

From: [SAO Office](#)
To: ["Michael Martin"](#)
Cc: ["Scott Stewart"](#)
Subject: Behchokö Inspectors Direction
Date: November-01-11 6:09:54 PM
Attachments: [CGB - Response to Letter of Direction RLS - Nov.11.pdf](#)
[CGB - RLS Prevention & Contingency - Oct.11.pdf](#)

Good day Michael.

Please find attached various documents in respect to your letter dated September 13, 2011.

I had hoped to include a photograph of the 'tank' but had some compatibility problems with this computer. I will have to upload the picture through another PC, and will send that tomorrow.

Regards,

David Steele, SAO-CGB

_____ Information from ESET NOD32 Antivirus, version of virus signature database 6593 (20111101) _____

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November 1, 2011

Michael Martin
Water Resource Officer
Aboriginal Affairs & Northern Development Canada
South Mackenzie District

RE: Inspector Direction for NT Spill 11-011 and Rae Sewage Lagoon Capacity

Find attached a report entitled "Rae Sewage Lift Station – Prevention & Overflow Contingency Plan". This report identifies a number of issues and problems that have been noted or experienced in respect to various associated aspects of the lift station, and provides insight into preventative steps taken to avoid sewage overflow and contingency plans should an overflow incident occur.

Lift Station:

The information within that report complements the requirements noted under item 1) of **Lift Station** within your 'direction'. A temporary secondary containment for the overflow discharge pipe has now been installed, and will be monitored on a daily basis from here on. This secondary containment 'tank' is fibreglass, holds up to 4,000 litres, and is situated just below the level of the overflow discharge pipe. Should a sewage overflow exceed that capacity then the excess will be captured within the recently upgraded catch basin described within the attached report. The preferred approach for mitigation on a more permanent basis will be submitted to the Board as required. Please note that this "temporary secondary containment" component approach has not been referenced within the complementary report, but will be a consideration once more information on sewage flow volumes have been ascertained.

A photograph will be sent separately that shows the configuration and location of the "temporary secondary containment" tank. That tank is fed by the overflow discharge pipe which in turn has an overflow pipe that returns to the catch basin. The tank also has a truck pump out connection. The tank will be covered with peat moss in the near future, for both protection and insulation.

Rae Sewage Lagoon:

Without precluding the outcome of further review and analysis, the preferred solution for the Rae sewage lagoon capacity issue may be the expansion of the lagoon. Efforts to increase treatment through means such as aeration have not proven to be effective in the past.

Respectfully submitted,



David Steele
Senior Administrative Officer

cc: Scott Stewart
Water Resources Officer
AAANDC
South MacKenzie District

Chief Clifford Danilels

Rae Sewage Lift Station --Prevention & Overflow Contingency Plan--



**Prepared by:
Community Government of Behchoko
October, 2011**

**Rae Sewage Lift Station
--Prevention & Overflow Contingency Plan--**

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Rae Sewage Lift Station

--Prevention & Overflow Contingency Plan--

Purpose

Although with a view towards prevention rather than response, the purpose of this report is to outline the components and steps that collectively minimize both the opportunity for, and any adverse effects on the environment should there be an 'overflow' sewage spill at the Rae Sewage Lift Station (RSL) within the Community Government of Behchoko (CGB). This report not only reflects the current state of affairs, but includes actions taken since December 2010, and pending action items at this date.

Background

The community of Rae's (as one of the communities with the corporate boundaries of the Community Government of Behchoko) water delivery and sewage services are provided by both trucked and underground systems. The trucked services are provided under contract while only a portion of the underground sewage services is under contract for that segment that requires that the sewage collected from underground system to be transferred by truck from an interim storage vault to the community's sewage lagoon. Within the underground sewage system there is a lift station that acts as an initial collection point, and then pumps the sewage from there to a larger vault where the transfer to truck takes place.

To clarify the flow of sewage in respect to that portion of the system that incorporates the RSL is as follows:

- Gravity flow sewage lines flow from various public, private, and residential facilities to the RSL located on Edzia Tili;
- From the single holding tank at the RSL the sewage is pumped through a single line that runs parallel to the Rae access road, into a larger sewage vault approximately 1000 metres to the east of the RSL;
- From the sewage vault the sewage is then removed by truck and transported to the Rae sewage lagoon for treatment.
- Following a two cell sewage lagoon process, the processed sewage is decanted into the neighbouring wet lands, no less than 10 months later.

In the isolated instance of there being a sewage overflow at the RSL, the excess flows into a catch basin close to the Rae Access road. At that point the bulk of the overflow is captured and removed by truck to the Rae sewage lagoon, with any residual being treated through the neighbouring wetlands on the other side of the Rae access road. To prevent further overflow until its cause is corrected, sewage is transported to the sewage lagoon by truck directly from the holding tank at the RSL.

Starting in December 2010 there have been a number of failures within the underground system that have led to the spill of raw sewage through a sewage overflow outlet at the RSLs, originally designed for such a purpose. The cause of each spill since January 2011 was immediately responded to by the CGB and their contractor, and damage to the environment mitigated through removal of the spilled sewage and treatment of the affected area. Previously the instance of sewage overflow on an annual basis at RSLs had been minimal, with incidents attributable to pump failure.

With the need for various regulatory authorities to respond to each incidence, and through their responsibility for environment oversight, a formal operational contingency plan to prevent and respond to the risk and occurrence of future incidents has been requested and prepared by the CGB.

Sewage Overflow Prevention

There are a number of key steps and components which collectively contribute to significantly reducing the risk of occurrence, and subsequent containment of a sewage overflow spill at the RSLs. Those include:

Reducing risk of pump failure

A key contributor to the recent incidence of sewage overflow was pump failure. The system is comprised of two pumps, one primary and one back-up. Both the earlier pumps have been replaced with new units, and a third [also new] compatible pump is on hand for emergency replacement. It took several months to obtain the required replacement pumps and to have them installed.

Previously the primary pump was 5 HP, and the secondary one 3.5 HP, where the smaller pump strained to keep up with the volume during peak periods. The three new pumps are all 5 HP. This compatibility provides excellent ease of replacement and allows the primary and secondary pumps to alternate on a monthly basis which helps to both monitor pump performance and average the wear and tear between the two. This alternating routine will be established during November, 2011.

Collection/screening of solid materials

It is believed that the prime contributor to pump failure was fabric getting into the pump(s) and causing burn out. During the initial pump replacement process, subsequent pumps also failed in due course, again due to fabric. Eventually the holding tank at RSLs was fully emptied, and all solid waste items including fabric remnants were removed. In order to prevent any future fabrics from damaging the pumps, a screen/basket was designed and installed at the RSLs sewage intake to capture such materials. Routine inspection and emptying of the screen/basket will ensure that fabric and or other substances do not hamper efficient and effective pump operation. There are only three or four sites where substantial solids such as

wads of fabric could enter the sewage systems. Property managers of each of those sites have been asked to implement and monitor stringent practices to ensure that solids such as fabric do not enter the sewage system.

Alarm Systems

- **Blue flashing light:** An external blue flashing light indicates that the 'magnatrol' needs to be reset. This is a device that measures the height of the liquid within the RSLs. When aware, CGB employees can readily respond to a blue flashing light situation by switching the monitor to manual override, until the system can be analysed, repaired and reset as required.
- **Red flashing light:** For a significant period of time, since December 2010, the external red flashing light indicating a system failure had been on continuously at the RSLs. Causes for such an alarm include failure of the primary pump, failure of the secondary pump, and eventually a high sewage level caused by pump/system failure.

As all contributing factors to both past and potential failure have been rectified, these alarm systems have been restored to their fully operational level. Currently both these alarm systems are stand alone, in that do not communicate electronically to CGB employees. The status of these alarms are monitored on a frequent basis by both CGB employees and water & sewer contractors as they pass through the area. As it happens, one of the CGB water & sewer employees lives right across from the RSLs and is able to readily view the status of the alarm lights. Should there be an 'alarm' then response procedures come into play.

All other major water & sewer system components and sites with the CGB have a dial-up system that kicks-in once a system related alarm is triggered. It is planned to have such a system set up for the RSLs as well, when The Vector Group (control specialists) of Edmonton come to Behchoko later this Fall. After installation of that feature, should there be an 'alarm' at the RSLs, there is an automatic dial up system that works its way through two job sites and two cell phone numbers in order to convey the emergency message. As part of this process, on a 24/7 basis, one employee is designated as the first responder. In recent months a third employee, up from two, has been added to the call out list. This additional employee will help to further increase the emergency coverage. This system will be tested on a regular basis to ensure that it is maintained in fully operational conditional. This test includes ensuring that all supporting back-up power supplies are operational for those two job sites, and for the [Ice Wireless] cell phone system. Apparently there had been a dial-up system in place at the RSLs system in earlier years, but that was removed.

Daily monitoring by CGB employees

As part of daily routines, including short week-end shifts, all Behchoko's water & sewer related facilities are scanned and checked by CGB employees. The potential to shift CGB's water & sewer related employees to a full seven day a week operation is being considered, up from Monday through Friday, and only partial on weekends. This approach could increase the service coverage and shorten emergency response time during the weekend.

Control system review

Later this Fall, The Vector Group of Edmonton will be in Behchoko to review and repair all controls related to the CGB's water and sewer systems. The RSLs will be included within the scope of work to ensure that all system control aspects continue to meet standards and requirements. The CGB is expected to be responsive to any suggestions for improvement.

Air Release Valve replaced

Along the sewage line between the RSLs and the Sewage Vault there is an air release valve station. When this valve is operational it ensures that a major portion of the sewage line is kept clear of sewage, by having it flow via gravity to the sewage vault during those times when the pump is not pumping. Or in other words, once the pump at the lift station shuts off the air release valve opens to let air into the system so that the sewage pipe (approximately 250 meters in length) will drain into the sewage vault. Without this feature, there is the risk that the sewage within that portion of the line could freeze if the pump was not operating for an extended period of time. Such was the case when the sewage within the line froze during the long period of non-use between December 2010 and when the new replacement pumps were eventually installed, in late Spring, 2011. Evidently this valve had not been working properly for some time, and has since been replaced.

It was also noted that some portions of the length of pipe between the air release valve station and the sewage vault have moved closer to surface over the years through some form of frost heave activity. As a result those affected portions will be identified late the Spring of 2012 and reburied to a greater depth to help maintain the gravity directional flow to the sewage vault and reduce risk of freezing due to close proximity to ground surface level.

Monitoring of flow at Sewage Vault

The contractor responsible for removing the sewage from the sewage vault operates seven days a week, and has employees at the sewage vault several times each and every day. When at the vault the contractor's employees check to ensure that the sewage is continuing to flow into the sewage vault from the RSLs, either visually or merely by hearing the flow. If there is no flow this is an indication of system failure. They then proceed to remove sewage directly from the RSLs to reduce any risk of overflow, and advise CGB employees of the situation.

Associated valves and connections

During the course of responding to pump failure and subsequent replacement, it was eventually noted that the tracks upon which the pumps were secured had become loose and misaligned [perhaps due to vibration] and one of two check valves to ensure one directional flow from the vault was not working. The tracks were eventually re-aligned and secured, and the two check-valves were recently replaced with new units. In replacing the check valves it was noted that there was some blockage within the one remaining operating valve. Once replaced the efficiency of the pump out appeared to increase significantly as evidenced by the greater pressure behind the sewage as it flowed into the sewage vault. The CGB now has a third brand new check valve on hand as a back-up replacement unit.

Sewage over-flow catch basin(s) and drainage

There is a 25 metre length of pipe extending from the RSLs southward towards the Rae access road. Should there be a sewage overflow from the RSLs it will flow through this pipe to the catch basin area at the open end of the pipe. This overflow pipe was installed in 2004. Previously any sewage overflow would merely have worked its way back into the various facilities from which the sewage came.

On at least two occasions in the past year the contaminated soil in this catch basin has been removed to the sewage lagoon following overflows and treatment of the area with hydrated lime. Clean soil and gravel replaced that which was removed.

The catch basin has recently been upgraded to replace the soil and smaller gravel with large aggregate. The larger stones will help to prevent pooling of stagnant water in the area, and will facilitate any clean-up that may be required due to a sewage overflow. Two 40 gallon sumps were added to the catch basin to facilitate pumping of sewage overflow and periodic removal of storm drain water from the catch basin area. Should there be a need to pump overflow sewage from the catch basin, then that will be by truck. If it merely the removal of excess storm drain water, then it will be with pump and hose. By keeping the water levels low in the catch basin area it will help to reduce the risk that any sewage overflow will flow into the nearby culvert under the Rae access road and prematurely to the wetlands beyond. A system of portable pumps and hoses aide in keeping the water levels low in that both the catch basin and neighbouring areas.

A second catch basin is planned at the south end of the culvert (across the Rae access road), so as to provide a secondary collection/recovery point should any sewage overflow make it to that point. A single 40 gallon sump will be installed within that catch basin. Hopefully that will be installed this Fall.

While on one hand sewage flow needs to be stopped, in other circumstances it needs to be enhanced. To prevent the risk of sewage flowing beyond the first catch-basin into the culvert under the access road, upon freeze-up in early fall a single large piece styrofoam will be installed at the north-end of the culvert. That blockage will prevent flow of any sewage overflow into the culvert, and increase the volume captured within the first catch-basin area through to Spring thaw. This Fall CGB will be acquiring a portable steamer, which will help to facilitate the thawing of ice generally in culvert and catch basin areas. To the extent that some sewage overflow may have frozen before removal was achieved, then it may need to be thawed before it can be removed. Previously, any thawing of drainage systems within the CGB had to be done by a contractor from Yellowknife, which has caused delay in responding to critical situations.

Should there be a sewage overflow, regardless of containment and the aforementioned remediation efforts, there will be some residual sewage eventually flowing through the culvert under the Rae access road and into the wetlands beyond. A notion will be considered by the CGB to redirect the flow from the culvert in a more southerly direction so as to increase the

distance of flow between the culvert and Marian Lake to increase the effectiveness of the available wetlands in processing any residual harmful bacteria. This opportunity will be explored in greater detail later in the Spring of 2012.

Back-up power supply

Complementing the RSLs is a dedicated diesel genset, which is programmed to respond immediately to a power outage. There is also an UPS (uninterruptible power supply) device that keeps the control system for the RSLs maintained until the genset kicks in. In recent months the UPS device was replaced due to indications that the earlier UPS unit was no longer reliable. As part of the emergency response measures, any time that there is a power failure within Bechoko, a CGB employee is responsible for checking on the gensets located throughout the community to ensure that all water & sewer systems remain fully operational. To the extent that the genset at the RSLs does not kick-in automatically, it can be started manually.

Sewage Overflow Response

As indicated within the prevention section, there are a number of indicators that suggest a pending sewage overflow situation. Those indicators include external blue flashing light alarm, external red flashing light alarm, observation from regular monitoring and assessment by CBG and contract employees, and observation of flow cessation at the sewage vault. Further, with a power outage, immediate response and on site assessment is required by CGB employees, to ensure that all back-up components are fully operational.

Initial response

Regardless of the cause or extent of system failure, the first step is to ensure that the sewage contractor immediately shifts the point of pumping from the sewage vault to the RSLs. This step will help to ensure that the risk of a consequential sewage overflow is minimized while the cause of the system failure is investigated and corrected by CGB employees.

System repair

In those instances where CGB employees are unable to fully restore the failed aspect of the system themselves, they will immediately contact designated electrical and/or pump service contractors on an emergency call-out basis to rectify the situation. Timeframes to fully restore the system could range from a period of minutes to weeks, depending upon nature and complexity of the failure.

Communications

Communication between CGB employees, the sewage contractor, and the repair contractors is essential to minimize risk and ensure that the required response and activities are carried out in a timely and effective manner. The lead CGB employee will ensure that this communication is maintained, and any updates or changes in circumstances is conveyed to all relevant parties.

Capture

Should preventative measures and immediate response to system failure indicators prevent a sewage overflow from occurring then spill capture, reporting, removal, and remediation steps will come into play.

The primary point of sewage overflow capture is the catch-basin and as indicated various system components have been established to contain the sewage in that area. For clarification, it should be pointed out that the nature of the sewage is fluid in nature and does not contain solids. The composition of the overflow is the portion of the sewage within the lift station that is from the upper portion of the tank, rather than from the lower portion where the solid portions tend to settle. As such it is much less difficult to remove the sewage and flush the contaminated area(s) than if solid if solid components were involved.

It is envisioned that the only time when it would be difficult to contain overflow sewage is during a period of concurrent heavy rainfall or spring thaw when the volume of storm drain water flowing into and passing through the catch basin and nearby culvert is relatively high.

Reporting

As soon as opportune, the prescribed "NT-NU SPILL REPORT" will be completed and distributed via fax by the CGB to share information on the spill with other interested/designated and regulatory bodies.

Removal

The overflow sewage will be promptly removed by contractor's truck and hauled to the Rae sewage lagoon, using the features of the sumps installed within the catch basin. A truck can be readily backed up to the catch basin area, and the sewage extracted using a modest length of hose. To the extent that sewage may have flowed through the culvert, sewage may also need to be extracted from the secondary catch basin on the other side of the road.

Remediation

Once the sewage has been fully removed, hydrated lime in powder form will be applied over the entire affected area, expected to be confined to the catch basin and immediate area. This hydrated lime will eventually mix with future rain and storm drain water to rinse and cleanse the area before flowing onward to the wetlands area. To the extent that the sewage overflow is considered to be significantly large, then removal and disposal of contaminated soil may be contemplated. Any soil removed from the area would be placed within the confines of the Rae sewage lagoon.

Cost Considerations

Within the past 10 months the CGB has spent approximately \$50,000 in capital expenditures to upgrade various aspects associated with the RSLs in an effort to ensure the ongoing integrity

and effective operation of its underground sewage system in Rae. All these upgrade related expenditures are Gas Tax Fund eligible.

The CGB has also incurred approximately \$100,000 in additional operating costs due to the need to haul sewage from the RSLs rather than the sewage vault. It should however be noted that at this date work is underway to explore the legitimacy of the extent of these additional charges invoiced by the contractor. Any incremental operating costs associated with the CGB's water and sewer systems are only further aggravating the cumulative and ongoing deficit in this segment of its operations.

Sewage Volumes

Although efforts have been made to have a meter installed to measure the volume of sewage that flows through the RSLs, installation continues to be delayed, in significant part through reliance upon a local contractor. Information on volumes will allow further review and refinement of the prevention components and contingency aspects of a sewage overflow.

The CGB remains optimistic that this installation will be finalized later in the Fall, at which time volumes will initially be measured on a daily basis, and less frequently thereafter.

Pending Action Items

While it is evident that significant work has been undertaken both from a short and long term perspective to deal with many issues surrounding the RSLs, there are a number of actions which are pending. All of those items have been specifically listed or alluded to within the body of this report, but are repeated below, with deadlines added for the anticipated completion of each action:

<u>Targeted Completion</u>	<u>Ref.#</u>	<u>Action</u>
November 2011	1.	Implement monthly routine of alternating between primary and secondary pumps at RSLs.
November 2011	2.	Establish routine to inspect and empty the screen/basket at RSLs intake.
December 2011	3.	Establish an automatic dial-up system to convey by telephone RSLs 'alarms' to CGB employees.
January 2012	4.	Explore potential to create a full 7 day operation/coverage within CGB's water & sewer employee complement.
December 2011	5.	Undertake review and repair as applicable all 'controls' related to the RSLs.
June 2012	6.	Assess depths and slopes, and rebury as required

		portions of the sewage line between air release valve station and sewage vault.
November 2011	7.	Install secondary catch basin at the south end of the culvert (across the Rae access road).
December 2011	8.	Acquire portable steamer.
May 2012	9.	Evaluate notion of redirecting storm water flow from the culvert on Rae access road in a more southerly direction so as to increase the distance between the culvert and Marian Lake to optimize processing through wetlands.
November 2011	10.	Complete installation of sewage volume/flow meter at RSLs.
April 2012	11.	Review and update prevention & sewage overflow contingency plan.

Periodic Review & Update

The intent is to review and update this report within a six month period, with the next review anticipated by the end of April 2012. That update will be shared with various stakeholders as considered appropriate.

Summary

This report has demonstrated that within the past year the CGB has taken significant steps to both prevent sewage overflow at the RSLs and has mitigated the risk of environmental damage and minimized risk to health when spill incidents have occurred.

It is noted that there is some further action that is required to fully complete both the prevention and mitigation components. The CGB is committed to complete those takes within the time frames noted.

To the extent that adjustments, refinements, and enhancements to this plan are required over time and through experience, it is anticipated that they too will be approached with similar commitment.

Rae Sewage Lift Station

Prevention and Overflow Contingency Plan

With respect to the Inspector's direction regarding Spill 11-011 at the Rae Sewage Lift Station (RSLs) in 2011, the Community Government of Behchoko (CGB) does confirm that temporary measures put in place in 2011 are sufficient as a permanent solution to issues arising. There have been no further issues arising at the RSLs since the 2011 incident. However the Inspector has also requested, in September 2013, confirmation that the 11 Action Items associated with the CGB Prevention and Overflow Contingency Plan of 2011 have been met. The following provides an update on the Action Items.

Action	Status Update
Implement monthly routine of alternating between primary and secondary pumps at RSLs	Upon installation of the two pumps, it was confirmed that there is not enough room for two large pumps; wiring now in place for primary and back up pumps, and not alternating pumps
Establish routine to inspect and empty the screen/basket at RSLs intake	Screen damaged and removed; awaiting a replacement
Establish an automatic dial-up system to convey by telephone RSLs 'alarms' to CGB employees	There have been technical difficulties; still attempting to get assistance to install proper equipment
Explore potential for 7 day operation/coverage	While an 'on-call' function continues, no 7 day operation is in effect
Undertake review and repair as applicable all 'controls' related to the RSLs	Ongoing project
Assess depths and slopes, and rebury as required portions of the sewage line between air release valve station and sewage station	Not required, as this is a force main
Install secondary catch basin at the south end of the culvert (across the Rae access road)	This has been completed
Acquire portable steamer	This has been done and is used as required
Redirecting storm water flow	This has not been pursued at this time
Complete installation of sewage volume/flow meter at RSLs	Meter needs to be installed in the vault, however without changes to the piping there is no spot to install the meter for effective operation
Review and update Prevention and Overflow Contingency Plan	This is an ongoing process

It is emphasized that all measures currently in place have ensured that no further issues have arisen at the RSLs and that the two new pumps continue to perform well.