INSTALLATION SPECIFICATIONS

CAM-D Simpson Lake site
80 km west of Kugaaruk, Nunavut

By: Nathalie Roy
Bionest Kodiak inc.
55, 12th street, C.P. 697,
Grand-Mère (Qc) G9T 5L4
Phone : 819-538-5662, fax : 819-538-5707
Email : nroy@bionest.ca
Website : www.bionest.ca

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1.0 PROJECT IDENTIFICATION

This document provides specific requirements for the installation of a Kodiak unit at the following location:

CAM-D Simpson Lake site
80 km west of Kugaaruk, Nunavut

1.1 Involved Parties

Owner	BIONEST™ contact	Consultant
Kudlik Construction Ltd. 1519 Federal Rd. Iqaluit, NU X0A 0H0 867 979-1166	Nathalie Roy Project Manager Bionest Kodiak inc. 866 538-5662	Mr. François Bourassa, P.Eng. Kudlik Construction Ltd. 1519 Federal Rd. Iqaluit, NU X0A 0H0 418 871-3368 #213

Treatment components supplier	Supplier - Tanks
Bionest Kodiak inc. 55, 12e rue, C.P. 697 Grand-mère, QC G9T 5L4	Bionest Kodiak inc. 55, 12e rue, C.P. 697 Grand-mère, QC G9T 5L4

Contractor	Supplier - Pumping equipment
Kudlik Construction Ltd. 1519 Federal Rd. Iqaluit, NU X0A 0H0 418 871-3368 #213	NA

2.0 GENERAL

The contractor shall coordinate the scheduling and supply of the wastewater treatment unit with Bionest (1 866 477-5203) and other suppliers.

This document presents installation specifications for a 20 feet Kodiak unit.

3.0 WORK DESCRIPTION

This document does not describe all specifications related to the installation of the wastewater treatment unit for the work camp mentioned above.

Specifications and methods described in this document do not exempt the Contractor or other parties from respecting the “good engineering practices” and ensure a fully functional and durable installation. The Contractor must respect all applicable rules and regulations.

The term “Contractor” refers to the person in charge of any construction related to the Kodiak unit. It may be the same general Contractor responsible for the balance of the work for this project or a Contractor designated exclusively for the Kodiak™ part of the project.

The contractor must provide the necessary material and labour related to all major tasks listed below, but without being limited to:

- Material transportation;
- Bed preparation for the Kodiak™ unit ;
- Container unloading and positioning;
- Plumbing connections of the unit;
- Electrical connection;
- Outfall construction
- Testing and start-up of the Kodiak™ treatment system.

4.0 Shop drawings

Bionest provides shop drawings of the Kodiak unit to the Contractor along with these installation specifications. The following drawings are available:

- mechanical room (NU-P09-1010_04_V2 1 of 3)
- Kodiak™ unit – section and plan view (NU-P09-1010_04_V2 2 of 3)
- Kodiak™ unit – treatment components (NU-P09-1010_04_V2 3 of 3)

5.0 MATERIAL TRANSPORTATION

Transportation of the material shall be provided and scheduled by the Contractor.

6.0 TANKS AND CONTAINERS

The wastewater treatment system of Camp-D Simpson Lake site includes:

- (1) grease interceptor equipped with an effluent filter (suppy and install by the contractor);
- (1) 20 feet Kodiak™ container

7.0 INSTALLATION OF A KODIAK™ UNIT

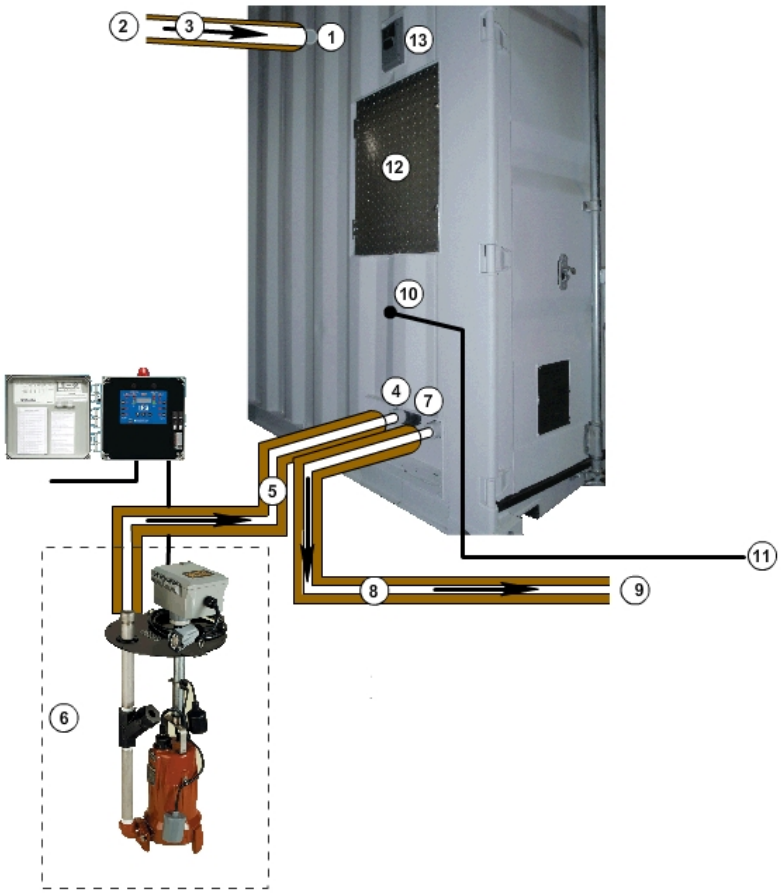

Figure 1 : Diagram of plumbing and electrical connections of a Kodiak™ unit.

1. 100 mm [4''] female NPT gravity inlet;

2. Domestic wastewater source free of any chemical or substances that may inhibit bacterial growth. Please refer to the operation manual for a complete list of prohibited substances. Table below represents typical concentration of domestic sewage as presented in the USEPA Onsite Wastewater Treatment Systems Manual (tables 3-7 from pages 3-11; 2002; http://www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf).

Table 1: Constituent mass loadings and concentrations in typical residential wastewater

Constituent	Concentration (mg/L)
Total solids (TS)	500-880
Volatile solids	280-375
Total suspended solids (TSS)	155-330
Volatile suspended solids	110-265
5-day biochemical oxygen demand (BOD_5)	155-286
Chemical oxygen demand (COD)	500-660
Total nitrogen (TN)	26-75
Ammonia (NH_4)	4-13
Nitrites and nitrates (NO_2-N; NO_3-N)	< 1
Total phosphorous (TP)	6-12
Fats, oils and grease	70-105
Volatile organic compounds (VOC)	0.1-0.3
Surfactants	9-18
Total coliforms (TC)[d]	10^8 - 10^{10} MPN/100 mL
Fecal coliforms (FC)[d]	10^6 - 10^8 MPN/100 mL

3. 100 mm [4''] PVC SCH40 or DR-35 sewer pipe or eq. with insulation where necessary. A 100 mm [4''] male NPT x 100 mm [4''] SW (socket weld) SCH40 or DR-35 adapter is required. All material shall be supplied and installed by the Contractor.

4. 38 mm [1 ½''] pipe (no coupling) forcemain inlet;

5. 38 mm [1 ½''] PVC SCH40, SCH80 or DR-26 pressure pipe or eq. with insulation where necessary. A simple 38 mm [1 ½''] union coupling is required. All material shall be supplied and installed by the Contractor.

6. Influent pump station if required. An adequate solid handling pump such as a grinder pump or vortex pump with sufficient capacity shall be use. Bionest recommends a pump that can deliver between 50 and 100 L/min at the Kodiak's unit inlet. A set of two valves may be required for calibration to release the pressure exerted on the pump. The excess pumped wastewater is simply discharged within the pump station during pumping sequences. If an on-demand pump configuration is used, floats shall be adjusted such that the maximum pumped volume per sequences does not exceed 150 L. Where a timed-dose control panel is selected, sequences shall be evenly distributed over 24h and pumped volume (max. 150 L) must be minimized while avoiding frequent override sequences. If low maintenance is desired and quick service is not possible, duplex configurations are recommended. The contractor shall supply, install, test and calibrate the pump station.

7. 38 mm [1 ½"] pipe (no coupling) gravity outlet;

8. 38 to 100 mm [1 ½" to 4"] PVC SCH40 or DR-35 sewer pipe or eq. with insulation where necessary. A 38 to 100 mm [1 ½" to 4"] male NPT x 100 mm [4"] SW (socket weld) SCH40 or DR-35 adapter is required. All material shall be supplied and installed by the Contractor.

9. The contractor has to develop an outfall sewer for the final discharge. This outfall should offer these characteristics:

    - Offers to the effluent a certain retention time to prevent a photoreactivation phenomenon (+/- 3 hours)
    - Be protected against freezing
    - Be esthetic (discreet and diffuse flow)

10. TEK connector for 3/3 (100 A) TEK cable. Material shall be supplied and installed by the Contractor,

11. 3/3 TEK cable. Electrical panel requires 100 A and current is 3 phases. Material shall be supplied and installed by the Contractor,

12. Electrical panel 100 A 3 phases. All electrical components of the Kodiak™ unit are designed to work on 1 phase as well. Bionest offers conversion of the electrical panel to 1 phase where necessary. Fees may be applicable.

13. SJE-Rhombus XT external alarm.

Figure 2 : 20 feet Kodiak™ unit.

1. 20 feet Kodiak™ unit.

2. Artic Vent AV120-CS from heat line. 75 W; 60 Hz and 120 V. Optional feature recommended where a Kodiak™ unit is in use at temperatures below 45°C (-50°F). Please call Bionest Kodiak inc. at 819 538-5662 for information or purchase.

3. Shall be connected onsite to the ground fault circuit within the unit by the Contractor. Connectors and wires are supplied by Bionest Kodiak inc.

4. Adequate stable bed for the unit shall be prepared. The 20 feet Kodiak™ unit, once filled, shall weight no more than 25 metric tons. Bed must be built with state-of-the-art construction method in order to avoid displacement of the container throughout the entire usage period of the Kodiak™ unit. Material and workforce shall be provided by the Contractor.

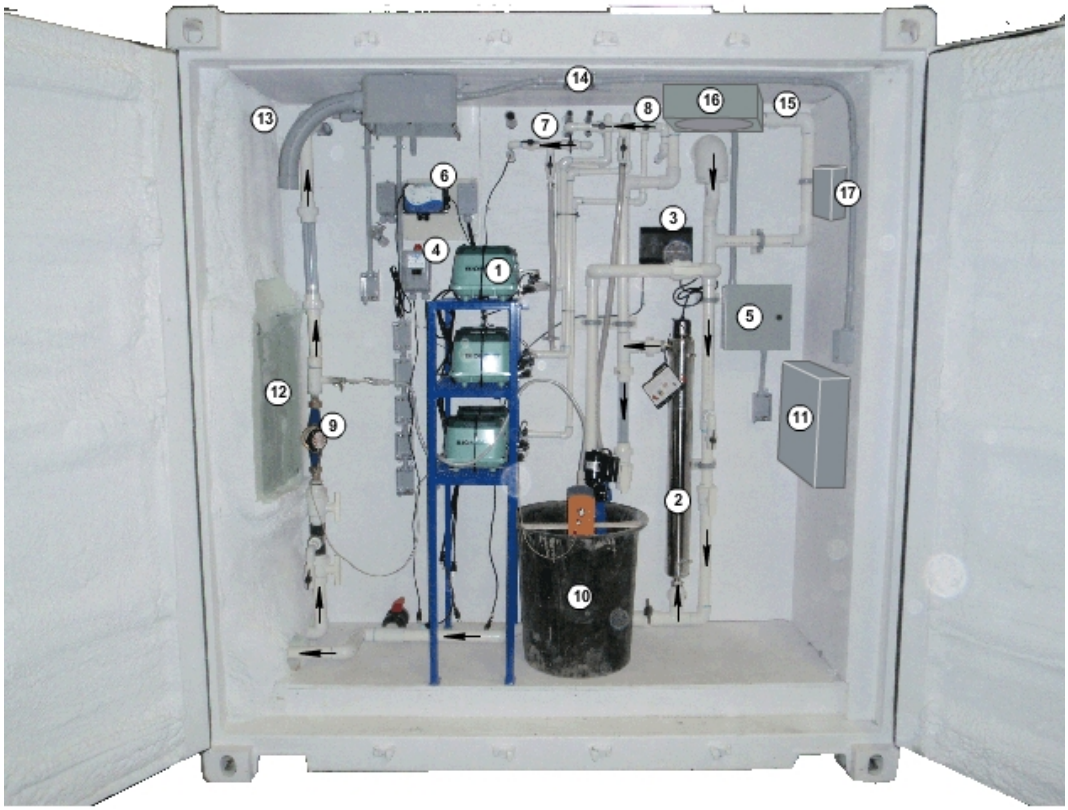

Figure 3 : Kodiak™ unit's mechanical room.

1. Five (5) HP-80 air pumps connected to linear diffusers within the bioreactor. One (1) spare pump supply and an HP-80 membrane replacement kit. 120 V; 60 Hz; 0.8 A.

2. TrojanUVmax ultraviolet disinfection unit model "F" with sampling points upstream and downstream. 120 V; 60 Hz; 1.0 A.

3. TrojanUVmax control and alarms.

4. Zabel AC-OSF effluent filter high level alarm. This alarm has been replaced by a connection to the Biolarm (point 6).

5. Pipe insert heater proportional control panel and thermostat.

6. Biolarm alarm system for air pumps' low pressure switches, recirculation pump undercurrent relay and high level alarm from a float switch located on the effluent filter.

7. Recirculation line between the end of the bioreactor and the inlet of the septic tank. Flow rate adjustment valves. Optional feature not included for the current project.

8. Recirculation line between the end of the bioreactor and the inlet of the bioreactor. Flow rate adjustment valves.

9. Electromagnetic flow meter 32 mm ∅ with flanges, converter 24 V, screen and MODBUS and 4-20 mV outputs. Meter shall be relayed to a data logger/controller and/or a metering pump to dose a substance where required. Optional feature. Please call Bionest Kodiak inc. at 819 538-5662 for information or purchase.

10. Alkalinity control unit including a metering pump controlled by water meter, a Neptune 1/20 Hp 24'' mixer, a chemical storage tank, an injection valve and a foot valve. Optional feature only required where discharge criteria regulates over nitrogen and alkalinity is too low for complete nitrification. It is not required for the current project.

11. Data logger/controller unit monitoring dissolved oxygen, pH/ORP, conductivity, bioreactor temperature, outside temperature, mechanical room temperature, all alarms and electricity consumption through an ampmeter. The data logger includes a network adapter which shall be connected through a router with Internet access. Optional feature. Please call Bionest Kodiak inc. at 819 538-5662 for information or purchase.

12. Electrical panel 100 A 3 phases. All electrical components of the Kodiak™ unit are designed to work on 1 phase as well. Bionest offers conversion of the electrical panel to 1 phase where necessary. Fees may be applicable.

13. Air intake louver for the mechanical room.

14. Light.

15. Air vent for ultraviolet disinfection unit.

16. 3000 W « Dragon » air heater controlled by a thermostat.

17. Ground fault electric breaker for the AV120-CS Artic Vent. Outside connection to vent.

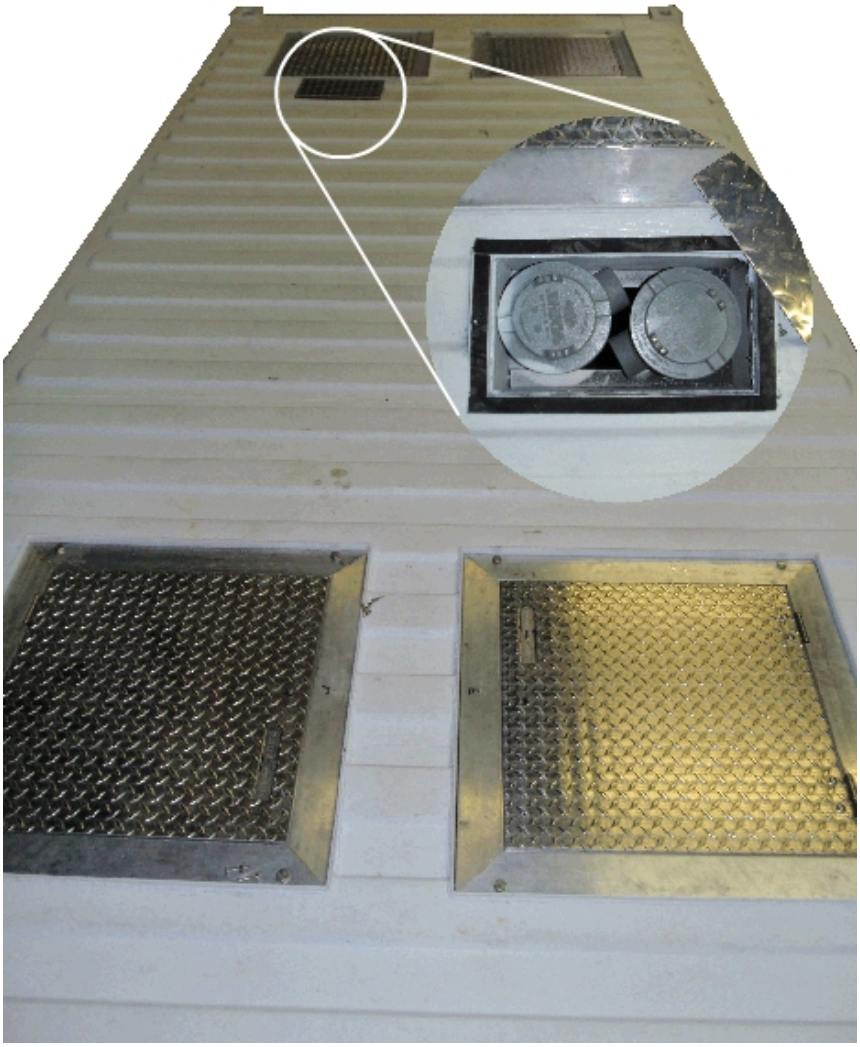

Figure 4 : Access opening and heater.

1. Halliday sealed aluminium access cover S1R2424.

2. Two (2) ASB 5 kW pipe insert heater controlled by a proportional Ranco thermostat and intelligent relays. 5 kW low watt-density (<12 W/in^2) element heat air in a 50 mm ∅ pipe 304 SS x 1.3 m. Heat is transferred to wastewater through conduction.

8.0 ELECTRICITY

A complete electric installation is realised inside the Kodiak unit by a qualified electrician. However, any other electrical job such as power supply, wall outlet installation or connection of any other components shall be done by a qualified electrician.

The Contractor must provide the material and the labour required to get the power supply available and ready for electrical components connections. The Contractor is responsible to ensure entirely functional equipment in respect with local regulations.

The TABLE II summarizes Kodiak's electric specifications:

Tableau 2: Kodiak's electric specifications

Qty	Electrical component	Voltage	Phase	Max. consumption	Duty cycle
5	Air Pumps	120 VAC	1 or 3	(1,6A x 5) = 8A (real consumption = 0.6 A @ 3.0 psi)	24 h
1	Recirculation pump	120 VAC	1 or 3	0.4 A	24 h
1	UV disinfection unit	120 VAC	1 or 3	0.9 A	24 h
2	Alarms (XT, Biolarm)	120 AC	1 or 3	0.25 A	24 h
2	Electronic temperature control (Ranco)	120 AC	1 or 3	0.2	24 h
1	Light (12W)	120 VAC	1 or 3	0.1	Only when manually turned on
1	Heat vent	120 VAC	1 or 3	0.6 A	Controlled by thermostat : starts only if outside temperature falls below - 45°C (-50 °F)
2	5 kW pipe insert Heaters *	240 or 208 VAC	1 or 3	(20.8 A x 2) = 41.7 A	Controlled by thermostat: starts only if effluent temperature falls below 12°C.
1	Ceiling Fan Heater 3kW	240 or 208 VAC	1 or 3	12.5 A	Controlled by thermostat: starts only if mechanical temperature falls below 20°C.
				TOTAL = 64.7 A	

9.0 UNIT START-UP

The Contractor shall fill both the 9 000 L septic tank and 9 000 L bioreactor with clean water prior to start-up. Starting the unit with wastewaters may result in excessive foam production, sludge accumulation on BIONEST™ media, odour problems etc..

When tanks are filled, all electrical components shall be turned and calibrated using appropriate set points indicated within the operation manual. Kodiak™ unit can then be feed with domestic wastewaters. For more information, please refer to the operation manual.

10.0 INSTALLATION SUPERVISION

Bionest Kodiak inc. can provide a qualified technician for supervision of the installation, start-up or any maintenance operation of your Kodiak™ unit at a reasonable rate. Please contact Bionest Kodiak inc. at 866 538-5662 for more information.