Tahera Diamond Corporation

LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY OPERATING MANUAL JERICHO DIAMOND MINE

1100060.008

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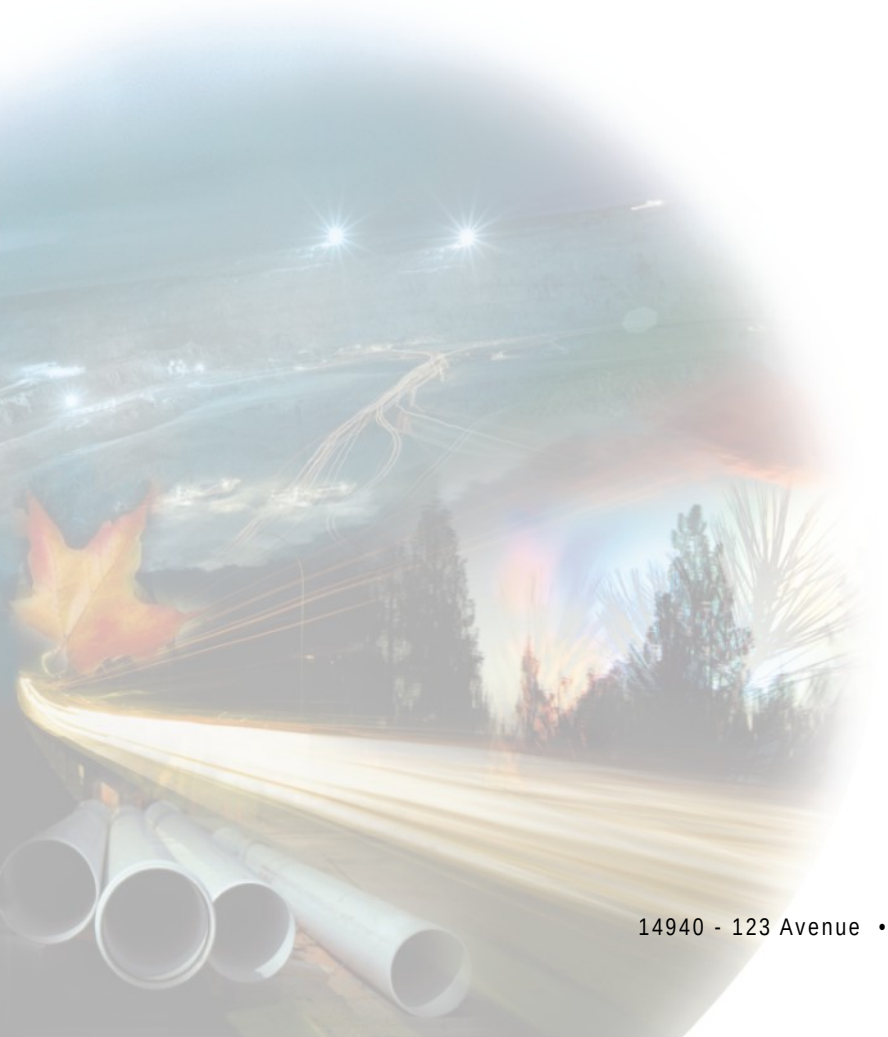

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TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

The Tahera Diamond Corporation (Tahera) recognizes the requirement for responsible treatment and/or containment of hydrocarbon contaminated soil and snow generated at its Jericho mine site.

It is anticipated that contaminated soil and snow will result from accidental spills associated with various site activities. Following excavation, contaminated soils and snow require treatment and / or containment. This operating manual deals with both the theory and practical day-to-day operations of a landfarm and contaminated snow containment facility (LCSCF) situated in a northern climate.

The proposed facility is required to contain hydrocarbon-contaminated snow and soil resulting from minor spills occurring during mine operation. Figure 1 shows the location of the proposed landfarm.

The upgradient portion of the facility, comprising the landfarm, is designed to accommodate up to 900 m^3 of petroleum hydrocarbon impacted soil.

The downgradient portion is designed as a sump to contain up to 750 m^3 of petroleum hydrocarbon impacted snow and ice and freshet runoff.

A design drawing of the landfarm is provided in Appendix A. Reference should be made to EBA's Landfarm and Contaminated Snow Containment Facility Design Summary Report (EBA File: 0101-1100060.008, dated December 2005).

The Health, Safety and Environment Manager or designate will be responsible for the management of the landfarm and snow containment facility. The environment department will be responsible for the inspection and monitoring of the facility.

2.0 GENERAL PROPERTIES OF PETROLEUM FUELS

The chemistry of the contaminants to be remediated in a landfarm is discussed in the following sections of the report.

2.1 CHEMISTRY OF HYDROCARBON FUELS

The primary source of hydrocarbon fuels is from nature with the majority of fuels manufactured through distillation and cracking of crude oils and tarsands.

Carbon atoms are special in that they can form large chains or rings with many branches and cross-links. They can attach to each other as well as other atoms, primarily, hydrogen hence the term hydrocarbons. Carbon atoms normally have four bonds, that is, carbon will normally single bond with four other atoms. Two large families of compounds generally apply to fuels: aliphatic hydrocarbons and aromatic hydrocarbons.

Aliphatic hydrocarbons include only carbon and hydrocarbon atoms. They can be straight chained, that is a row of carbon atoms linked or bonded with at most two other carbon atoms or multi-branched involving carbon atoms linked with three or four other carbon atoms. The remaining links are normally with hydrocarbon atoms.

Aromatic hydrocarbons also involve exclusively carbon and hydrogen atoms, however, the structure is based on the benzene ring. A benzene ring is a flat symmetrical molecule with six carbons in a ring structure, with bonds between the carbons equal in length and intermediate in size between a single and double bond. Six hydrogen atoms lie in the same plane as the carbon atoms.

Benzene rings can link up with each other and form polyaromatic hydrocarbons. Two benzene rings form naphthalene. Three rings will form anthracene/phenanthrene. The hydrogen atoms in the benzene ring can be substituted by other elements as well or with aliphatic hydrocarbons. For instance, a methyl group substituting a hydrogen atom in benzene yields toluene.

Common constituents of petroleum hydrocarbons are listed in Table 1

TABLE 1: CONSTITUENTS OF COMMON PETROLEUM FUELS AND RELATED COMPOUNDS

Fuels	Distillation Temperature ^{o}C	Aliphatic Constituents	Aromatic Constituents
Gasoline	40 - 205	Highly branches aliphatic with the majority containing between six and 12 carbon groups	Benzene, toluene, ethylbenzene, and xylenes
Kerosene	175-325	Aliphatics with greater than 12 carbon groups	Dimethyl and methyl naphthalene, toluene, ethylbenzene, and xylenes
Diesel	>275	Aliphatics with greater than 12 carbon groups	Toluene, ethylbenzene, xylenes, phenanthrene, anthracene, substituted naphthalene
Lubricating Oil	Non-volatile liquids	Long chains attached to cyclic structures	Polyaromatic hydrocarbons
Asphalt	Non-volatile solids	Very complex >30 carbon groups	Polyaromatic hydrocarbons

2.2 PETROLEUM PRODUCT TOXICITY

Determining the toxicity of petroleum compounds is complex because each fuel is a mixture of thousands of compounds of various structures. Only some of these compounds have been studied in detail by toxicologists and these compounds have usually been studied as the pure compound rather than as a mixture.

There are a few constituent compounds, primarily aromatic compounds, which have been studied. Some of these compounds are listed in Table 2.

TABLE 2: TOXICITY OF SELECTED PETROLEUM PRODUCT CONSTITUENTS				
Constituent	Primary Routes of Exposure	Known to Cause Cancer	Non-cancer Causing Effects	Exposure Limit[1] Time Weighted Average 8 hours
Benzene	Inhalation, absorption, ingestion, skin or eye contact	Yes (leukemia)	High levels in air cause headaches, tremors, confusion, unconsciousness, and death. Low levels affect immune system and blood cells.	25 ppm (inhalation)
Toluene	Inhalation, ingestion, adsorption, skin or eye contact	No	Affects brain and kidneys. High levels cause dizziness, sleepiness, unconsciousness and death. Long-term exposure affects brain functions. High levels of toluene inhaled by mothers can cause neurologic problems in babies.	100 ppm (inhalation)
Ethylbenzene	Inhalation, ingestion, adsorption, skin or eye contact	No	Dizziness, fatigue, headache, vertigo, unconsciousness, central nervous system effects, death, liver and kidney problems.	100 ppm (inhalation)
Xylenes	Inhalation, ingestion, adsorption, skin or eye contact	No	Dizziness, eye and throat irritation, vomiting, abdominal pain, central nervous system.	10 ppm (inhalation)
Naphthalene	Inhalation, skin adsorption, ingestion, skin or eye contact	No	Irritation eyes, headache, confusion, nausea, vomiting, abdominal pain, irritation bladder, profuse sweating, jaundice, hematuria, renal shutdown, dermatitis, optical neurosis, corneal damage.	10 ppm (inhalation)

[1] The Time Weighted Average is the standard exposure allowed for workers to these chemicals for an eight-hour period as recommended by NIOSH.

2.3 HYDROCARBON CONSTITUENT PROPERTIES

The volatility, mobility, and ability to biodegrade hydrocarbon constituents of fuels is closely related to their chemical structure.

Volatility refers to the ability of a chemical to become gaseous at ambient temperatures. The volatility is related to the boiling point of a chemical. Low boiling point chemicals quickly volatize.

Mobility and biodegradability of various constituents are also related to the boiling point with high mobility and biodegradability related to low boiling point chemicals. The following table summarizes these properties:

TABLE 3: PROPERTIES OF VARIOUS HYDROCARBON CONSTITUENTS			
Hydrocarbon Constituents	Volatility	Mobility in Soils/ Groundwater	Biodegradability
Aliphatics $<C_{10}$	High to moderate	High	High
Monoaromatic hydrocarbons	High	High	High
C_{10}< Aliphatics $<C_{20}$	Moderate to low	Moderate to low	Moderate
Napthalenes	Moderate	Moderate	Moderate
Phenanthrene/Anthracene	Low to none	Low	Moderate to low
Other Polyaromatics	None	Very low	Low
Aliphatics $>C_{20}$	None	Very low	Low

3.0 LANDFARMING PRINCIPLES

3.1 OVERVIEW

Landfarming is a form of bioremediation that uses naturally occurring microorganisms to metabolize or breakdown petroleum hydrocarbons in impacted soils. This is achieved by spreading contaminated soil in a thin layer across the landfarm area.

Volatilization is another process that is associated with landfarming in which specific hydrocarbons are transferred from the soil to the air as a result of low boiling points.

End products of bioremediation are microorganism protein, carbon dioxide and water. Stimulation of microbial growth and activity for hydrocarbon removal is accomplished primarily through the addition of air and nutrients. Metabolism of hydrocarbon is mediated predominantly through aerobic microbes.

The effectiveness of landfarming depends on three main parameters:

- Soil characteristics;
- Type of petroleum hydrocarbon; and
- Climatic conditions.

Soil characteristics include grain size, soil texture, bulk density, moisture content and permeability. Soil nutrient composition is important, as nutrients are required for effective biodegradation. Most microorganisms that breakdown petroleum hydrocarbons in soil require an aerobic environment therefore the introduction of oxygen into the soil is very important.

Climatic conditions influence landfarm efficiency. Climatic factors include rainfall, snow, wind effects and temperature. Rain and snow melt will change the moisture content of the remediating soil. Runoff also has the potential to cause soil erosion. Landfarm soil erosion can also occur during windy periods particularly during tilling or plowing operations.

Temperature affects the rate of remediation as bacterial metabolism rates are typically reduced at very low temperatures. Local site bacteria are better adapted to the cold environment, and may be able to maintain metabolic activity at colder temperatures.

Two processes are generally involved in the landfarming of petroleum hydrocarbon impacted soils:

- Volatilization - evaporation, and
- Biodegradation - breakdown by microbes in the soil.

Volatilization refers to the process of hydrocarbons being transferred from the soil to the air. Low boiling point hydrocarbons volatilize readily in temperatures above 5°C. Lighter hydrocarbon compounds such as gasoline, and to a lesser extent, kerosene and diesel will volatilize, but heavier hydrocarbons such as lubricating oils and asphalt, will not.

Biodegradation refers to the process where soil microorganisms use hydrocarbon as a food source and convert the hydrocarbons into soil biomass. Biodegradation can occur readily for certain hydrocarbons if conditions for microbial growth are optimized.

The microorganisms which readily degrade hydrocarbons require moderate temperatures, water, oxygen, pH, and macronutrients (carbon, nitrogen, hydrogen, oxygen, sulphur, phosphorus, potassium, and magnesium).

Microorganisms also require a non-toxic environment and therefore the concentration and types of contaminants in soil are an important consideration when determining whether biodegradation will occur. Bioremediation and landfarming are accepted as suitable techniques for the remediation of hydrocarbon impacted soils in the Northwest Territories.

The following macronutrients and their associated functions and required concentrations are summarized in the following table.

TABLE 4: MACRONUTRIENTS AND ASSOCIATED FUNCTIONS

Element	Physiological Function	Required Concentration (Molar)
Carbon	Constituent of organic cellular components. Energy source for the cell.	$>10^{-2}$ M
Nitrogen	Constituent of proteins, nucleic acids and	10^{-3} M
Hydrogen	Constituent of organic matter and water	
Oxygen	Constituent of organic matter and water	
Sulphur	Constituent of proteins and certain co-enzymes	10^{-4} M
Phosphorus	Constituent of nucleic acids, phospholipids, nucleotides and certain co-enzymes	
Potassium	Principle inorganic cation in the cell and a cofactor for certain co-enzymes	$10^{—4}$ -10^{-3} M
Magnesium	Co-factor for many enzymes, chlorophylls and required for the synthesis of cell walls and membranes	10^{-4} -10^{-3} M

The average hydrocarbon fuel content in the soil should generally be 4% by weight or less for optimum bioremediation. Fertilizers or commercial bioremediation products can be used to improve the macronutrient content of the soil.

Petroleum hydrocarbons, which can be readily degraded include gasoline, kerosene, and diesel. In a northern environment, it is more difficult to biodegrade hydrocarbons due to fewer days with optimum temperature conditions, and biodegradation may take several years or more.

An undesirable process, which could occur in the operation of the landfarm, is the leaching of hydrocarbons into underlying native soils and groundwater. The inclusion of a liner system in the LCSCF significantly lowers the potential for leaching. With proper operation and management and regular monitoring, the potential for leaching is even further reduced.

The operational management of the landfarm requires that factors, such as soil moisture and nutrient content be maintained within a desirable range. Soil moisture should be 30 to 80% water content of the soil (12 to 30% soil moisture). In addition, surface water runoff and leachate need to be controlled. Soils within a landfarm may require watering to ensure the optimal water content for biodegradation. Water collecting in the landfarm sump can be used to irrigate the landfarm during dry periods.

3.2 ENVIRONMENTAL GUIDELINES

3.2.1 Soils

Concentrations of analysed contaminants of concern in soil at the landfarm should be compared to Government of the Northwest Territories (GNWT) Environmental Guidelines for Site Remediation (2003). Industrial Land Use soils standards are the most applicable for the Tahera Jericho Mine. At a minimum soils should be analysed for BTEX and F1 to F4 petroleum hydrocarbons.

3.2.2 Waters

Concentrations of analysed contaminants of concern in melt water at the LCSCF should be analysed for BTEX and F1. Laboratory analysis should be compared to Canadian Council of Ministers of the Surface Water Quality Guidelines (2002) and the Water License (Nunavut Water Board License NWB1JER0410).

3.3 SOIL SAMPLING REQUIREMENTS

In order to determine the environmental quality of soils within the landfarm a minimum number of soil samples should be analysed. It is recommended that one composite of ten (10) samples be collected for every 100 m^3 of petroleum hydrocarbon impacted soils.

3.4 HEALTH AND SAFETY

There are two primary safety concerns at a landfarming facility:

- chemical hazards; and
- heavy equipment hazards.

The chemical hazards are of greatest concern at the beginning of landfarming, when soils are initially spread. Following even a short period of bioremediation, the hazards will be reduced as more volatile and toxic chemicals are remediated.

There are four primary exposure pathways to chemicals within the landfarm:

1. inhalation;
2. ingestion;
3. skin contact; and
4. eye contact.

Inhalation is normally the greatest risk. The risk of inhaling these chemicals can be dramatically reduced by wearing a respirator (breathing mask with a special organic filter cartridge). The organic filter cartridge will adsorb both contaminants contained in dust, as well as organic vapours.

Ingestion of contaminants normally occurs accidentally. For example when hands, in contact with contaminants, are not washed prior to smoking, eating, and drinking. Consequently smoking, eating, and drinking should be prohibited in the landfarm area.

Skin and eye contact with contamination can be prevented by wearing coveralls, rubber safety boots, safety glasses, and gloves to reduce skin exposure when working in the landfarm area.

Heavy equipment, such as loaders, dump trucks, disc and heavy-duty tillers, are inherently dangerous and should only be operated by competent and experienced workers. Workers working alongside such equipment should wear hard hats approved by the Canadian Standards Association (CSA). Heavy equipment should be equipped with back-up warning sounds to alert workers to this danger. A trained flag-person should be available at the site to direct any truck traffic.

Equipment must be thoroughly hosed down prior to leaving the landfarm to remove contamination from the wheels, blades, discs, etc. of the equipment. Discing equipment and tillers can also be cleaned by tilling or discing a small clean area beside the landfarm to loosen off any soil clinging to this equipment.

Workers must be thoroughly trained so that they are aware of the potential health risks associated with landfarming operations. Training should include proper use of personal protective equipment and first aid procedures. Ideally, workers should have extensive heavy construction or landfarming experience.

No access should be granted to unauthorized personnel.

3.5 ACCEPTANCE OF SOIL

Acceptance procedures for the landfarm must ensure that difficult to remediate materials or unauthorized contaminated materials are not permitted into the landfarm. The acceptance procedure goals should be as follows:

- to ensure that the majority of soil accepted in the landfarm is of the type that is easily remediated, i.e. gasoline or diesel;
- to ensure that difficult-to-remediate hydrocarbons, such as lubricating oils are not accepted; and
- to ensure that contaminated materials which cannot be remediated and can accumulate in the landfarm are prohibited.

The volatile and semi-volatile hydrocarbons (light hydrocarbons), such as diesel, gasoline and kerosene, can readily be remediated. Lubricating oils and other heavier hydrocarbons are difficult to remediate. Advice from Tahera Jericho mine environmental staff should be sought for remediating these more difficult contaminants. Acceptance of these more difficult to remediate soils in the landfarm should not be permitted.

The characterization of the wastes must meet the sampling guidelines previously noted.

Hydrocarbon contaminated soils with metals, chlorinated hydrocarbons or polyaromatic hydrocarbons with four or more rings, should not be allowed into the landfarm area if these parameters exceed adopted guidelines. These contaminants are difficult to remediate and will accumulate in the landfarm. These types of contaminated soils will require offsite disposal or treatment.

Rock exceeding 40 mm in diameter will not be accepted in the landfarm. This may require that contaminated soil be screened or sorted prior to acceptance in the landfarm. Oversized material will be treated as directed by the environmental department and placed in a segregated area of the waste rock stockpile.

3.6 OPERATING THE LANDFARM

3.6.1 Receiving Soil/Snow

Following acceptance of soil, the amount of landfarm area needed to remediate that volume of soil should be calculated. To optimize bioremediation, contaminated soil should be spread about 30 cm thick.

Contaminated soil and/or snow should be trucked directly to the landfarm. Once the trucks hauling the contaminated soil reach the landfarm, mine environmental staff will estimate the volume of contaminated soil. If the contaminated soil can be segregated into areas of high hydrocarbon-impacted soil and lower hydrocarbon-impacted soil, remediation of the lower hydrocarbon-impacted soil can occur faster, thereby allowing faster removal of

the remediated soil from the landfarm. The high hydrocarbon-impacted soil can then be spread thinner over the formerly remediated area.

Contaminated soil should be placed in the upgradient portion of the LCSCF. Contaminated snow should be hauled and placed directly in the sump area.

If excavation and direct transport to the landfarm is not possible, the soil can be stockpiled at the contaminated site until landfarm space is available. A temporary berm should be constructed around the hydrocarbon contaminated soil stockpiles to prevent runoff of contaminants.

3.6.2 Spreading/Tilling

After excavation and transport of contaminated soil to the landfarm area, the soil should be dumped and spread under the direction of the environmental staff with a front-end loader or bulldozer. The soil should be plowed or tilled as it is spread, and this should continue until all of the soil has been deposited to ensure that the material is well mixed. Material placement should maintain a minimum 2 m offset from the inside berm toe.

During the summer months after spreading, the contaminated soil should ideally be tilled every two weeks. During the winter months, contaminated soil can be stockpiled in the landfarm for spreading and tilling in the spring. Stockpiles should be no higher than 5 m.

Only the equipment being used to plow the soil should ever drive on the landfarm soil, and only during plowing. Trucks or other vehicles should not drive on the landfarm soil as this will pack the soil down making it difficult to plow, and prolong the soil remediation time. As such, an access path should be maintained at the edge of the facility to allow for vehicles transporting snow to the sump area.

The landfarmed soil after spreading should be loose (i.e. fluffy) and moist, and not hard and dusty. If the landfarm soil is too dry, watering the soil is recommended prior to tilling. It should not be worked if it is too dry. The landfarm soil should not be tilled during, or immediately following, heavy rain as this will cause the soil to compact. If the soil is muddy, or sticks to the tires of the tilling equipment, it is too wet to plow.

Remediation of soils within the landfarm would occur during the summer season from approximately June to September at the Jericho Mine. It is usually not beneficial to plow the landfarmed soil if daytime temperatures are below 5°C.

If necessary, the landfarmed soil should be watered to prevent dust generation during the summer and to enhance biodegradation.

3.6.3 Record Keeping

A standard form to record landfarm operation is provided in Appendix B. This form can be used to keep track of work undertaken at the site, and the scheduling of follow-up activities. Detailed instructions for summer landfarm operations are outlined below.

1. Every week, check the landfarm. Is it -

   – too dry to plow, i.e. dusty, soil is very hard and lumpy?

   – too wet to plow, i.e. muddy, sticks to wheels and boots, or good?

2. If the soil is too wet or too dry, do not plow. Fill in the forms, and make note on the forms that it should be checked again in about seven days. If soil is too dry for a period of two weeks or more, and no rain is forecast, soils should be irrigated.

3. If the soil seems fine, plow or till it.

   – If using a disc or plow, do two passes over the site, at right angles;

   – If using a tiller, do one pass over the site.

4. Note any hydrocarbon odours from the soil while plowing. Check a few freshly plowed areas for hydrocarbon odours.

5. Dig into at least five locations to make sure that the equipment is plowing deep enough. Hand dig down to the base of the landfarm. Watch out for areas where contaminated soil has been packed down below the plowed soil. If the soil is packing down, it has to be broken up. A ripper blade that penetrates for the full thickness of the compacted area would work. After breaking up the compacted soil, continue to plow as usual.

6. Fill in the form, and note to check the landfarm again in another week.

7. If there are no noticeable odours from the soil from a particular source for two plowing sessions, the landfarm should be ready for sampling to determine if the landfarm soil has been remediated to guideline criteria. If soil odour persists after two months of landfarming, additional remediation efforts, such as fertilizer application, may be required to treat difficult to landfarm soil.

8. If confirmatory sampling of the landfarm soil has determined that the soil has been successfully remediated, the soil can be removed and reused. Confirmatory testing should be conducted under the direction of an environmental professional to determine if soil has been successfully remediated.

3.6.4 Removal of Meltwater

Accumulated water should be tested for BTEX and F1 hydrocarbons in accordance with Section 3.2.2. If results are below applicable criteria, the water can be released to the environment. If results are above criteria, the water should be treated prior to release.

3.7 ENVIRONMENTAL MONITORING

Monitoring and record keeping are an essential component of a successful landfarm operation. To determine if a particular soil source has been completely remediated to the applicable guideline criteria, confirmatory sampling and laboratory analysis are required. Landfarm soil can be sampled and analysed when no odour has been detected for two months.

For sampling hydrocarbon-impacted soils, glass jars with teflon or foil covered lids, supplied by the laboratory should be used. The jar should be completely filled with soil with no air pockets and the jar stored in a cooler with ice for transportation to an accredited laboratory for analysis. Soil sampling and analysis should be conducted under the direction of environmental staff.

If tested soil is below applicable criteria, the remediated soil can be removed from the landfarm and reused elsewhere on site.

It is recommended that annual monitoring of moisture, nutrients and hydrocarbon degrading bacteria levels in landfarmed soils be conducted. Soil samples for this analysis should be collected during the middle of the summer season. The mine site environment department will annually review soil analysis data and determine proactive measures to increase microbial degradation of petroleum hydrocarbons within the landfarm.

3.8 LANDFARM CLOSURE PLAN

The landfarm facility will eventually require decommissioning and detailed planning can help to be better prepare for future closure. Some steps taken during initial start-up will make the landfarm closure less expensive and simpler. The following guiding principles will simplify the decommissioning process:

- Contaminated soil should only be placed within the proposed landfarm footprint. Soil should not be stockpiled at the mine site without prior consultation with environmental staff. There is a danger that too much contaminated soil may be accepted than can be treated in a reasonable time frame. If soil is stockpiled on site, it should be contained within a bermed facility;
- Maintenance of the landfarm, monitoring wells, and other facilities at the site must be on-going. Mine staff responsible for the landfarm should be diligent in inspecting the facilities and repairs should be made promptly when required;
- Accidental spills outside of designated areas should be promptly cleaned up, reported and inspected;
- There should be minimal disruption to areas outside the landfarm except on a need be basis;
- There must be no other use of the facility, except as a landfarm. No materials other than petroleum hydrocarbon impacted soils should be allowed.

4.0 STANDARD OPERATING PROCEDURES AND LANDFARM RULES

4.1 PETROLEUM CONTAMINATED MATERIALS CLASSIFICATION

Soil contaminated with hydrocarbon constituents that are not difficult to remediate, such as light fraction petroleum hydrocarbon (gasoline, jet fuel, diesel, stove oil and glycol), should be placed in the landfarm.

Soil impacted with difficult to remediate materials such as heavy fraction petroleum hydrocarbons (lubricating and hydraulic oil) should not be placed in the landfarm. Soil impacted with difficult to remediate materials should be stockpiled within a bermed area and hauled to an appropriate treatment or containment facility.

Contaminated snow is to be placed in the area downgradient and adjacent to the landfarm (sump area). The following table summarizes the segregation of material as it applies to the landfarm and snow containment facility.

TABLE 5: SEGREGATION SUMMARY

Material	Destination / Location
Light hydrocarbon contaminated soil, particle size diameter <4 cm	Landfarm
Heavy hydrocarbon contaminated soil, particle size diameter <4 cm	As directed by Environment Department
Rock, particle size diameter > 4 cm	Remove majority of petroleum impacted fines; store in a segregated area of the waste rock dump[1]
Hydrocarbon contaminated snow and ice	Place in the contaminated snow containment portion (sump)

1. Monitor seepage from waste rocks dump(s).

4.2 GENERAL RULES

- The Health, Safety and Environment Manager or designate will be responsible for the management of the landfarm and contaminated snow and ice containment facility. The environment department will be responsible for monitoring and inspection of the facility.
- The landfarm will normally operate from soil thaw to freeze up which is approximately from June to September at the Tahera Jericho mine. Soil aeration will occur approximately every two weeks a summer season, as required. The mine site environmental department may recommend the application of fertilizer, commercial bioremediation products such as Oil Sponge™ if necessary. Hauling of petroleum hydrocarbon impacted soil will be co-ordinated between the environmental staff and generators of contaminated soil at the mine site.

- During winter the landfarm and snow containment facility will continue to receive hydrocarbon impacted soil and snow for stockpiling. If the facility capacity is exceeded the contaminated materials should be stockpiled within a bermed area.
- No unauthorized personnel should be allowed in the landfarm area. It may be necessary to designate areas that are clearly signed if the facility treats different levels of impacted soils. As more types of petroleum hydrocarbon impacted soils are placed in the landfarm they will be placed in designated areas within the landfarm. Appropriate signage will be provided.
- No development should be conducted immediately within the facility.
- The mine site environmental staff are responsible for recordkeeping and monitoring of the landfarm.

4.3 SOIL SPREADING PROCEDURE

- Mine site environmental staff will coordinate scheduling of hauling and spreading of contaminated soil at the landfarm. In order to effectively treat soils within the landfarm the soils will be aerated once every two weeks over the summer.
- Mine site environmental staff will conduct weekly inspections of the landfarm facility and complete a weekly inspection form.
- Mine site environmental staff will monitor the quantity and quality of contaminated soils entering the facility.
- Mine site environmental staff will inspect the trucks leaving the landfarm to ensure that no contaminated soil, remains on the tires of the truck. If necessary, the truck should be cleaned.
- Mine site environmental staff will direct the equipment operator to level soil within the landfarm to appropriate depths of approximately 30 cm.
- In the event more soil is delivered than there is space in the landfarm, the soil can be stockpiled on site if space is available. Stockpiling of soil should only be conducted with mine site environmental staff approval. Stockpiled soil must be contained within a berm. The stockpile can be spread in the landfarm as space becomes available.
- The possibility of birds landing on ponded oil contaminated water in the landfarm and snow containment facility is a concern. This may be prevented by stringing rope at 2 m intervals across the ponded surface water areas and to place flagging at 1 m intervals on these ropes.
- Melting contaminated snow and ice and runoff or seepage from the landfarm will collect in the sump. The sump will need to be pumped out during the summer. Water pumped from the sump will be passed through an oil water separator if necessary prior to discharging. Following laboratory analysis waters will be discharged to the

processed kimberlite containment area (PKCA) or the Open Pit as directed by the environment department. The sump should be pumped dry prior to freeze-up.

4.4 ROUTINE LANDFARM OPERATION

- On a weekly basis the landfarm will be inspected by the environmental staff. A site inspection form will be completed during the inspection.
- If the moisture conditions in the landfarm are good, the mine site environmental staff will request that heavy equipment be used to till or disc the soil. The environmental staff will inspect the equipment operator's work to ensure that the chosen equipment is aerating the full depth of the contaminated soil.
- The mine site environmental staff will periodically review previous inspection reports. If no hydrocarbon odour has been noted for two months, the environmental staff will arrange for soil sampling and analysis of soil within the landfarm.
- All confirmatory soil sampling will be conducted under the supervision of environmental personnel.
- If mine site environmental staff determine that soil has been sufficiently remediated, the soil can be removed from the landfarm and stockpiled on site for future approved use.
- Remediated soil should be stockpiled separately from any contaminated soil stockpile on site.
- Identified repairs to the landfarm facility should be completed as soon as possible.
- If soil contaminated with fuels other than gasoline is found to be too dry for two successive weeks, it can be irrigated with water. Gasoline is highly volatile and will likely remediate even under dry soil conditions.
- Once annually, in late summer, the environmental staff should arrange for ground and surface water monitoring. The landfarm environmental staff should supervise or conduct sampling.
- Once annually the landfarm should be analyzed for suite of assays that will provide an indication of the facility's performance in fostering bacterial growth, reduction of petroleum hydrocarbons, residual nutrient concentrations and pH. This is necessary to determine the efficiency of the treatment process and whether any modification of the process is necessary.

4.5 HEALTH AND SAFETY

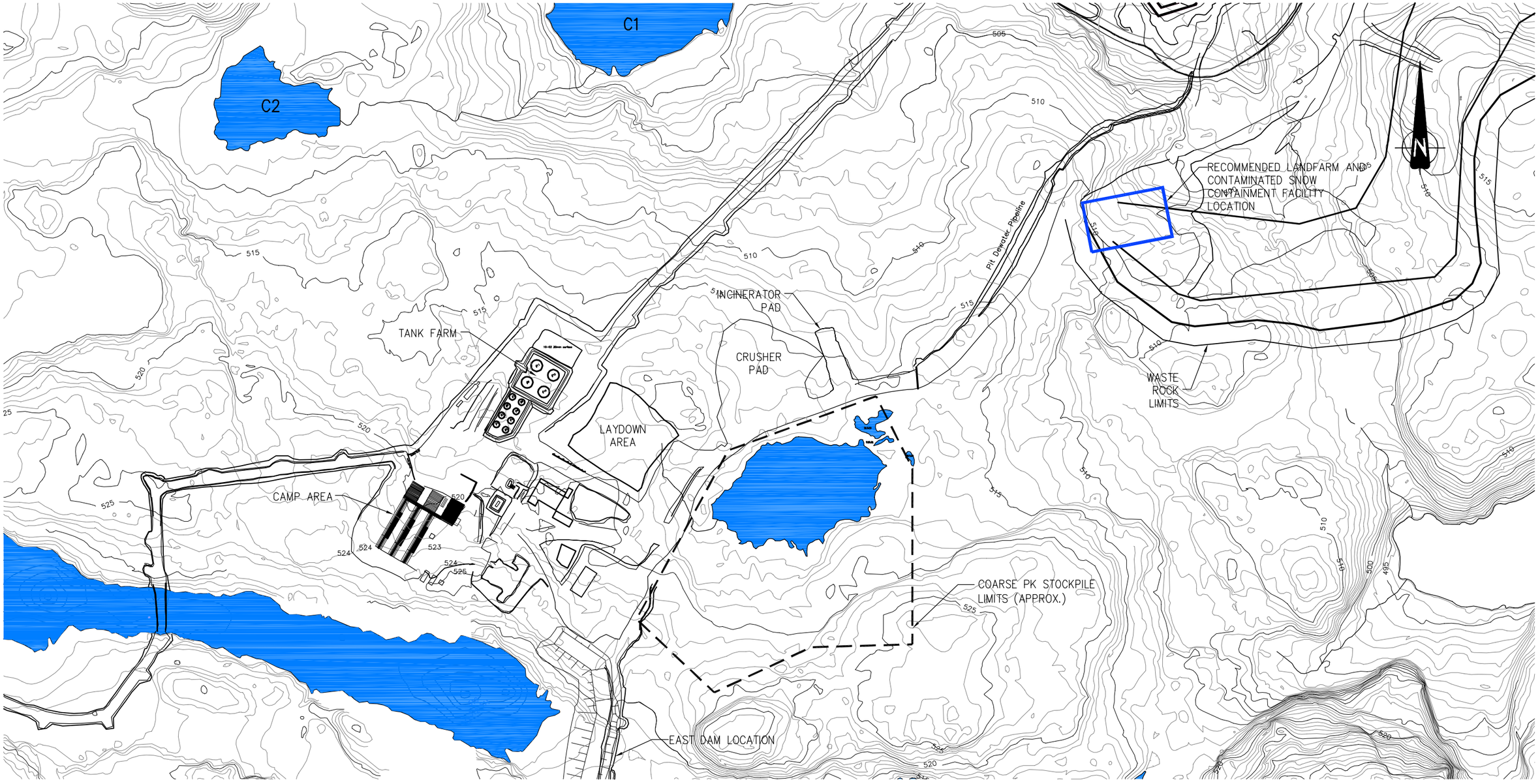
- Workers should have CSA approved hard hats and rubber boots, coveralls, gloves, safety glasses, and a half mask respirator with organic cartridges. Truckers do not require all the above equipment. The windows of their cab must remain closed during dumping of soil with their vents closed.
- No eating, smoking, or drinking is allowed at the landfarm.

- Workers handling contaminated soil must wash their hands and face as soon as possible after working in the landfarm.
- No unauthorized access is allowed into the landfarm.

4.6 RECORDKEEPING

- A file should be kept detailing landfarm operation, monitoring and environmental sampling. The file should also contain chemical analysis reports supplied by the laboratory. The file should contain weekly facility inspection checklists. All repair records should also be kept in this file.

FIGURES



NOTE: FIGURE BASED ON AS-BUILT DRAWING PROVIDED BY TAHERA OCTOBER 30, 2005

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metres
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Figure 1
Site Locations
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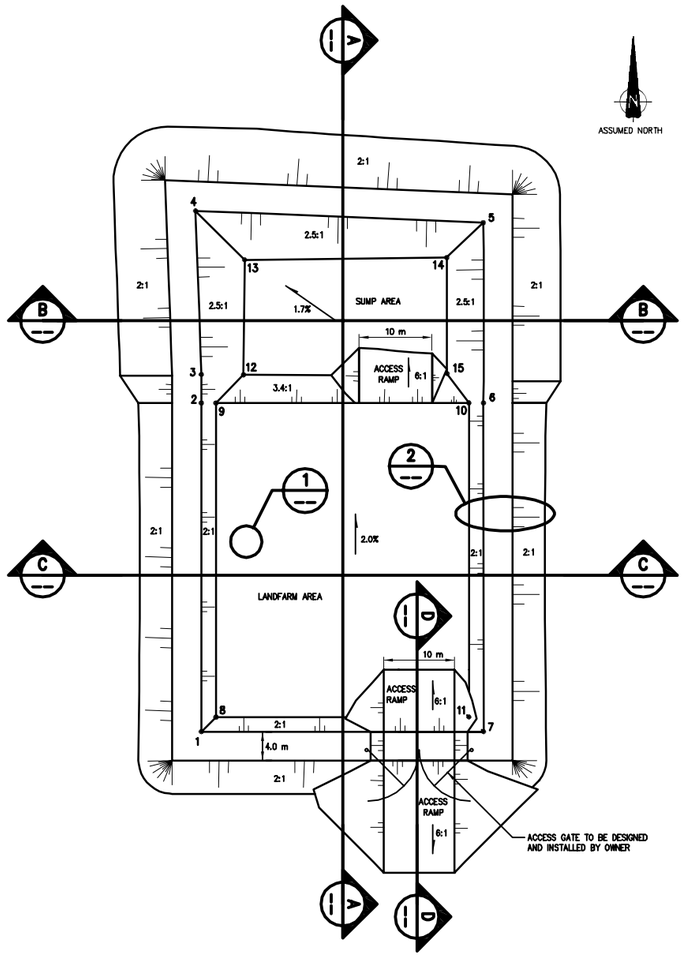
APPENDIX

APPENDIX A LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY DRAWING



PLAN
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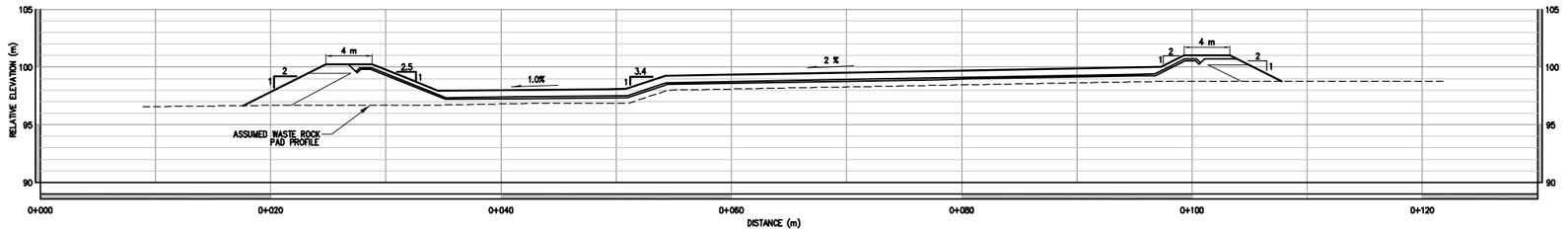
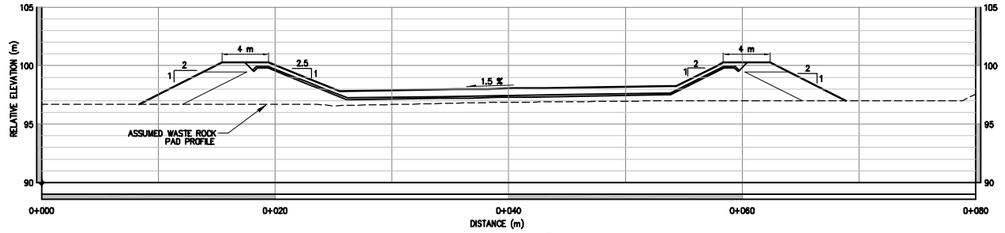
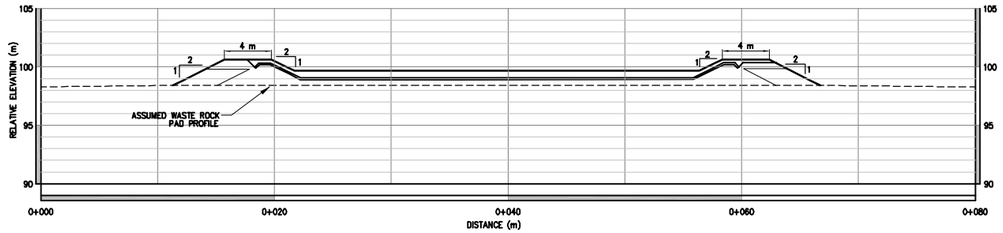


SECTION A
SCALE: 1: 250

RELATIVE LAYOUT COORDINATES			
POINT	X (m)	Y (m)	ELEVATION (m)
1	0	0	101.00
2	0	45.00	100.25
3	0	48.90	100.25
4	−0.879	71.31	100.25
5	38.65	69.74	100.25
6	38.65	45.00	100.25
7	38.65	0.00	101.00
8	2.00	2.00	100.00
9	2.00	45.00	99.25
10	36.65	45.00	99.25
11	36.65	2.00	100.00
12	5.79	48.87	97.95
13	5.93	64.60	97.65
14	33.63	64.90	98.25
15	33.66	49.03	98.25



SECTION B
SCALE: 1: 250



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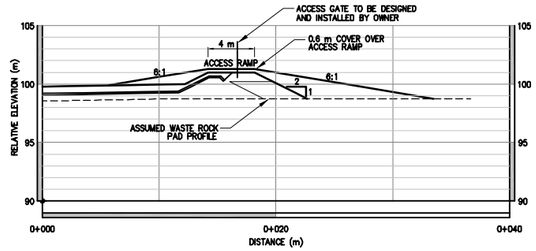
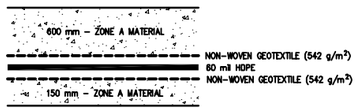
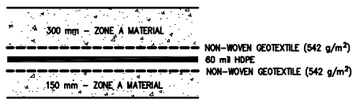


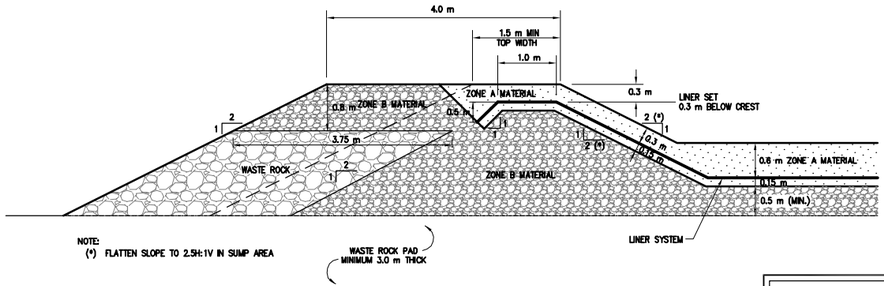
SECTION D
SCALE: 1: 250



DETAIL – LINER SYSTEM (BASE) 1
N.T.S.



DETAIL – LINER SYSTEM (BERMS) 2
N.T.S.



SECTION – (TYPICAL)
N.T.S.

REDUCED COPY
- Do Not Scale -

NOTES:

1. FOUNDATION CONDITIONS TO BE INSPECTED BY ENGINEER PRIOR TO STARTING CONSTRUCTION.
2. LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY TO BE CONSTRUCTED ON WASTE ROCK PAD, MINIMUM 3.0 m THICK, UNLESS SITE INVESTIGATION INDICATES A THINNER PAD THICKNESS MAY BE USED. REDUCTION IN PAD THICKNESS SHALL BE DETERMINED BY THE ENGINEER.
3. MAINTAIN THE FOLLOWING MINIMUM COVER THICKNESS OVER LINER TO SUPPORT LISTED EQUIPMENT. CONSULT ENGINEER IF DESIRED EQUIPMENT IS NOT LISTED.

COVER OVER LINER (mm)	ALLOWABLE EQUIPMENT
0	FOOT TRAFFIC, 4 TIRE ATV
300	D4–D6 STYLE CAT, BOBCAT
600	D300 HAUL TRUCK WITH 350 kPa TIRE PRESSURE

4. COVER THICKNESS OVER ACCESS RAMP TO BE INCREASED TO 0.6 m.
5. FACILITY LAYOUT BASED ON ASSUMED BENCHMARK LOCATION AND ELEVATION. CONSTRUCTION ELEVATIONS TO BE ADJUSTED TO MATCH EXISTING TOPOGRAPHY.
6. LAYOUT POINTS 11 AND 15 LOCATED UNDER ACCESS RAMPS.
7. BERM TOP WIDTH MAY BE ADJUSTED BY ENGINEER IN ACCORDANCE WITH SITE SPECIFIC CONDITIONS. MINIMUM BERM TOP WIDTH MEASURED FROM THE INSIDE CREST SHALL BE 1.5 m.

REFERENCE DRAWINGS				REVISION			
–	–	DD/MM/YY		A	ISSUED FOR CLIENT REVIEW	DEC/05	KJ
DRAWING No.	DRAWING TITLE	DATE	REV	No.	DESCRIPTION	DATE	APPROVED

EBA ENGINEERING CONSULTANTS LTD.

DESIGNED BY:	GK
DRAWN BY:	GK/DRG
DATE:	09/11/05
SCALE:	AS SHOWN
PROJECT No.:	1100060.008
ACAD FILENAME:	1100060008D01e.dwg

ORIGINAL
SIGNED AND SEALED
Seal: G.D. Koop, P.Eng. Date: December 9, 2005
Permit: Kevin W. Jones, P.Eng. Date: December 9, 2005
The signed Professional Seal and Permit to Practice stamps reside on the executed drawing which is held and controlled by EBA Engineering Consultants Ltd.

Tahera Diamond Corporation

TAHERA DIAMOND CORPORATION

LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY

LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY DESIGN PLAN, SECTIONS AND DETAILS

REVISION ISSUE: A

DRAWING No.: 1100060–01

APPENDIX

APPENDIX B LANDFARM INSPECTION CHECKLIST

LANDFARM INSPECTION CHECKLIST

This checklist must be filled out each time the site is visited. An inspection does not have to be carried out more than once in a 24-hour period, ie. if the site is visited more than once a day, it need only be filled out once.

Date Inspected: _____ Inspected by: _____
Weather: _____ Temperature: _____
Facilities: Cell Condition _____ Berm Condition _____ Road Condition _____
Gate _____ Monitoring Wells _____ Fence and Gate _____
Other _____
Repairs Needed _____

Soil condition: No of locations inspected _____ Odour _____
Too dry, too wet, ideal _____ Other _____

Soil transported to site Yes or No _____ No. of trucks _____
Tonnage _____ Estimated Volume _____

Soils tilled or disced _____

Date Inspected: _____ Inspected by: _____
Weather: _____ Temperature: _____
Facilities: Cell Condition _____ Berm Condition _____ Road Condition _____
Gate _____ Monitoring Wells _____ Fence and Gate _____
Other _____
Repairs Needed _____

Cell Soil condition: No of locations inspected _____ Odour _____
Too dry, too wet, ideal _____ Other _____

Soil transported to site Yes or No. _____ No. of trucks _____
Tonnage _____ Estimated Volume _____

Soils tilled or disced _____