INUVIALUIT SIVUNNIUQPAIT IMAKKUN

INUVIALUIT WATER BOARD

Hamlet of

Water Licence Number:

Sewage Waste Disposal Facilities Operation and Maintenance Plan

Date Prepared:

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☐ Other (Specify):

1. Introduction

Name of the Hamlet:

Location of the Hamlet - latitude and longitude in Degrees, Minutes and Seconds (DMS):

Latitude:

Longitude:

Present Population of the Hamlet:

Climate (a brief note such as mean July and January temperature)

Attach a Map of the Hamlet

☐ **Attached a map of the Hamlet (Appendix 1)**

2. Purpose

The purpose of this plan is to assist the Hamlet of personnel with the operation and maintenance of their sewage waste disposal facilities.

3. Sewage Waste Disposal Facilities - Site Description

Definitions:

- **Mechanical Plant**: a constructed system with mechanical parts such as tanks, pumps, blowers, screens, and grinders.
- **Natural Lake Lagoon**: a natural lake being used as a lagoon, including lakes with minor modifications or added control structures.
- **Engineered Lagoon**: any type of constructed or artificial lagoon that is decanted at a specific point or flows continuously through a weir or other discharge structure, including all lined lagoons.
- **Exfiltration System**: a pit, trench, or lagoon that is designed to allow effluent to seep continuously through gravel, sand, or another material.

Identify the type of Sewage Waste Disposal Facilities:

- ◯ Mechanical Plant
- ◯ Natural Lake Lagoon
- ◯ Engineered Lagoon
- ◯ Exfiltration System

Global Positioning System (GPS) locations of Sewage Waste Disposal Facilities (Note: Due to inconsistencies between individual GPS units, Google Earth latitude and longitude should be utilized as the GPS points):

Latitude (Degrees, Minutes, Seconds):

Longitude (Degrees, Minutes, Seconds):

Attach a location map including following features:

Map to include scale, north arrow, Sewage Waste Disposal Facilities, Hamlet, access road from Hamlet, nearby water bodies, effluent receiving water body and/or wetland, location of all Surveillance Network Program (SNP) sampling stations with associated Global Positioning System (GPS) locations (Note: Due to inconsistencies between individual GPS units, Google Earth latitude and longitude should be utilized as the GPS points), groundwater monitoring wells and any other features.

☐ **Attached a map indicating above features (Appendix 2)**

Date of Commissioning of Sewage Waste Disposal Facilities yyyy/mm/dd (if date is unknown, estimate year)

What are the ground conditions relating to permafrost in and around the community in which the Sewage Waste Disposal Facilities is located?

Definitions:

- **Permafrost** – Ground that stays frozen through the summer. There is a surface layer that thaws, but underneath the ground stays frozen. (There are other definitions, but for the following question, use this one.)
- **Continuous permafrost** – There is permafrost everywhere in the area.
- **Discontinuous permafrost** – (a) There is permafrost, but some areas thaw in the summer, or (b) there are some patches of permafrost, but most of the ground thaws in the summer.

◯ Continuous permafrost

◯ Discontinuous permafrost

◯ No Permafrost in area

4. Sewage Waste Disposal Facilities – Staff Contact Information

Provide name, contact information (phone and email), and role for each staff member responsible for Operations and Maintenance of Sewage Waste Disposal Facilities.

Name	Phone	Email	Role and responsibilities

5. Security and Control

How is public access to the system controlled? (**Check all that apply**)

- ☐ No control
- ☐ Front gate locked when facility is closed
- ☐ Perimeter chain-link fence around entire facility
- ☐ Locked man-door
- ☐ other (specify):

Is the following signage posted at the Sewage Waste Disposal Facilities? (**Check all that apply**)

- ☐ Name of facility
- ☐ Notification of restriction of public access
- ☐ Sign at each Surveillance Network Program (SNP) monitoring site
- ☐ Warning signage regarding chemicals used in the treatment process
- ☐ other (specify):

6. Hamlet Population and Sewage Generation

In this section please provide the following information:

- Current population:
- Projected population after 10 years:
- Sewage generation (L/person/day):
- Total daily sewage generation (L): 0
- Projection of total daily sewage generation after ten (10) years (L): 0

7. Sewage Collection and Conveyance

Is wastewater collection done with trucks, or a sanitary sewer system (either underground pipes or utilidor)?

- ○ Trucks
- ○ Sanitary Sewer
- ○ Combination of sanitary sewer and trucked
- ○ Other (Specify)

If both a sanitary sewer and trucks are used, please answer both sets of questions below.

For **sanitary sewer systems**, attach a map indicating locations of lift stations and force mains including design flow rates and control points (valves).

☐ **Attached a map of sanitary sewer system (Appendix 3)**

Annual volume of wastewater collected in piped system: m^3/year

For trucked systems, provide the following information:

Describe the group responsible for the collection and transport of sewage to the Sewage Waste Disposal Facilities (e.g., community staff, private contractor) and scope of service (e.g., vehicles, equipment, fuel etc.):

How many days per week is sewage waste collection done? days per week

Number of sewage trucks available: Truck(s)

Volume of each sewage waste truck: Litres

number of truckloads delivered to lagoon per week: Trips per week

Annual volume collected by all trucks (if known): m^3/year

Are honeybags accepted at the Sewage Waste Disposal Facilities?

Yes No

If **Yes**,

Estimated annual volume of honeybags: m^3/year

Where are honeybags stored/disposed of?

How are hazardous wastes and other unacceptable substances kept out of the Sewage Waste Disposal Facilities?

8. Raw (influent) Sewage Quality

Raw (influent) sewage waste quality refers to the composition of the raw sewage waste to be treated at the Sewage Waste Disposal Facilities.

Are water quality results available for influent (raw) sewage quality?

◯ Yes ◯ No

If **No**, skip this section.

If **Yes**, attach the results of the sampling program

☐ **Attached results of raw sewage (Appendix 4)**

9. System Capacity and Design Data

Indicate the **Design Flows** for which the system was designed. If this is an existing system and **design information** (such as an engineering report) is not available, skip this question.

Monthly **design** flow: _____ m³

Annual (yearly) **design** flow: _____ m³

Indicate the Effluent Quality Criteria for which the **system was designed**. Add any additional criteria listed in the water license for the system. Skip any that don't apply. If this is an existing system and **design information** (such as an engineering report) is not available, skip this question.

pH:		
Biochemical Oxygen Demand (BOD5):		mg/L
Carbonaceous Biochemical Oxygen Demand (CBOD):		mg/L
Total Suspended Solids (TSS):		mg/L
Oil and Grease:		mg/L
Fecal Coliforms:		CFU/100 ml
Ammonia-N (NH3-N):		mg/L
Phosphorus:		mg/L
Acute Toxicity - Rainbow Trout		% survival
Acute Toxicity - Daphnia magna		% survival

Additional criteria from water licence:

10. Sewage Waste Disposal Facilities Design and Treatment System

Attach one of the following drawing options with the documents you are submitting. As-built drawings are preferred, if available. All drawings are required to have scales and north arrows (for plan views).

Indicate what type of drawings are attached (**Appendix 5**):

- ☐ As-built drawings of the Sewage Waste Disposal Facilities signed and stamped by a professional engineer registered with Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG)
- ☐ Design drawings signed and stamped by a professional engineer registered with Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG)
- ☐ Scaled site plan with an air photo
- ☐ If engineering drawing is not available, provide schematics including north arrows, sewage flow direction, effluent outlet point and receiving water body and/or wetland and other features

Provide the following data **from the engineering design** of the treatment system. **If this is an existing system and design information (such as an engineering report) is not available, provide the lagoon dimensions and any other information you have and skip the rest.**

Lake Lagoon Dimensions:

Length: _____ m

Width: _____ m

Maximum Depth: _____ m (if known)

> **Note**: If you have measurements in feet, multiply by 0.305 to get meters.
> e.g. 20 ft x 0.305 = 6.1 m

Lake Lagoon Area: _____ hectares

Liquid Operating Depth: _____ m (total depth minus freeboard and sludge allowance)

Freeboard Depth for structures: _____ m (if applicable; normally applies to berms, dykes, and other control structures)

Design Sludge Depth Allowance: _____ m

Lake Lagoon Active Volume: _____ m^3

> **Note**: If you know the volume in cubic feet, multiply by 0.028 to get cubic meters.
> e.g. 4500 ft3 x 0.028 = 126 m3

Peak flow rate out of lake: _____ L/sec (the fastest flow rate of the year, measured at the point where water leaves the lake lagoon)

Hydraulic Retention Time: _____ days (amount of time that wastewater will stay in the lagoon, based on the lagoon volume and the flow rate)

Are flow control structures used in the lagoon system?

◯ Yes ◯ No

If "**Yes**", identify type, quantity and purpose of control structure (inlet, interconnection of cells, cell drain/discharge etc.) (**Check all that apply**)

☐ Stop logs

Quantity: _____

Purpose of structure: _____

☐ Valves

Quantity: _____

Purpose of structure: _____

☐ Raw (influent) sewage discharge chute

Quantity: _____

Purpose of structure: _____

☐ Other control structures (Specify): _____

Quantity: _____

Purpose of structure _____

11. Effluent Discharge

Is treated sewage discharged/decanted at specific times (seasonal), or does it flow all the time except when frozen (continuous)? (**Check that apply**)

☐ Seasonal ☐ Continuous

If "**Seasonal**", indicate the duration of discharge (or decant)

_____ Days OR _____ Weeks

What time of year seasonal discharge is typically done?

_____

Indicate the average discharge flow rate: _____ m^3/day

Indicate which of the following activities are done. Your water licence will specify which requirements apply to your system. (**Check all that apply**)

☐ The Licensee shall advise the Water Resource Officer (i.e. Inspector) at least ten (10) days prior to initiating a formal decant of the Sewage Waste Disposal Facilities should it be necessary

☐ Water Resource Officer (i.e. Inspector) approval is obtained prior to discharge of treated sewage waste

☐ Effluent shall be sampled prior to, and once during each decant

☐ Effluent shall be sampled once immediately after break-up and monthly during open water Season

☐ The Licensee shall immediately notify the Board and inspector of any effluent quality results that exceed the maximum standard concentration

☐ Other (Specify): _____

Where the Treated sewage discharge?

☐ Surface Waterbody ☐ Natural Wetland

☐ Other (Specify): _____

If discharge to surface water, provide the following information:

Name of waterbody:

Average annual flow rate of waterbody (if known): m^3/sec

Attach water quality data for the waterbody upstream of the discharge point, if available.

☐ **Attached water quality data for the waterbody upstream of the discharge point (Appendix 6)**

If discharged to a natural wetland, provide as much of the following information as possible. If this is an existing system and design information (such as an engineering report) is not available, skip any that are unknown.

Average annual discharge flow rate out of the wetland system: m_3/sec

Wetland Area: hectares

Wetland Length: m

Wetland Operating Depth: m

List the types of plants in the wetland:

Estimated Hydraulic Loading Rate: cm/day

Estimated Hydraulic Retention Time: days

12. Surveillance Network Program (SNP)

Sampling station number and description of the sampling stations as specified in your water licence:

Parameters to be analyzed and maximum quality guidelines as specified in your water licence:

Frequency of the effluent water sampling at each sampling stations as specified in your water licence:

SNP sampling laboratory results submission requirements as specified in your water licence:

Provide name and contact information of the responsible person(s) for sampling, monitoring and reporting for the Surveillance Network program (SNP):

Name	**Phone**	**Email**	**Role and responsibilities of each person**

Attach a map or drawing indicating the location of all Surveillance Network Program (SNP) sampling stations, with associated Global Positioning System (GPS) locations in Degrees, Minutes, Seconds (Note: Due to inconsistencies between individual GPS units, Google Earth latitude and longitude should be utilized as the GPS points).

☐ **Attached a map indicating SNP GPS locations (Appendix 7)**

13. Sludge Management

Has sludge from the treatment system ever been removed for disposal?

◯ Yes ◯ No

How frequently is the sludge level checked?

◯ Annually ◯ Other:

How often is sludge removal done?

Every _____ year.

Estimated annual sludge production: _____ m^3

Briefly explain how sludge removal is done:

How is the sludge disposed of?

- ◯ On-site Land Application
- ◯ Off-site Land Application
- ◯ Landfill
- ◯ Other: _____

Identify/name and describe the location or facility where the sludge is disposed of:

14. Sewage Waste Disposal Facilities Operation and Maintenance

The following provides a list of typical operation, maintenance and monitoring activities applicable to a water license.

Indicate the frequency of each of the following activities at the Sewage Waste Disposal Facilities:

Activities	**Frequency**						
	Never	Daily	Weekly	Monthly	Annually	Other (specify)	
Monitoring of the colour of the liquid in the lagoon as an indication of performance.	○	○	○	○	○	○	
Monitoring of water levels to ensure the minimum freeboard limit of 1 m on constructed berms, dykes, and dams (or as approved by the Board) is maintained.	○	○	○	○	○	○	
Removal of floating debris, algae and plant growth.	○	○	○	○	○	○	
Inspection of dams, dykes, berms and liners for damage by animals, vegetation growth or erosion.	○	○	○	○	○	○	
Measurement of sludge levels.	○	○	○	○	○	○	
Removal and disposal of accumulated sludge.	○	○	○	○	○	○	
Inspection of inlet, interconnecting valves, outlet and truck discharge structures for damage, blockage, settlement or erosion.	○	○	○	○	○	○	

Monitoring for damage to fencing/signage and gate.	◯	◯	◯	◯	◯	◯	
Monitoring damage to monitoring wells.	◯	◯	◯	◯	◯	◯	
Monitoring damage to traffic barriers.	◯	◯	◯	◯	◯	◯	
Inspection, grading and reshaping of access road and truck pad.	◯	◯	◯	◯	◯	◯	
Monitoring and clearing of drainage ditches and culverts (if applicable).	◯	◯	◯	◯	◯	◯	
Sewage discharge measurement	◯	◯	◯	◯	◯	◯	
SNP sampling	◯	◯	◯	◯	◯	◯	
Inspection and maintenance of sewage trucks	◯	◯	◯	◯	◯	◯	
Other monitoring activities:							
	◯	◯	◯	◯	◯	◯	
	◯	◯	◯	◯	◯	◯	
	◯	◯	◯	◯	◯	◯	
	◯	◯	◯	◯	◯	◯	
	◯	◯	◯	◯	◯	◯	

Operation of the lagoon from Freeze-up to Break-up:

Operation of the lagoon during this time is for winter operations. Changeover to winter operations should occur when effluent in the lagoon begins to freeze. Sewage will be collected using the Hamlet's vacuum truck and will be discharged into the lagoon via the sewage discharge chute. Any sewage spilled onto the truck turn around pad must be cleaned up immediately to prevent the accumulation of ice. Also, any accumulation of ice on the discharge chute should be cleared away to keep the chute clean and free of blockages

Operation of lagoon from Break-up to Freeze-up:

Operation of the lagoon during this time is for summer operations. Changeover to summer operations should occur when stored effluent in the lagoon has thawed. Sewage will be collected and discharged into the lagoon as described for winter operations. Should the need arise (i.e. severe risk of sewage overflow) the lagoon will also be decanted during this time using a pump and hose to decant effluent into the adjacent wetland. If any effluent is going to be decanted into the wetland, the Hamlet must provide notice to an ECC Inspector at least 10 days before decanting occurs as specified in the water licence. Once the decantation period is over the pump and hose system will be disconnected and sewage will be stored in the lagoon during the winter months.

Measures to be taken to control odor, weeds and insects in and around the lagoon:

In order to discourage attracting insects, the wetland surrounding the lagoon should be inspected regularly for areas of ponding water. Hamlet staff must cover up any puddles or potholes by filling them with soil. Weeds growing in and around the lagoon surface may also attract insects. For information about weed management.

Weeds growing in and around the lagoon may cause a number of problems such as attracting unwanted insects, causing excessive odours, and impeding photosynthesis. Surface weeds block sunlight from entering the lagoon that is required for photosynthesis to occur. Photosynthesis is the reaction that provides energy for algae and that in turn allows algae to provide oxygen to bacteria in the lagoon. Bacteria require oxygen in order to break down wastes within the lagoon. Wastes that are not breaking down may result in excessive odour. Weeds/plants on the surface and edges of the lagoon must be removed promptly. Hamlet staff should skim weeds off the top of the lagoon and trim them at the edges. Any weeds that have been removed must be buried in the landfill immediately to prevent odours and insects.

Describe the requirements of the general maintenance and inspection for sewage trucks because they can be a source of pollution due to spill if not properly inspected and maintained:

15. Final Discharge Point and Receiving Environment

The "**final discharge point**" is the point where the treated sewage leaves the treatment system and enters the environment. What type of final discharge point does the Sewage Waste Disposal Facilities have? (**Choose one**.) *Note this is at the end of the treatment system, which may be different from the lagoon decant point.*

- ◯ Exfiltration through berm or substrate
- ◯ Natural channel outflow (i.e. discrete from natural lake lagoon)
- ◯ End of wetland (natural or engineered)
- ◯ Engineered berm – water pumped or syphoned over berm
- ◯ Engineered berm – outfall structure built into berm (gate with stop logs/pipe/spillway/notch)
- ◯ Pipe outflow
- ◯ Other (specify)

What are the coordinates of the final discharge point?

Global Positioning System (GPS) locations of the final discharge point (Note: Due to inconsistencies between individual GPS units, Google Earth latitude and longitude should be utilized as the GPS points):

Latitude (Degrees, Minutes, Seconds):

Longitude (Degrees, Minutes, Seconds):

The "**receiving environment**" is the environment or area where the treated wastewater ends up after passing through the entire treatment system. What is the receiving environment located after the final discharge point? (**Choose one**)

- ◯ River/stream
- ◯ Lake/pond
- ◯ Ocean (i.e. water goes directly from the treatment system to the ocean, with nothing else in between)
- ◯ Ocean (i.e. water goes from the treatment system to the natural wetland and enters ocean)
- ◯ Wetland (that is not part of the treatment system)
- ◯ Land – subsurface (exfiltration)
- ◯ Land surface (overland) (e.g. a field)
- ◯ Other (specify)

Name of receiving waterbody or area, if applicable:

If the receiving environment is water (river/stream/lake/pond/ocean or similar), estimate the size of the waterbody:

What types of plants or trees are in the receiving environment? (**Choose all that apply**)

- ☐ Wildflowers (e.g. Butterwort, Cloudberry, Common Plantain, Common Yarrow, Fireweed, Indian Paintbrush, Mountain Avens, Prickly Saxifrage, Red Baneberry, Silverweed, Twinflower, Wild Mint, Yellow Lady's Slipper)
- ☐ Aquatic plants (e.g. Cat-tail, Duckweed, Rat Root, Water-arum, Yellow Pond-lily)
- ☐ Horsetails (e.g. Common Horsetail)
- ☐ Sedges (e.g. Cotton-grass)
- ☐ Shrubs (e.g. Black Currant, Bog Rosemary, Crowberry, Ground Juniper, Labrador Tea, Mountain Cranberry and Kinnikinnick, Prickly Wild Rose, Silverberry, Soapberry, Willow)
- ☐ Trees (e.g. Black Spruce and White Spruce, Jack Pine, Paper Birch and Dwarf Birch, Tamarack, Trembling Aspen and Balsam Poplar)
- ☐ Other (specify):

Has a study or sampling program been done to determine **background water quality** at the final discharge point (i.e. a study of the water in the environment before the Sewage Waste Disposal Facilities started discharging there, or at a distance from the discharge point)?

- ◯ Yes ◯ No

If "**Yes"**, provide the following information on the study.

Title of document:

Name of company or person who did the study:

Date study was completed (yyyy/mm/dd):

Attach the results of the study if available.

- ☐ **Attached background water quality results (Appendix 8)**

Has a study or sampling program been done to assess **effluent quality** at the final discharge point (i.e. a study or sampling of the water coming out the end of the treatment system)?

◯ Yes ◯ No

If "Y**es"**, provide the following information on the study.

Title of document:

Name of company or person who did the study:

Date study was completed (yyyy/mm/dd):

Attach the results of the study if available.

☐ **Attached effluent quality results (Appendix 9)**

16. Surface Water Management

Are there perimeter ditches surrounding the site to manage run-on?

◯ Yes ◯ No

Is the site constructed with positive site drainage (minimum 1%) to minimize ponding?

◯ Yes ◯ No

What is the distance (m) to the nearest fish-bearing water body (lake, river, etc.)? m

Briefly describe the flood response measures including temporary alternate Sewage Waste disposal practices, locations and mitigation measures (**if applicable**):

17. Record Keeping

The following are record keeping requirements related to Operation and Maintenance (O&M) of the Sewage Waste Disposal Facilities and should be filed as an annual report with the Inuvialuit Water Board (IWB) no later than the date stipulated in the water license for the previous year. The annual report should include the following:

- Monthly and annual quantities in cubic metres (m^3) or litres (L) of all sewage discharged to the Sewage Waste Disposal Facilities

  How and where is this recorded?

  Where are these records kept?

- Tabular summaries of all data generated under the “Surveillance Network Program (SNP)”

  How and where is this recorded?

  Where are these records kept?

- Monthly and annual quantities of sewage sludge removed from the Sewage Waste Disposal Facilities and disposal location

  How and where is this recorded?

  Where are these records kept?

- Any problems, modifications or repairs done to the Sewage Waste Disposal Facilities, including all associated structures

  How and where is this recorded?

Where are these records kept?

- A list of spills and unauthorized discharges

How and where is this recorded?

Where are these records kept?

- A description of any Closure and Reclamation work completed during the year and an outline of any work anticipated for the next year

How and where is this recorded?

Where are these records kept?

- A description of any studies requested by the Board that relate to water use, waste disposal or closure and reclamation and a brief description of any future studies planned

How and where is this recorded?

Where are these records kept?

- A description of any spill training and/or other operator training carried out

How and where is this recorded?

Where are these records kept?

- Any updates and/or revisions to the approved Sewage Waste Disposal Facilities Plan

  How and where is this recorded?

  Where are these records kept?

- Results of staff inspections on Sewage Waste Disposal Facilities including all dams, berms, dykes and control structures authorized under this licence and any corrective actions, as necessary

  How and where is this recorded?

  Where are these records kept?

- All correspondence between the inspector and the Licensee

  How and where is this recorded?

  Where are these records kept?

- Any other details on waste disposal requested by the Board by November 1 of the year being reported

  How and where is this recorded?

  Where are these records kept?

18. Safety Procedures

The following safety procedures should be obeyed in order to minimize health risks to personnel working in and around the Sewage Waste Disposal Facilities:

- Equipment is to be kept clean;
- Wear protective clothing such as gloves and boots at all times;
- Work clothes must be kept in a designated change room and employees are to change into them when they arrive for work. Work clothes must NOT be worn home. The Hamlet's Maintenance Garage should be equipped with laundry facilities to wash work coveralls onsite;
- Hands to be washed frequently; as a minimum before eating and after work; and
- Personnel should receive appropriate vaccinations and ensure they are kept up-to-date. Please contact the Department of Health for a list of the appropriate vaccinations.

19. Operator Training

Describe the operator training program, and plans:

20. Closure and Reclamation Plan and Post-Closure Monitoring Plan

If not already submitted, a Closure and Reclamation (C&R) Plan shall be submitted when required by the Inuvialuit Water Board (typically required at least six months prior to closure).

The C&R Plan shall include, but not be limited to, the following details:

- contaminated site remediation;
- the potential for groundwater contamination (leachate prevention);
- consideration of altered drainage patterns;
- type and source of cover materials;
- future area use;
- hazardous wastes removal, transportation and disposal;
- an implementation schedule;
- maps delineating all disturbed areas, borrow material locations, and site facilities; and
- a restoration monitoring plan.

Additional considerations shall include:

- Any and all structures to be reused if possible, otherwise proper disposal shall be ensured;
- Equipment that is not required during the C&R phase shall be removed from site; and
- Signage shall be placed at the entrance that indicates that closure and reclamation are in progress and the facility is no longer accepting sewage waste. Alternative locations for sewage waste disposal shall be provided.

Post-Closure Monitoring will take place until one or more of the following conditions apply:

- It can be demonstrated that the site is no longer releasing contaminants; or
- It can be demonstrated that the site has reached an equilibrium state in which contaminant release poses no unacceptable risk to the environment.

Post-Closure Monitoring shall include, but not be limited, to:

Monthly	Seasonally	Annually
• Site Inspection	• Sludge sampling and analysis • Monitor vegetation and reseed as necessary	• SNP sampling and analysis • Monitor settling and fill in low areas • Monitor and repair drainage pathways • Submit inspection reports to Inuvialuit Water Board regarding matters of concern

Appendices

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