DRAFT
OPERATION PLAN FOR BIOCELL TREATMENT SYSTEM, CAMBRIDGE BAY, NUNAVUT

PREPARED FOR:

KITNUNA CORPORATION

PREPARED BY:

KOMEX INTERNATIONAL LTD.

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EXECUTIVE SUMMARY

Kitnuna Corporation (Kitnuna) has retained Komex International Ltd. (Komex) to prepare an operation plan to operate a biocell treatment facility for approximately 1,100 m^3 of hydrocarbon-impacted soil near Cambridge Bay. A separate document of preliminary construction specification and drawings of the biocell has also been prepared. Both the operations plan and the construction specification and drawings will be submitted to Nunavut regulatory authorities for approval application.

It is understood that the hydrocarbons are mainly jet fuel, fuel oil and gasoline. The biocell design is preliminary and will be finalised for construction. A detailed characterisation of the chemical and biological of the impacted soil should also be completed specifically to optimise the treatment process. Once the biocell design is finalised and characterisation of the impacted soil is completed, the operation plan can be finalised.

The operation plan is divided into three categories:

- general site conditions;
- material treatment and handling; and,
- environmental monitoring.

Details of the above categories are presented in the report.

1. INTRODUCTION

Kitnuna Corporation (Kitnuna) has retained Komex International Ltd. (Komex) to prepare an operation plan to operate a biocell treatment facility for approximately 1,100 m^3 of hydrocarbon-impacted soil near Cambridge Bay. A separate document of preliminary construction specification and drawings of the biocell has also been prepared. Both the operations plan and the construction specification and drawings will be submitted to Nunavut regulatory authorities for approval application.

This document should be read in conjunction with the construction specification and construction drawing of the biocell. It is understood that the hydrocarbons are mainly jet fuel, fuel oil and gasoline. The biocell design is preliminary and will be finalised for construction. A detailed characterisation of the chemical and biological of the impacted soil should also be completed specifically to optimise the treatment process. Once the biocell design is finalised and characterisation of the impacted soil is completed, the operation plan can be finalised.

The following provides a preliminary operation plan for the biocell treatment facility. The operation plan is divided into three categories:

- general site conditions;
- material treatment and handling; and,
- environmental monitoring.

The following sections discuss the details of the operation plan.

2. GENERAL SITE CONDITIONS

Perimeter fence and gate should be erected to secure the facility. The site should be secured and locked during after-hour operation to prevent animals and unauthorised entry to the site. Signs should be posted to inform the public and non-authorised persons not to enter the treatment area. Site access should be restricted to a planned road; drivers should not deviate from the planned road unless given the authorization. The access road should not be blocked at any time. All access roads should be maintained for safe vehicle operation.

The site should also be kept clean of garbage; no littering is allowed at the site.

2.1 SOIL TREATMENT OPERATIONS

The following outlines the soil treatment operations and methods to prevent damage to the underlying liner. It is assumed that conventional construction equipment will be used and experienced contractors will be conducting the soil mixing and moving operation.

- The impacted soil should be placed up to a maximum thickness of 0.6 m for treatment.
- The biocell treatment operations should be conducted when ambient temperatures are favourable for the degradation process to occur. The facility will remain dormant over the winter periods until the ambient temperatures are favourable for treatment.
- Low ground-pressure equipment (*i.e.*, Bobcat; back-hoe) should be used to move the soil while operating inside the biocell. Equipment should not travel directly on the underlying geosynthetic liner until a minimum of 300 mm of impacted soil is placed. No sharp turning of equipment is allowed directly on the geosynthetics.
- Objects that have the potential to puncture the underlying geosynthetic layers, such as metals, sharp rocks, and scrap wood should be removed from the impacted soil before it is transported to the biocell for treatment.
- The sump area should be left open and not filled with impacted soil.
- Liquid fertilizer should be sprayed over the impacted soil prior to soil turning and mixing. The contractor should determine the best type of fertilizer, the optimum concentration, and application quantity for the soil treatment. Spraying should not be conducted in windy conditions to prevent off site impact.
- The hydrocarbon impacted soil should be turned and mixed immediately after the fertilizer application. The soil is to be turned with an excavator to expose the soil from below. The mixing process should be conducted with care such that the underlying geosynthetic layers are not disturbed or damaged.
- The impacted surface water and leachate collected from the collection sump (if any) should be stored temporarily in a tank. The liquid can be mixed with the impacted soil for treatment provided the soil requires additional liquid for treatment. Soil moisture should be monitored to optimise and monitor the treatment process.

- The excess leachate or surface water collected in the sump that will not be used in mixing with the soil may be re-mixed into the soil or transported off-site to an appropriate wastewater treatment facility.
- The liquid level in the sump shall be monitored to avoid overflow.
- Any large accumulation of snow shall be removed as necessary, without removing any of the impacted soil, to prevent flooding of the sump.
- Mixing and turning of overly dry soil should be kept to a minimum to prevent dust generation.
- An environmental emergency response plan should be in-place and implemented in the event of an environmental hazards (*e.g.* spill; liner damage).

A health and safety operation procedure should also be prepared and implemented for on-site personnel.

2.2 SOIL TREATMENT MONITORING

Approved industry standards and methods for sampling, and shipping and handling procedures must be followed to ensure that representative soil samples are taken, and chemical integrity of the soil samples is maintained during transportation. A work plan including sampling frequency, sampling location, and sampling methods should be prepared and implemented prior to the operation. Soil samples may be taken once every month during the period of active soil treatment. A record of sampling and chemical analysis shall be maintained to monitor the performance of the treatment. The soil treatment performance should be evaluated using the Guideline for Contaminated Sites (Canadian Council of Ministers of the Environment [CCME], 1999).

A health and safety plan should be developed specific for the work involving soil sampling and handling. The plan should include personal protective equipment, and an emergency response plan.

2.3 ENVIRONMENTAL MONITORING

Samples from surface water bodies located downgradient from the facility should be visually inspected for potential of hydrocarbon contamination from the biocell treatment area. Surface water may be collected before, during, and after the operation of the biocell facility and submitted for chemical analysis. The CCME Canadian Environmental Quality Guideline for the Protection of Aquatic Life (CCME, 1999) can be used to assess the surface water quality.

Sampling protocol is not included in this document, however proper sampling procedure should be consulted and followed to ensure that the integrity of the samples collected are not compromised. Additional reference for monitoring and sampling frequency can be found in the

Code of Practice for Land Treatment and Disposal of Soil Containing Hydrocarbons (Alberta Environment, 2001).

3. CLOSURE

We trust that the contents of this report meet your requirements. Should you have any questions or require further information, please contact the undersigned.

Respectfully,

KOMEX INTERNATIONAL LTD.

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4. REFERENCES

Alberta Environment, 2001. Code of Practice for the Land Treatment and Disposal of Soil Containing Hydrocarbons - DRAFT

Canadian Council of Ministers of the Environment, 1999. Canadian Environmental Quality Guideline (updated 2003).

5. DISCLAIMER

The information presented in this document was compiled and interpreted exclusively for the purposes stated in Section 1.0 of the document. Komex International Ltd. provided this report for Kitnuna Corporation solely for the purpose noted above.

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Any questions concerning the information or its interpretation should be directed to Juliana Tang or Wayne Bryant.

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