OPERATION AND MAINTENANCE PROCEDURE OF THE EXISTING SEWGAE LAGOONS

HAMLET OF CAPE DORSET

BAFFIN REGION, NUNAVUT

SEPTEMBER 2018

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1 INTRODUCTION

1.1 Purpose

The purpose of this manual is to establish existing operation and maintenance protocol for the management of the sewage treatment system for Hamlet of Cape Dorset. Information presented in this manual has been developed based on the document "Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities." This document fulfills Parts B, D, F and H of the Water License 3BM-CAP0810.

To assist personnel that operate the existing 1990s built sewage lagoon with proper operation and maintenance procedures, the following requirements are addressed in this O&M manual:

1. Proper operation and maintenance procedures for the sewage treatment system to provide effective treatment and operation of the facility;
2. Monitoring program description;
3. Appropriate methods and procedures for wastewater sampling, and;
4. A spill contingency plan.

1.2 Site Setting

The Hamlet of Cape Dorset is located on Dorset Island, near the southwest tip of Baffin Island at 64° 14' North latitude and 76°32' West longitude. situated in the Qikiqtaluk Region of Nunavut, the Community is approximately 402 air km southwest of the city of Iqaluit (see **Figure 1** in page 2).

Located in the continuous permafrost zone, Cape Dorset has a climate which consists of short cool summers and long cold winters. Annual snowfall and rainfall are approximately 118 cm and 15 cm, respectively. The typical temperature range for January is between a low of about -29°C and a high of about -23°C whereas in July, the temperatures range between a low of 3°C to a high of about 7°C. Usually, freeze up occurs during the month of November but it may happen as early as October or even September. In some years, early freeze up may thaw again before final freeze up occurs. Spring thaw typically takes place during the month of July, but the time frame can vary as much as freeze up. During spring runoff, the community experiences mild flooding.

The community is situated between two valleys of the Kingnait range of hills. Topography consists of areas of moss surrounded by rock outcrops, bedrock and steep cliffs.

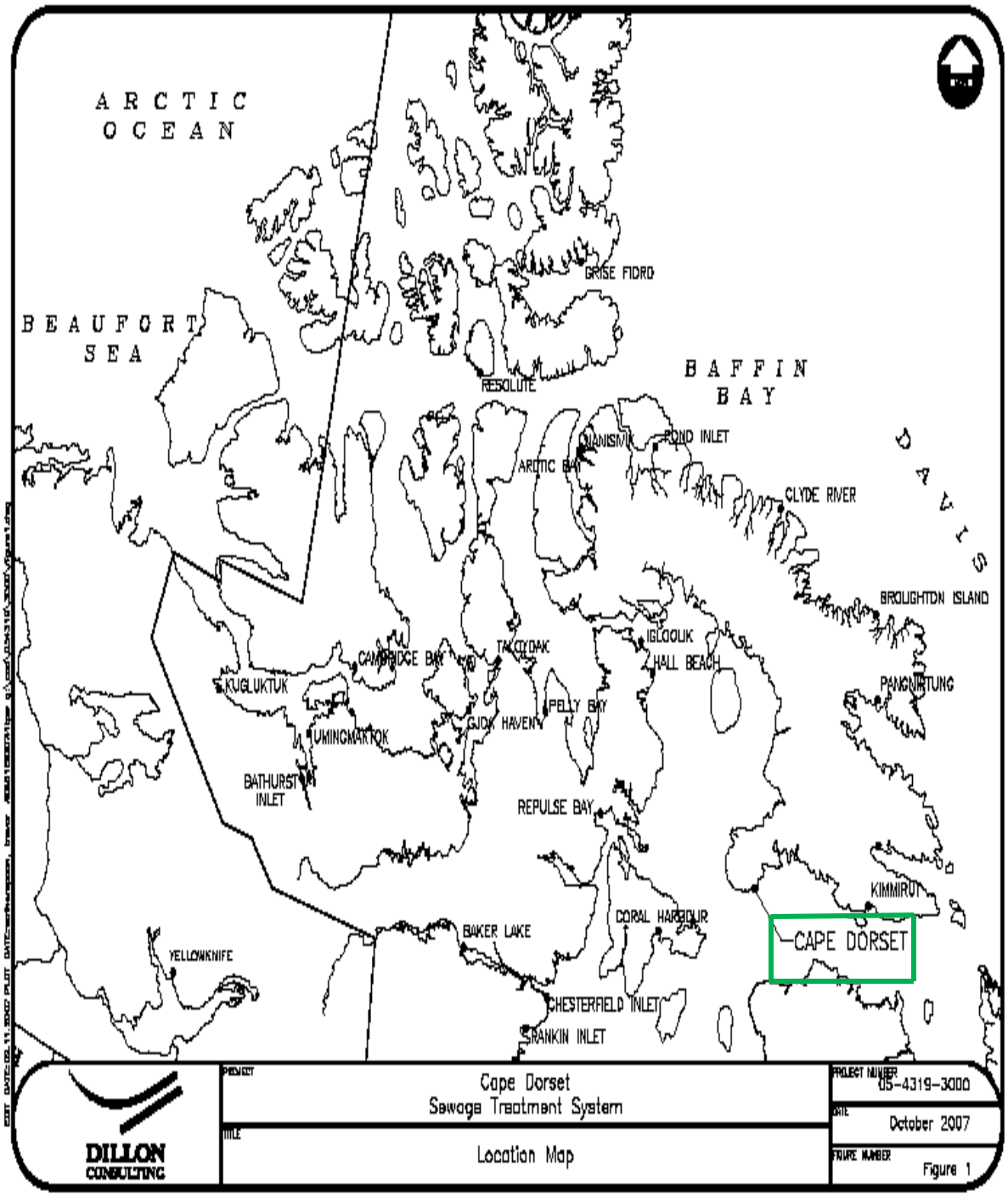


Figure 1: Map of Nunavut

The community uses trucked services for both water delivery and sewage collection. Wastewater is treated using a constructed retention cell treatment system that is located approximately 800 m southwest from the center of the community.

1.3 Population Projection

Presently, the population of Cape Dorset is approximately 1,473 people (Based on 2009 GN estimates). **Table 1** shows the population growth for the Hamlet over the lifetime of the new plant projected by Nunavut Bureau of Statistics.

Table 1: Population Projections for Cape Dorset

Year	2000	2006	2011	2016	2021	2026
Population	1,213	1,382	1,536	1,692	1,848	2,002

Source: Nunavut Bureau of Statistics.

1.4 Contact List

The Hamlet of Cape Dorset has a Maintenance Management Operation System (MMOS) already in place. Regular maintenance will be conducted as outlined in this manual whereas specific work orders for sewage treatment facility and system will be passed through to the MMOS. A list of the individuals that are responsible for the operation and maintenance of the sewage treatment and waste disposal system are as follows:

Senior Administrative Officer	(867) 897-8943
Municipal Works Foreman	(867) 897-8943

2 BACKGROUND

2.1 General

2.1.1 Sewage Treatment Facility

The existing three cell sewage lagoons were built some time in 1900 located at N64^{0}13'40.8'' and W76^{0}34'29.5". These are not engineered facilities. Initially there was a natural valley and it was divided into three cells by constructing two separation berms .Surveys, geotechnical information and design documents are not available. As built drawings were not also prepared. Sewage is being dumped into the first cell. First cell is connected with the second cell with an 8 inches diameter pipe, and second cell is connected to the third cell also with an 8 inches diameter pipe. The third cell also has an 8 inches diameter pipe which controls the overflow. Hamlet maintains these berms in each summer to prevent structural failure.

There is also a natural ditch located at N 64^{0}13'49.3" and W 76^{0}34'23.7". This one is used for emergency dumping in case of blizzard or heavy snow fall.

No operational procedure as such was developed at the past.

A new sewage lagoon was built in 2007 and it was not commissioned yet. Until the new Mechanical Wastewater Treatment Plant is built and commissioned, these existing three cells lagoons will be used. The three cells lagoons have a capacity issue. Whereas sewage production in 2017 was recoded for roughly 52, 499 cubic meters. These cells are not containment, and once the water level rises at the pipe invert level, over flow starts. The system is in noncompliance.

2.1.2 Sewage Collection and Transport

All municipal wastewater of the community is collected and transported to the sewage lagoon by vacuum trucks. The sewage collection service operates 7 days a week. With three trucks operating, about 15 to 20 trips are made to the sewage lagoon per day.

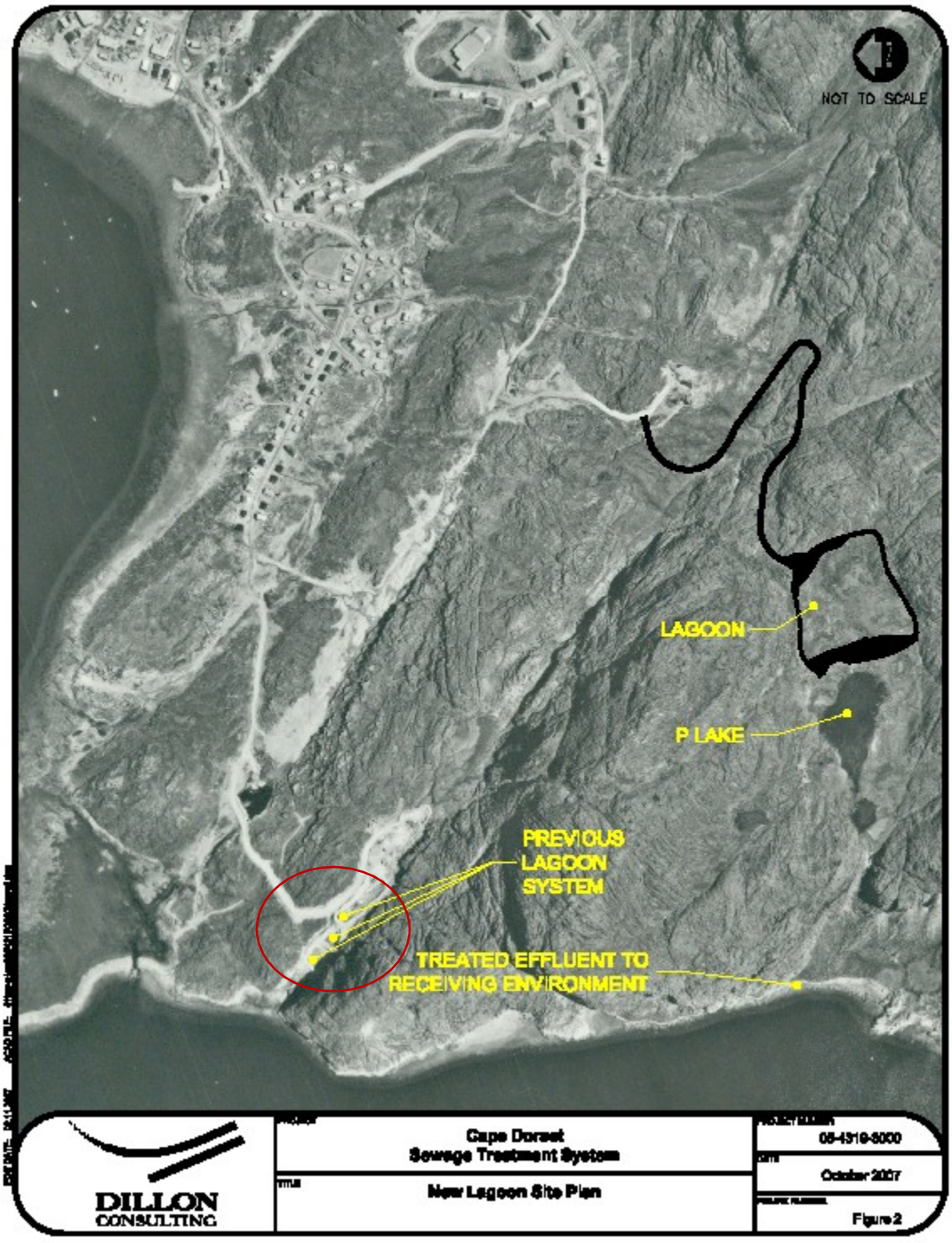
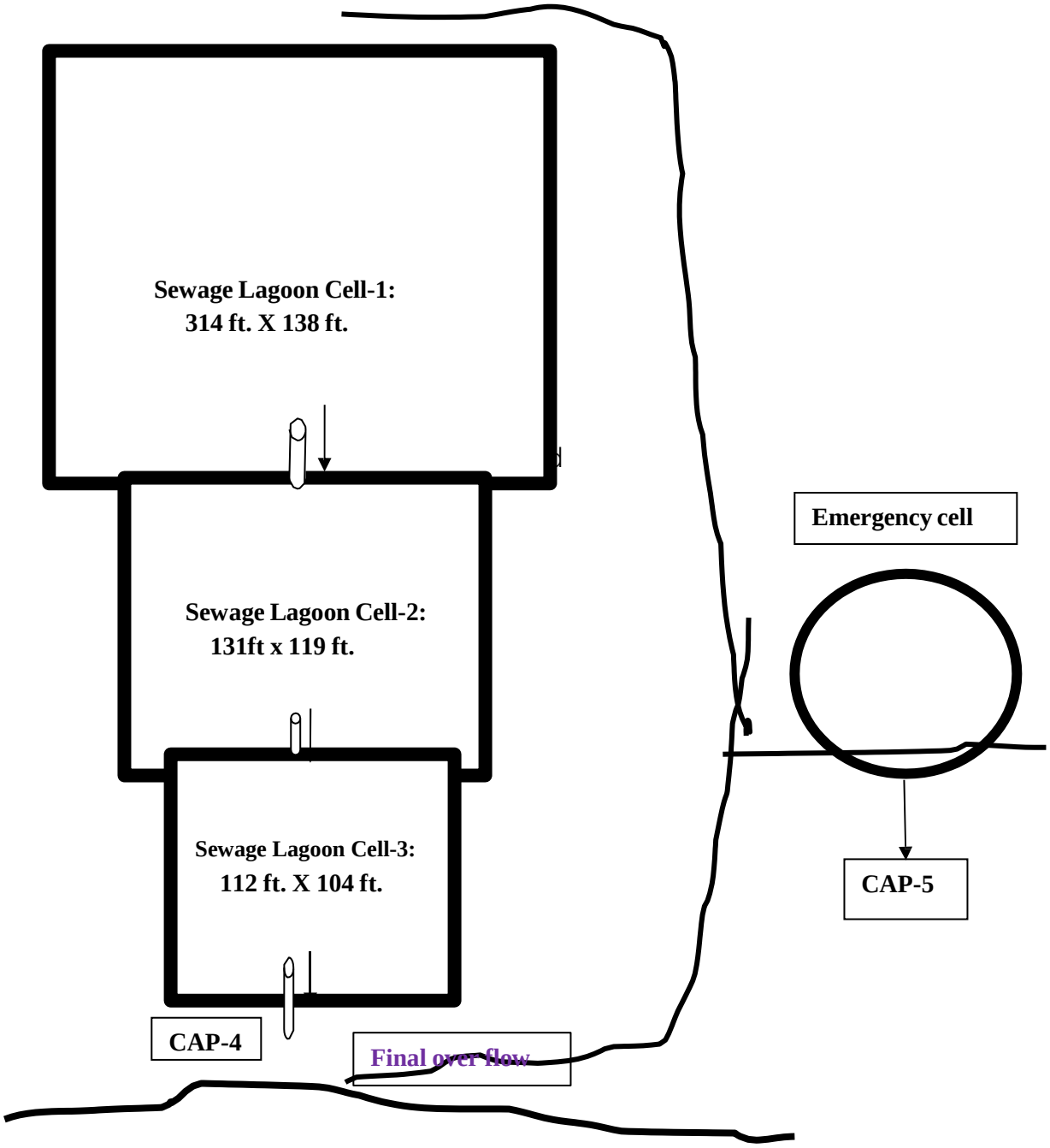


Figure 2: Location of Sewage Treatment Facility -3 cells and P-lake



2.2 Sewage Production

It is approximated, for smaller communities such as Cape Dorset where water distribution is provided by trucks, that the sewage generation is equal to the water consumption. Therefore, the daily and annual sewage generation rates are approximately equivalent to the water consumption rates. The following equation, proposed by MACA, gives the water consumption rate for small communities on trucked services that have a population less than 2,000 people.

$$\textit{Water Use (L/capita/day)} = 90\ \textit{L/capita/day} \times (1.0 + 0.00023 \times \textit{Population})$$

Using the estimated population projections shown in **Table 1**, the projected sewage generation are shown

in **Table 2** below. The new P- lagoon was constructed to hold the annual generation rate of 96,100 m^3 of wastewater but never Use. Hamlet has no intention to use in future. This facility is recommended to be decommissioned. Until the new facility is commissioned, the entire sewage will be continued to dump into these three cells lagoons.

Table 2: Projected Sewage Generation

Year	Population	Sewage Generation Rate (L/capita/day)	Annual Generation (m^3/yr.)
2000	1,213	115.11	50,964
2006	1,382	118.61	59,829
2011	1,536	121.80	68,283
2016	1,692	125.02	77,213
2021	1,848	128.26	86,530
2026	2,002	131.44	96,047

Physical, chemical and biological characteristics of sewage are referred to as its composition. It is assumed that raw wastewater has a typical average concentration of 625 mg/L for BOD_5 and 900 mg/L for TSS. For domestic waste, average raw FC concentration is about 2 x 10^9 FCU per 100 mL.

3 SEWAGE DISPOSAL SYSTEM

3.1 Manual Organization

This section of the manual presents the operation and maintenance procedures that are associated with the wastewater treatment facility that designated operators assigned to the system should be aware of concerning the facility and system.

3.2 Equipment

The equipment required to operate the Cape Dorset sewage treatment system consists of three sewage collection trucks with the following capacities:

- 9,092 L (2,000 imp. gal); 13,025 L (2,865 imp. gal) and 13,093 L (2,880 imp. gal)

3.3 Site Personnel

The overall responsibility of the waste disposal site as well as the overseeing of the operation and maintenance personnel is that of the Senior Administrative Officer. Day-to-day operation and maintenance of the facility is the responsibility of the Municipal Works Foreman. In addition, several other employees operate and maintain the sewage trucks on a day-to-day basis.

3.4 Operational Procedures

These procedures must be carried out frequently to ensure efficient operation of the treatment system. Daily operation procedures must/should be carried out frequently to ensure smooth operation of the treatment system.

3.4.1 Basic Operations

1. Municipal wastewater is collected from holding tanks at each residence and commercial building by sewage (vacuum) trucks.
2. Sewage (vacuum) trucks pump the wastewater out of the holding tanks and transport it to the sewage treatment area.
3. Throughout the year, the wastewater is discharged into the lagoon through the offload chute located at the truck pad. The sewage truck backs up to the lagoon (bollards are placed for safety purposes) and the valve is opened. Wastewater is discharged into the lagoon, over the splash pad.
4. The wastewater cannot remain in the lagoons for 12 months because these are under capacity and flow arrangement is made to prevent structural failure. The retention period is minimum to satisfy the effluent quality to the water licence requirement.
5. Natural decanting/overflow occurs throughout summer until freeze up.

At least 10 days' notice to the Nunavut Water Board (NWB) prior to decanting is not followed in this case.

The effluent discharged from either the existing Sewage Disposal Facility at sampling station CAP-4 and/or the Emergency Sewage Disposal Facility at sampling location CAP-5 should meet the following effluent quality standards prior to decant as listed in **Table 3**. Practically over flow starts before the sewage quality meets that target. All of these lagoons have capacity issue. In order to prevent structural failure, overflow is the most acceptable approach. During winter, the emergency lagoon is being used.

Table 3: Effluent Quality Limits for the 1990s Sewage Disposal Facility and the Emergency Sewage Disposal Facility

Parameter	Units	Maximum Average Concentration
Fecal Coliforms, FC	CFU/100 mL	1×10^4
5 Day Biological Oxygen Demand, BOD_5	mg/L	120
Total Suspended Solids, TSS	mg/L	180
Oil and Grease	-	No visible sheen
pH		6 - 9

3.4.2 Decanting Procedure

The overflow is uncontrolled at this case. The steps involved with gravity decanting the lagoon cells are as follows:

- Overflow starts once water level rises at the invert of the pipe which is installed at the lower berm.
- Monitor flow rate leaving discharge pipe during gravity decant period.
- Monitor for erosion at the end of the discharge pipe and repair as required.
- Check daily for erosion, blockages and other problems that may occur on the upstream slope of the berm. Apply necessary procedures to fix problem during decanting.
- If the discharge pipe happens to be blocked or frozen at the time of decanting, then the following options should be used:
  - Try to unblock or thaw pipe using a steamer hose. Once unfrozen, proceed with decanting. If necessary, keep applying heat to the discharge pipe to assist with the flow of material.
  - Decant lagoon using a diesel fired pump or siphon system. If a pump system is used for the decanting, then obtain a pump that will give the required flow rate to discharge the lagoon volume over the two week decant timeframe. In year 20, the required pump flow rate is 5,000 L/min.

3.4.3 Service Disruption Contingency

In the event of any disruption in the service of these three cells lagoons, for instance, the road to the lagoon is inaccessible mostly in Winter season; the Hamlet will use the emergency sewage disposal site located at N $64^0$13’49.3’’ and W $76^0$34’23.7”until the disruption has been resolved.

During times when the emergency cell is active, the community will record the following items;

- The date that the emergency commenced;
- The reason for the emergency;
- The date that the emergency ended;
- The number of trucks discharged to the lagoon; and,
- The volume of the sewage deposited in the lagoon.

Sewage deposited in the emergency lagoon cell will be treated until the discharge criteria are met, and then the treated sewage will be discharged to the receiving environment. It is proposed that this cell be decanted on an annual basis in October.

The Hamlet will notify CIRAC when the emergency lagoon is in service, and prior to the decant of the emergency lagoon.

The Senior Administrative Officer of the Hamlet of Cape Dorset will be the responsible party for the actions taken under this emergency procedure.

3.4.4 Sampling Procedures and Requirements

A key component to the operations and maintenance of the proposed sewage treatment system is a sampling program.
The proposed sampling program will help to monitor the treatment while verifying compliance with regulations. As well, it will model the treatment process which with help to understand the behavior of the lagoon for future development and expansions of the system.

It is important such a sampling program be implemented by the Hamlet as a part of the annual operations for the facility. Local members of the community that operate the system are to be trained on the proper operation and procedure methods used in the sampling program. In addition, quality and safety training will also be included which will ensure that the high quality data will be obtained.

All sampling, sample preservation and analyses will be in accordance with methods described in the current edition of *Standard Methods for the Examination of Water and Wastewater*. In addition, a document has been attached in **Appendix A** of this manual that provides guidelines and procedures to follow when sampling wastewater.

To obtain meaningful results from the analysis, the following five factors are of particular importance:

- Sample collection at designated time and location;
- Correct usage of container/sample bottle for parameter being tested;
- Correct labeling of sample bottles and filling out record/field sheet;
- Correct procedure for field sampling;
- Proper and timely shipment of samples to the laboratory.

It is critical, from a quality perspective, that sample collection be performed from an area of higher concentration to an area of lower concentration of contaminants. Therefore, a sample will be collected at various locations along the system to monitor the effluent quality at various stages of treatment. Descriptions of each sampling location of the sewage treatment system for the Monitoring Program are listed in **Table 4** below in page 10 and shown in **Figure 4** on page 11.

Table 4: Sampling Station Locations

Monitoring Program Station Number	Description of Monitoring Program Station
CAP-3	Influent of Wastewater to Wastewater Facilities at the point of discharge into the first cell
CAP-4	Effluent Discharge from existing Sewage Disposal Facilities on the third cell overflow pipe
CAP-5	Effluent Discharge from Emergency Sewage Disposal Facility

Figure 3: Sampling Locations

By obtaining samples at each of the locations proposed above, effluent treatment rates can be monitored. According to the water licence, wastewater samples will be taken from locations CAP-3 ,CAP-4 and CAP-5, one (1) week prior to the proposed decant date and weekly during the course of lagoon decant. These wastewater samples will undergo the same analysis which will include the following set of parameters as listed on the following page.

Biochemical Oxygen Demand, BOD_5	Carbonaceous Biochemical Oxygen Demand, $CBOD_5$
Total Suspended Solids, TSS	Fecal Coliforms, FC
pH	Conductivity
Oil and Grease (Visual)	Total Organic Carbon, TOC
Total Hardness	Total Alkalinity
Nitrate-Nitrite	Ammonia Nitrogen, NH_3-N
Total Phosphorus, TP	Total Phenols
Magnesium, Mg	Calcium, Ca
Potassium, K	Sodium, Na
Chloride, Cl	Sulphate, SO_4
Total Arsenic, As	Total Aluminum, Al
Total Antimony, Sb	Total Barium, Ba
Total Beryllium, Be	Total Cadmium, Cd
Total Chromium, Cr	Total Cobalt, Co
Total Copper, Cu	Total Iron, Fe
Total Lead, Pb	Total Lithium, Li
Total Manganese, Mn	Total Mercury, Hg
Total Molybdenum, Mo	Total Nickel, Ni
Total Selenium, Se	Total Tin, Sn
Total Strontium, Sr	Total Thallium, Tl
Total Titanium, Ti	Total Uranium, U
Total Vanadium, V	Total Zinc, Zn

Table 5: Sampling Analysis for Annual Discharge Monitoring

Test Parameter	Receiving Water Body	
Biological Oxygen Demand, BOD_5	X	X
Total Suspended Solids, TSS	X	X
Fecal Coliforms, FC	X	X
Ammonia-Nitrogen, NH_3 – N	X	X
Total Phosphorus, TP	X	X
Heavy Metals	X	X

Annual sampling and testing for acute lethality to Rainbow Trout, Oncorhynchus Mykiss and Daphnia Magna will be performed for sampling station CAP-4 are recommended to delete from the water licence due to constrain of sampling, shipping and transportation to the lab. (These tests have been requested to delete from the water licence due to constrain of sampling and transportation of samples to the Lab.)

A grab sample will be taken from each of the three sewage trucks during discharge to the lagoon. Samples from the trucks will provide quality of the raw sewage before it enters the lagoon. The last pipe discharge quality is considered the first point of effluent discharge in the environment after some degree of treatment. This data will assist with monitoring the water quality of these areas by comparing the results of both raw and treated wastewater samples. These samples will be taken four times in summer months. No flow meter exists at the end of the final discharge pipe.

Once collected, the samples will be shipped to the laboratory and analyzed using the same test method/procedure. This sampling program will be conducted over several years to collect sufficient data for trend analysis. All lab results for the monitoring program will be submitted to NWB along with the Hamlet annual report. Note that any other additional sampling during the year will be at the request of the regulatory agencies.

Hamlet will be using the services of the following Accredited Environmental lab in Ottawa, ON.

Caduceon Environmental Laboratories
Ottawa, Ontario, K1V 7P1
Phone: (613) 526-0123
Fax: (613) 526-1244

3.4.5 Sludge Monitoring Plan

The sludge blanket will be monitored as part of the annual discharge procedure. Approximately 10 year's interval, a study may be undertaken to determine the need and frequency for sludge removal and disposal over the lifetime of the lagoon. It is recommended for storage the sludge blanket at the bed of the lagoons for the life time of operation of the lagoons. If the lab test results from the 3rd lagoon discharge point, specifically BOD and TSS analyses, become non-compliance, then sludge removal study can be conducted earlier.

Sludge in sewage lagoons should be sampled more often if required. The purpose of the sampling is to ensure that the sludge remains of a quality suitable for land disposal. Sampling shall consist of a sample collected from the center point of a grid no less than 10 m by 10 m. Sufficient samples shall be taken to describe the entire sewage lagoon. Results from the sludge analysis are to be reported upon completion of the test and in the annual report.

However, considering the present status of the facility, it is recommended to keep the sludge at the bed of the Lagoon for the rest of the life of the Lagoon.

3.4.6 Geotechnical Reviews

A Dam Safety review is to be completed by a qualified engineer and will be executed annually in each summer. Baffin Regional Engineer conducts annual inspection along with the CIRNAC inspector and findings are presented in the Hamlet annual report.

The review is to include a site inspection report of the existing lagoons under operation based on the following items:

- Site inspection of all berms and structures of all three lagoon cells.
- Safety review to include the operation of all discharge and back up equipment and procedures,
- Maintenance review to verify that all facilities required for safety of the dam and monitoring systems are maintained in satisfactory condition.
- Review of the surveillance and monitoring program and methods to verify that the monitoring program will detect any unsafe conditions in a timely manner.
- Review the level of emergency preparedness to verify that it is appropriate for the facility.
- Review previous report to verify that recommendations have been complied with.

The report generated from the geotechnical review in being submitted as a part of the annual report to the Nunavut Water Board.

3.4.7 Record Keeping and Reporting

Records of all activities and operation should be kept to assist in the planning of annual operations and maintenance as well as the evaluation of the effectiveness of the sewage treatment facility. These records should be kept in the Hamlet Office and be maintained by the facility's supervisor. Sample O&M log sheets for the Cape Dorset Sewage Treatment System are available in the Hamlet office.

Based on the record keeping and reporting requirements listed in Part B of the water licence, the following information and data should be recorded and be included in the annual report that is submitted to the Board:

- Monthly and annual quantities in cubic meters (m^3) of raw sewage offloaded from sewage trucks for the existing Sewage Disposal Facility and Emergency Sewage Disposal Facility;
- Number of days of use for the existing Sewage Disposal Facility and Emergency Sewage Disposal Facility;
- Number of trips to each of the Sewage Disposal Facilities;
- Start and end date for discharge of lagoon;
- Date and description of maintenance activities carried out on the Sewage Disposal Facilities; and
- Date, volume and description of any spills that have occurred.

3.4.8 Health and Safety

Due to the potential health hazards associated with municipal wastewater, it is imperative, for those personnel working in this area, to be familiar with and execute all safety precautions involved with the various work tasks associated with the system.

- Equipment is to be kept clean.
- Wear protective clothing such as gloves and boots at all times.
- Work cloths should not be worn home.
- Hands to be washed frequently; as a minimum before eating and after work.
- Personnel should receive appropriate vaccinations and ensure they are kept up-to-date.

3.5 Maintenance Procedures

In the proceeding sections, maintenance procedures for the different areas of the wastewater treatment infrastructure are discussed and should be carried out to ensure the system runs efficiently.

3.5.1 Sewage Trucks and Holding Tanks

The most important part of the sewage treatment system and process is the collection and transport of the wastewater from the residences and buildings to the lagoon cell. Therefore, it is crucial that the sewage trucks be kept in good repair. Procedures for truck and tank maintenance are as follows:

- Repairs should be completed immediate and take high priority;
- Full tank sewage trucks should not rest for long periods of time, especially during the winter;

- Holding tanks should be kept in good working order and prevented from freezing in the winter.

3.5.2 Access Road and Truck Pad

Basic road maintenance such as those listed below must be performed on a regular basis to ensure that the site is accessible at all times.

- Road and truck pad be graded smooth and reshaped at least twice (2) per year;
- Snow, when necessary during the winter, to be removed to provide unrestricted access to discharge point;
- During snow removal, care is to be taken not to damage berms and surrounding areas;
- Any spilled and/or frozen wastewater should be removed with the snow to appropriate disposal site;
- Discharged point should be monitored for potential erosion problems.

3.5.3 Drainage

The truck pad at the sewage discharge point should be graded such that any wastewater spilled during the offloading procedure will flow into the lagoon cell and sewage treatment system. During the winter months, it is important to monitor the discharge pipe as this may be problems with flow during periods of extreme low temperatures. Wastewater remaining in the pipe may freeze, causing blockage and/or buildup which can potentially damage or break the structures.

3.6 Operation and Maintenance Summary

Daily, weekly, monthly and yearly activities and procedures that are required by the operator and maintenance personnel are summarized in **Table 6** shown as follows.

Table 6: Summary of Operation and Maintenance Tasks

Frequency	Description of Task
Daily	▪ Collection, transportation and disposal of wastewater and/or sewage from residential and commercial holding tanks to the truck discharge point at the sewage treatment lagoon. ▪ Immediate cleaning of any spills. ▪ Clearing of snow from access road and truck turn-around pad as required during winter. ▪ Maintaining O&M information records
Weekly	▪ Inspection of berms, dykes and drainage courses. ▪ Monitoring of area surrounding thermistor. ▪ Conduct weekly monitoring program (if required). ▪ Maintaining O&M information records

Monthly	▪ Maintenance of access road and truck pad if required. ▪ Monitoring and recording of thermistor readings for monitoring program. ▪ Confirm location and readability of signs. ▪ Conduct monthly monitoring program (if required). ▪ Maintaining O&M information
Yearly	▪ Perform annual decanting of lagoon cell in fall. ▪ Conduct geotechnical review of geothermal monitoring program. ▪ Grading and reshaping of access road and truck pad. ▪ Conduct annual monitoring program (if required). ▪ Maintaining O&M information records

4.0 SPILL CONTINGENCY PLAN

The intent of this Spill Contingency Plan (SCP) is to provide a guide to operators and other Hamlet personnel in the event of an accidental release of fuel and waste water treatment facilities in Cape Dorset. The SCP is planned to be protective of the local environment and public and personnel health and safety.

This SCP has been developed for implementation at the waste water treatment facility in Cape Dorset. At these sites, there may be situations that arise that are beyond the scope of this SCP. In these situations, all activities at the site should stop until a revised procedure or SCP is prepared, reflecting the changing conditions at the site (e.g., operation of a new hazardous waste storage area [if developed] should not continue until this SCP is updated to reflect the new conditions).

All persons involved with operations at the waste water Treatment facilities (Sewage lagoons) should read and be familiar with this SCP. To be effective, it is important that all personnel are familiar with their responsibilities and steps to take in the event of a spill. Personnel should not be reading the SCP for the first time during an emergency.

4.1 Site Descriptions

The waste water Treatment facilities (Sewage Lagoons) have been described in the preceding sections of this O&M Manual. The sites are shown **in Figure-3**

4.2 Regulations

Under Section 34 of the *Environmental Protection Act*, the Nunavut Consolidation of Spill Contingency Planning and Reporting Regulations was enabled by the Commissioner in 1998. In the Spill Contingency Planning and Reporting Regulations, a SCP is required to include the following:

- The name and address of the owner or person in charge, management or control of the site(s).
- The name, job title and 24-hour telephone number for the person(s) responsible for activating the contingency plan.
- A description of the facility (ies) including location, size, type and amount of contaminants normally stored on the site(s), and site map(s).
- The steps to be taken to report, contain, clean up and dispose of a contaminant in the case of a spill.
- The means by which the contingency plan is activated.
- An inventory and location of the response and clean-up equipment available to implement the plan.

- A description of the training required and provided to employees who respond to a spill.
- The date the plan was prepared.

4.3 Contacts and Regulatory Authorities

The SAO has overall responsibility of Hamlet waste water Treatment facilities (sewage Lagoons). The Foreman manages the facilities and is responsible for initiating the Spill Contingency Plan. The SAO/Foreman should be contacted when a spill occurs at the waste water treatment facilities. Contact information as follows.

Distribution List

This plan and most recent revisions will be distributed to:

Tim Brown	Director, Infrastructure, GN-CGS
Bhabesh Roy	Municipal Planning Engineer, GN- CGS
John Hussey	Senior Administrative Officer
Joseph Monteith	Inspector, CIRNAC
Richard Dwyer	Manager of Licensing, Nunavut Water Board

Every time a spill is identified at the waste water treatment facilities (sewage Lagoon), the SAO/Foreman should be contacted as soon as possible. The 24-hour Emergency Spills Report Line should also be contacted in the event any quantity of contaminant is spilled.

24-HOUR EMERGENCY SPILL REPORT LINE: (867) 920-8130

Any person reporting a spill is required to give as much information as possible, however reporting of a spill should not be delayed if all of the necessary information is not known. Additional information can be provided later. From the Consolidation of Spill Contingency Planning and Reporting Regulations (1998), as much of the following information should be reported during the initial spill report:

- Date and time of spill
- Location of spill
- Direction spill is moving

- Name and phone number of a contact person close to the location of the spill
- Type of contaminant spilled and quantity
- Cause of spill
- Whether spill is continuing or has stopped
- Description of existing contaminant
- Action taken to contain, recover, clean up, and dispose of spilled contaminant
- Name, address and phone number of person reporting the spill
- Name of owner or person in charge, management or control of contaminants at the time of the spill.

Other regulatory agencies which have a legislated (vested) interest in the event of a spill.These authorities do not need to be immediately contacted if a spill occurs, however may be involved in follow-up or additional clean-up activities.

4.4 Potential Contaminants

At the date of this SCP, the Hamlet of Cape Dorset had not completed a Sewage inventory and exact types and quantities of contaminants are unknown. However the following contaminants are anticipated to be used at the facilities, and may be involved in a spill:

- Gasoline
- Other lubricating oil
- Diesel
- Antifreeze and other coolants
- Hydraulic oil
- Sewage
- Motor oil

At the sewage facilities, spills may result from any of the following occurrences:

- Leakage or seepage of sewage
- Sewage Lagoon Berm failure
- Sewage Overflow
- Accident of Sewage truck during dumping
- Sludge

4.5 Spill Response Procedures

The following steps outline the general spill response procedures for reporting, containing, cleaning up and disposing of materials in the event of hydrocarbon (e.g., fuel, oil, etc.) and other waste spill, or sewage spill.

Gasoline:

Environmental Impacts:

- Harmful to wildlife and aquatic life
- Not readily biodegradable
- Has potential to bio accumulate in environment
- Volatilizes easily
- Runoff into water bodies must be avoided

Worst Case Scenario: All fuel drums open simultaneously and contents pour onto ground and surrounding environment.

Diesel:

Environmental Impacts:

- Harmful to wildlife and aquatic life
- Not readily biodegradable
- Has potential to bio accumulate in environment
- Burns slowly (more readily contained than volatile fuels)
- Runoff into water bodies must be avoided

Worst Case Scenario: All fuel drums open simultaneously and contents pour onto ground and surrounding environment.

Waste Oil and Miscellaneous Oils and Grease:

Environmental Impacts:

- Harmful to wildlife and aquatic life
- Not readily biodegradable
- Has potential to bio accumulate in environment
- Runoff into water bodies must be avoided

Worst Case Scenario: All storage drums open simultaneously and contents pour onto ground and surrounding environment.

Sewage:

Environmental Impacts:

- Human health hazard, and unsightly appearance
- High nutrient concentrations could negatively impact water bodies and runoff into water bodies must be avoided

Worst Case Scenario: Full sewage truck releases all of its contents onto ground and surrounding environment.

4.6 Hydrocarbon Spills

Three procedures for hydrocarbon spills have been developed depending on the media on which the spill has occurred. The following sections outline procedures for hydrocarbon or other waste spills occurring on land (soil, gravel, sand, rock and vegetation), water, or snow/ice.

SpillsonLand

1. Once a spill is identified, all sources of ignition turned off (e.g., no smoking, shut off engines).
2. The spilled material (e.g., gasoline, diesel, antifreeze, etc.) should be identified, if possible.
3. The affected area should be secured, ensuring the area is safe for entry and does not represent a threat to human health and safety of the spill responders. Public access of the area should be restricted.
4. If possible, identify where the spill is coming from (the source). Determine if the spill is still occurring (i.e., still leaking) or if the spill has stopped. If the spill has not stopped, determine if it is safe to stop or control the spill (e.g. plug hole, close valve, upright container), or contain the spill (e.g., place a container or tarp with built up edges under the spill source to contain the spill).
5. If the spill is too large to be controlled with the spill materials at hand, contact the Foreman and report the spill immediately.
6. If the spill is small enough to be controlled with the materials at hand, prevent spilled contaminants from spreading or entering waterways by using sorbent (oil-absorbing) materials or a soil dyke down slope from the spill. This is especially the case with liquid contaminants (e.g., gasoline, diesel). If some contaminant has entered a waterway, follow procedures in the next section (***Spills on Water***) to contain and clean-up the contaminant in the water.
7. Once the spill has been controlled and further spreading prevented, contact the Foreman and report the spill.
8. If possible with spill response materials at hand, clean up the remaining spilled contaminant and store contaminated materials in a secure container for disposal. Do not flush the affected area with water.
9. If possible, remove any contained liquid by pumping into secure drums.
10. If needed, assist the Foreman by providing details to complete the Nunavut Spill Report Form with as much information as possible. This form is included in **Appendix B.**
11. The SAO/Foreman will contact the **24-Hour Emergency Spill Report Line (Phone: (867) 920-8130)** to report the spill as soon as possible and obtain additional advice.
12. The SAO/Foreman will fax the completed Nunavut Spill Report Form to the **24-Hour Emergency Spill Report Line: Fax: (867) 873-6924**.

Spills in Water

1 Once a spill is identified, all sources of ignition turned off (e.g., no smoking, shut off engines).

2 The spilled material (e.g., gasoline, diesel, antifreeze, etc.) should be identified, if possible.

3 The affected area should be secured, ensuring the area is safe for entry and does not represent a threat t o Human health and safety of the spill responders. Public access of the area should be restricted.

4 If possible, identify where the spill is coming from (the source). Determine if the spill is still occurring (i.e., Still leaking) or if the spillage has stopped. If the spill has not stopped, determine if it is safe to stop or control the Spill (e.g., plug hole, close valve, upright container).

5 If the spill is too large to be controlled with the spill materials at hand, contact the Foreman and report the spill immediately).

6 If the spill is small enough to be controlled with the materials at hand, use sorbent (oil absorbing) booms.

7 Once the spill has been controlled and further spreading prevented, contact the Foreman and report the spill.

8 If possible with the spill response materials at hand, clean up the remaining spilled contaminant within the boomed area. Store contaminated materials in a secure container for disposal.

9 If needed, assist the Foreman by providing details to complete the Nunavut Spill Report Form with as much information as possible. This form is included in **Appendix B** of this O&M Manual.

10. The Foreman will contact the **24-Hour Emergency Spill Report Line (Phone: (867) 920-8130)** to report the Spill as soon as possible and obtain additional advice.

11. The Foreman will fax the completed Nunavut Spill Report Form to the **24-Hour Emergency Spill Report Line (Fax: (867) 873-6924)**.

Spills on Snow/Ice

1. Once a spill is identified, all sources of ignition turned off (e.g., no smoking, shut off engines).

2. The spilled material (e.g., gasoline, diesel, antifreeze, etc.) should be identified, if possible.

3. The affected area should be secured, ensuring the area is safe for entry and does not represent a threat to human Health and safety of the spill responders. Public access of the area should be restricted.

4. If possible, identify where the spill is coming from (the source). Determine if the spill is still occurring (i.e., still leaking) or if the spillage has stopped. If the spill has not stopped, determine if it is safe to stop or control

the spill (e.g., plug hole, close valve, upright container).

5. If the spill is too large to be controlled with the spill materials at hand, contact the Foreman and report the spill immediately (see Section 6.2.3 above for contact information), particularly since a spill occurring on snow or ice presents the potential for immediate access of contaminants into waterways.

6. If the spill is small enough to be controlled with the spill response materials at hand, prevent spilled contaminants from spreading or entering waterways by using sorbent materials or a snow/soil dyke down slope from the spill.
This is especially the case with liquid contaminants (e.g. gasoline, diesel).

7. Once the spill has been controlled and further spreading prevented, the Foreman will provide a report.

8. If possible with the spill response materials at hand, clean up the remaining spilled contaminant and store

Cont contaminated materials in a secure container for disposal. Impacted snow should also be stored in drums

for disposal.

9. If needed, assist the Foreman by providing details to complete the Nunavut Spill Report Form with as much information as possible. This form is included in **Appendix -B** of this O&M Manual.

10. The Foreman will contact the **24-Hour Emergency Spill Report Line (Phone:**

(867) 920-8130) to report the spill as soon as possible and obtain additional advice.

11. The Foreman will fax the completed Nunavut Spill Report Form to the **24-Hour Emergency Spill Report Line (Fax: (867) 873-6924)**.

AdditionalSpillDelineationorMonitoring

In the event of a large spill or a spill in which not all of the spilled contaminant can be readily cleaned up with materials at hand (as described above), delineation of the affected area may be required. This would include subsurface investigation of the area (i.e., digging of test pits, soil sampling, installation of monitoring wells) to

determine how large and how deep the contaminant affected the subsurface soil and/or groundwater (horizontal and vertical extent of the spill). The delineation would result in the development of an appropriate remediation plan for the affected area. In this case, a qualified environmental consultant should be retained to provide advice on how to proceed with delineation and remediation of a large spill.

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4.7 Spill Kit and Training Requirements

The following sections outline the recommended minimum requirements for contents and number of spill kits that should be present at the water, sewage and solid waste facilities. Personnel training requirements are also provided.

4.8 Spill Kit Contents

Each spill kit should be regularly inspected to ensure it always contains the following, at a minimum (in part from INAC [2007]):

- 1 – 205 L open top steel drum with lid, bolting ring and gasket (spill kit container)
- 4 – 12.5 cm x 3 m (5 in. X 10 ft.) sorbent booms
- 10 kg bag of sorbent particulate
- 1 roll duct tape
- 1 field notebook and pencil
- 1 pick-axe
- 4 Tyvex® splash suits
- 4 pairs of splash protective goggles
- 10 disposable large 5 mil polyethylene bags (dimensions 65 cm x 100 cm) with ties
- 100 sheets (1 bail) of 50 cm x 50 cm sorbent sheets
- 2 large (5 m x 5 m) plastic tarps
- 1 utility knife
- 1 rake
- 3 spark-proof shovels
- 4 pairs chemical resistant gloves
- Instruction binder, including Spill Contingency Plan

The entire spill kit contents, with the exception of the spark-proof shovels, can be stored within the 205 L steel drum. The drum should be sealed securely to protect the spill kit contents though should always be accessible without the use of tools (i.e., finger tight bolt ring). The drum's bolt ring should be inspected regularly during facility inspections to ensure it turns freely and is lubricated.

Extra spill response materials should also be available for use, in addition to the spill kit contents. These include:

- 10 – 205 L open top steel drum with lid, bolting ring and gasket
- 2 spark-proof shovels
- 50 disposable large 5 mil polyethylene bags (dimensions 65 cm x 100 cm)
- 10 – 12.5 cm x 3 m (5 in. X 10 ft.) sorbent booms
- 5 – 10 kg bags of sorbent particulate
- 500 sheets (5 bails) of 50 cm x 50 cm sorbent sheets
- 2 Tyvex ® splash suits
- 2 pairs of chemical resistant gloves
- 2 pairs of splash protective goggles

4.9 Spill Kit Locations

At least one spill kit should be clearly marked and present at the solid waste disposal facility (within the facility). One spill kit should also be present within the water distribution facility, located at the pump house. The kits are kept in the Garage.

4.10 Required Training

To ensure the SCP is carried out effectively, the following actions should occur:

- The SCP should be reviewed annually to ensure it is still up-to-date for current conditions.
- When required, the SCP should be revised to reflect current conditions.
- The SCP should be distributed to and read by all personnel who work at the Hamlet's water, sewage and Solid waste facilities.
- Personnel at these facilities should be familiar with the location of all HHW and other potentially hazardous materials, and their associated Material Safety Data Sheets (MSDS).
- Personnel at these facilities should be trained to read and use MSDS, and have their WHMIS training, at a

minimum.

- Personnel should receive proper spill response training to learn and understand the techniques and Materials used to contain, clean up and remediate spills.

4.11 Off-site Resources

The following resources are available for assistance if needed:

Territorial 24-Hour Spill Line	(867) 920-8130
Aboriginal and Northern Affair Canada (CIRNAC)	(867) 669-2761
GN – Emergency Measures Officer	(888) 624-4043
Cape Dorset River Health Centre	(867) 897-8820
RCMP (Cape Dorset)	(867) 897-1111
ECCC Environmental protection	(867) 669-4730.
GN Environmental Health Office	(867) 975-4817
First Air Cargo	1-800-267-1247 ,(867) 897-8938

4.12 Record Keeping

Records of any spills, spill response activities, follow-up inspections, monitoring, and any additional remedial work must be kept. These records should be stored at the Hamlet office and kept by the Operations Manager or SAO. These records will assist with the annual review of the SCP, operations and maintenance practices at all facilities, and spill response requirements.

Every year by March 31st, the Hamlet is required to submit an Annual Report to the NWB. The Hamlet is required to provide a list of all spills and a summary of follow-up action taken for each spill. Therefore, at a minimum, the following records should be kept:

- Reports of all spills and spill reports submitted to the 24-Hour Emergency Spill Report Line;
- Types and quantities of spill contaminants;
- All spill follow-up activities;
- Inspections of spill kit contents and replacement records for any items; and,
- Records of spill response training for all Hamlet spill responder personnel.

Appendix- A: Guideline of Wastewater Sampling

Appendix- B: Sketches of Sewage Lagoon

Appendix- C: Spill Reporting Forms

REFERENCE:

- Dillon Consulting Limited. "P lake Sewage Lagoon System", produced for Department of Community and Government Services, Government of Nunavut, January 2006.

APPENDIX-A

GUIDELINES FOR WASTEWATER SAMPLING AND TESTING

Guide Lines Wastewater (Sewage) sampling

Wastewater:

1. Collect monthly treated samples from the first point of discharge of Sewage (end of pipe) as long as flow is seen.
2. Collect monthly raw samples directly from the truck discharge at the same time of item 1.

All the wastewater samples will be sent to Ottawa Lab.

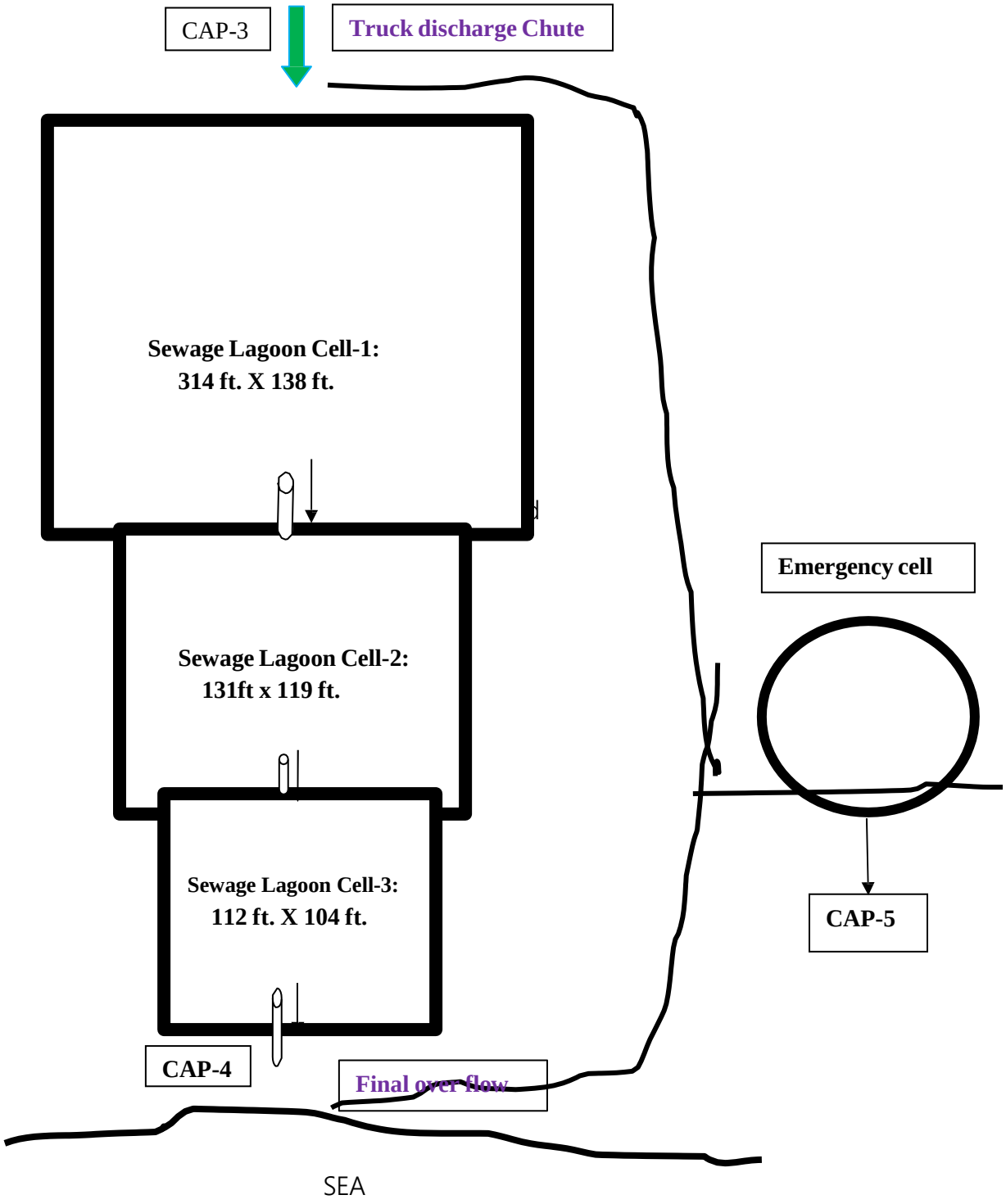
Gord Murphy/Rebecca Marshall
Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613 526 1244

Precautions of sampling:

1. Use hand gloves
2. Record Chain of Custody
3. Ensure each bottle level information is filled:
    1. -Date and time sample taken
    2. -Location with GPS coordinates
    3. -Sampler's name
4. Person's name and contact information where to send sample Test Results and invoice.
5. Samples must be arrived Ottawa Lab within 24 hours from the time of sampling. Wall bills could be sent to the Lab so that cooler is located during the shipment.

APPENDIX-B

SKETCHES OF SEWAGE LAGOONS


CAP-3
Truck discharge Chute
Sewage Lagoon Cell-1:
314 ft. X 138 ft.
Sewage Lagoon Cell-2:
131ft x 119 ft.
Sewage Lagoon Cell-3:
112 ft. X 104 ft.
Emergency cell
CAP-5
CAP-4
Final over flow
SEA

APPENDIX-C:

SPILL REPORTING FORM

Instructions for Completing the NT-NU Spill Report Form

This form can be filled out electronically and e-mailed as an attachment to spills@gov.nt.ca. Until further notice, please verify receipt of e-mail transmissions with a follow-up telephone call to the spill line. Forms can also be printed and faxed to the spill line at 867-873-6924. Spills can still be phoned in by calling collect at 867-920-8130.

A. Report Date/Time	The actual date and time that the spill was reported to the spill line. If the spill is phoned in, the Spill Line will fill this out. **Please do not fill in the Report Number**: the spill line will assign a number after the spill is reported.
B. Occurrence Date/Time	Indicate, to the best of your knowledge, the exact date and time that the spill occurred. Not to be confused with the report date and time (see above).
C. Land Use Permit Number /Water Licence Number	This only needs to be filled in if the activity has been licenced by the Nunavut Water Board and/or if a Land Use Permit has been issued. Applies primarily to mines and mineral exploration sites.
D. Geographic Place Name	In most cases, this will be the name of the city or town in which the spill occurred. For remote locations – outside of human habitations – identify the most prominent geographic feature, such as a lake or mountain and/or the distance and direction from the nearest population center. **You must include the geographic coordinates** (Refer to Section E).
E. Geographic Coordinates	This only needs to be filled out if the spill occurred outside of an established community such as a mine site. Please note that the location should be stated in degrees, minutes and seconds of Latitude and Longitude.
F. Responsible Party Or Vessel Name	This is the person who was in management/control/ownership of the substance at the time that it was spilled. In the case of a spill from a ship/vessel, include the name of the ship/vessel. Please include full address, telephone number and e-mail. Use box K if there is insufficient space. **Please note that, the owner of the spilled substance is ultimately responsible for any spills of that substance, regardless of who may have actually caused the spill.**
G. Contractor involved?	Were there any other parties/contractors involved? An example would be a construction company who is undertaking work on behalf of the owner of the spilled substance and who may have contributed to, or directly caused the spill and/or is responding to the spill.
H. Product Spilled	Identify the product spilled; most commonly, it is gasoline, diesel fuel or sewage. For other substances, avoid trade names. Wherever possible, use the chemical name of the substance and further, identify the product using the four digit UN number (eg: UN1203 for gasoline; UN1202 for diesel fuel; UN1863 for Jet A & B)
I. Spill Source	Identify the source of the spill: truck, ship, home heating fuel tank and, if known, the cause (eg: fuel tank overfill, leaking tank; ship ran aground; traffic accident, vandalism, storm, etc.). Provide an estimate of the extent of the contaminated/impacted area (eg: 10 m^2)
J. Factors Affecting Spill	Any factors which might make it difficult to clean up the spill: rough terrain, bad weather, remote location, lack of equipment. Do you require advice and/or assistance with the cleanup operation? Identify any hazards to persons, property or environment: for example, a gasoline spill beside a daycare centre would pose a safety hazard to children. Use box K if there is insufficient space.
K. Additional Information	Provide any additional, pertinent details about the spill, such as any peculiar/unique hazards associated with the spilled material. State what action is being taken towards cleaning up the spill; disposal of spilled material; notification of affected parties. If necessary, append additional sheets to the spill report. Number the pages in the same format found in the lower right hand corner of the spill form: eg. "Page 1 of 2", "Page 2 of 2" etc. **Please number the pages to ensure that recipients can be certain that they received all pertinent documents.** If only the spill report form was filled out, number the form as "Page 1 of 1".
L. Reported to Spill Line by	Include your full name, employer, contact number and the location from which you are reporting the spill. Use box K if there is insufficient space.
M. Alternate Contact	Identify any alternate contacts. This information assists regulatory agencies to obtain additional information if they cannot reach the individual who reported the spill.
N. Report Line Use Only	**Leave Blank**. This box is for the **Spill Line's use only**.

Northwest Territories | Nunavut | Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR	REPORT NUMBER -
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME	☐ UPDATE # TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM THE NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR		
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS		
F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION		
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION		
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES	
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS			

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION **Station operator**	EMPLOYER	LOCATION CALLED **Yellowknife, NT**	REPORT LINE NUMBER **(867) 920-8130**

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			