INNAVIK HYDRO

Innavik Hydroelectric Project

Annual Report – 2020

Drinking Water Quality Monitoring

Submitted to the Ministry of the Environment and the Fight against Climate Change

File nº 3215-10-05

June 16, 2021

INNAVIK HYDRO

Annual Report – 2020
Drinking Water Quality Monitoring

June 16, 2021

PROJECT TEAM

Innavik Hydro

Pituvik Landholding Corporation

Director	Eric Atagotaaluk

Innergex Renewable Energy

Senior Manager – Community Relations and Environment	Jeanne Gaudreault

PESCA Environnement

Project Director	Matthieu Féret

☐ TABLE OF CONTENTS

☐ LIST OF FIGURES

☐ LIST OF APPENDICES

1 Context

Innavik Hydro, a limited partnership, received a certificate of authorization (CA) on August 23, 2019 for the construction and operation of the Innavik Hydroelectric Project. The project shall be completed and operated in conformity with the CA and in compliance with 13 conditions, including Condition 9, which states:

> *The proponent shall submit, for information, an annual report detailing the results of drinking water quality monitoring performed during the construction period. All incidents, mitigation measures taken and observations submitted in its exchanges of information with the follow-up and cooperation committee shall be included in the report.*

Water quality during both the construction and operational phases represents an issue for the population of Inukjuak, as the water intake for the Northern Village's drinking water supply is located at the mouth of the Inukjuak River, approximately 7 km downstream of the project.

This document presents the drinking water quality monitoring report for the year 2020. This was the first year of construction for the Innavik Hydroelectric Plant. CRT Construction is the general contractor responsible for project construction. Due to the COVID-19 situation in spring, construction work commenced in July 2020. Health measures implemented within the community throughout the year also complicated monitoring efforts.

2 Water Quality Monitoring

2.1 Responsibilities

Innavik Hydro has undertaken to carry out continuous water quality monitoring in the Inukjuak River during the plant's construction period. At the start of construction, the responsibilities of CRT Construction and Innavik Hydro were discussed and clearly defined in an environmental protection plan:

- CRT Construction is responsible for sampling the water generated by excavation work at the construction site;
- Innavik Hydro is responsible for taking water samples from the Inukjuak River upstream and downstream of the construction site.

CRT Construction is also responsible for initiating the emergency response procedure in the event of a risk of contamination of the village's source of drinking water during construction.

ACTIVITIES AND MONITORING	RESPONSIBILITIES	
	CRT Construction	Innavik Hydro
Water generated by excavation work: daily monitoring of sedimentation/decanting systems (pH, turbidity, ammonia-nitrogen [NH4])	X	
Monitoring upstream/downstream of construction site (pH, turbidity, ammonia-nitrogen [NH4])		X
If emergency response procedure is initiated – Contamination of village's drinking water source	X	

2.2 Procedure and Results

2.2.1 Water Generated by Excavation Work

Excavation work was performed between September 21 and October 27, 2020. Water generated by excavation work was channelled to a sedimentation/decanting system composed of successive containers (Figure 1), then to a geotextile sediment filter bag before trickling toward the Inukjuak River.

Figure 1 Sedimentation/decanting systems for water generated by excavation work at the construction site

Temperature, turbidity and pH of the water were measured daily during this period at the location where this water (hereafter referred to as “effluent”) flows into the Inukjuak River. In parallel, similar measurements were taken at a control site located in the Inukjuak River upstream of the construction site. All measurements were taken instantaneously using a portable pH meter (Ohaus ST300) and a portable turbidity meter (2020t).

Additionally, water samples were taken in order to determine the presence or absence of ammonia-nitrogen (NH4) during periods of blasting. These samples were preserved in appropriate containers and sent to AGAT Laboratoires for analysis.

The results are presented in Figure 2.

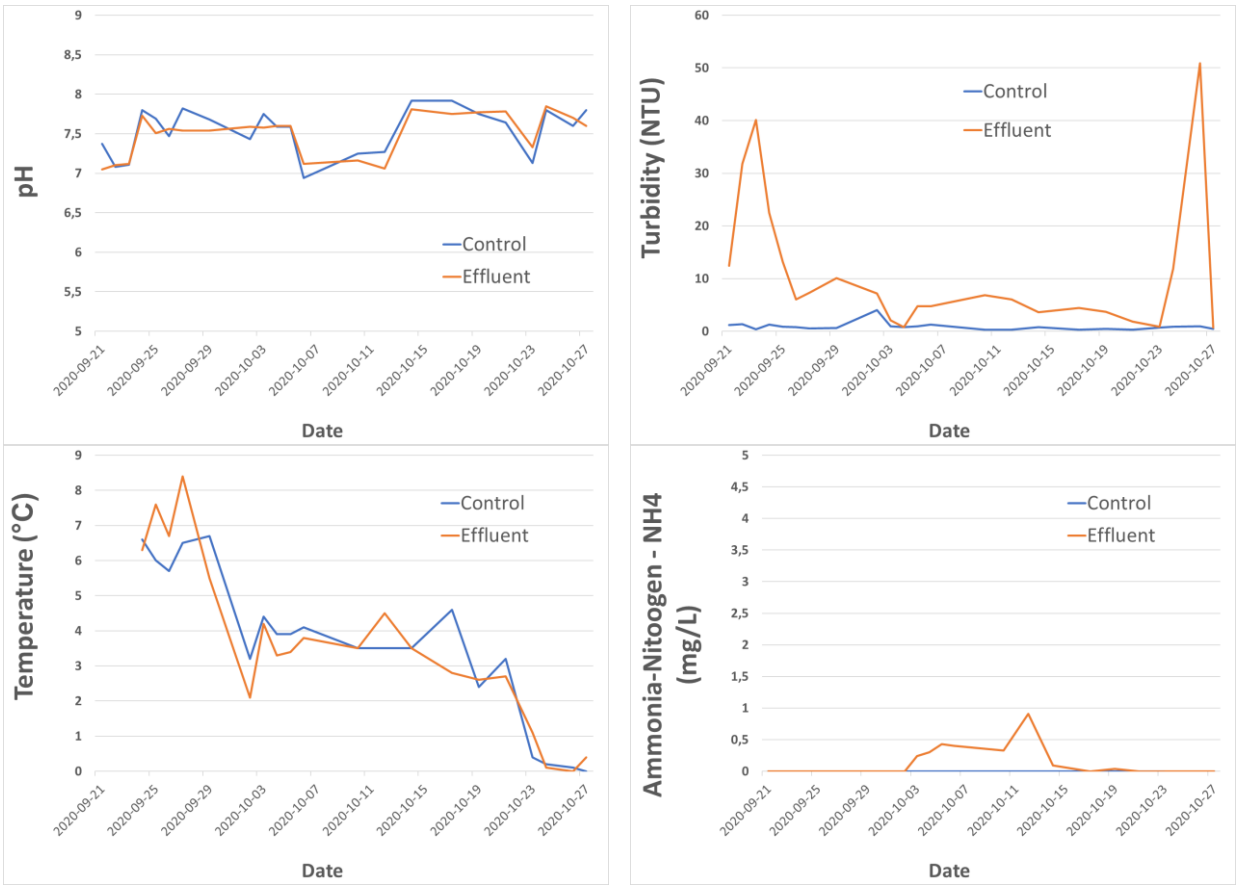


Figure 2 Monitoring results for water generated by excavation work

In summary:

- The pH of the effluent was between 7.05 and 7.85. The pH was generally similar between the control site (average = 7.54) and the effluent (average = 7.50);
- Turbidity varied between 0.27 NTU and 50.9 NTU. The highest values were obtained following a period of heavy rain (September 22, 2020) and the saturation of the sediment filter bag, which resulted in water flowing onto the sides of the containers (October 26, 2020);
- Water temperatures varied between 0°C and 8.4°C;

- The concentration of ammonia-nitrogen (NH4) in the effluent remained below 1 mg/L, whereas concentrations upstream of the construction site (at the control site) were 0 or below the detection limit (< 0.01 mg/L).

In compliance with commitments made in the Environmental and Social Impact Assessment, during the two episodes of increased turbidity, CRT Construction and Innavik Hydro immediately implemented corrective measures to limit the transport of sediment into the Inukjuak River. Sediment barriers and retention booms (straw) were installed to trap soil particles in runoff water (Figure 3).

Figure 3 Sediment barriers and retention booms (straw) positioned downstream of the sedimentation/decanting systems at the construction site

2.2.2 Water Quality Monitoring Upstream and Downstream of Construction Site

The period covered by water quality monitoring in the Inukjuak River ran from July 28 to October 29, 2020. Water quality was continually monitored as much as possible in the context of COVID-19 restrictions, and the frequency of analyses was adjusted as a function of the level of risk of construction activities. Measurements were also disrupted for safety reasons related to the presence of ice along the banks of the Inukjuak River beginning on October 24, 2020.

Measurement sites were located along the Inukjuak River: one upstream of construction work (BM1) as a control site and three downstream of construction work (BM2, BM3 and BM4) in order to ensure that water quality was not being impacted by this work. Measurements were alternatingly taken at these three sites throughout the fall. The locations of these sites are presented in Figure 4.

Parameters measured included temperature, pH and turbidity as well as ammonium-nitrogen (NH4) during blasting periods. Measurements were taken instantaneously using a multiparameter meter (HI-9829) manufactured by Hanna Instruments®. Specifications of this instrument are presented in Appendix A.

Figure 4 Locations of sampling sites for water quality monitoring upstream and downstream of construction work

The turbidity measured by this instrument is expressed in FNU (*Formazin Nephelometric Unit*). However, according to the manufacturer's representative, no conversion is required to obtain the figures in NTU (Nephelometric Turbidity Unit), as the values are identical. In the present context, the unit is largely irrelevant since the objective is simply to compare turbidity values upstream and downstream of the construction work in order to verify whether the water is disturbed by the construction site.

The results of this monitoring are presented in Figure 5. In summary:

- The pH of the water in the Inukjuak River was between 6.89 and 8.01. Generally speaking, pH values were similar upstream (average = 7.37) and downstream (average = 7.31) of the construction site;
- Turbidity varied between 0.03 FNU and 7.50 FNU. The highest values were obtained following a period of heavy rain (September 22, 2020), both upstream and downstream of the construction site. Saturation of the sediment filter bag at the construction site (October 26, 2020) did not have any impact on water quality in the Inukjuak River. Turbidity measurements taken upstream (BM1) and downstream (BM3) of the construction site are identical: 0.06 FNU on October 27, 2020 and 0.13 FNU on October 29, 2020, at both sites. These results suggest that the corrective measures implemented were effective in controlling runoff and sediment transport into the Inukjuak River;
- Temperatures varied between 0.01°C and 19.3°C;

The concentration of ammonia-nitrogen (NH4) was measured during blasting periods. With each monitoring activity, measured concentrations between the upstream and downstream sites were identical and ranged from 0.05 mg/L to 0.13 mg/L.

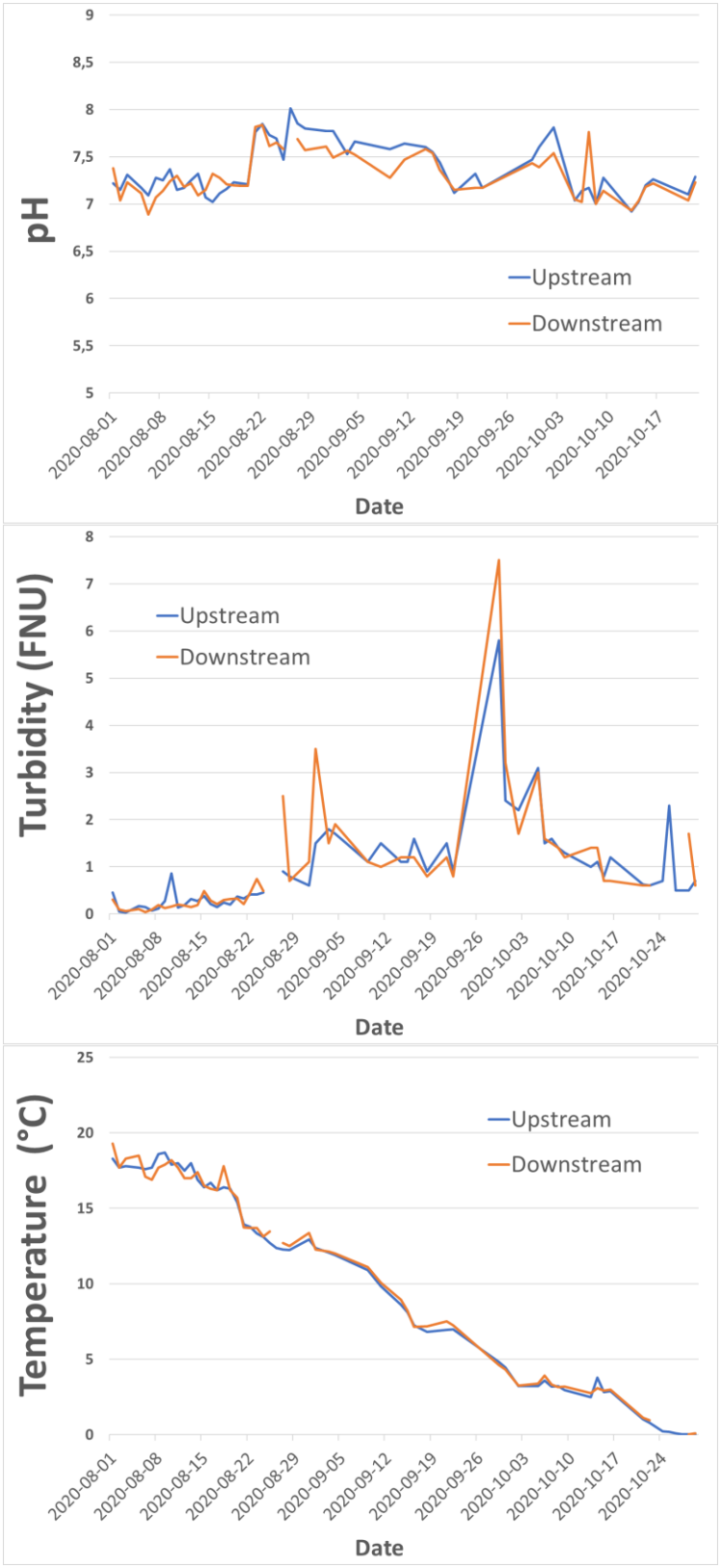


Figure 5 ***Results of water quality monitoring in Inukjuak River upstream and downstream of construction site***

3 Emergency Response Procedure

The emergency response procedure was developed in order to react quickly and in a coordinated manner in the event that an accidental spill should occur and threaten the quality of the village's drinking water. This procedure was defined at the start of construction work, but was not initiated in 2020. The emergency response procedure is presented in Appendix B.

As soon as construction commenced in July 2020, an access road was built in order to install the temporary water intake upstream of the construction site. The location of this water intake is shown in Figure 6. Photos illustrating its installation are presented in Figure 7.

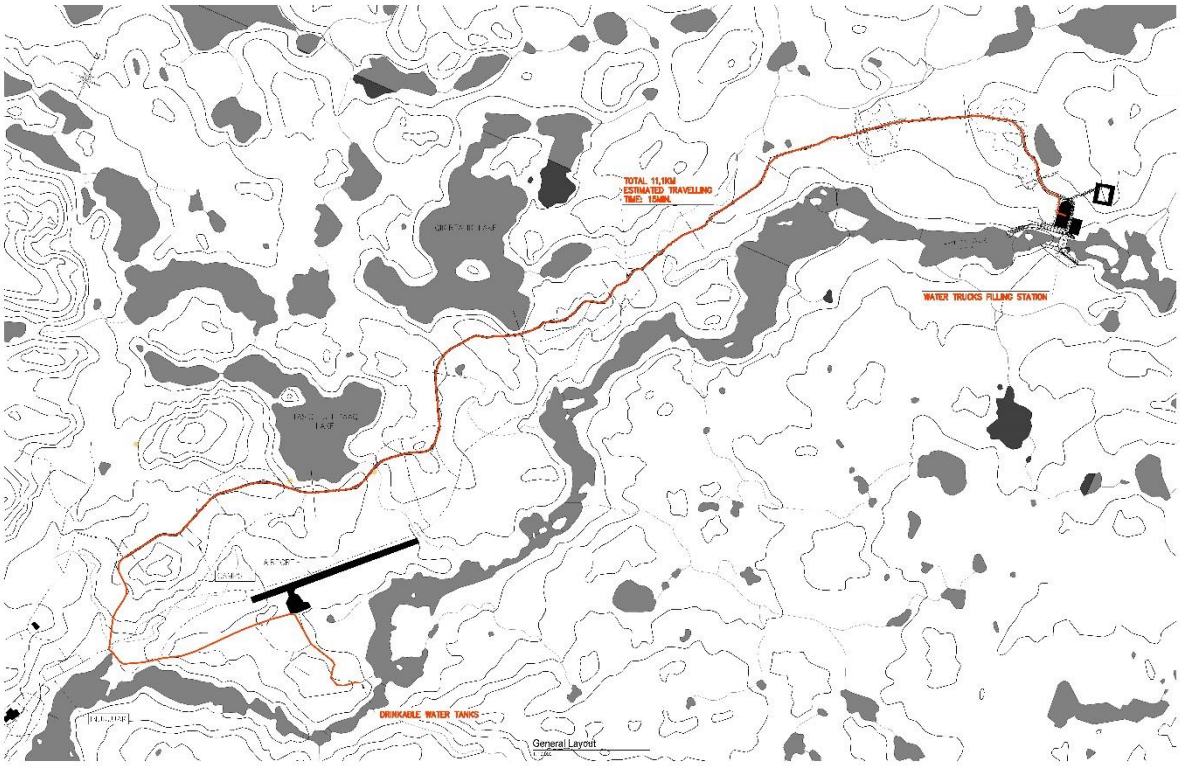


Figure 6 Location of temporary water intake upstream of construction site

Figure 7 Installation of temporary water intake

4 Exchanges with Follow-up and Cooperation Committee and Information Shared with Local Residents

In collaboration with the Follow-up and Cooperation Committee (meeting held September 30, 2020), the community was informed of water quality monitoring activities by radio and by means of an information leaflet (see Appendix C) that was distributed in the fall of 2020. The latter was drafted in English and Inuktitut to facilitate understanding.

5 Conclusion

In compliance with the certificate of authorization, Innavik Hydro and CRT Construction monitored drinking water quality in Year 1 (2020) of construction of the Innavik Hydroelectric Project. Maintaining water quality in the Inukjuak River represents an issue, as the water intake for the Northern Village's drinking water supply is located at the mouth of the river, approximately 7 km downstream of the project.

Monitoring demonstrated that this is essentially a question of managing the water generated by excavation work, notably in terms of controlling sediment transport. The implementation of corrective measures proved to be effective and helped limit repercussions on water quality in the Inukjuak River.

Water quality in this river was similar upstream and downstream of the construction site, which suggests that construction work did not have any impact. The emergency response procedure was not initiated in 2020. A temporary water intake was installed as a preventive measure.

For 2021, Innavik Hydro and CRT Construction would like to make improvements to drinking water quality monitoring in order to facilitate regular monitoring while adhering to applicable health measures related to the COVID-19 pandemic. The objective is to train a local resource to carry out data collection on a daily basis.

Appendix A Specifications of HI-9829 Multiparameter Meter

HI 9829

Multiparamètre professionnel

pour la qualité de l'eau

pH /pH en mV / Rédox / NH_4 / Cl^- / NO_3 / EC / TDS / Resistivité / Salinité / Gravité spécifique eau de mer / Turbidité / Oxygène dissous / Température / Pression atmosphérique

- Eaux de surfaces
- Eaux souterraines
- Océanographie
- Aquaculture/pisciculture

GPS

Avec sonde autonome

Affiche jusqu'à 12 paramètres

Nouvelles mallettes professionnelles « prêtes à mesurer » !

Mesure jusqu'à 15 paramètres

HANNA instruments France est certifié ISO 9001

Versions intégrales avec sonde dotée des capteurs standards

HANNA® instruments

HI 9829

Mesurez et affichez 12 paramètres simultanément et laissez-vous guider par des fonctionnalités innovantes !

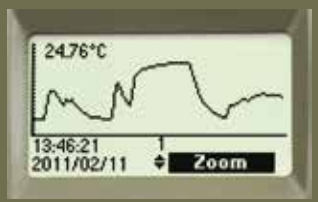
Multiparamètre avec sonde intelligente, gestion traçabilité FastTrack et système GPS

pH /pH en mV / Rédox / NH_4 / Cl^- / NO3 / EC / TDS / Resistivité / Salinité / Gravité spécifique eau de mer / Turbidité / Oxygène dissous / Température / Pression atmosphérique

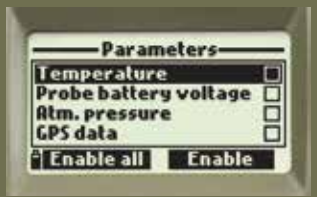
Une polyvalence inégalée et des performances au-delà de vos attentes
Un logiciel d'instrument intuitif, pour une grande simplicité d'utilisation et une grande efficacité opérationnelle sur le terrain

Caractéristiques de l'instrument

- **Grand écran graphique plaisant pour la lecture, rétro-éclairé**
- **Boîtier ergonomique, permettant le maniement d'une seule main**
- **Robuste et étanche**
- **Menu aide contextuelle**
- **Informations et instructions en texte clair (multilingue)**
- **Interface utilisateur d'une grande souplesse : configurez votre instrument à vos besoins !**
- **Gestions de traçabilité des données innovantes par système de clés d'identification (FastTrack) et/ou par géolocalisation GPS**



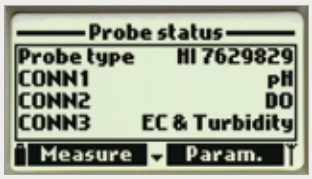
Représentez vos mesures sous forme graphique.



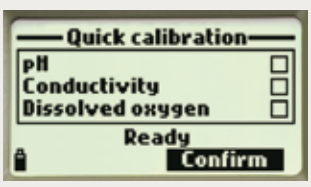
Aide contextuelle en ligne

Caractéristiques de la sonde

- **NOUVEAU : capteur conductivité/ TURBIDITÉ conforme EN ISO 7027**
- **NOUVEAU : sonde autonome avec acquisition de données (peut rester sur place, mesure et mémorise les données)**
- **Robuste et étanche IP 68 avec extrémité lestée**
- **Reconnaissance automatique des capteurs et électrodes**
- **Capteurs et électrodes remplaçables sur site**



Reconnaissance automatique des capteurs/électrodes



Étalonnage rapide avec une solution unique

L'instrument, unité de contrôle aux performances étonnantes

Un design ergonomique et des fonctionnalités 100 % orientés terrain

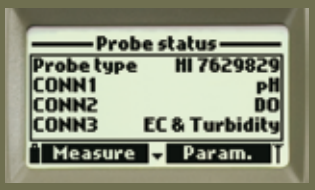
FastTrack

FastTrack :
Associez vos mesures à un lieu !
Ce dispositif permet d'identifier par un code numérique (clé IButton) un lieu de prélèvement. La clé est parfaitement étanche et peut rester sur place (fixée à un tronc d'arbre par ex.). Avant la mesure, il suffit d'appuyer le lecteur à puce contre le bouton et les mesures sont reliées à l'endroit où elles ont été prises.

Système GPS :
Enregistrez vos mesures avec leur position géographique !
Les études environnementales n'ont un intérêt représentatif que dans la mesure où les tests sont effectués à un même endroit.
Le système GPS intégré vous permettra de mémoriser, en plus des paramètres de la qualité de l'eau, la longitude et la lattitude du lieu de mesure. Les lieux de prélèvement peuvent être mis en mémoire pour les contrôles ultérieurs. Transférées sur PC, toutes les données pourront non seulement être exploitées sous Exel mais aussi lues et positionnées sur une application de cartographie.

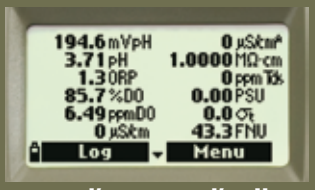
HI 9829

Du sur mesure pour le terrain

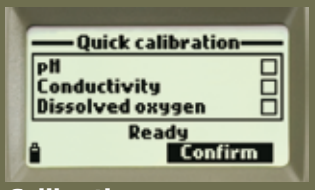


Reconnaissance automatique des capteurs/électrodes

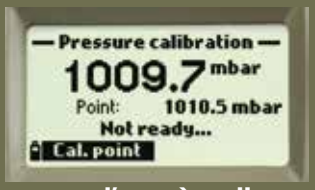
Acquisition des données :
choix de mémorisation automatique ou à la demande



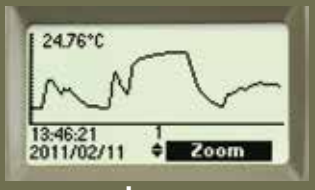
12 mesures d'un coup d'oeil :
affichage de 1 à 12 paramètres avec ajustement automatique de la taille des caractères



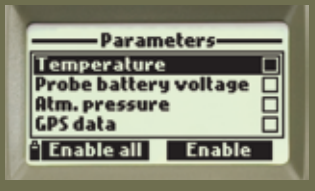
Quick Calibration :
étalonnage multiparamètre rapide et facilement réalisable sur site avec une solution d'étalonnage commune pour le pH, la conductivité et l'oxygène dissous



Des mesures d'oxygène dissous précises :
baromètre intégré



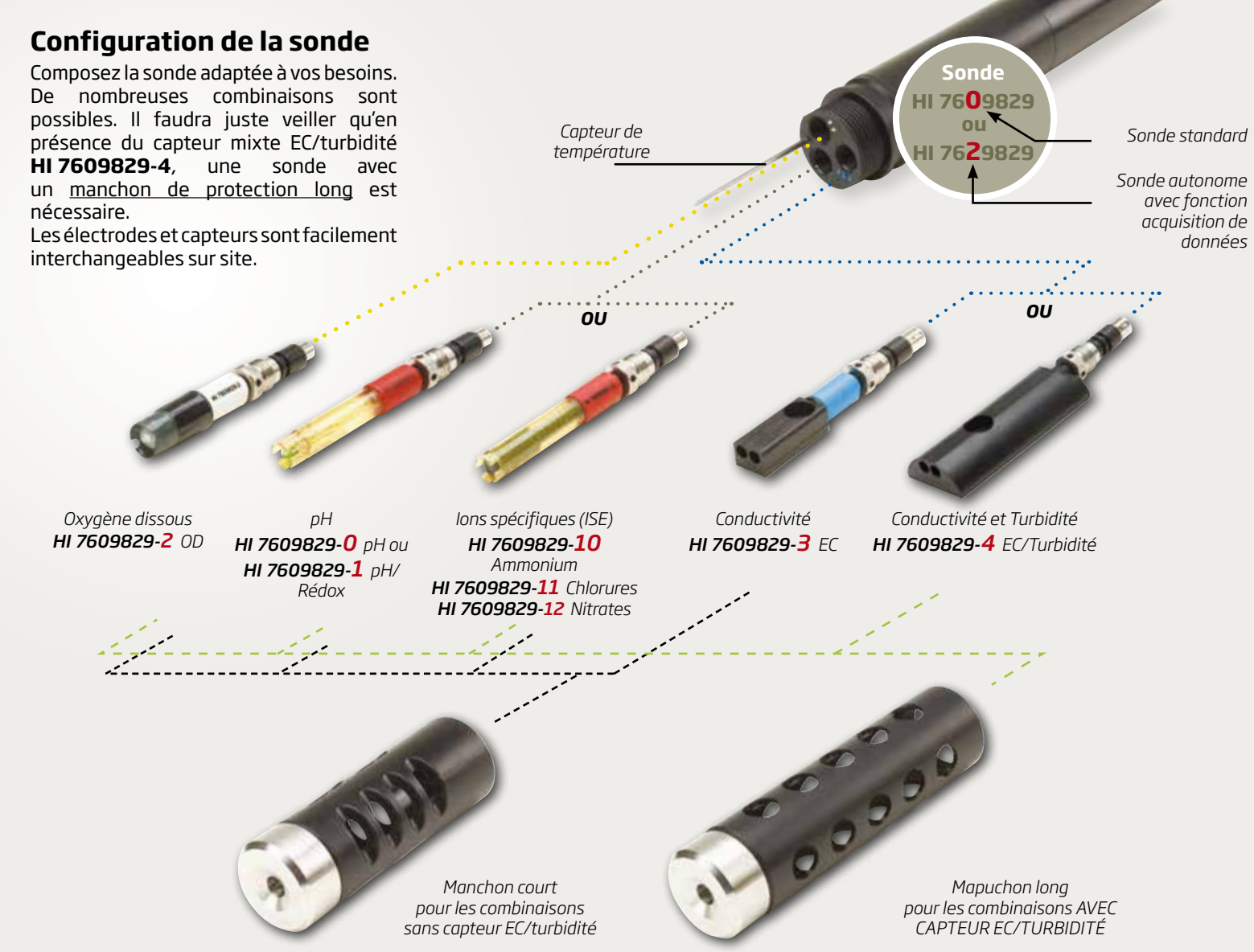
Lecture en graphes :
représentation graphique des mesures



Utile :
menu d'aide contextuelle disponible à toute étape

Configuration de la sonde

Composez la sonde adaptée à vos besoins. De nombreuses combinaisons sont possibles. Il faudra juste veiller qu'en présence du capteur mixte EC/turbidité **HI 7609829-4**, une sonde avec un manchon de protection long est nécessaire.
Les électrodes et capteurs sont facilement interchangeables sur site.



Les sondes, modulables, pour mesurer jusqu'à 14 paramètres

et autonomes avec acquisition de données

La sonde **HI 7629829** peut mesurer et mémoriser des données de manière autonome sans être reliées à l'instrument **HI 9829**.
Les mesures mémorisées peuvent être récupérées, en connectant la sonde soit à l'instrument **HI 9829** soit à un PC.

Spécifications		HI 7609829	HI 7629829 autonome
Paramètres	Réf. capteurs (en option)	Sondes nues pouvant accueillir les capteur suivants	
pH	**HI 7609829-0**	•	
pH/rédox	**HI 7609829-1**	•	
Ammonium	**HI 7609829-10**	•	
Chlorures	**HI 7609829-11**	•	
Nitrates	**HI 7609829-12**	•	
EC/EC absolue/TDS/résistivité/salinité/gravité spécifique	**HI 7609829-3**	•	
Oxygène dissous	**HI 7609829-2**	•	
Turbidité + EC/ EC absolue/TDS/résistivité/salinité/ gravité spécifique	**HI 7609829-4**	• (Nécessite l'emploi du manchon de protection long HI 7698296)	
Température	intégré	•	
Pression atmosphérique	intégré	Mesurée par l'appareil HI 9829	
Capteur de température		Intégré	
Acquisition autonome		–	• (jusqu'à 35 000 mesures)
Intervalle de mémorisation		–	1 seconde à 3 heures
Interface HI 9829		•	
Connexion PC		Via **HI 9829**	Via USB
Alimentation		–	4 piles 1,5 V AA
Durée de vie des piles		–	Selon l'intervalle configuré, de 72 heures à 70 jours
Indice de protection		IP68	
Dimensions / poids		342 mm x Ø 46 mm / 570 g	442 mm x Ø 46 mm / 775 g

Spécifications techniques

Spécifications		HI 9829-02	HI 98290-02 avec GPS
GPS		–	•
Mémoire		Jusqu'à 44000 mesures	
Intervalle de mémorisation		1 seconde à 3 heures	
Connexion PC		USB (avec logiciel **HI 929829**)	
Fonction FastTrack		I	
Indice de protection		IP67	
Alimentation		4 piles alcalines 1,5 V / 4 piles rechargeables 1,2 V, USB, adaptateur secteur 12 V	
Dimensions / Poids		221 x 115 x 55 mm / 750 g	
pH Étalonnage auto. en 3 points, compensation automatique de T°	Principe de mesure	Potentiométrique avec électrode de pH combinée, corps plastique	
	Gamme	0,00 à 14,00 pH	
	Résolution	0,01 pH	
	Exactitude	±0,02 pH	
pH en mV	Principe de mesure	Potentiométrique avec électrode de pH combinée, corps plastique	
	Gamme	±600,0 mV	
	Résolution	0,1 mV	
	Exactitude	±0,5 mV	
Rédox Étalonnage auto. en 1 point	Principe de mesure	Potentiométrique avec électrode rédox combinée, corps plastique	
	Gamme	±2000,0 mV	
	Résolution	0,1 mV	
	Exactitude	±1,0 mV	
Ammonium Étalonnage auto. en 2 points	Principe de mesure	Potentiométrique avec électrode ion spécifique	
	Gamme	0,02 à 200 mg/L (ppm) (N)	
	Résolution	0,01 à 1 mg/L (ppm) ; 0,1 à 200 mg/L (ppm)	
	Exactitude	±5 % de la lecture ou 2 mg/L (ppm), le plus grand	
Chlorures Étalonnage auto. en 2 points	Principe de mesure	Potentiométrique avec électrode ion spécifique	
	Gamme	0,6 à 200 mg/L (ppm)	
	Résolution	0,1 mg/L (ppm)	
	Exactitude	±5 % de la lecture ou 2 mg/L (ppm), le plus grand	
Nitrates Étalonnage auto. en 2 points	Principe de mesure	Potentiométrique avec électrode ion spécifique	
	Gamme	0,62 à 200 mg/L (ppm) (N)	
	Résolution	0,01 à 1 mg/L (ppm) ; 0,1 à 200 mg/L (ppm)	
	Exactitude	±5 % de la lecture ou 2 mg/L (ppm), le plus grand	
Conductivité (EC) Étalonnage auto. en 1 point Correction automatique de T° β ajustable	Principe de mesure	Potentiométrique avec sonde 4 anneaux	
	Gamme	0,000 à 200,000 mS/cm (jusqu'à 400 mS/cm pour EC absolue)	
	Résolution	Manuel : 1 µS/cm ; 0,001 mS/cm ; 0,01 mS/cm ; 0,1 mS/cm ; 1 mS/cm ; Automatique : 1 µS/cm de 0 à 9999 µS/cm ; 0,01 mS/cm de 10,00 à 99,99 mS/cm ; 0,1 mS/cm de 100,0 à 400,0 mS/cm ; 0,001 mS/cm de 0,000 à 9,999 mS/cm ; 0,01 mS/cm de 10,00 à 99,99 mS/cm ; 0,1 mS/cm de 100,0 à 400,0 mS/cm	
	Exactitude	±1 % de la lecture ou ±1 µS/cm, le plus grand	
TDS Facteur de conversion ajustable	Principe de mesure	Conversion de la conductivité	
	Gamme	0 à 400000 mg/L (ppm) (la valeur max dépend du facteur TDS)	
	Résolution	Manuel : 1 mg/L (ppm) ; 0,001 g/L (ppt) ; 0,01 g/L (ppt) ; 0,1 g/L (ppt) ; 1 g/L (ppt) ; Automatique : 1 mg/L (ppm) de 0 à 9999 mg/L (ppm) ; 0,01 g/L (ppt) de 10,00 à 99,99 g/L (ppt) ; 0,1 g/L (ppt) de 100,0 à 400,0 g/L (ppt) ; 0,001 g/L (ppt) de 0,000 à 9,999 g/L (ppt) ; 0,01 g/L (ppt) de 10,00 à 99,99 g/L (ppt) ; 0,1 g/L (ppt) de 100,0 à 400,0 g/L (ppt)	
	Exactitude	±1 % de la lecture ou ±1 mg/L (ppm)	
Résistivité	Principe de mesure	Conversion de la conductivité	
	Gamme	0 à 999999 Ω.cm ; 0 à 1000,0 kΩ.cm ; 0 à 1,0000 MΩ.cm	
	Résolution	En fonction de la lecture	
Salinité	Principe de mesure	Conversion de la conductivité	
	Gamme	0,00 à 70,00 PSU (échelle de salinité pratique - 1 PSU = 1 g/L)	
	Résolution	0,01 PSU	
	Exactitude	±2 % de la lecture ou ±0,01 PSU le plus grand	
Gravité spécifique eau de mer Lectures en σ_t, σ_0, σ_{15}	Principe de mesure	Conversion de la conductivité	
	Gamme	0,0 à 50,0 σ_t, σ_0, σ_{15}	
	Résolution	0,1 σ_t, σ_0, σ_{15}	
	Exactitude	±1 σ_t, σ_0, σ_{15}	
Oxygène dissous Étalonnage auto. en 2 points Compensation automatique de T°	Principe de mesure	Sonde oxygène galvanique, sans polarisation	
	Gamme	0,0 à 500,0 % ; 0,00 à 50,00 mg/L	
	Résolution	0,1 % ; 0,01 mg/L	
	Exactitude	0,0 à 300,0 % : ±1,5 % de la lecture ou ±1,0 %, le plus grand ; 300,0 à 500,0 % : ±3 % de la lecture ; 0,00 à 30,00 mg/L : ±1,5 % de la lecture ou 0,10 mg/L, le plus grand ; 30,00 mg/L à 50,00 mg/L : ±3 % de la lecture	
Turbidité Étalonnage auto. en 3 points	Principe de mesure	EN ISO 7027	
	Gamme	0,0 à 99,9 FNU ; 100 à 1000 FNU	
	Résolution	0,1 FNU de 0,0 à 99,9 FNU ; 1 FNU de 100 à 1000 FNU	
	Exactitude	±0,3 FNU ou ±2 % de la lecture, le plus grand	
Pression atmosphérique Étalonnage auto. en 1 point	Gamme	450 à 850 mm Hg ; 17,72 à 33,46 Hg ; 600,0 à 1133,2 mbar ; 8,702 à 16,436 psi ; 0,5921 à 1,1184 atm ; 60,00 à 113,32 kPa	
	Résolution	0,1 mm Hg ; 0,01 Hg ; 0,1 mbar ; 0,001 psi ; 0,0001 atm ; 0,01 kPa	
	Exactitude	±3 mm Hg si Δ T° de mesure - T° d'étalonnage < 15 °C	
Température	Gamme	-5,00 à 55,00 °C	
	Résolution	0,01 °C	
	Exactitude	±0,15 °C	

Structure de commande

INSTRUMENT
0 = SANS GPS
1 = AVEC GPS

CARACTÉRISTIQUES DE LA SONDE
0 = Sonde avec mesure pH/ORP, EC, OD, °C
1 = Sonde avec mesure pH/ORP, EC/turbidité, OD, °C
2 = Sonde autonome avec mémoire et mesure pH/ORP, EC, OD, °C
3 = Sonde autonome avec mémoire et mesure pH/ORP, EC/turbidité, OD, °C

LONGUEUR DE CÂBLE
04 = Sonde avec câble 4 m
10 = Sonde avec câble 10 m
20 = Sonde avec câble 20 m

ALIMENTATION
2 = 220 V

HI 9829 – [ ] [ ] [ ] [ ] [2]

Présentation des Kits HI 9829

Toutes les références sont livrées en mallette de transport avec les accessoires suivants :

HI 7698291	Câble USB
HI 929829	Logiciel
HI 920005	iButton® + support (5 pcs)
HI 710045	Câble d'alimentation
HI 7698292	Nécessaire de maintenance
HI 7698295	Manchon de protection court (uniquement pour les modèles sans turbidité)
HI 7698296	Manchon de protection long (uniquement pour les modèles avec turbidité)
HI 7698290	Récipient pour étalonnage, court (uniquement pour les modèles sans turbidité)
HI 7698293	Récipient pour étalonnage, long (uniquement pour les modèles avec turbidité)
HI 9828-25	Solution d'étalonnage, 500 mL
HI 9829-16	Solution d'étalonnage 0 FNU, 230 mL (uniquement pour les modèles avec turbidité)
HI 9829-17	Solution d'étalonnage 20 FNU, 230 mL (uniquement pour les modèles avec turbidité)
HI 9829-18	Solution d'étalonnage 200 FNU, 230 mL (uniquement pour les modèles avec turbidité)
HI 710046	Câble d'alimentation allume cigare

HANNA instruments France
Parc d'Activités des Tanneries - 1 rue du Tanin - BP 133
Lingolsheim - 67833 TANNERIES CEDEX
Téléphone : 03 88 76 91 88 - Télécopie : 03 88 76 58 80
info@hannafr.com – www.hanna-france.com

Présentation HI 9829

HI 9829-02	Instrument sans sonde, avec adaptateur secteur 12 V
HI 98290-02	Instrument avec système GPS, sans sonde avec adaptateur secteur 12 V

Les sondes, capteurs et accessoires sont à commander séparément.

Sondes nues avec capteur de température intégré, sans modules ni manchon de protection

Chaque sonde peut accueillir les capteurs suivants :
- pH ou pH/rédox ou Ammonium ou Chlorures ou Nitrates
- EC ou EC+Turbidité
- Oxygène dissous

HI 7609829/4	Sonde standard, câble 4 m
HI 7609829/10	Sonde standard, câble 10 m
HI 7609829/20	Sonde standard, câble 20 m
HI 7629829/4	Sonde autonome avec mémoire, câble 4 m
HI 7629829/10	Sonde autonome avec mémoire, câble 10 m
HI 7629829/20	Sonde autonome avec mémoire, câble 20 m

Électrodes et capteurs

HI 7609829-0	pH
HI 7609829-1	pH/Rédox
HI 7609829-2	Oxygène dissous
HI 7609829-3	EC
HI 7609829-4	EC/Turbidité
HI 7609829-10	Ammonium ISE
HI 7609829-11	Chlorures ISE
HI 7609829-12	Nitrates ISE

Solutions d'étalonnage rapide

HI 9828-25	Solution Quick Calibration, 500 mL
HI 9828-27	Solution Quick Calibration, 3,78 L

Solutions tampons

HI 7004L	Solution tampon pH 4,01, 500 mL
HI 7007L	Solution tampon pH 7,01, 500 mL
HI 7010L	Solution tampon pH 10,01, 500 mL

Solutions rédox

HI 7021L	Solution de test rédox à 240 mV, 500 mL
HI 7022L	Solution de test rédox à 470 mV, 500 mL

Solutions d'étalonnage conductivité

HI 7030L	Solution d'étalonnage 12,88 mS/cm, 500 mL
HI 7031L	Solution d'étalonnage 1413 µS/cm, 500 mL
HI 7033L	Solution d'étalonnage 84 µS/cm, 500 mL
HI 7034L	Solution d'étalonnage 80,00 mS/cm, 500 mL
HI 7035L	Solution d'étalonnage 111,8 mS/cm, 500 mL
HI 7039L	Solution d'étalonnage 5,00 mS/cm, 500 mL

Solutions oxygène dissous

HI 7040L	Solution zéro oxygène, 500 mL
HI 7042S	Solution électrolyte, 30 mL

Solutions d'étalonnage turbidité

HI 9829-16	Solution d'étalonnage à 0 FNU, 100 mL
HI 9829-17	Solution d'étalonnage à 20 FNU, 100 mL
HI 9829-18	Solution d'étalonnage à 200 FNU, 100 mL

Standards ISE

HI 9829-10/11	Kit solutions standard ammonium 10 ppm et 100 ppm, 10 x 25 mL de chaque
HI 9829-10	Solution standard ammonium 10 ppm, 25 x 25 mL
HI 9829-11	Solution standard ammonium 100 ppm, 25 x 25 mL
HI 9829-12/13	Kit solutions standard chlorures 10 ppm et 100 ppm, 10 x 25 mL de chaque
HI 9829-12	Solution standard chlorures 10 ppm, 25 x 25 mL
HI 9829-13	Solution standard chlorures 100 ppm, 25 x 25 mL
HI 9829-14/15	Kit solutions standard nitrates 10 ppm et 100 ppm, 10 x 25 mL de chaque
HI 9829-14	Solution standard nitrates 10 ppm, 25 x 25 mL
HI 9829-15	Solution standard nitrates 100 ppm, 25 x 25 mL

Kit de maintenance pour la sonde

HI 7698292	Kit contenant une solution électrolyte pour capteur OD **HI 7042S**, 5 O-rings pour capteur OD, une petite brosse, et une seringue contenant du lubrifiant pour O-rings.

Solutions de nettoyage et de maintenance

HI 70300L	Solution de conservation pour électrodes pH/rédox, 500 mL
HI 7061L	Solution de nettoyage pour électrodes pH/rédox, 500 mL

Accessoires

HI 929829	Kit logiciel de transfert compatible Windows®
HI 7698291	Câble USB de liaison du PC vers instrument
HI 76982910	Câble USB de liaison du PC vers sonde autonome
HI 920005	iButton® avec support (5 pcs)
HI 7998095	Manchon de protection court pour sonde sans module de turbidité
HI 7698296	Manchon de protection long pour sonde avec module de turbidité
HI 7698290	Becher d'étalonnage court pour sonde sans module de turbidité
HI 7698293	Becher d'étalonnage long pour sonde avec module de turbidité
HI 7698294	Chambre de passage courte pour sonde sans module de turbidité
HI 7698297	Chambre de passage longue pour sonde avec module de turbidité
HI 710045	Câble d'alimentation de recharge
HI 710046	Adaptateur allume-cigare
HI 710140	Mallette de transport vide

HANNA® instruments

Appendix B Emergency Response Procedure

CRT CONSTRUCTION

INNAVIK HYDROELECTRIC PROJECT

EMERGENCY RESPONSE PROCEDURE

VILLAGE'S DRINKABLE WATER SOURCE

Revision	Prepared by:	Revised by:	Date
04	Erick Gaudreau	Alain Labonté	2020-07-01

Document type	*Number*	*Revision*
PRO	001	04

TABLE DES MATIÈRES

LIST OF APPENDIX

1. Emergency Response Procedure

This plan will be in effect only when the road access to the temporary water intake is completed, when the temporary pumping equipment is in place and when the work will be inside the high-water level mark of the river. Any of the creek crossing will be upgraded after the plan is in effect.

The effectiveness of an emergency response often depends on the speed of the response. As soon as an abnormal situation arises, it is important to raise the alarm as soon as possible.

Certain situations which seem banal at the start can deteriorate very quickly. If the emergency response team is notified as soon as an abnormal situation is discovered, they can respond quickly. The witness of a dangerous situation must gather as much information as possible in order to be able to describe the situation to the responders.

The manager of the site where the event took place must immediately contact the site superintendent. The Superintendent will issue a work stoppage warning if deemed necessary. Then, he will be in charge of setting up the alert and emergency management procedure. Depending on the case, the superintendent will take charge of the intervention or designate a person responsible. He will then decide if external resources are necessary, and will manage the support and interactions with these resources, if applicable.

Below, the flow chart of the emergency response plan and in the emergency phone number list:

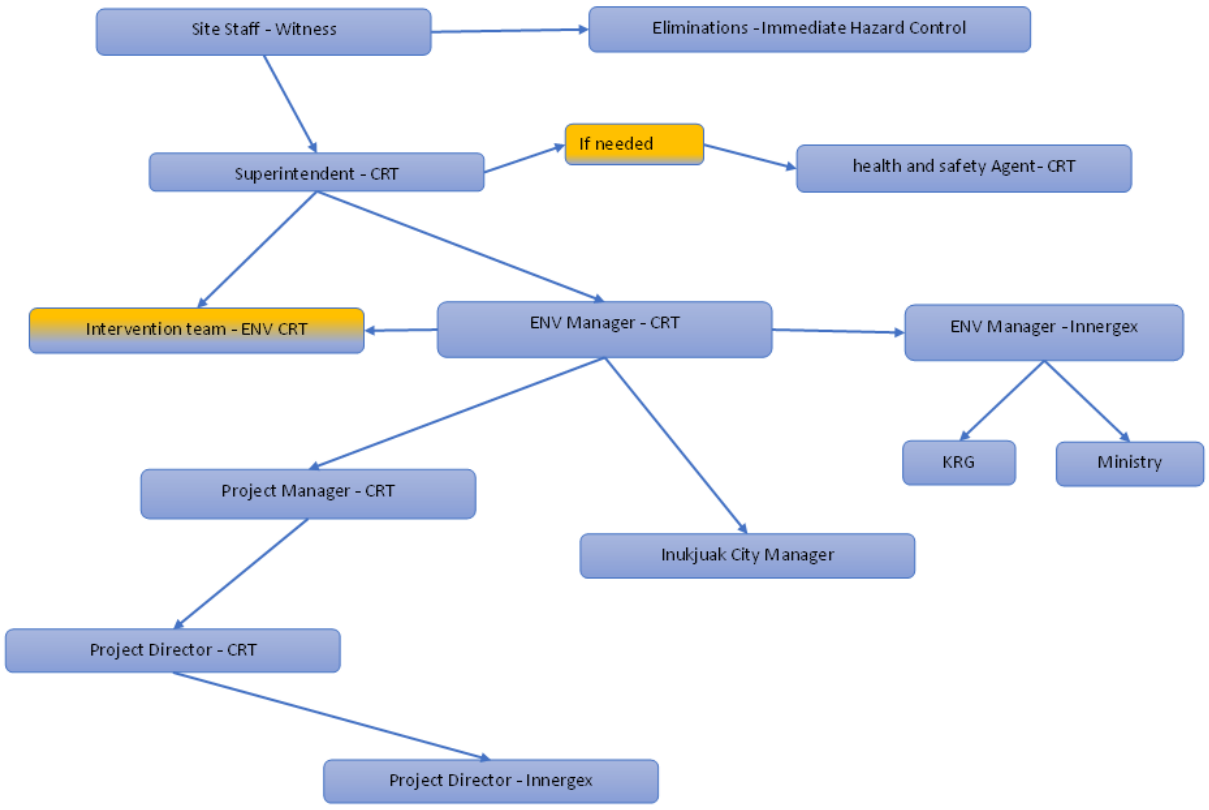


Figure 1: Organizational chart

INTERNAL RESOURCES				
Always call on business number before personal number				
Name	**Title**	**Company**	**Business number**	**Personnal number**
Alain Labonté	Project Director	CRT	(418) 564-8051	
François Hébert	Senior Director – Hydroelectric	Innergex	514 249-2677	
Maxim Desjardins	Project Manager	CRT	418.858-0781	
Sabin Savard	Superintendant	CRT	1-514-706-8801	
Jean-Gabriel Dorval	Environmental manager	CRT		418-473-9319
Jeanne Gaudreault	Senior Manager - Community Relations and Environment	Innergex	514 220-0892	
Martin Lacas	Health and safety coordinator	CRT	514-266-6965	

EXTERNAL RESOURCES	
Organization	**Phone number**
Kativik regional police (CPRK)	**Emergency: 819 254-9111**
Inukjuak police station	Phone : 819 254-8144
Fire department	**Emergency: 819 254-9000**
Service des incendies d'Inukjuak	Phone : 819 254-9000
Health services	**Emergency: 819 254-9090**
CLSC d'Inukjuak	Phone : 819 254-8540
Emergency medical team (ambulance)	**Emergency: 819 254-9000**
First responder	Phone : 819 254-8822
MELCC – Urgence-Environnement	Phone : **1 866-694-5454**
Ministère des Forêts, de la Faune et des Parcs (MFFP) sans frais :	Phone : 1 844 523-6738
Direction de la protection de la faune du Nord-du-Québec	Phone : 418 748-7701
Environnement Canada	Phone :1 800 668-6767
Municipal office	
Village nordique d'Inukjuak	Phone : 819 254-8822
Other	
Services d'évacuation héliportée (AirMedic)	**Emergency: 1 877 999-3322** Other: 450 766-0770

EXTERNAL RESOURCES	
Organization	**Phone number**
CANUTEC (emergency involving dangerous goods)	613-996-6666
Kativik Regional Government – Environmental specialist	1-877-964-2961
Société de protection des forêts contre le feu (SOPFEU)	Phone : 1 800 463-3389

2. CONTAMINATION OF THE VILLAGE'S DRINKABLE WATER SOURCE

2.1. DEFINITION

An event that could potentially make the water drawn from the village's drinkable water system improper for human consumption. This could be caused by a spill or a significant increase of sediment in the water.

The temporary intake water will be located in the river upstream side of the work area. This intake will be use also for the water need during the construction period. The appendix B is showing the location of the temporary water intake. The Schedule B is showing the traffic and travelling plan. The appendix C is showing the pumps technical information. The pump will be in service 24/24 hours, 7 days per week.

2.2. VOLUME OF WATER REQUIRED CALCULATIONS

The Village's consumption data were provided. The daily water consumption of 270m^3 / day over a period of 10 hours, or an average of 27m^3 / hr. The existing reservoir has a total capacity of 273m^3 and the water reserve must not go below 150m^3 in order to keep a minimum volume in the event of a fire. This means from the following calculation; the maximum response time is approximately 4 hours:

Total volume, 273m^3 - minimum fire reserve 150m^3 = Total available 123m^3

Total available 123m^3 / consomation27m^3/hr = 4.56 hrs.

- The first tanker truck filled with water must arrive within **4** hours after the gate had been closed.

The pump has a rate of 100 m^3/h with a total head of 20 meters, as can be seen in Appendix C.

CRT has two tank trucks with a transport capacity of 20m^3 / 70min and 35m^3 / 120min respectively, including filling time and transport time. The time required to fill the tank trucks are 12 minutes (20m^3) and 21 minutes (35m^3).The total daily capacity is around 34.5m^3 / hr or 828 m^3 / day.

Truck 1 : 20m^3 / (1.166hr) = 17m^3/hr

Truck 2 : 35m^3 / (2 hr) = 17.5 m^3/hr

Total m^3 /hr : 17m^3 + 17.5m^3 = 34.5m^3/hr

34.5m^3 / hr * 24hr = 828m^3 / day

In conclusion, the rate of filling of the Village's tank will be limited by the time of consumption of those.

2.3. PROCEDURE

2.3.1. ROLE OF WITNESS

- Notify the site superintendant as soon as an incident occurs. The risk can come from but is not limited to: cofferdam breach, silt from work underway (fine sand) will create high level of turbidity, equipment will have an accident with oil or fuel spill.
- In the event of a spill, control the spill according to the environmental emergency plan (see Appendix E).
- In the event of a cofferdam rupture, ensure that a turbidity curtain is in place and install a second if necessary. Also install a second cofferdam to circumscribe the area.
- In the case of a significant increase of sediment, control erosion according to the environmental emergency plan.

2.3.2. ROLE OF THE SITE SUPERINTENDENT

- Receive the call.
- Immediately notify Innavik Hydro and the village civil security manager.
- Apply the alert process in section 1 and designate the person in charge of the intervention.
- If the pump is running, immediately notify the concrete batch plan staff to stop production and begin the process of pumping potable water for the village.
- If the pump is not in operation, notify the manager to start the pump and begin the process of pumping potable water for the village.
- Contact the superintendent to have the tanker on the way to supply the village with water.
- Notify on the radio that the road will be used by the tanker to supply water to the village.
- Take note of the water meter at the start of the process. (Permit to take water Art.22)

2.3.3. ROLE OF THE INTERVENTION SUPERINTENDENT

- Inform the relevant authorities immediately with Innavik Hydro. Inukjuak village officials must be notified promptly to stop the standard pumping of drinking water and to shut off the village supply valve.
- Begin the emergency protocol for the supply of emergency drinking water.
    - The two tank trucks will be sent to the water intake which is located near the concrete batch plan (capacity of 20 m^3 / 70 min for the first truck and 35 m^3 / 120 min for the second truck);
    - The trucks will go back and forth from the water intake to the village pumping station as long as the notice is not close;
    - Emergency measures will be put in place to stop and control the source;
    - Village water tests will be performed by Innavik Hydro;
    - TSS turbidity tests will be performed by CRT
- Upon an incident, CRT will monitor the water quality until it is back to a quality equal to the temporary water intake. The usual monitoring is the responsibility of Innavik Hydro.
- As soon as the situation returns to normal and the laboratory results are in compliance, the municipality and Innavik Hydro will be notified of the resumption of standard pumping and a report will be given to the authorities, if required.
- Complete the environmental incident report, if the contamination was caused by a spill (see Appendix F).

2.3.4. Role of the Superintendent at the Village Pumping Site

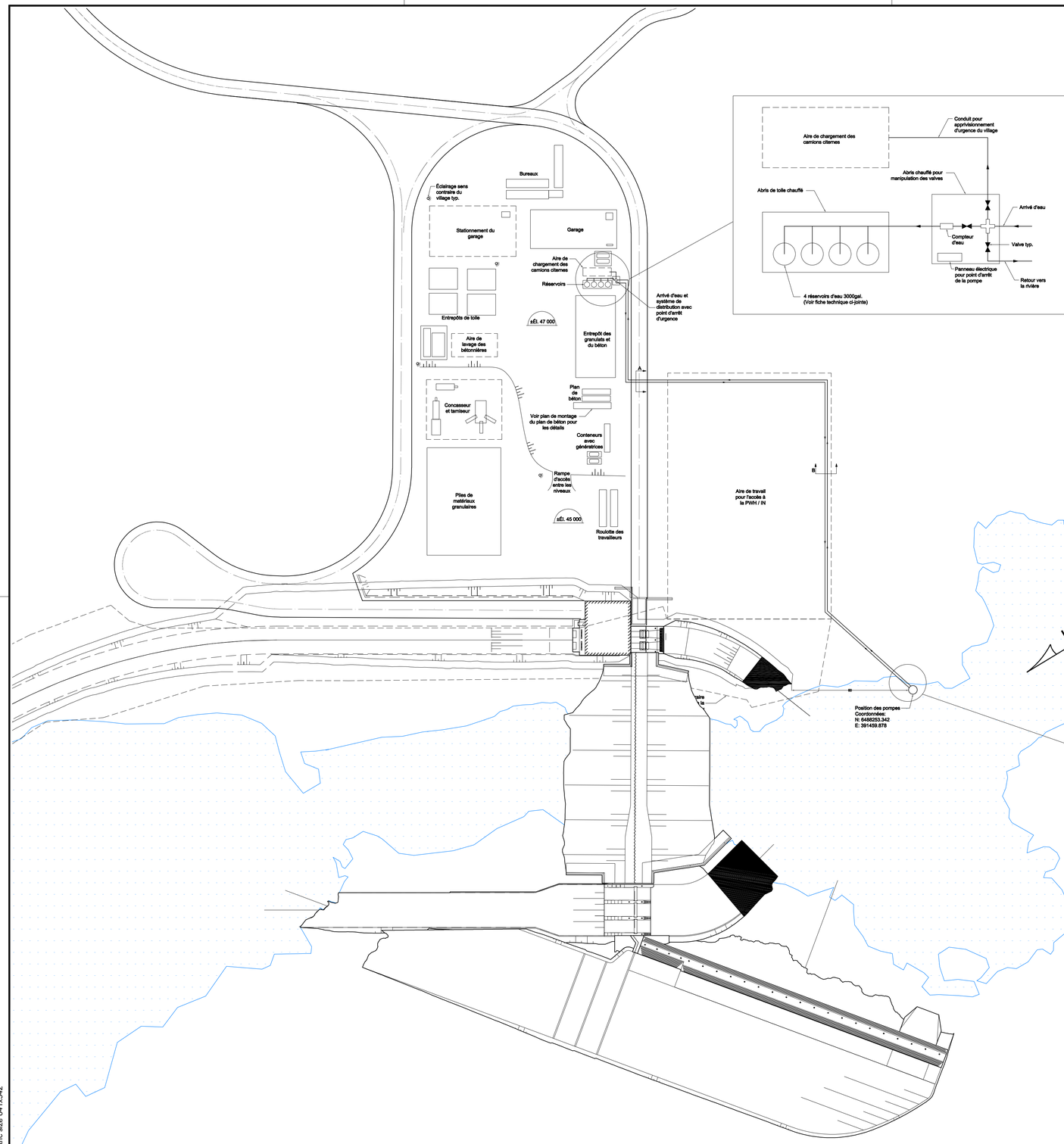
- Have the pumping site door opened by the public safety officer.
- Close the primary water gate (20 sec.) and install a lock system to insure it can't be open.
- Install the vacuum type filling pump, connect to the water tank drain line.
- Install and connect the flexible hose for pumping directly into the well.
- Do regular inspection on site at all times to ensure the smooth running of each arrival and departure of trucks.
- Ensure the pump is functional and fueled.

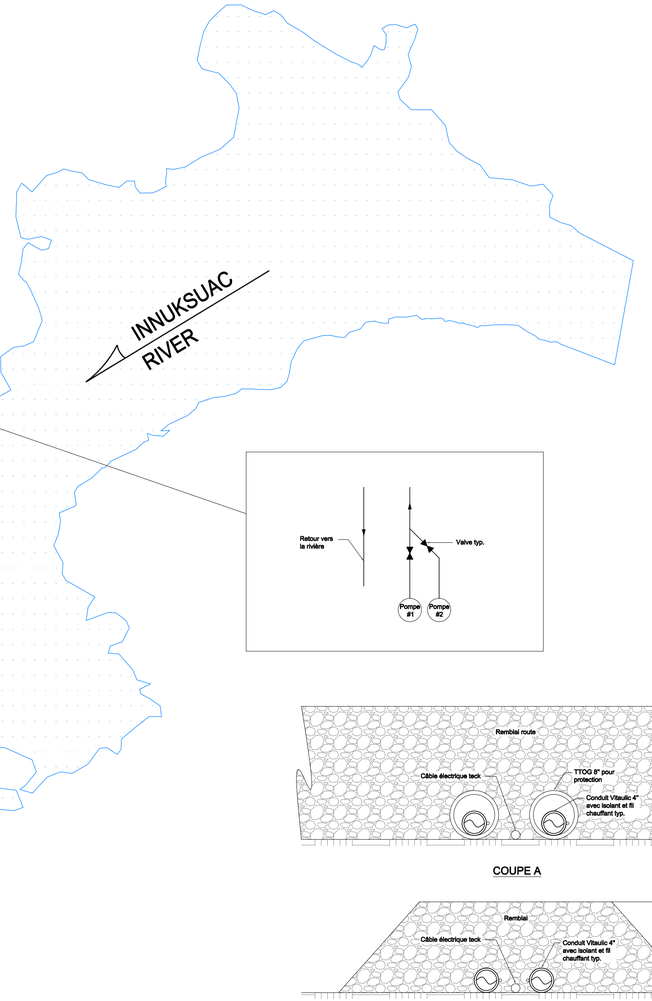
2.3.5. Practice test

Before the start of work close to the high-water level mark. A practice test of the emergency procedure will be carried out with the various parties involved to validate the communication chain, the response time and the effectiveness of the emergency plan. Thereafter, update meetings will be held frequently at the beginning of each month with all the emergency team members to ensure that the emergency plan for the village's water supply is operative.

Appendix A

Water intake location plan





COUPE A

COUPE B

NOTES:

1. Les dimensions inscrites sont en mètre (SI)
2.
3.
4.

0	C.GOD	POUR APPROBATION
2020/03/26		
REV.	TECH.	RÉGISTRE DES RÉVISIONS OU ÉMISSIONS
DATE		

SCEAU

CRT CONSTRUCTION

CLIENT

INNAVIK HYDRO LP

PROJET

PROJET HYDROÉLECTRIQUE INNAVIK

TITRE

PLAN GÉNÉRAL DE LA PRISE

POUR ACTIVITÉS AU CHANTIER ET PLAN D'URGENCE POUR LE VILLAGE

Date	Préparé par	Approuvé par	
MARS 202	C. GODBOUT	É. GAUDREAU	
Échelle	Consultant #		Client #
TEL QUE MONTRÉ			
Dessin #			Révision
CRT-005			0

A1-MOD metric size 841x542

Appendix B

Circulations plans

N

TOTAL 11,1KM
ESTIMATED TRAVELLING
TIME: 15MIN.

QIKIRTALIK LAKE

INNUKSUAC
RIVER

WATER TRUCKS FILLING STATION

TASIQ TULLIPAAQ
LAKE

AIRPORT

CAMPSITE

INUKJUAK

DRINKABLE WATER TANKS

General Layout
1: 10,000

Appendix C

Pumps

Electric Motor Driven

Submersible Pump

Model S4C1-E10

Size 4”

Certified in Canada

CERTIFIED PERFORMANCE

PUMP SPECIFICATIONS

Diffuser: G-R Hard Iron;
Maximum Operating Pressure 69 psi (476 kPa).*
Impeller: G-R Hard Iron.
Wear Plate: Carbon Steel ASTM A36.
Seal Plate: G-R Hard Iron.
Intermediate: Aluminum Alloy 356-T6.
Casing: Aluminum Alloy 6061-T6 with Chromicoat.
Motor Housing: Aluminum Alloy 356-T6.
Motor Shaft: Stainless Steel Type 416.
Shaft Sleeve: Stainless Steel Type 304.
Bearings: Upper - Open Single Row Ball Bearing.
Lower - Two Synthetic Seals, Double Row Ball Bearing.
Discharge Flange: Aluminum Alloy 356-T6.
Gaskets: Cork with Nitrile Binder (NC710).
O-Rings: Buna-N.
Wetted Hardware: Standard Plated Steel and Stainless Steel.
Strainer: Urethane Coated Steel; 50.6% Open Area,
0.375” (9,5 mm) Diameter Openings.
Hoisting Bail: Urethane Coated Steel.

Standard Equipment

NEMA Type 3R Rainproof Control Box. *(See Section 130, Page 90.)*
Provides On-Off, Circuit Breaker and Motor Overload Protection.

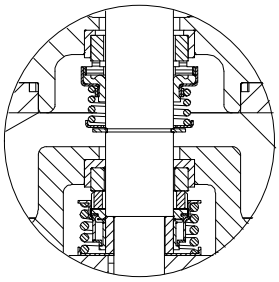
Optional Equipment

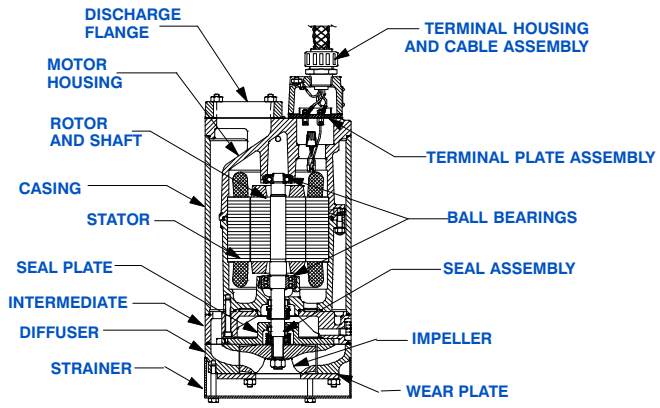
Liquid Level Control: *(See Sec. 130, Page 150.)*
a. Turtle Type Pressure Activated Level Switch.
b. Float Activated Level Switch.
Staging Adapter Kit.

MOTOR/CABLE SPECIFICATIONS

Motor: Oil Filled Enclosure; 10.0 H.P.; 3450 R.P.M.; Three Phase: 200/230/460/575 Volt, 60 Hz, 39/34/17/13.6 Full Load AMPS, 12.2 kW (Max.)
Power Cable:
200/230/460 Volt: 6 Wire; Type GGC; 8 AWG. 3 Power Conductors, 2 Ground Conductor and 1 Ground Check.
575 Volt: 4 Wire; Type SO/SOW/SOOW; 10 AWG; 3 Power Conductors, Plus 1 Ground. Nominal Length 50 Feet (15 m). Standard.
(*Specify Alternate Length at Time of Order.*)
Recommended Generator Size: 15 kW Across the Line Start.
**Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.*

WARNING!
Do not use in explosive atmosphere or for pumping volatile flammable liquids.





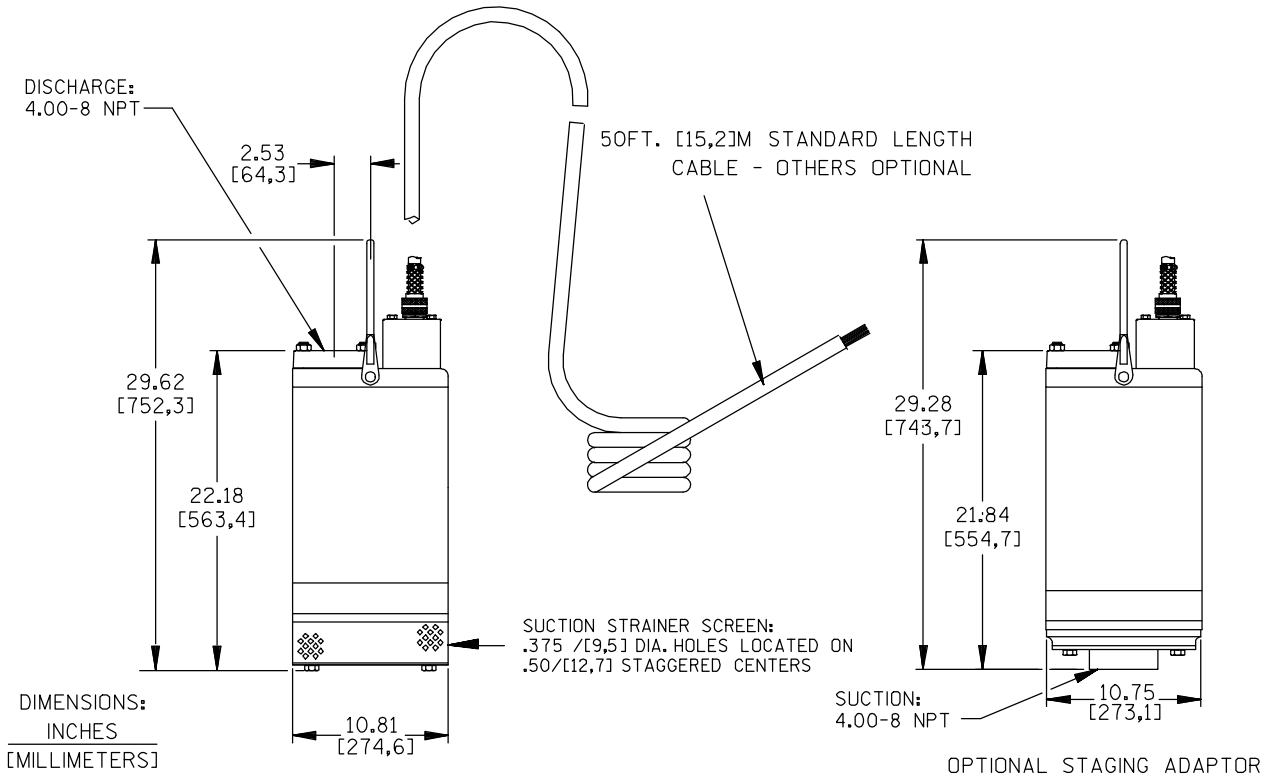
SEAL DETAIL
Tandem, Oil Lubricated.

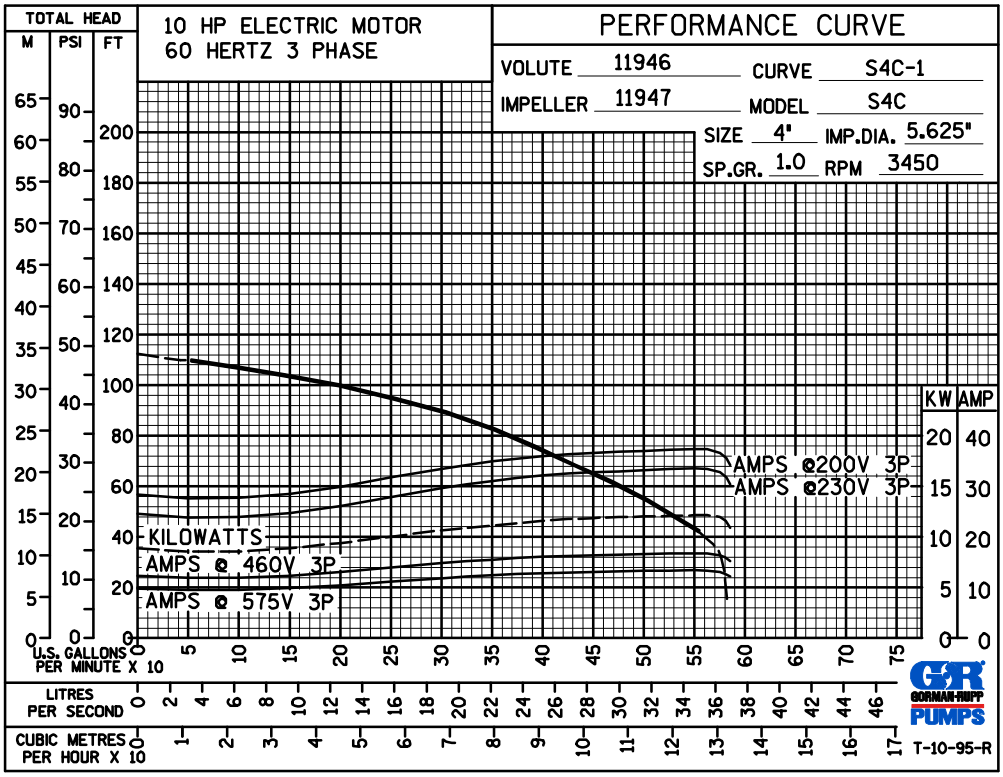
Upper Seal: Type 21, Mechanical. Carbon Rotating Face. Ceramic Stationary Face. Buna-N Elastomers. Stainless Steel 18-8 Cage and Spring.

Lower Seal: Type 2, Mechanical. Tungsten Titanium Carbide Rotating Face and Silicon Carbide Stationary Face. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel 303/304 Cage and Spring.

Maximum Temperature of Liquid Pumped, 122°F (50°C).*

Specification Data	APPROXIMATE DIMENSIONS and WEIGHTS	NET WEIGHT: 254 LBS. (115 KG.) SHIPPING WEIGHT: 269 LBS. (122 KG.) EXPORT CRATE:13.3 CU. FT. (0,38 CU. M.)
SECTION 130, PAGE 820C		





Appendix D

Emergency measures plan

Emergency measures plan

CONTAMINATION OF THE VILLAGE DRINKABLE WATER SOURCE

Witness of an event:

- ❖ Notify the site manager as soon as an incident is noted or as soon as there is a possibility that the water source is contaminated by any way.

CRT site manager:

- Immediately notify Innavik Hydro and the village officials.
- If the pump is running, immediately notify the concrete plan staff to stop production and begin the process of pumping potable water for the village. If the pump is not in operation, notify the person in charge of putting it into operation and starting the pumping procedure for drinkable water for the village.
- Contact the superintendent to have the tank truck on the way to supply the village with water and notify on the radio that the road will be used by the tank truck to supply the village with water.

Inukjuak village officials:

- ➢ Interrupt the standard pumping of drinkable water and close the system supply valve.

Start the emergency protocol for the supply of drinkable water:

- ✓ The two tank trucks will be sent to the water intake which is located near the concrete batch plan (capacity of 20 m^3 / 70 min for the first truck and 35 m^3 / 120 min for the second truck);
- ✓ The trucks will go back and forth from the water intake to the village tanks until the notice is not closed;
- ✓ Emergency measures will be put in place to stop and control the source;
- ✓ Village water tests will be performed by Innavik Hydro;

Stopping the emergency protocol for the supply of drinkable water:

As soon as the situation returns to standard and the laboratory results are in compliance, the municipality will be notified of the resumption of standard pumping and the trucks will be notified.

Appendix E

Environmental emergency plan (extracts)

11.7 EROSION

The work area must be circumscribed to avoid the dispersion of sediments. Any work resulting in unconsolidated soil (excavation, storage, disturbed soil, etc.) shall be accompanied by erosion and sediment control (ESC) measures to mitigate the risk of reaching a water body or wetland. As the construction project moves forward, all disturbed areas shall be permanently stabilized. If a delay was to occur in the completion of work, all erosion and sediment control measures must remain in place until permanent stabilization is possible.

The ESC measures should be adapted to the different construction steps that will occur during the work seasons. The general contractor intends to use sediment barrier or fences, compacted straw or any other relevant device to retain fine-grained soil if there is any water runoff. The ESC devices will be visually inspected and maintained, if their efficiency is decreasing.

11.7.1 TEMPORARY STABILIZATION OF EMBANKMENTS

A geotextile membrane shall be used to stabilize embankment that may be affected by erosion or produce sediment runoff. If gullying is detected on stabilized surfaces, the general contractor must implement supplementary measures, as soon as the situation is reported by a site supervisor.
Any unconsolidated material pile, such as excavated ground, located closer than 30m from a water body or wetland shall be protected by temporary stabilization measures to avoid any sediment runoff into the water. A geotextile membrane installed to stabilize an embankment shall be held in place by relevant devices.

11.7.2 TEMPORARY SEDIMENT BARRIER

Temporary sediment barrier made of a geotextile membrane shall be adequately installed. The installation of a sediment barrier crossing completely (perpendicular to the flow and intercepting its entirety) a stream is forbidden. At the beginning and for the duration of the various work phases, the general contractor must install sediment barriers at the locations where sediments can be transported by runoff. To ensure a good efficiency of those devices, they shall be properly maintained for the complete duration of the work. The removal of a sediment barrier shall be carefully executed to avoid releasing all the sediments accumulated.
Visual inspection will be done particularly before and after a rainfall event. It will allow to verify the efficiency of the geotextile membrane and to address deficiencies.
If a simple temporary sediment barrier is deemed unefficient, a mat made of Type II geotextile membrane would be used as cover material to ensure the temporary stabilization of the embankment.

11.7.3 SEDIMENT FILTER TUBES

The installation of a sediment filter tube across a stream (perpendicular to the flow and intercepting its entirety) is forbidden.

11.7.4 SEDIMENT TRAP AND BERM

The construction of a berm or a sediment trap across a stream (perpendicular to the flow and intercepting its entirety) is forbidden. The trap shall be cleaned when it reaches 50% of its capacity. A cleaning of all the sediment traps must occur before any prolonged temporary closure of the construction site. Preventive cleaning should be realized before a weather alert regarding unusually high rainfall.

12.1 SPILL OF CONTAMINANTS

12.1.1 DEFINITION

A situation that resulted in a contaminant spill requiring a prompt, safe and efficient intervention to protect the population and environment. The definition of contaminant includes hazardous material like flammable, corrosive, reactive, toxic or any other substances that can endanger life or affect the environment.

12.1.2 PROCEDURE

Role of the first witness

1. Stop all work around the spill.
2. Identify the spilled product – check the packaging, warning labels, material safety datasheet (MSDS), etc.
3. Plug the leak and contain the spill with the closest emergency spill kit, if possible and safe to do so.

4. Immediately inform the site supervisor and the superintendant if a spill involving hazardous material occurs.
5. Be ready for further instructions from the person in charge of the spill response.

Role of the site manager

1. Receive the information
2. Initiate the alert and emergency management procedure (see section 1 of this document) and decide who will be the person in charge of the spill response.

Role of the person in charge of the spill response

1. Collect primary informations regarding the location of the incident and the severity of the situation.
2. Immediately contact Urgence-Environnement and give them information regarding the contaminant and the estimated volume.
3. With the help of the response team, implement a safety perimeter around the spill to reduce the risk of exposition or explosion.
4. Determine if the resources required to remediate the situation are available :
    a. If the resources are available: collect the contaminated material and residual hazardous material and store them in distinct waterproof containers. If appropriate, use the emergency spill kits to circumcise the spill or continue the surveillance of the situation.
    b. If the resources are not available : use external resources to remediate the spill. Organize a meeting point on-site for the emergency services and site personnel. Designate a worker to guide the emergency services (ambulance, fire department or police force) to the meeting point so that their intervention is timely.
5. Oversee that the site remediation is completed according to the criteria of the *Environment Quality Act.* The contaminated soils and residual hazardous material shall be transported to a MELCC authorized disposal facility. The site remediation shall be confirmed by analysis done in an accredited laboratory.
6. Prepare an environmental inciddent report :
    a) Description of the incident;
    b) Names of the witness;
    c) Contaminant description;
    d) Estimation of the quantity (L) of spilled contaminant;
    e) Estimation of the quantity (m^3) of contaminated soil removed;
    f) Add the incident to the environmental incident register;
    g) Take pictures of the spill area before and after the site remediation;
    h) Locate the spill using a GPS;
    i) Containers used for the spill and location of the storage;
    j) Unconformities, corrective actions and preventive measures taken.

Appendix F

Environmental incident report

Environmental Incident Form

To be completed by the first witness

Send to the Project Director

Location		
Site description:		
If applicable:	Km _____	
GPS coordinates:	Longitude _____	Latitude _____
Date of communication of the incident:		

Date of the incident	Time of the incident	Duration of the incident
Substance at issue	**Volume involved**	**Product trade name**
Company Name in question	**Defective equipment**	**Equipment repair date**

Cause and description of the incident

Reason for the incident (check)		
☐ Weather conditions	☐ Absence of procedure	☐ Equipment breakdown
☐ Lack of training	☐ Erreur humaine	☐ Carelessness during a procedure

Affected area (m2)				
Nature of the affected site		**Ground slope**	**Meteo**	
☐ Sand / Gravel	☐ Concrete	☐ Low 2%	☐ Cloudy	☐ Snowy
☐ Rock	☐ Grass	☐ Average 2-10%	☐ Sunny	☐ Calm
☐ Clay	☐ Snow	☐ Strong 10%	☐ Rainy	☐ Windy
☐ Asphalt				
☐ Body of water: _____				
Distance from sensitive elements (in meters)				
Housing: _____	Watercourse: _____	Road: _____	Well: _____	Other: _____

Measures to control the situation	
Cleaning start date: _____	Cleaning end date: _____
Description of the intervention:	
Quantity recovered:	
Disposal location:	
People involved in cleaning	
☐ Contractor involved	☐ Specialized companies ☐ Other: _____

Written by	

Signature of witness	
Date	
Report receipt date	
Signature of responsible	

Related documents	Note: Attach pictures of the spill when sending the form c.c. :Project Director

Appendix C Information Leaflet Distributed to Residents of Inukjuak

INNAVIK HYDRO PROJECT

WATER MONITORING CAMPAIGN

September 2020

Work on the Innavik Hydro Project has started and protecting the quality of Inukjuak's drinking water is our top priority. We take every measure to prevent and avoid any contamination, for instance by keeping our machinery in top condition to prevent any spills, and stopping any dirty water draining into the crystal clear Inukjuak River.

Along with being careful, we also monitor water quality, through daily sampling of the Inukjuak River.

Monitoring work

To make sure the water is not negatively impacted by the construction work, two samplings are made every time:

- One upstream from the work site ("Control site" - completely natural)
- One downstream from the work site ("Test site" to detect any change)

Downstream monitoring is performed at the location of the Community's water intake, the source for the village's drinking water.

Currently-monitored parameters include temperature, pH and turbidity. Those results are instantaneous. Further analysis is required for other parameters monitored, including ammonia.

Monitoring results

The water criteria measured at the intake are within the expected ranges. Furthermore, in many instances, water parameters are identical at the upstream and downstream monitoring points. This means the construction site has no effect on water quality and that there is no increased risk for our drinking water.

In the event that an incident would occur on the construction site, immediate communication will take place to activate the Emergency Action Plan. Agreed with the KRG and NV, it involves delivering pure water to the drinking water treatment plant, therefore preserving public health.

For more information, call 819 254-8101 or send an email at innavikhydro@innergex.com

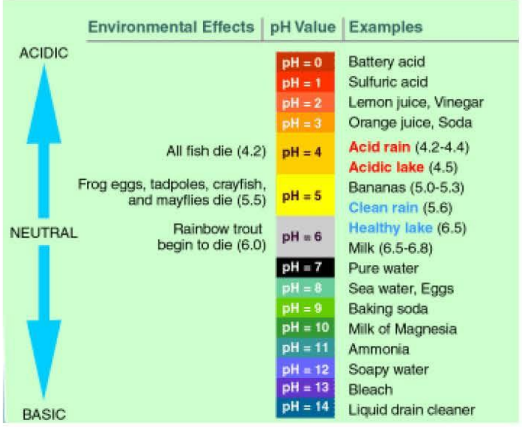
About Water Monitoring Parameters

The parameters that are monitored allow us to track the quality of the Inukjuak River water and would immediately identify a significant change / issue that could effect drinking water supplies.

pH

The pH value of a water source is a measure of its acidity or alkalinity. Ranging from 0 to 14, the value of 7.0 is neutral. Pure water would have a pH of 7.0, but rivers, lakes, and rain/snow tend to be slightly acidic, due to substances naturally present in the water.

Based on results from 2019, the Inukjuak River's pH usually is between 6.98 and 7.51. Since the beginning of work, it has been of 7.4 on average. Results from upstream of the work site and downstream at the water intake have been always in the same range which means the construction has not modified the river quality.



Turbidity

Turbidity is a measure of cloudiness which is caused by suspended sediment in the water. Normally the Inukjuak River flows almost crystal clear and all efforts are made to keep it that way. Turbidity is measured in the field using a hand-held digital meter that measures water cloudiness (or 'light scatter'). Turbidity measurements taken since work started on the Hydro project have remained low (water has been consistently clear).

Based on results from 2019 (KRG), the Inukjuak River's turbidity usually is between 0.4 and 0.9 NTU. In most cases, turbidity results are nearly identical upstream and downstream of work. Even in situations where downstream levels were higher, the result was still under 5, which is considered excellent according to the Environment Ministry. This shows that work has no significant impact on water quality.

ᐃᓐᓇᕕᒃ ᐃᑯᒪᑎᓕᐅᕐᕕᓴᐅᑉ ᓴᓇᔭᐅᓂᖓ
ᐃᒪᐅᑉ ᐃᑉᐱᕆᔭᐅᒐᓱᐊᕐᓂᖓᓂᒃ ᑐᓴᐅᒪᑎᑦᓯᓂᖅ

ᓯᑉᑎᒻᐱᕆ 2020

ᐃᓐᓇᕕᒃ ᐃᑯᒪᐅᑎᓕᐅᕐᕕᓴᐅᑉ ᐱᓇᓱᐊᕐᑕᐅᓂᖓ ᐱᕆᐊᕐᓯᒪᓕᕐᒪᑦ ᑕᒪᓐᓇᓗ ᐃᓄᑦᔪᐊᒥ ᐃᒪᑦᓯᐊᖅᑲᓇᐊᖅᑲᕐᓂᖅ ᐃᒥᕋᑦᓴᒥᒃ ᐱᒻᒪᕆᐅᓂᕐᐸᐅᑎᕙᕗᑦ. ᖃᓄᓕᒫᑦᓯᐊᖅ ᐱᓇᓱᐊᕐᐳᒍᑦ ᓱᒃᑯᑕᐅᑎᑦᓯᒍᓕᑦᓯᑕ ᐃᒪᕐᒥᒃ, ᐆᑦᑐᕋᐅᑎᕆᑦᓯᔪ ᐊᐅᓚᐅᑎᓕᕐᑯᑎᓕᒫᕗᑦ ᐱᐅᓂᕐᐸᐅᑎᒐᓱᐊᕐᓯᕆᑦ ᑯᕙᔪᖅᑲᖅᑯᔫᙱᕐᒍᑦ, ᓄᖅᑲᙵᑎᑦᓯᒐᓱᐊᕐᓯᑕᓗ ᐃᒪᕐᓗᒥᒃ ᑯᕕᑎᑦᓯᒍᓕᑦᓯᑕ ᐃᓄᒃᔪᐊᑉ ᑰᖓᓄᑦ ᑲᑭᐊᑦᑑᒪᑦ.

ᐃᑉᐱᒍᓱᑦᓯᐊᕋᓱᐊᕋᑦᑕ, ᐃᒪᐅᑉ ᖃᓄᐃᓐᓂᖓᓂᒃ ᖃᐅᔨᒪᒐᓱᐊᖅᑲᑦᑕᓇᕗᒍᑦ ᖃᐅᑕᒫᑦ ᖃᐅᔨᓴᕋᑦᓴᑖᖅᑲᑦᑕᓯᑕ ᐃᓄᒃᔪᐊᑉ ᑰᖓᓂᑦ.

ᖃᐅᔨᒪᒐᓱᐊᕐᓂᒧᑦ ᐱᓇᓱᐊᕐᑕᐅᖃᑦᑕᑐᑦ

ᐃᒪᖅ ᓱᒃᑯᓇᕐᑐᒧᑦ ᓱᕐᕋᑕᐅᕐᑯᓇᒍ ᓴᓇᔪᓄᑦ, ᒪᕐᕉᓂᒃ ᖃᐅᔨᓴᕋᑦᓵᓂᒃ ᐃᒪᕐᑖᓰᒍᔪᒍᑦ ᑌᒪᙵᑦ ᖃᐅᔨᓴᓇᐊᖅᑲᓕᑐᐊᕋᑦᑕ.

- ᐁᑉᐸᖓ ᐱᓇᓱᐊᕐᕕᐅᔫᑉ ᑲᖏᐊᓂᑦ ("ᐊᐅᓚᑦᓯᕕᒻᒥᑦ"- ᐃᒪᑦᓯᐊᓚᓐᒥᑦ)
- ᐁᑉᐸᖓ ᐱᓇᓱᐊᕐᕕᐅᔫᑉ ᒥᑦᓯᑎᓐᓂᑦ ("ᖃᐅᔨᓴᕋᑦᓴᑖᕐᕕᒥᑦ") ᐊᓯᑦᔨᐸᓪᓕᐊᓂᖅᑲᕐᒪᖕᒫᑦ ᖃᐅᔨᒪᒐᓱᐊᕈᑎᒥᒃ.

  ᐱᓇᓱᐊᕐᕕᐅᔫᑉ ᒥᑦᓯᑎᓐᓂ ᖃᐅᔨᒪᒐᓱᐊᕐᕕᒃ ᐃᓄᒃᔪᐊᑉ ᐃᒪᕐᑕᕕᖓᓂᑦ ᐱᔪᒥᒃ ᖃᐅᔨᒐᓱᐊᕐᕕᐅᖃᑦᑕᑐᖅ. ᐃᓄᒃᔪᐊᒥᐅᑦ ᐃᒥᕋᑦᓴᒥᒃ ᐃᒪᕐᑖᕕᕆᔫᖓᓂᑦ.

ᑕᒐᑕᒐᐅᑎᓪᓗᒍ ᖃᐅᔨᓴᕐᑕᐅᖃᑦᑕᑐᑦ ᓂᕈᒥᓐᓂᖓ, pH-ᒧᓂᕋᕐᑕᐅᔪᖅ ᐊᒻᒪᓗ ᐃᓯᕐᓂᖓ. ᑕᒣᓐᓇᖅ ᖃᐅᔨᓴᐅᑎᙱᑦ ᖃᐅᔨᒍᓐᓇᓯᖃᑦᑕᓯᑎᒃ. ᐊᓯᖕᒋᑦᓕ ᖃᐅᔨᒪᒐᓱᐊᕐᑕᐅᔪᑦ ᖃᐅᔨᓴᕐᑕᐅᒥᐊᓪᓚᓇᐊᖅᑲᖅᑲᑦᑕᑐᑦ ᐃᓚᐅᑎᓪᓗᒍ ᖄᔫᑉ ᐃᓚᑦᓴᔭᖓ.

ᖃᐅᔨᔭᐅᖃᑦᑕᑐᑦ

ᐃᒪᐅᑉ ᖃᓄᐃᓐᓂᖓ ᖃᐅᔨᓴᕐᑕᐅᔪᕕᓂᖅ ᓂᓇᐅᒋᔭᐅᓯᒪᔪᒧᑦ ᑎᑭᐅᑎᖃᑦᑕᑐᑦ. ᓱᓕᕆᐊᓪᓚᓗ, ᑌᒪᙱᓚᓕᒫᑲᔩᒃ, ᐃᒪᖅ ᐊᑦᔨᒌᑐᐃᓐᓇᐅᖃᑦᑕᑐᖅ ᑲᖏᐊᓂᑦ ᒥᑦᓯᑎᓐᓂᓗ ᖃᐅᔨᓴᕐᕕᐅᔪᓂᑦ ᐱᔪᖅ. ᑕᒪᓐᓇ ᑐᑭᓕᒃ ᓴᓇᕕᐅᔪᖅ ᓯᕐᑌᓯᒪᑦᓴᖕᒋᑦᑐᖅ ᐃᒪᐅᑉ ᐱᐅᓯᖓᓂᒃ ᐃᒪᕗᓪᓗ ᐃᒥᕐᐸᑕᕗᑦ ᐊᑦᑕᓇᕐᑐᒦᓕᕐᑭᑦᓴᒐᓂ.

ᖃᓄᐃᓕᖕᖕᒐᑐᕕᓂᐅᔪᖅᑲᕐᐸᑦ ᓴᓇᕕᐅᔪᒥ, ᑕᒣᓐᓇᖅ ᑐᓴᕐᑎᓯᓂᖅᑲᕐᓴᕐᑐᖅ ᐊᐅᓚᑦᔭᓇᐊᑦᓴᐅᑎᒥᑐᑎᓪᓗ ᐅᐃᒪᓇᕐᑐᓯᐅᑎᒥᒃ ᐸᕐᓇᑕᐅᒪᔪᒥᒃ ᐊᑐᓕᕐᑎᓯᕆᐊᓯᑐᑎᒃ. ᐊᖏᖅᑲᑎᒌᒍᑕᐅᒪᑦᓯᓂ ᑲᑎᕕᒃ ᓄᓇᓕᓕᒫᑦ ᑲᕙᒪᖓᓄᑦ ᓄᓇᓕᐅᓪᓗ ᑲᕙᒫᐱᖓᓄᑦ, ᐃᑐᓕᓕᒃ ᐃᒪᑦᓯᐊᑉ ᐃᒥᕋᑦᓴᐅᑉ ᐊᐅᓚᑕᐅᒥᐊᖅᑲᕋᔭᕐᓂᖓᓂᑦ ᐃᒥᕐᑕᕕᓪᓗᒍᑦ ᖃᓄᐃᙱᓯᐊᓇᐊᖅᑲᕐᓂᖅ ᐱᑦᔪᑎᒋᑦᓯᒍ.

ᑐᑭᓯᒥᐊᓪᓚᕈᒪᔪᑦ ᓯᕙᓂᕈᓐᓇᑐᑦ ᐅᕗᖓ, 819 254-8101 ᖃᓇᑕᐅᔭᒃᑯᓗᓐᓃᑦ ᐊᓪᓚᓗᑎᒃ ᐅᕗᖓ: innavikhydro@innergex.com

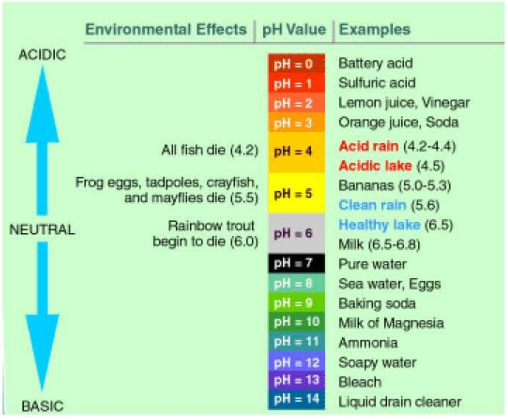
ᖃᓄᐃᓕᖅᑐᑦ ᐃᒪᐅᓂᒃ ᖃᐅᔨᒪᔭᐅᓚᓱᒪᒍᖅᑐᑦ

ᐃᒪᐅᓂᒃ ᖃᐅᔨᒪᔭᐅᓚᓱᒪᒍᖅᑐᑦ ᖃᐅᔨᒧᐊᓕᕆᓂᖅᓱᑦ ᐃᓄᐊᔪᐊᓂᒃ ᑯᓘᑎᒃ ᐃᒪᖅᑲ ᖃᓄᐃᓕᓪᒪᓕᒃ ᓇᓗᓀᔭᐅᑎᒪᔭᖏᓐᓄᓪᓗ ᐊᓱᓕᔨᕐᓂᐊᓂᖅᑐᓪᓗᒍ/ᐱᓕᔪᑎᖃᓂᖅᓪᓗᒍ ᓱᓇᐅᕐᓂᐊᓘᒃ ᐃᒥᑦᑎᒥᐅ ᐃᒪᖅᒥᐅ.

Ph

pH - Jᓂᕆᖅᑕᖏᓐ ᐃᒪᖅᒥ ᖃᐅᔨᒪᑐᓕᕆᓱᐅᔪᖏᓐ ᖃᓄᐊᓪᓚᐊᑎᒋᐅ ᓱᐅᑯᓇᖅᑐᑕᖃᓂᖅᒪᓕᒃᓴᓕᒃ acidity ᓯᔪᐅᔾᔨᐅ ᐅᕕᓪᓚᓂᒃ alkalinity ᓯᔪᐅᔾᔨᐅᑎᐅᒃ. ᐱᑎᐊᖅᓱᓂ 0-ᒥᑦ 14-ᒍᑦ, 7.0-ᒥᓪᓕᖅᒥ ᖃᓄᐃᓕᓪᒪᓕᖅᑐᑦ ᐅᕕᓪᓚᓂᒃᓴᖅᖃᖅᑐᒃ. ᐃᒪᑦᓱᐊᖅ pH ᑕᖃᖅᖃᖅᑐᖅ 7.0-ᒥᐅᒃ, ᑭᓱᐊᓂ ᑯᑦ, ᑕᓱᑦ, ᓱᓪᓗᐅᒃ ᖃᓄᐃᓪᓚᓂ acid-ᒥᐅᒃ ᐱᑕᖃᐅᓴᓪᓕᑦᑕ ᐱᐅᓱᖃᑐᐃᓪᓕᓱᑎᐅᒃ ᐃᒪᐅᑦ ᐃᓪᓚᐊᑯᓱᓪᓕᒃ ᑌᒣᓪᕿᐅᑦᓱᑎᐅᒃ.

ᑐᓪᓚᐃᑎᑦᓱᒥᑦ 2019-ᒥ ᖃᐅᔨᓴᐅᑎᐃᑯᓪᑦ, ᐃᓄᐊᔪᐊᓂᒃ ᑯᓘᑎᑕ pH-ᓚᑦ 6.98ᓗ 7.51ᓗ ᐊᑯᓪᓂᓚᑯᓪᓕᓪᓚᓱᒪᔪᖏᓐ. ᐱᓕᓱᐊᖅᑐᑦ ᐱᑎᐊᖅᓱᒪᓪᓗᑎᒥᑦ, 7.4 ᑭᓪᓕᓪᓚᒥᔪᖏᓐ. ᐱᓕᓱᐊᖅᓃᐃᐅᔨᐊᓂ ᑲᓪᓱᐊᓂ ᒥᑦᓱᑎᓪᓂᓗ ᖃᐅᔨᓴᖅᑎᐅᕕᓪᓕᑦᑐᑦ ᐊᑦᓴᑲᑐᐃᓪᓕᓕᐅᓱᒧᑦ ᑌᒣᒪᑦ ᐅᖃᐅᓪᓕᑐᒍᒧᑦ ᓴᓇᓂ ᓱᓇᓐᓄᑦ ᓱᓇᓗᒪᓕᕆᓂᖅᑐᓂᖏᓐᓄᖅ ᑯᑦ ᐃᒪᑦᓱᐊᓘᔪᓂᒃᓴᖅᑐᑦ.



ᐃᓱᖁᔨᓪᓕᐊᓂᖅ

ᐃᒪᖅ ᐃᓱᖁᔨᓪᓕᐊᓕᓪᒪᓚᑦᑎᓪᓕ ᖃᐅᔨᒪᒪᓱᐊᖁᖅᑕᐅᔪᖁᖅᖁᓪᓚᖅ ᐃᒪᖅᒥ ᑭᖑᓪᑐᑐᓗᓕᑦ ᑌᒣᓕᖅᑐᑦ. ᐱᐅᓱᖃᖅᓂᒃ ᐃᓄᐊᔪᐊᓂᒃ ᐊᑐᖅᓚᐅᖅᓯᒪᔪᓂᓪᓗ ᑌᒣᖅᑐᓪᓚᑎᑕᐅᓱᐊᖁᓱᓂ. ᐃᓱᖁᑎᓪᓕᓪᒪᓚᑦᑎᓪᓕ ᐊᑐᖁᓱᑎᐅᓱᒧᑦ ᑎᑐᒥᖁᑦᑕᐅᔪᓯᑎᒃ ᖃᐅᔨᒪᒪᓱᐊᖁᖅᑎᐅᑎᒃ ᐃᓱᖁᑎᑎᑕᐅᓱᐊᖁᖅᓱᒧᑦ. ᐃᑯᒪᐅᑎᓕᐅᔨᖁᖅᓱᒧᑦ ᐱᐅᓱᖃᑐᐃᓪᓕᓕᐅᓱᒧᑦ (ᐃᒪᖅ ᑲᑭᐊᓕᑐᐃᓪᓕᐅᔪᖁᖅᓱᒧᑦ.)

ᑐᓪᓚᐃᑎᑦᓱᒥᑦ ᑲᑎᐃᒃ ᓄᓇᓕᓕᒫᑦ ᑲᔪᒪᓚᑕ ᖃᐅᔨᒪᐅᑎᑎᓕᒪᓚᖅᑐᑦ, ᐃᓄᐊᔪᐊᓂᒃ ᑯᓘᑎᑕ ᐃᓱᓂᓚᖅ 0.4ᓗ 0.9ᓗ ᐊᑯᓪᓂᓚᑯᓪᓕᓪᓚᓱᒪᔪᖁᖅᓱᒧᑦ. ᖃᐅᔨᒪᒪᓱᐊᑎᐅᔨᓕᒪᓱᑦ ᐃᓱᓂᓚᓂᒃ ᑲᖑᓕᓂᒃ ᒥᑦᓱᑎᓪᓂᓗ ᐱᔨᓂᒃ ᐊᑦᓴᑦᑎᒫᓂᐅᓪᓕᐃᓪᓕᑦ. ᒥᑦᓱᑎᓪᓂᑦ ᐱᓱᒪᔨᑦ ᐳᖏᑐᓂᓱᐊᕐᓂᐅᔨᑦᑕᐅᓱᐊᖁᓱᓂᒃ 5 ᒥᑦᓱᑎᓪᓚᖑᖑᓪᓕᓱᑦ ᑕᒪᓪᓕᓗ ᐱᐅᔨᒪᓕᑎᓂᐅᓂᖏᓐᓄᑦᑕᐅᓱᓂ ᐊᕐᖁᑎᓕᑎᓂᐅᔨᒃ ᑐᖏᖏᑕᖏᓐᓄᑦᑎᓪᓕᓪᓚᓱᒪᓕᒃ ᐃᒪᑦᓱᐊᖅᑲᓕᖏᓐᓄᑦᓱᑎᐅᒃ. ᑕᒪᓪᓕ ᓄᐃᑕᑎᑦᓱᒥᖏᓐ ᐱᓕᓱᐊᖅᑐᑦ ᓄᐃᑕᔨᒥᐅ ᓱᓇᐅᓂᖏᓐᓄᖅᑲᓂᖏᓐᓄᒪᓕᑕ ᐃᒪᑦᓱᐊᖅᑲᖏᓐᓄᓂᖏᓐᓄᓪᓗᒥᐅ.