylenes	C6 - C10	>C10 - C16	>C16 - <C21	>C21 - <C32	Mod. TPH[2]	
MW3	June 17, 2013	<0.001	0.0019	<0.001	<0.002	<0.01	<0.05	0.06	0.15	0.21	one product in fuel/lube oil range
MW6	June 17, 2013	<0.001	<0.001	<0.001	<0.002	<0.01	<0.05	<0.05	<0.1	<0.1	-
MW7	June 17, 2013	<0.001	<0.001	<0.001	<0.002	<0.01	0.057	<0.05	<0.1	<0.1	no resemblance to petroleum products in the fuel oil mode
RDL[1]		0.001	0.001	0.001	0.002	0.01	0.05	0.05	0.1	0.1	-
Atlantic RBCA - Tier I RBSLs (commercial/non-potable/coarse)[4]		6.9	20	20	20	-	-	-	-	20/20/20[5]	-

Notes:
1. RDL = laboratory's reportable detection limit; n/a = not applicable; "-" = no guideline available or parameter not analyzed
2. Modified TPH = total petroleum hydrocarbons excluding total BTEX
3. RBCA = Risk Based Corrective Actions for Petroleum Hydrocarbon Impacted Sites
4. Atlantic RBCA analytical method does not analyze for >C36-C50 hydrocarbon
5. 20/20/20 = Guideline concentrations represented as 20 mg/L gas, 20 mg/L fuel oil/diesel, and 20 mg/L lube oil.

Maxxam

Success Through Science®

Your C.O.C. #: 5-580-4

Attention: Neil Hunt
AFN Engineering Inc.
29 Brad Gushue Crescent
St. John's, NL
CANADA A1H 0A3

Report Date: 2013/06/20

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B395195
Received: 2013/06/18, 9:35

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
TEH in Water (PIRI)	3	2013/06/18	2013/06/19	ATL SOP 00198	Based on Atl. PIRI
VPH in Water (PIRI) (1)	3	2013/06/19	2013/06/20	ATL SOP 00118	Based on Atl. PIRI
ModTPH (T1) Calc. for Water	3	N/A	2013/06/20	N/A	Based on Atl. PIRI

Remarks:

Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bedford

Encryption Key

Paula Chaplin
20 Jun 2013 15:43:37 -02:30

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Rob Whelan, Project Manager
Email: RWhelan@maxxam.ca
Phone# (709) 754-0203

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Analytics International Corporation o/a Maxxam Analytics 49-55 Elizabeth Ave, Suite 101A, St.John's, NL, Canada A1A 1W9 Tel: 709-754-0203 Toll Free: 888-492-7227 Fax: 709-754-8612 www.maxxam.ca

Maxxam

Success Through Science®

Maxxam Job #: B395195
Report Date: 2013/06/20

Sampler Initials: NH

ATLANTIC MUST IN WATER - PIRI TIER I (WATER)

Maxxam ID		RX8017	RX8021	RX8022		
Sampling Date		2013/06/17	2013/06/17	2013/06/17		
COC Number		5-580-4	5-580-4	5-580-4		
	Units	MW3	MW6	MW7	RDL	QC Batch
Petroleum Hydrocarbons						
Benzene	mg/L	ND	ND	ND	0.0010	3252238
Toluene	mg/L	0.0019	ND	ND	0.0010	3252238
Ethylbenzene	mg/L	ND	ND	ND	0.0010	3252238
Xylene (Total)	mg/L	ND	ND	ND	0.0020	3252238
C6 - C10 (less BTEX)	mg/L	ND	ND	ND	0.010	3252238
>C10-C16 Hydrocarbons	mg/L	ND	ND	0.057	0.050	3250653
>C16-C21 Hydrocarbons	mg/L	0.060	ND	ND	0.050	3250653
>C21-<C32 Hydrocarbons	mg/L	0.15	ND	ND	0.10	3250653
Modified TPH (Tier1)	mg/L	0.21	ND	ND	0.10	3250652
Reached Baseline at C32	mg/L	No	Yes	Yes	N/A	3250653
Hydrocarbon Resemblance	mg/L	SEECOMMENT (1)		SEECOMMENT (2)	N/A	3250653
Surrogate Recovery (%)						
Isobutylbenzene - Extractable	%	109	126	86		3250653
n-Dotriacontane - Extractable	%	105 (3)	123 (3)	100 (3)		3250653
Isobutylbenzene - Volatile	%	89 (4)	80 (4)	91 (4)		3252238

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) One product in fuel/lube oil range.
(2) No resemblance to petroleum products in fuel oil range.
(3) TEH sample contained sediment.
(4) VPH sample contained sediment.

Maxxam

Success Through Science®

Maxxam Job #: B395195
Report Date: 2013/06/20

Sampler Initials: NH

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 49-55 Elizabeth Ave, Suite 101A, St.John's, NL, Canada A1A 1W9 Tel: 709-754-0203 Toll Free: 888-492-7227 Fax: 709-754-8612 www.maxxam.ca

Maxxam

Success Through Science

Quality Assurance Report

Maxxam Job Number: ZB395195

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3252683 SPI	Matrix Spike	Isobutylbenzene - Extractable	2013/06/19		113	%	30 - 130
		n-Dotriacontane - Extractable	2013/06/19		116	%	30 - 130
		>C10-C16 Hydrocarbons	2013/06/19		99	%	30 - 130
		>C16-C21 Hydrocarbons	2013/06/19		113	%	30 - 130
		>C21-<C32 Hydrocarbons	2013/06/19		109	%	30 - 130
	Spiked Blank	Isobutylbenzene - Extractable	2013/06/19		104	%	30 - 130
		n-Dotriacontane - Extractable	2013/06/19		105	%	30 - 130
		>C10-C16 Hydrocarbons	2013/06/19		108	%	30 - 130
		>C16-C21 Hydrocarbons	2013/06/19		121	%	30 - 130
		>C21-<C32 Hydrocarbons	2013/06/19		104	%	30 - 130
	Method Blank	Isobutylbenzene - Extractable	2013/06/19		98	%	30 - 130
		n-Dotriacontane - Extractable	2013/06/19		102	%	30 - 130
		>C10-C16 Hydrocarbons	2013/06/19	ND, RDL=0.050		mg/L	
		>C16-C21 Hydrocarbons	2013/06/19	ND, RDL=0.050		mg/L	
		>C21-<C32 Hydrocarbons	2013/06/19	ND, RDL=0.10		mg/L	
	RPD	>C10-C16 Hydrocarbons	2013/06/19	4.7		%	40
		>C16-C21 Hydrocarbons	2013/06/19	NC		%	40
		>C21-<C32 Hydrocarbons	2013/06/19	NC		%	40
3252206 MS-<	Matrix Spike	Isobutylbenzene - Volatile	2013/06/20		97	%	70 - 130
		Benzene	2013/06/20		91	%	70 - 130
		Toluene	2013/06/20		91	%	70 - 130
		Ethylbenzene	2013/06/20		91	%	70 - 130
		Xylene (Total)	2013/06/20		90	%	70 - 130
	Spiked Blank	Isobutylbenzene - Volatile	2013/06/20		87	%	70 - 130
		Benzene	2013/06/20		119	%	70 - 130
		Toluene	2013/06/20		110	%	70 - 130
		Ethylbenzene	2013/06/20		105	%	70 - 130
		Xylene (Total)	2013/06/20		104	%	70 - 130
	Method Blank	Isobutylbenzene - Volatile	2013/06/20		84	%	70 - 130
		Benzene	2013/06/20	ND, RDL=0.0010		mg/L	
		Toluene	2013/06/20	ND, RDL=0.0010		mg/L	
		Ethylbenzene	2013/06/20	ND, RDL=0.0010		mg/L	
		Xylene (Total)	2013/06/20	ND, RDL=0.0020		mg/L	
		C6 - C10 (less BTEX)	2013/06/20	ND, RDL=0.010		mg/L	
	RPD	Benzene	2013/06/20	NC		%	40
		Toluene	2013/06/20	NC		%	40
		Ethylbenzene	2013/06/20	NC		%	40
		Xylene (Total)	2013/06/20	NC		%	40
		C6 - C10 (less BTEX)	2013/06/20	NC		%	40

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Maxxam

Success Through Science®

Validation Signature Page

Maxxam Job #: B395195

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Paula Chaplin, Project Manager

Rose MacDonald, Scientific Specialist (Organics)

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 49-55 Elizabeth Ave, Suite 101A, St.John's, NL, Canada A1A 1W9 Tel 709-754-0203 Toll Free 888-482-7227 Fax 709-754-8612 www.maxxam.ca