Kudlik Construction Ltd.

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Operation and Maintenance Manual

Sewage, Solid Waste Disposal & Waste Handling Facilities
CAM-D DEW Line Environmental Remediation

SIMPSON LAKE, NUNAVUT

Presented to
Indian and Northern Affairs (INAC)

Review: October 5th, 2010

KUDLIK CONSTRUCTION LTD.
P.O. BOX 727, 1519 FEDERAL ROAD
IQALUIT, NUNAVUT

Operation and Maintenance Manual

Sewage, Solid Waste Disposal & Waste Handling Facilities

CAM-D DEW Line Environmental Remediation

Prepared by :

François Bourassa, P. Eng.
Project Manager
Kudlik Construction Ltd.

October 5th, 2010

TABLE OF CONTENTS

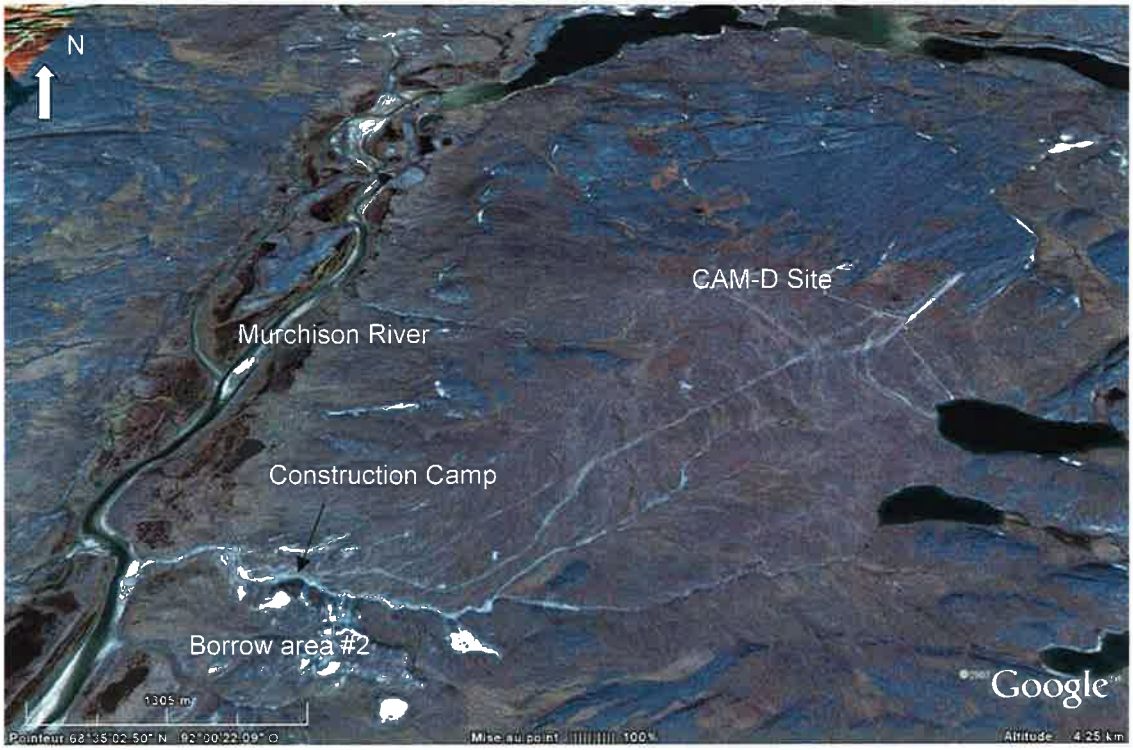
1. INTRODUCTION

CAM-D is located in the middle of the Boothia Peninsula (Nunavut), approximately 4.5 km south of Simpson Lake and approximately 120 km southwest of Taloyoak (Spence Bay) in Nunavut (Figure 1). The remediation project was awarded to Kudlik Construction Ltd. in December 2008. In August 2009, heavy equipments, camp facilities, material and all consumables were delivered by sealift to Shepherd Bay, located about 100 km northwest of CAM-D. All equipment, material and consumables required to achieve the remediation project at CAM-D was transported by CAT train during the spring 2010 from Shepherd Bay to CAM-D. In order to achieve the different cleanup activities included in the scope of work of the CAM-D Environmental Site Remediation, a construction camp was established nearby the Murchison River, located 4 kilometres southwest of the CAM-D DEW Line Station (Figure 2). The first cleanup season was started in July 2010 and was completed in October 2010.

The purpose of this document is to present the operation and maintenance manual for the camp waste water, the solid waste management and the waste handling facilities for the CAM-D DEW Line site remediation project. The O&M manual for the waste water plant was already presented to INAC. However, in order to fulfill the conditions of the water licence amendment No.1, the management of the solid wastes generated on site and the operation of the waste handling facility are also presented in this document.

Figure 1: Localization Map

Figure 2: Construction Camp localization



2. SEWAGE TREATMENT AND DISPOSAL

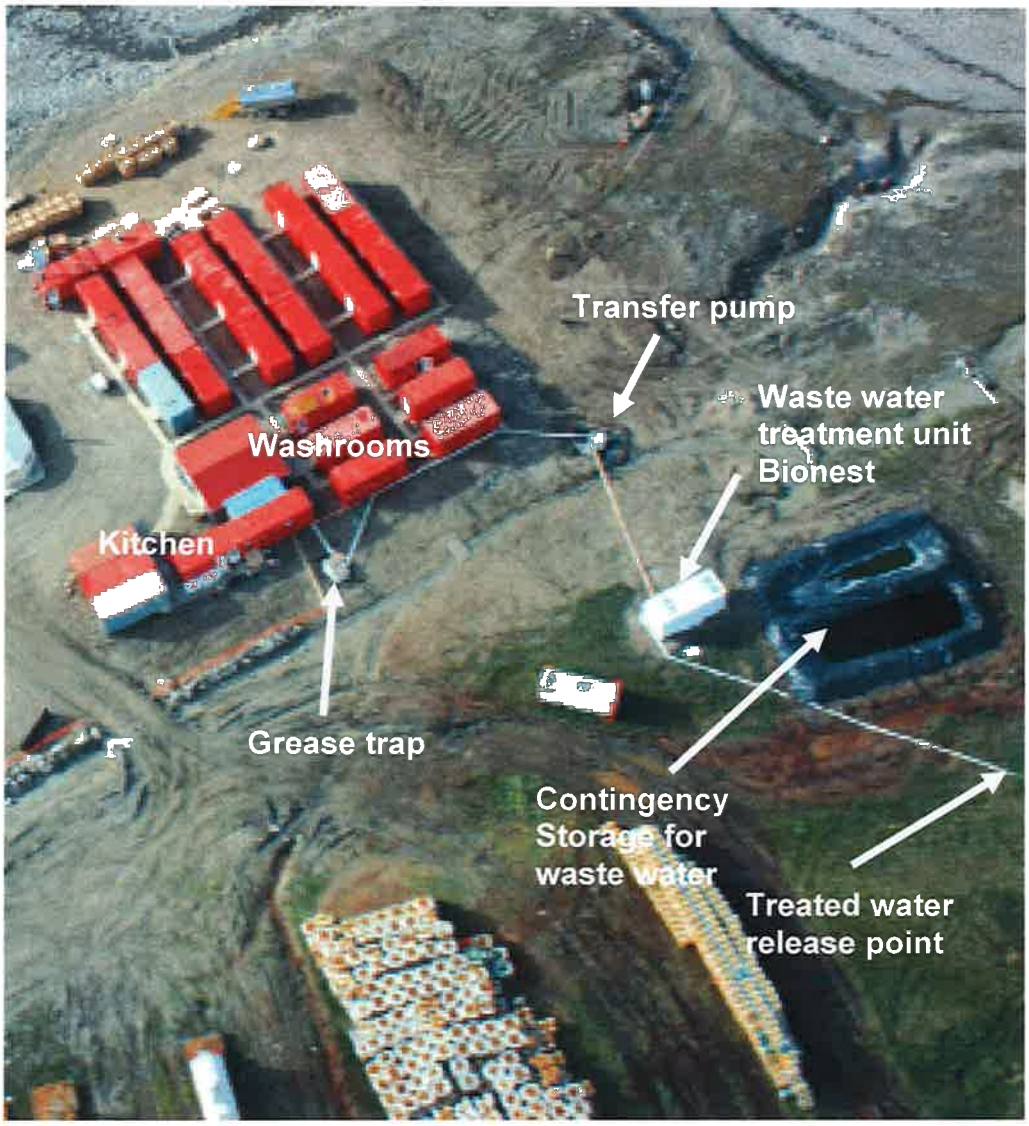
The waste waters generated from the camp activities are treated with a waste water plant brought on site. The "Bionest" waste water treatment unit operation and maintenance manual is presented in Appendix 1.

The waste water generated from the kitchen is sent through a grease trap located at the back of the building (Figure 3) and then, to the pumping station which sending all camp waste waters into the septic tank of the treatment plant. The waste waters are treated to meet the project waste water discharge criteria and released in the tundra. As per water license agreement, the treated effluent is tested once per month and at the beginning and at the end of each construction season.

The solids are accumulated in the septic tank of the treatment unit during each construction season. When the season is ending, the treatment unit is shut down and the sludge is emptied and temporary stored into a lined lagoon located nearby the treatment station.

Two lined lagoons were built nearby the treatment plant. These lagoons are used to contain waste water in the event that the treatment plant must be temporary shut down. The lagoons were designed to contain the camp waste water during a complete week, which represents about 21,000 litres. These lagoons are also used to treat the sludge removed from the unit, as explained in the shut down procedure (Appendix 1). According to the analytical results, the sludge will be disposed into the project landfill or containerized and shipped out to the appropriate treatment facility.

Figure 3: Waste Water Treatment Plant



3. SOLID WASTE DISPOSAL

The non-hazardous solid wastes generated from the project activities are disposed in the project landfill. The domestic wastes produced from the camp operation are incinerated on site and incombustible wastes are disposed into the project landfill. Ashes produced from the incinerator are collected in drums and analyzed to determine if they can be disposed into the non-hazardous landfill or they need to be ship off-site for treatment and final disposal.

The project landfill (non-hazardous waste landfill) was designed by AECOM and built by Kudlik Construction Ltd in July 2010. The construction drawings are attached in appendix 2 and a picture of the landfill dated from August 2010 is presented in Figure 4. The landfill is located on the old DEW Line site, about 4 kilometres north-east from the camp. The landfill is operated as per contract specifications.

Figure 4: Project non-hazardous landfill

4. WASTE HANDLING FACILITY

No waste handling facilities was required to perform the project activities. The contaminated soils were containerized directly on each excavation site and the hazardous wastes from building demolitions were containerized on demolition site. The buried debris excavation was started in September 2010. Due to very soft ground conditions, it was found that it is more practical to sort debris directly in the excavation than hauling them on a waste handling facility.

HDPE liner (80 mil) was brought on site and if during the last remediation season it appears that a waste handling facility is require, a surface of appropriated dimensions will be prepared and the liner will be installed.

APPENDIX 1
Bionest O&M Manual

BIONEST KODIAK

Maintenance

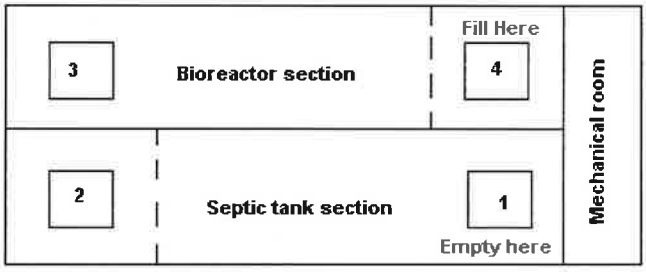
TABLE OF CONTENTS

BIONEST KODIAK

1 START-UP PROCEDURE

1. Please verify that both the inlet and outlet pipes are properly connected to the KODIAK unit.
2. Completely fill the unit with clean water via the last compartment of the bioreactor, (section 1/3, lid #4)

Figure 1: KODIAK unit's configuration.

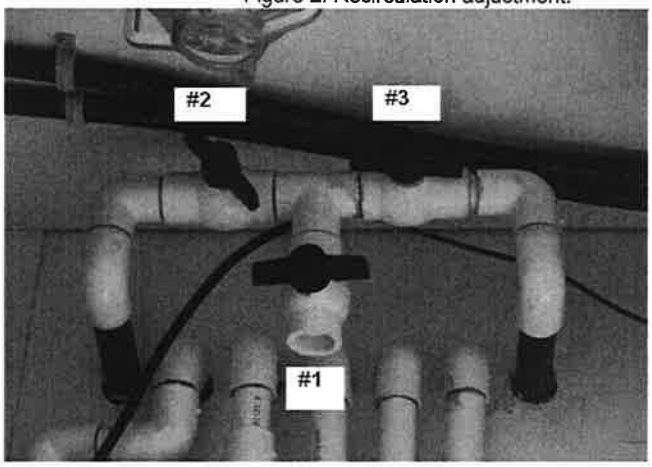


Kodiak 20 feet

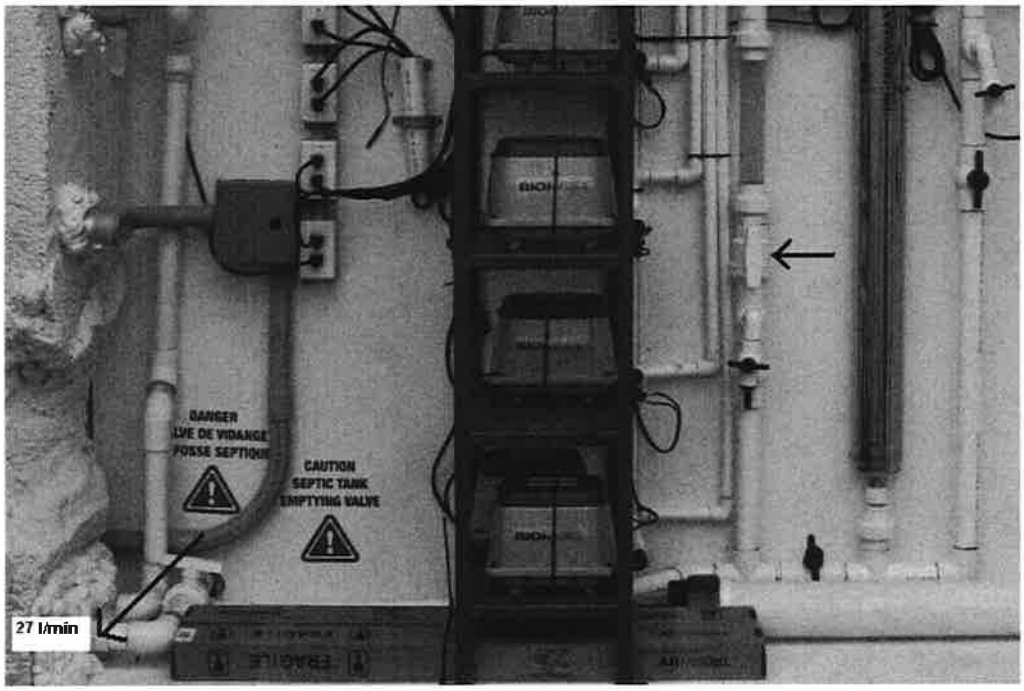
As the bioreactor is filled, water flows to the septic tank through one-way valves in order to balance the water level in each tank. If the filling is made by any other opening, water from the other tanks could not flow through one-way valves and therefore, too much pressure could cause breakage of partition walls.

3. Open water supply. (if needed)
4. Turn on the electrical supply. **(The KODIAK unit should never be electrically powered if it is not fully filled with water)**
5. Adjust the recirculation flow (see Figure 2)
    a. Place a bucket under valve #1.
    b. Open valves #1 and 3.
    c. Close valve #2.
    d. Adjust valve #3 in order to have a flow rate equivalent to 2,5 times the inlet flow rate.
    e. One adjusted, open valve #2 and close valve #1.

Figure 2: Recirculation adjustment.



6. Adjust the flow rate within the UV disinfection unit.
    a. Fill the KODIAK unit with clean water. (via the bioreactor compartment, section 1/3, lid #4).
    b. Adjust the valve identified below to obtain a flow rate of 27 L/min out of the KODIAK unit.



BIONEST KODIAK

7. Verify the different alarms effectiveness.
8. Adjust the ceiling fan heater thermostat to 20°C.
9. Adjust the different setpoints (see SETPOINT document)

BIONEST KODIAK

2 COMPONENT MAINTENANCE

Every year, an inspection of the following elements must be carried out by the owner. (If the KODIAK unit is used on a seasonal basis, the maintenance shall be done during the start-up and the shut down procedure of the system).

- ⇨ Effluent filter
- ⇨ Air pump
- ⇨ Recirculation pump
- ⇨ Alarm system
- ⇨ UV unit

2.1 Security instructions

- ✓ Do not allow wastewater or treated wastewater to come in contact with your mouth.
- ✓ Please wash your hands thoroughly with antibacterial soap after each inspection.
- ✓ Always turn off the power supply before carrying out the inspection or maintenance of electrical components.

CAUTION: The air pump may be hot. Please take the proper precautions.

2.2 Components inspection

2.2.1 AIR PUMP INSPECTION

A. Verification of the proper operation of the air pump.

1) Verify that the air pump functions properly and make sure that it does not emit any abnormal noise.

B. Cleaning the air pump filter

The filter of the air pump must be cleaned during the maintenance. However, depending on general conditions around the air pump (ex: dusty environment), it may be necessary to carry out additional cleaning during the year.

To clean the air pump filter:

1) Disconnect the power supply of the air pump. (The alarm should go on after a few minutes);
2) To remove the filter cover, put your fingers on one side of the cover and pull it up, then remove the filter. See figure 2 and 3. (Pump models may have a screw or a knob bolt to remove);

3) Vacuum any dust;
4) If heavily soiled, hand wash in soapy water, rinse with clear water and dry the filter before reinstalling;
5) Replace the filter, put the filter cover back and press downwards from above to fit it in. Remember to screw or bolt the knob if so. See figure 4 (Take care not to press the filter cover in its improper position as it may be damaged and make sure that the seal is adequately located);

Figure 3

Figure 4

Figure 5

6) Connect the power supply. (Reconnect the alarm if it was disconnected).

2.2.2 INSPECTION OF THE BIOLARM™

A. Verification of the proper operation of the BIOLARM™ control panel:
   1) Disconnect the pressure switch from an air pump and stick the two clamps together.
   2) Make sure that the alarm turns on (sound and light)
   3) Reconnect the pressure switch
   4) Repeat the same operation for each pump.

CAUTION:	**If the alarm has not emitted any sound, it may be malfunctioning. Please refer to section 4.5 of this manual.**

2.2.3 INSPECTION OF THE UV unit

To keep the effluent quality produced by this treatment, the UV lamp has to be expected and cleaned every 6 months. The lamp has to be replaced every year. An alarm is connected to the UV disinfection unit. This one is activated when the UV lamp is burned or when 375 days have elapsed since the change of the lamp. All the information related to the

maintenance of the unit is presented in the COMPONENTS documents. **Note that if the KODIAK unit is used on a seasonal basis, the lamp has to be removed during the shut down procedure and put in a warm place.**

2.2.4 INSPECTION OF THE BIOREACTOR SECTION

1) Remove both lids #3 and 4.
2) Verify that the water level in each compartment of the reactor is normal.
3) The first compartment of the reactor is aerated with fine bubble air diffusers. The appearance of fine bubbles on the surface is an indication that the fine bubble air diffusers are functioning normally.
4) In the event that no bubbles appear this may indicate a problem with the air pump and the BIOLARM™ should have been activated. Please refer to sections 3.4.2.

CAUTION:	**Large bubbles of air at irregular frequency may indicate a problem with the fine bubble air diffusers. In that case, please contact us immediately.**

5) Measure the dissolved oxygen (if possible) in the two compartment of the BIONEST™ reactor. The dissolved oxygen should be 4 mg/L or above in the first compartment (lid #3) and 1 mg/L or above in the 2nd compartment (lid #4).
    a. If the dissolved oxygen is lower than 4 mg/L, this indicates that there is not sufficient oxygen in the reactor. Please refer to section 3.4.1.
    b. If the dissolved oxygen is higher than 6 mg/L, this indicates too much oxygen is sent to the septic tank. Reduce the recirculation rate (see section 1.5)
6) Measure the pH (if possible) in the second compartment of the reactor and indicate it on the maintenance report.
7) Make sure that there is no strong smell coming from the second compartment of the reactor.

CAUTION:	**A strong ammonia odour may indicate a problem with the treatment system. The malfunction of one of the components of the KODIAK unit or a lack of ventilation may be the cause of this problem. Please refer to section 3.2.2.**

8) Verify the presence of sludge under the media in both compartments of the reactor. If you find any sludge, please proceed to its removal by pumping it back in the 1st compartment of septic tank.
9) Verify if the water recirculation pump functions properly.
10) Before replacing the lids, clean the surrounding area to make sure that the cover will close properly.
11) You can now replace the two lids of the reactor.

2.2.5 INSPECTION OF THE SEPTIC TANK

Sludge needs to be pumped out periodically from the septic tank using a vacuum truck normal pump-out procedure. Kodiak inc. recommends that the septic tank be pumped out when the sludge reaches 30 cm (12") deep. Please note that all applicable local regulations supersede these operational instructions.

Please note that the emptying of your septic tank must be carried out by a specialized firm. Do not hesitate to contact your local Health department, or adequate authorities, or us for a list of the specialized firms in your area.

A. Water level verification

1) Remove the lids of the septic tank (lids #1 and 2)
2) Verify that the water level in the septic tank is normal.
3) Verify that the pipe at the inlet and outlet are not blocked by any object.

B. Measurement of the sludge in the septic tank (if needed)

1) Using a sludge measurement apparatus, please measure the height of sludge in the septic tank. If the height of sludge is higher than 30 cm (12") in the first compartment, the septic tank needs to be pumped out.

CAUTION:	**The contents of the septic tank can be harmful to your health. Avoid direct contact with the wastewater by using the appropriate equipment.**

C. Inspection and cleaning of the effluent filter

1) If water level is high, move effluent filter up and down 2 or 3 times, without removing it to allow water to drop to normal level. Remove effluent filter only when water level is normal.
2) Remove the effluent filter which is located at the outlet of the second compartment of the septic tank (lid #2)
3) Make sure that it is not blocked. Note its condition in the maintenance report.
4) Use a water hose to clean the effluent filter by placing it over the first opening of the septic tank before rinsing it.
5) Replace the effluent filter into its receptacle.

D. Calculate the recirculation rate (see Section 1.5) and indicate it on the maintenance report.

2.2.6 VENTILATION

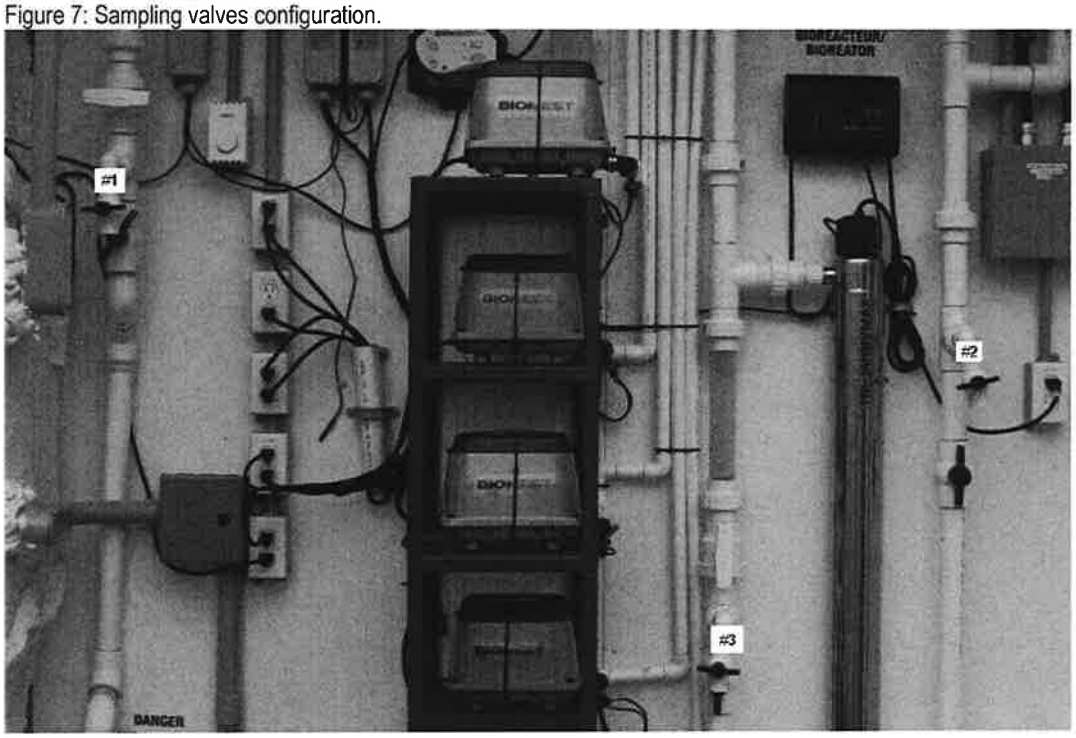
An adequate ventilation of the KODIAK unit is necessary to ensure the proper operation of the system. Make sure the vent is not blocked.

2.2.7 MAINTENANCE REPORT

The maintenance report must be filled out and sent to us.

2.2.8 SAMPLING PROCEDURE

Three different sampling valves are located in the mechanical room. These valves are indicated below:
Figure 7: Sampling valves configuration.



Valve #1: affluent
Valve #2: effluent of the bioreactor.
Valve #3: desinfected water.

2.2.9 PRELIMINARY EVALUATION OF THE COLLECTED SAMPLES

Although the sample must be analyzed in laboratory using specialized equipment, it is possible to make a qualitative evaluation of them immediately after having collected them.

The effluent samples and the disinfected water must normally be colourless, transparent and no strong smell of ammonia should be detected. The suspended solids are generally not detectable to the naked eye.

3 TROUBLESHOOTING SECTION

In the event where a malfunction or failure of the KODIAK unit treatment system component is detected, this section will provide you technical assistance. In such case, you must initially carry out a visual and olfactory inspection of all components of the system.

After having completed the inspection and identified the problem(s), you should use this section to carry out the repair of any non functioning component.

CAUTION:	**It is strictly forbidden to remove the media from the KODIAK unit no matter what repair has to be carried out. If you judge that it is impossible to carry out the repair of the system without removing the media, please contact us. Please note that this instruction is very important to comply with.**

If the content of this section does not help you to solve all problems encountered, please contact us as soon as possible.

3.1 Odours inside the building or wastewater backup

Generally, the appearance of a backup in the sanitary appliances means that:

- ✓ It's time to empty the septic tank or
- ✓ The effluent filter is blocked.

Please verify what has blocked the effluent filter (grease, paper, etc.), clean the effluent filter and check to see when the septic tank was emptied the last time. Please ensure that the tank was emptied in conformity with the local regulations in force and/or as indicated in this manual.

3.2 Odours outside the building

If odours are located outside the building, start by identifying from which part of the treatment train it comes from.

3.2.1 ODOURS COMING FROM THE SEPTIC TANK SECTION

Odours may originate from a properly functioning septic tank but is normally evacuated by the vent. However, in some cases, odours may evacuate by the covers of the septic tank. In those cases, locate and make sure the vent is not blocked. Also, to prevent the smell from exiting from the access covers of the septic tank, they may be sealed appropriately.

It is also appropriate to verify and clean the effluent filter since it may block the circulation of air into the system and may cause odours problems.

3.2.2 ODOURS COMING FROM THE REACTOR SECTION

Generally, an effluent which releases a strong ammonia smell is a sign of a possible failure of the air pump or that the effluent filter is blocked.

1) Verify that the air pump is functioning properly.
2) Measure the dissolved oxygen in the reactor (if possible). If the dissolved oxygen is lower than 4 mg/L in 1st compartment (lid #3) and lower than 1 mg/L in 2nd compartment (lid #4).
3) Inspect and clean the effluent filter.

The other possible cause of strong ammonia smell in the system is the absence of a sufficient biomass fixed to the media. This occurs when the system is subjected to a shock, i.e. under unusual conditions causing the death of the treatment bacteria. Please check the temperature and the pH of water. Relay this information to us in writing.

3.3 Abnormal water level

3.3.1 HIGH WATER LEVEL IN THE SEPTIC TANK SECTION

A high level of water in the septic tank section may indicate that the water cannot be properly evacuated. Please inspect and clean the effluent filter since it may be blocked and thus prevent the water from correctly exiting the septic tank.

1) The effluent filter must be removed only to its half to allow the water to exit the septic tank without bringing solids to the BIONEST™ reactor.
2) When the water reaches a normal level, the effluent may be completely removed.
3) Use a water hose to clean the effluent filter by placing it over the first opening of the septic tank (lid # 1) before rinsing it.
4) To avoid contamination of the surrounding area, remove the excess of water before replacing the effluent filter into the second compartment of the septic tank (lid #2).

3.3.2 LOW WATER LEVEL IN THE SEPTIC TANK SECTION

A low water level in the septic tank may be caused by a recent emptying of the septic tank. Please note that the septic tank must always be refilled with water after being emptied.

If the septic tank has not been recently emptied, this may be caused by a leaking septic tank. This may constitute a serious problem and we recommend that you immediately contact us to discuss what measures are to be taken.

3.3.3 LOW WATER LEVEL IN THE REACTOR

First, verify if the septic tank level is normal. If the water level of the septic tank is too low, this may be caused by a leakage from the septic tank. This may constitute a serious problem and we recommend that you immediately contact us to discuss what measures are to be taken.

3.4 Failure of specific components

3.4.1 DISSOLVED OXYGEN LEVEL

If the dissolved oxygen is lower than 4 mg/L in the first compartment of the bioreactor and lowers than 1 mg/L in the 2nd compartment of the bioreactor, this indicates that the amount of oxygen in the reactor is insufficient.

First, you must verify if there is fine air bubble in the first compartment of the BIONEST™ reactor. If not, verify if the air pump is functioning properly.

If the air pump does not function properly, please refer to section 3.4.2 Please note that if the air pump does not function properly, the alarm should go on. If the alarm did not go on, please refer to section 3.4.4.
If the air pump is functioning properly, verify that all connections are properly sealed. If so, verify if the air line is blocked by measuring the air flow at its entry to the reactor. To do so:

1) Unscrew the metal hose clamps that hold the air line to the pre-assembled adapter.
2) Remove the pre-assembled adapter from the air line. The air line may be heated with a heat gun to ease its removal.
3) Verify if there is condensation that may have occurred in the air line.
4) Measure the pressure with a pressure gage. It should be around 6-7 psi. If not, the air line is probably blocked. In that case, please contact us.

3.4.2 FAILURE OF THE AIR PUMP

CAUTION:	**Before attempting any repair, unplug the electrical cord of the air pump.**

A. Air pump does fails to work

1) If the air pump does not function, make sure it is properly connected to a power source.
2) Verify the safety screw. If the air pump over heated, the safety screw may have broken. To replace the safety screw, please refer to section 4.
3) If the air pump still does not function, the problem is related to the electrical supply.

B. Air pump works but makes loud irregular noise or does not evacuate enough air

1) Verify the air pump filter. If dirty, hand wash in soapy water, rinse with clear water and let dry before replacing it.

2) If the air pump functions but the alarm is on and/or the air pressure at the exit of the air pump is insufficient (lower than 4 psi), it is possible that the air pump is defective.
3) Verify the diaphragms, valves and electromagnet. If one of those is defective, replace the defective parts (see section 4 for replacement procedure). If after the replacement of the defective parts, the air pressure at the exit of the pump is still insufficient, proceed to complete replacement of the air pump (see section 4 for replacement procedure).

C. Air pump functions, but no air bubble appears in the first compartment of the BIONEST™ reactor.

1) Verify to insure that all connections are properly sealed.
2) Verify if the air pipe is blocked, damaged or pierced.
3) Push down on the media in the BIONEST™ reactor to see bubbles.
4) Open air line in the BIONEST™ reactor to see air pressure.

3.4.3 FAILURE OF THE FINE BUBBLE AIR DIFFUSERS

If inconsistent air bubbles are observed in the first compartment of the reactor, please notify us. We will determine the nature of the failure.

3.4.4 MALFUNCTION OF THE BIOLARM™

If the BIOLARM™ has not emitted any sound during the test or if it has not turned on while the air pump if defective, it is probably due to a bad electrical connection. Please contact us.

4 REPLACEMENT OF SYSTEM COMPONENTS

4.1 Air pump diaphragm and valve replacement

- Be sure to unplug the pump unit.
- For chamber block replacement, be sure to change both chamber blocks at the same time.
- The rod employs powerful permanent magnets. Therefore, be sure to remove your watch and precision machine before starting the work as it may fail due to their strong magnetic force.
- Do not put the actuating rod close to a magnetic card, a magnetic disk or any other magnetic media as their data may be lost.

4.1.1 HP-80

➔ **IMPORTANT :** For the HP-80 model, the diaphragm or the valves cannot be changed. The complete chamber block must be changed.

A. Remove all the bolts from the four corners.

B. If it is difficult to remove it due to the heavily stuck internal seal packing, pry it open by inserting the tip of a flat-head screwdriver into the clearance between the exhaust nozzle and the upper housing.

C. If the stick is too heavy, raise up the pump body and hit the exhaust nozzle lightly with a hammer (do not use a metal hammer).

D. Remove the sound absorber.
Pull out the L-tube from the casing nozzle. (See figure 8)
Remove the four screws hold the chamber block and the casing block on both side. (See figure 9)

Figure 8

Figure 9

E. Remove one of the U-lock nuts hold the diaphragm mounting block to the rod.
- Use the box driver to loosen (or tighten) the U-lock nut.

F. Remove one of the diaphragm mounting blocks from the actuating rod and pull out the other diaphragm mounting block with the rod and finally, separate the diaphragm mounting block and rod.

➔ **IMPORTANT** : When pull out the rod; take care not to allow the rod projection to accidentally hit the lever of the SP switch. If the pump stops automatically, the safety screw must be broken to prevent any further damage to the pump. Be sure all debris is removed from unit.

G. Install the new diaphragm mounting block on the actuating rod.
- Use new U-lock and washer only that come as replacement parts to prevent loosening and causing failure of the pump.

Figure 10

Figure 11

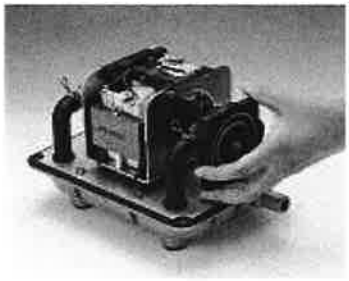
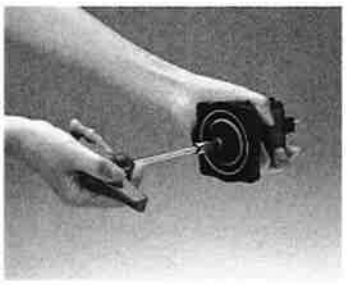


Figure 12



H. Insert the actuating rod in accordance with the gap of the frame.
Secure the diaphragm mounting block on the other side and tighten the U-lock nut with the box driver.
Make sure the gaps between the actuating rod and the electromagnet are even.

I. Connect L-tube to the casing block and secure the casing with the screws.

J. Repeat steps from "E" to "I" for the other chamber block.

K. Install the sound absorber.

L. Place the upper housing back on body.
   - Be extremely careful not to pinch the Sound Absorber in the Upper Housing
     Secure it with the bolts.
     Then place the filter and filter cover on the upper housing.

4.2 Air pump safety screw replacement

4.2.1 HP-80, HP-100, HP-150 AND HP-200 MODELS

A. Dispose of broken screw. Be sure all debris is removed from unit as it can result in damage to permanent magnets and or even in a failure of the pump.

B. Draw the new and safety screw through a hole in the different direction of the terminal.
(Threading order: The L-shaped lever-the spring electrode)

C. Fasten screw with nut.
The screw is designed so that the nut will turn freely when it is properly fastened, stop tightening when this happens.

D. Make sure the gaps between L-shaped lever and lug of the actuating rod are even.
   - When checking the movement of the switch while the power is connected, touching the terminal will result in an electric shock.
   - Unplug the pump immediately after the check.

Figure 13

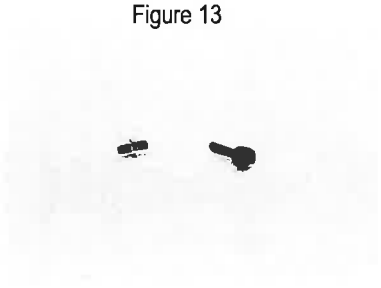
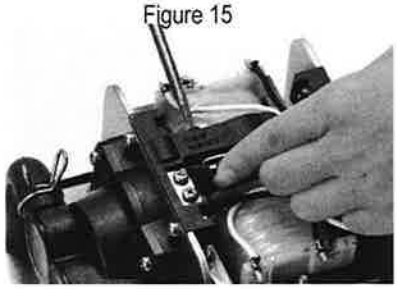


Figure 14

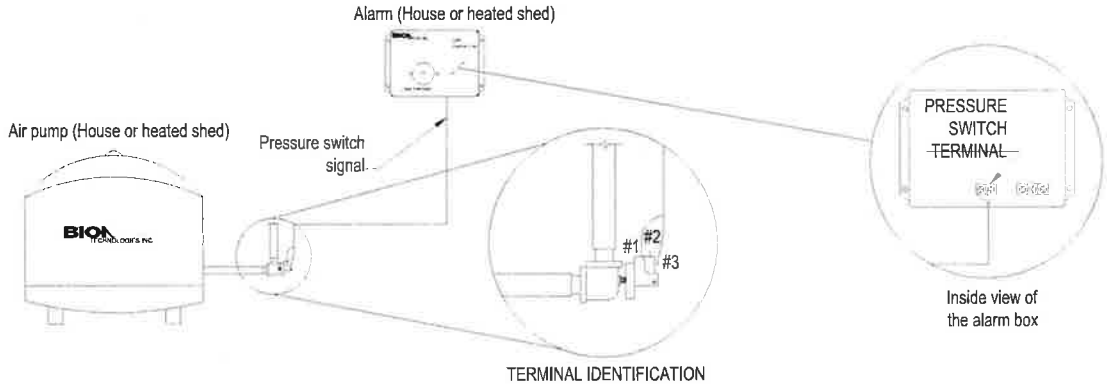
Figure 15



4.3 Complete air pump replacement

If the air pump needs to be replaced, please disconnect the electrical wire and the air line and replace it with a new one as followed. You may disconnect the alarm during the operation. Don't forget to reconnect it after the air pump has been replaced and to reconnect it to the BIOLARM™ control panel.

Figure 16: BIOLARM™ electrical connection.



4.4 Recirculation pump

The recirculation pump is located in the last compartment of the reactor. If it needs to be replaced, please contact us.

4.5 BIOLARM™ control panel

If the BIOLARM™ needs to be replaced, please contact us.

BIONEST KODIAK

4.6 Air diffuser

In the event that the air diffuser needs to be replaced, please contact us. The media should never be removed from the reactor without prior written authorization from us.

BIONEST KODIAK

5 PERIODIC EMPTYING PROCEDURE

1. Turn off electrical supply.
2. Clean the prefilter with a garden hose.
3. Clean the recirculation line.
    a. Open ball valves #1 and 2. (see Figure 2)
    b. With a garden hose, supply the recirculation line.
    c. Perform steps 4 a) and 4 b) but this time, with ball valves # 1 and 3.

4. Drain the KODIAK unit via the septic tank compartment (section 2/3; lid #1) (see Figure 1)

As water from the septic tank is pumped, water from other compartments flows through one-way valves to balance the water level in each tank. If the drain is made by any other opening, water from the other tanks could not flow through one-way valves and therefore too much pressure could cause breakage of partition walls.

5. Completely fill the KODIAK unit with clean water. (via the bioreactor compartment, section 1/3, lid #4). As the bioreactor is filled, water flows to the septic tank through one-way valves in order to balance the water level in each tank. If the filling is made by any other opening, water from the other tanks could not flow through one-way valves and therefore, too much pressure could cause breakage of partition walls.

6. Turn on the electrical supply. **(The KODIAK unit should never be electrically powered if it is not fully filled with water)**

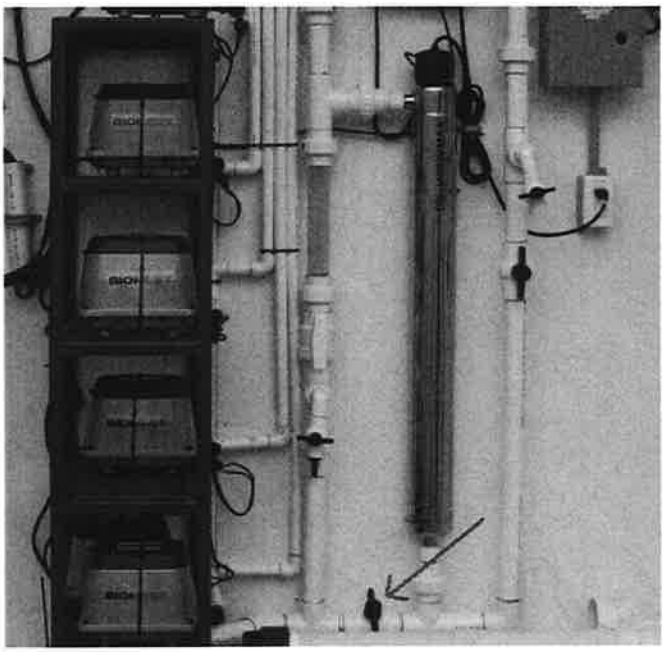
BIONEST KODIAK

6 SHUTDOWN PROCEDURE

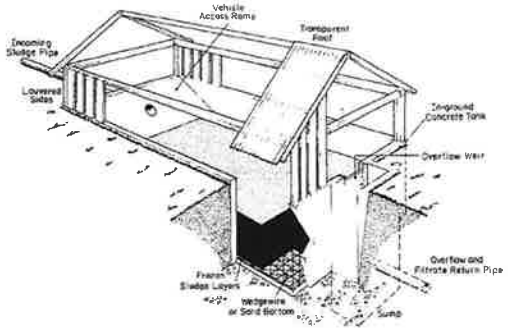
1. Shut off the wastewater supply.
   a. Pressure supply; take out the pump(s) from the pump station and put it in a dry place. Disconnect the feeding line from the KODIAK unit and put a cap on the unit's inlet.
   b. Gravity supply; disconnect the feeding line from the KODIAK unit and put a cap on the unit's inlet.

2. Disconnect the power supply of UV units.

3. Drain water from the UV unit by opening the valve indicated below. Drained water should be emptied in the septic tank compartment (lid #1). Remove the sleeve the TrojanUVmax disinfection unit and clean it using a soft, lint-free cotton cloth and a chemical scale-remover such as Lime-a-Way™ or CLR™. Then also remove the lamp and store the parts in a safe and warm environment.

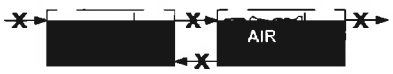


Since equipment, chemicals and spare parts are difficult to obtain where the Kodiak™ unit will be installed, the suggested method to condition the sludge is through freezing and thawing. The figure below demonstrates a typical freeze-thaw bed that would be use throughout the year.



The thickness of individual applied layer and the maximum thickness can be established based on the temperature and length of the freezing and the thawing periods. For design information, please refer to Martel (1989) for more details. For the current project, an uncovered underground lagoon will be used as a freezing bed. A sand layer will be added at the bottom with drainage pipes to allow a more complete removal of the water after thawing.

4. Leave the aeration in operation for a period equivalent to the hydraulic retention time (HRT), which is 1.5 days.



5. Using a sludge judge, determine the height of the accumulated secondary sludge and then transfer a little part of the supernatant of the bioreactor. (1 or 2 feet max)

BIONEST
KODIAK

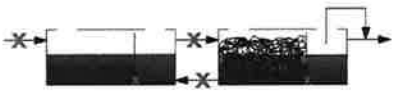
6. Using a sludge judge as shown on the figure beside, identify the height of primary sludge accumulation in the septic tank.

   Then transfer the supernatant of the septic tank into the bioreactor using an adequate pump.

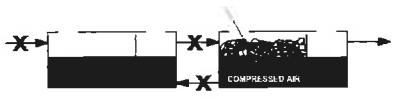
7. Leave the aeration in operation for a period equivalent to the hydraulic retention time (HRT), which is 1.5 days.

8. Turn off the main electrical breaker.

   Using a sludge judge, determine the height of the accumulated secondary sludge and then transfer the supernatant of the bioreactor.



9. Detach excess biomass on the Bionest™ media with compressed air.



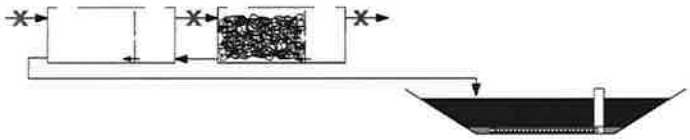
BIONEST
KODIAK

Clean the recirculation line.

a. Open ball valves #1 and 2. (see Figure 2)
b. With a garden hose, supply the recirculation line.
c. Perform steps 5 a) and 5 b) but this time, with ball valves # 1 and 3.

Clean the effluent filter with a garden hose.

10. Drain primary and secondary sludge through the drain valve located in the mechanical room of the Kodiak™ unit. The sludge will be transferred into a waterproof lagoon. The lagoon will operated as a freezing and thawing bed and will also serve as a contingency storage basin in the Kodiak™ unit has to be maintained for any reason.



Make sure that the tank is adequately drained by lifting the opposite end with a lift and the bioreactor side of the container. Sludge will flow from the last compartment of the bioreactor to the first compartment of the septic tank through the one-way valves at the bottom of the partition walls in the tank.

BIONEST KODIAK

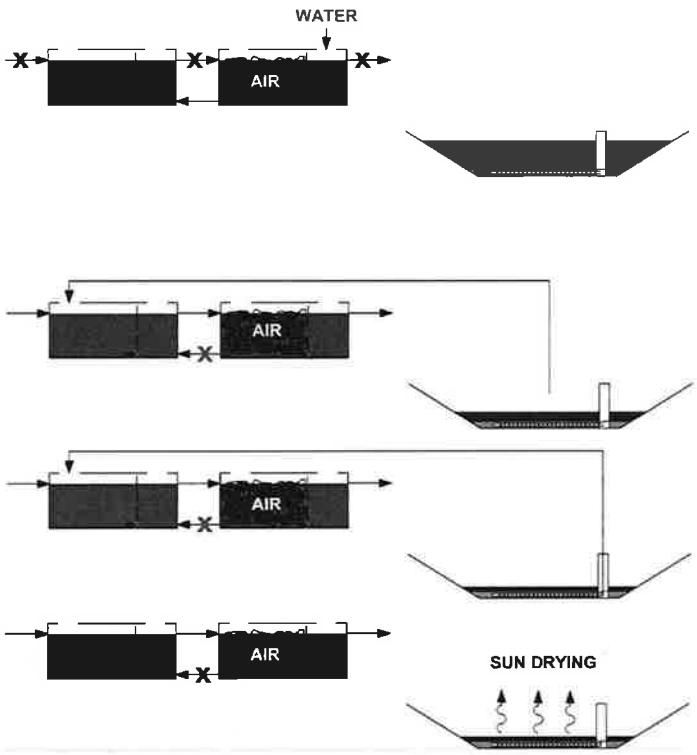
This completes the shut down procedure. The following steps describe the start-up of the Kodiak™ unit following the first year.

1. Add clean water in the last compartment of the bioreactor. Water will distribute throughout the entire tank through the one-way valve at the bottom of the partition walls.

2. Pump the supernatant of the freezing/thawing bed into the first compartment of the septic tank.

3. Transfer the rest of the water within the sludge by connecting to the drain located in the sand layer of the bed.

4. Please refer to chapter 1 for detailed instructions of the start-up of the Kodiak™ unit.



Bibliography

Martel, C.J. 1989. Development and Design of Sludge Freezing Beds. Journal of Environmental Engineering 115:799-808.

BIONEST KODIAK

Register

TABLE OF CONTENTS

BIONEST KODIAK

1 MAINTENANCE

This register will allow you to maintain a follow-up on the operations and inspections made on your KODIAK unit. By completing it each time you are making the verifications and the operations asked, you will allow Bionest Kodiak be sure that the operations have been made in conformity with the recommendations.

Table 1: Maintenance activity register

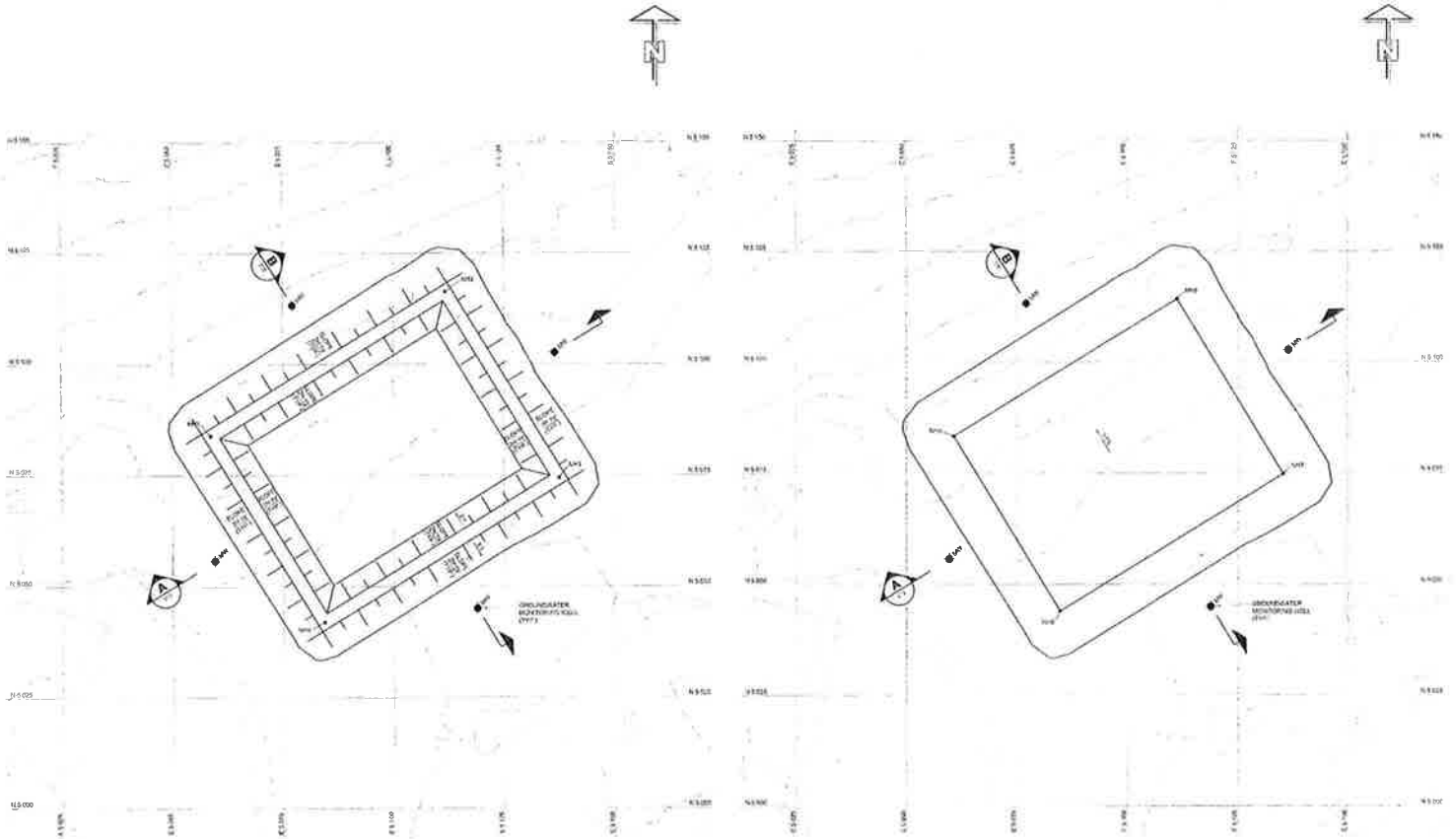
Date	Description of the intervention	Signature

BIONEST KODIAK

Date	Description of the intervention	Signature


BIONEST
KODIAK

APPENDIX 2
Project Landfill Drawings



BERM PLAN

COORDINATE LISTING			
No.	NORTHING	EASTING	ELEVATION
1			
2			
3			
4			
5			
6			
7			
8			

FINAL COVER PLAN

Indian and Northern Affairs Canada / Affaires indiennes et du Nord Canada

Canada

NUNAVUT REGIONAL OFFICE
IQALUIT, NUNAVUT

GENERAL NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. SITE PLANS AND TOPOGRAPHICAL INFORMATION ARE BASED ON AS PHOTOGRAPHED PLANS BY [illegible] EXPANSION AND INC. CURRENT CONSTRUCTION MAY NOT REFLECT AS SHOWN.
3. ALL COORDINATES ARE P.S.C. COORDINATES AND ALL ELEVATIONS ARE BASED ON SITE DATUM.

LEGEND

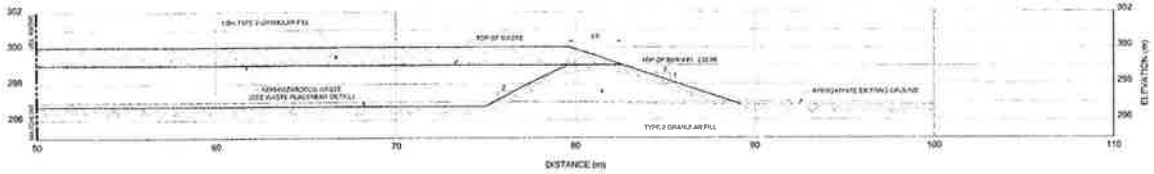
UMA | AECOM

CAM-D
REMEDIATION PROJECT

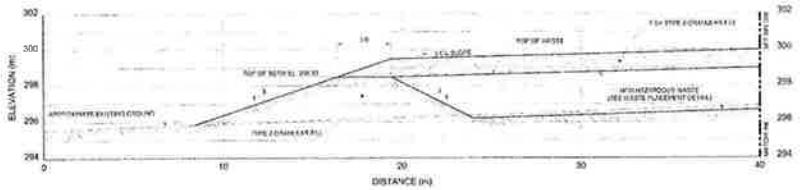
NON-HAZARDOUS WASTE LANDFILL PLAN

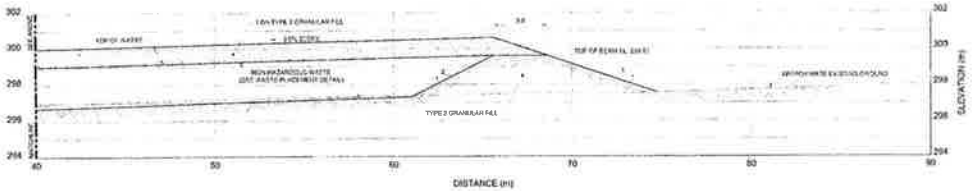
416837

C09

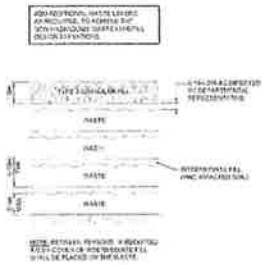


SECTION A





SECTION B



WASTE PLACEMENT DETAIL

Canada

NUNAVUT REGIONAL OFFICE
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GENERAL NOTES:

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CAM-D REMEDIATION PROJECT

NON-HAZARDOUS WASTE LANDFILL SECTIONS

C10