Electronic Approval	
David Frenette	Environmental Coordinator – AEM Exploration

1 – PURPOSE

The purpose of this procedure is to outline the steps that need to be taken to commission the BIONEST KODIAK waste water treatment plant at the Amaruq exploration camp.

2 – SCOPE

This procedure applies to first commissioning of the plant prior to full scale use or to re-commissioning of the plant in the event of a loss of bacteria or at restart of the plant at the beginning of the exploration season

3 – SYSTEM DESCRIPTION AND COMMISSIONING REQUIREMENTS

The BIONEST KODIAK system is a biological process using a submerged fixed film reactor followed by ultra-violet treatment. The biomass develops and firmly attaches itself to both sides of the «ribbon shaped» plastic media. Two units are available at the Amaruq camp, the KODIAK 40 and the KODIAK 20.

Constant aeration of the first 2/3 of the reactor with warm air from the mechanical room assures constant and optimal biological activity, independently of the outdoor weather conditions. Linear air diffusers connected to a series of diaphragm air pumps are used for aeration.

In order for the BIONEST KODIAK system to be able to treat wastewater, bacteria have to be established on the plastic media. The surface available in the BIONEST is sized such that after the bacteria are fully installed, they are able to treat the required flow. The installation of the bacteria on the media requires a commissioning period.

The commissioning period is completed after the effluent quality at monitoring startion MEA-1 has reached the water license conditions shown in Table 1.

Table 1: Effluent Quality Limits

Parameter	Maximum Concentration of any grab sample
pH	6.0 to 9.5
Biochemical	80 mg/L
Total suspended solids	100 mg/L
Fecal Coliforms	1000 CFU/100 ml
Oil and Grease	5 mg/L and no visible sheen

4 – COMMISSIONING STEPS

The commissioning phase comprises the following steps:

Step 1: The pre-operational verification of equipment
Step 2: Match-up of sewage loading to treatment capacity
Step 3: Bacteria building start-up
Step 4: Performance monitoring

Step 1: Pre-operational verification of equipment

Equipment verification

The following equipment should be verified prior to startup (ex: verification of electrical and hydraulic connections, alarm verification, piping free of obstruction, vent free of obstruction, etc.):

1. Air pumps connected to linear diffusers within the BIONESTTM reactor.

2. Trojan UV max ultraviolet disinfection unit model “F” with upstream and downstream sampling points. 120 V;

3. Trojan UV max control and alarms.

4. Pipe insert heaters with proportional control panel and thermostat.

5. BIOLARMTM alarm system for air pumps’ low pressure switches, recirculation pump undercurrent relay (for the pumps recirculating within the BIONESTTM reactor) and high water level in the septic tank (effluent filter clogging).

6. Recirculation line and flow rate adjustment valves. Supplied by Bionest Kodiak.

7. Air vent for ultraviolet disinfection unit.

8. Two (2) ASB 9 000 W pipe insert heaters controlled by a proportional Ranco thermostat and intelligent relays.

Step 2: Match-up of sewage loading to treatment capacity

- It is important to align the sewage loading of water sent to the BIONEST to the design treatment capacity; standard criteria for sewage treatment are based on a flow rate of 250 liters /day/worker. At the Amaruq camp, because of the restriction on water usage, the flow per person is restricted and from experience is a maximum of about 150 litres per person.
- The capacity of the Kodiak 40 unit is 13,500 l/d – at 150 litres per person = 90 people
- The capacity of the Kodiak 20 unit is 5,500 l/d – at 150 litres per person = 37 people
- The loading at the entry of the treatment system at 130 litre/person/day is likely higher than design (concentration of organic matter will be higher).
- A sample of the pre-treatment water needs to be collected at start-up and every time the flow is increased to ensure that the sewage loading matches the treatment capacity.
- When the camp population decreases so that only one unit can be used, a sample of the pre-treatment water should be taken to verify if one unit can be shutdown.

Step 3: Bacteria building start-up

- The Bionest system has already a built-in recirculation loop that recirculates part of the flow to promote bacterial growth on a continuous basis by reseeding with bacteria.
- There should be a ramp-up of the flow/loading through the BIONEST to allow bacteria to establish themselves on the media. A suggested ramp up could be as follows (it is assuming that water quality results would be available within 24 hours):
    - Day 1: 10% of loading
    - Day 2: 20% of loading

      ---------- influent and effluent quality verification – to continue ramp-up or slow it down
    - Day 3: 20% of loading
    - Day 4: 30% of loading
    - Day 5: 40% of loading

      ---------- influent and effluent quality verification – to continue ramp-up or slow it down
    - Day 6: 40% of loading
    - Day 7: 50% of loading
    - Day 8: 60% of loading

      ---------- influent and effluent quality verification – to continue ramp-up or slow it down
    - Day 9: 60% of loading
    - Day 10: 70% of loading
    - Day 11: 80% of loading

      ---------- influent and effluent quality verification – to continue ramp-up or slow it down
    - Day 12: 80% of loading
    - Day 13: 90% of loading

- Day 14: 90% of loading
- Day 15: 100% of loading

---------- influent and effluent quality verification – to continue ramp-up or slow it down

- **Step 4: Performance monitoring during decommissioning**

For a successful commissioning, it is important to make decisions on treatment flow based on the results of the monitoring. The ramp up of flow in Step 3 will be accelerated or slowed down based on the results of sampling of the influent and effluent to see if there is any treatment.

During the commissioning phase samples of influent and effluent should be taken on each unit at the following intervals:

- During ramp-up of flow samples should be taken at the following intervals:
  - 48 hours after start-up
  - 5 days after start-up
  - 8 days after start-up
  - 11 days after start-up, and
  - 15 days after start-up.
- During the next month of operation, weekly samples of influent and effluent should be taken.
- Monthly samples should be taken thereafter.

The attached Bionest maintenance and sampling manual contains specific instructions on how to take samples.

5 – TROUBLE SHOOTING

The attached BIONEST maintenance and sampling manual contains instructions on trouble shooting problems.

6 – SPECIFIC RESPONSIBILITIES

Role	Responsibility
Camp Manager	
Environmental Technician	

7 – REFERENCES / RELATED DOCUMENTS

References
BIONEST KODIAC Maintenance and Operating Manual
Amaruq Camp Waste Water Management Plan
BIONEST Maintenance and Sampling Manual

Related documents

8 - CHANGE LOG

Version	Revision date	Modification
1.0		