The Tale of Saddle Lake Cree Nation – Answer Key

Name: _____

1. Describe where Saddle Lake Cree Nation is located. (2 marks)

   Saddle Lake Cree Nation is located almost 200 km northeast of Edmonton, Alberta.

2. What are two of the main challenges in terms of Saddle Lake's surface water? (2 marks)

   The lake is a terminal lake (has no outflow) and, through evaporation, high levels of Dissolved Organic Compounds (DOC) are generated.

3. Why was the water distributed by the water treatment plant among the worst in the country, even after treatment? (3 marks)

   The source water comes from Saddle Lake, and it is full of thick blue-green algae that washes up on shore in large quantities. The water treatment plant was built in 1982 and required large quantities of harsh chemicals to treat the water. The distribution system itself was also poorly built. After treatment, the aluminum levels in the tap water were still 10 times higher than the limit in the Guidelines for Canadian Drinking Water Quality.

4. What is DOC? What might happen when water that has a high level of DOC is chlorinated? (2 marks)

   Dissolved Organic Compounds, harmful by-products called Trihalomethanes (THMs), which are carcinogenic (cancer causing), may be produced.

5. Name three treatment methods that are effective in removing DOC from water. (3 marks)

   Any three of: coagulation/flocculation processes, biological filtration, granulated activated charcoal, or distillation.

6. What is the maximum amount of DOC a water source can have in order to be easily treated while limiting disinfection by-products? (1 mark)

   2 mg/L

7. Why can't they just use chlorine? (3 marks)

   The chlorine reacts with the organics, forming many different chlorinated organic compounds. Also, the bacteria present in the water before chlorination go from living to

dead and we drink a graveyard of bacteria – yuck!

8. What is used in the surface water IBROM process to carry out both particle removal and bioavailable DOC removal? (1 mark)

   Ceramic filtration material

9. How much THM is there in Saddle Lake's treated water now? (1 mark)

   A below detectable level (<5 ug/L).

10. What distinction is associated with Saddle Lake's water treatment system? (1 mark)

    First surface water biological treatment system in the world.

The following questions might require some online research:

11. Provide a detailed explanation of cyanobacteria. (3 marks)

    They are bacteria that live in the water and can manufacture their own food. They are quite small and usually unicellular. However, they often grow in colonies large enough to see. They are the oldest known fossils; they are more than 3.5 billion years old. They are one of the largest and most important groups of bacteria on Earth. Many oil deposits are attributed to the activity of cyanobacteria. They are also important providers of nitrogen fertilizer in the cultivation of rice and beans. They have also been tremendously important in shaping the course of evolution and ecological change throughout Earth's history. Numerous cyanobacteria during the Archaean and Proterozoic Eras generated the oxygen atmosphere on which we depend. The chloroplast with which plants make food for themselves is actually a cyanobacterium living within the plant's cells.

12. What is the Guideline for Canadian Drinking Water Quality for colour? What kind of guideline is this? (2 marks)

    15 True Colour Units (TCUs). This is an aesthetic objective.

13. Name five locations where ground water IBROM systems are located. Is Saddle Lake the only location where a surface water IBROM is located? If not, then list the locations where surface water IBROM systems are located. (7 marks)

    Any five of of: George Gordon First Nation, Pasqua First Nation, Yellow Quill First Nation, Whitecap Dakota First Nation, Dakota Dunes Casino, Kawacatoose First Nation, Poundmaker Cree Nation, Muskeg Lake Cree Nation, Witchikan Lake First Nation,

Saulteaux First Nation, Moosomin, James Smith Cree Nation, Makwa Sahgaiehcan First nation, Shoal Lake Cree Nation, Sturgeon Lake First Nation, Mistawasis First Nation, Kahkewistahaw, Sandy Lake, Kinistin First Nation, Village of Mankota, Town of Craik. Yes, Saddle Lake is the only location where a surface water IBROM is located. (Please visit https://www.safedrinkingwaterteam.org/ibrom/ for the updated list.)

14. What is the importance of producing stable chlorine residuals in the distribution system? What is the significance of the stable chlorine residuals in the distribution system being the same amount that is added at the water treatment plant? (5 marks)

    There needs to be enough chlorine such that there is a sufficient amount at the very end of the distribution line. Chlorine is used up when it kills parasites, bacteria, and viruses. Therefore, if it is not encountering these types of things then it is not being used up. In addition, if the amount of chlorine residual in the distribution system is the same amount that is added at the water treatment plant then that means that the water is biologically stable.

15. Why is it important that calcium and magnesium be added? Explain fully. (5 marks)

    It adjusts the pH so that the water is not as acidic. This is necessary so that the water does not leach metals out of the pipes. Also, calcium and magnesium are part of a healthy diet and, while we don't get much calcium and magnesium from the water we drink, some people think that cooking with water that has no minerals in it can cause vitamins/minerals to be removed from the food. Furthermore, it is possible that drinking water that does not contain minerals can cause small amounts of minerals to be pulled from your body, including from your teeth.

Total: ____/43