BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

YUKON GOVERNMENT

NORTH FORK ROCK DRAIN, SEEPAGE INTERCEPTION SYSTEM, FARO MINE

AS-BUILT REPORT DOWNSTREAM ELEMENTS

FINAL

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March 19, 2015
Project No.: 0533-010-07

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Dear Mr. Brassard,

Re: As-Built Report, Downstream Elements, NFRD Seepage Interception System, Faro Mine

Please find the as-built report for the downstream elements of the North Fork Rock Drain (NFRD) Seepage Interception System (SIS) Project. As requested, the other aspects of the project are contained in the separate report on the upstream elements.

We thank you for the opportunity to provide service once again at Faro Mine and we look forward to continuing our relationship with the Yukon Government.

Yours sincerely,

BGC ENGINEERING INC.
per:

ISSUED AS DIGITAL DOCUMENT.
SIGNED HARDCOPY ON FILE WITH
BGC ENGINEERING INC.

James W. Cassie, M.Sc., P.Eng.
Principal Geotechnical Engineer

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ACRONYMS AND ABBREVIATIONS

A	ampere
AANDC	Aboriginal Affairs and Northern Development Canada
back hoe	CASE back hoe
BGC	BGC Engineering Inc.
C-Can	pumping station
CAT330	Caterpillar 330C excavator
CAT336	Caterpillar 336 excavator
CAT773	Caterpillar 773B haul truck
CAT988	Caterpillar 988 front loader
CH2M	CH2M Hill Canada Ltd.
CMP	Corrugated Metal Pipe
Creek	North Fork Rose Creek
D6	Caterpillar D6R dozer
Deere400	John Deere 400D articulated truck
DR11	pressure rating 160 psi
DR17	pressure rating 100 psi
DS	Downstream
DSAR	Downstream Access Road
DSR	day shift report
DSSC	Downstream Seepage Collection System
E	east
ECL	Elemental Controls Limited
ELR	Ecological Logistics & Research Ltd.
FM	Field Memorandum
FMC	Faro Mine Complex
fork lift	SELLICK S100 fork lift
front loader	VOLVO L150G front loader
FPMT	Faro Project Management Team
GPS	Global Positioning System
grader	Caterpillar 14H grader
GRF	General Rock Fill (unsorted)
HDPE	high-density polyethylene
hiab	HIAB 300-5 hiab

IFC	issued-for-construction
kg	kilogram
kVA	kilo-volt-ampere
L	litre
Laberge	Laberge Environmental Services
m	meter
Minnow	Minnow Environmental Inc.
N	north
NFRC	North Fork Rose Creek
NFRD	North Fork (of Rose Creek) Rock Drain
NF2	Water Quality Station NF2
NF2A	Water Quality Station NF2A
NF2B	Water Quality Station NF2B
Nuline	NuLine Powerline Contractors Ltd.
PCL	Pelly Construction Ltd.
PL	Pipeline
ppm	parts-per-million
Precision	Precision Service & Pumps Inc.
PVC	Polyvinyl chloride
Rev	Revision
RGC	Robertson Geoconsultants Inc.
s	second
SIS	Seepage Interception System
SFRC	South Fork Rose Creek
TC	thermocable circuit
TEES	Tlicho Engineering and Environmental Services Ltd.
track loader	KUBOTA SVL90 track loader
TP	test pit
Underhill	Underhill Geomatics Ltd.
US	Upstream
UTM	Universal Transverse Mercator
V	volts
W	watt
Wildstone	Wildstone Group of Companies

XRF	X-Ray Fluorescence
YG	Government of Yukon
Zn	zinc

LIMITATIONS

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1.0 INTRODUCTION

1.1. Background

The Government of Yukon (YG) and Aboriginal Affairs and Northern Development Canada (AANDC) are responsible for the management of the abandoned Faro Mine Complex (FMC), located in the south-central Yukon, approximately 20 km north of the Town of Faro and the Pelly River.

In November 2013, contaminated seepage was noted at the toe of the North Fork (of Rose Creek) Rock Drain (NFRD), while water in the headpond was compliant. The North Fork Rose Creek (NFRC) [the "Creek"] flows in a southwesterly direction around the southeast side of the mine, as shown on Figure 1-1, connecting up with the South Fork Rose Creek (SFRC) just upstream (or east) of the Original Tailings Impoundment.

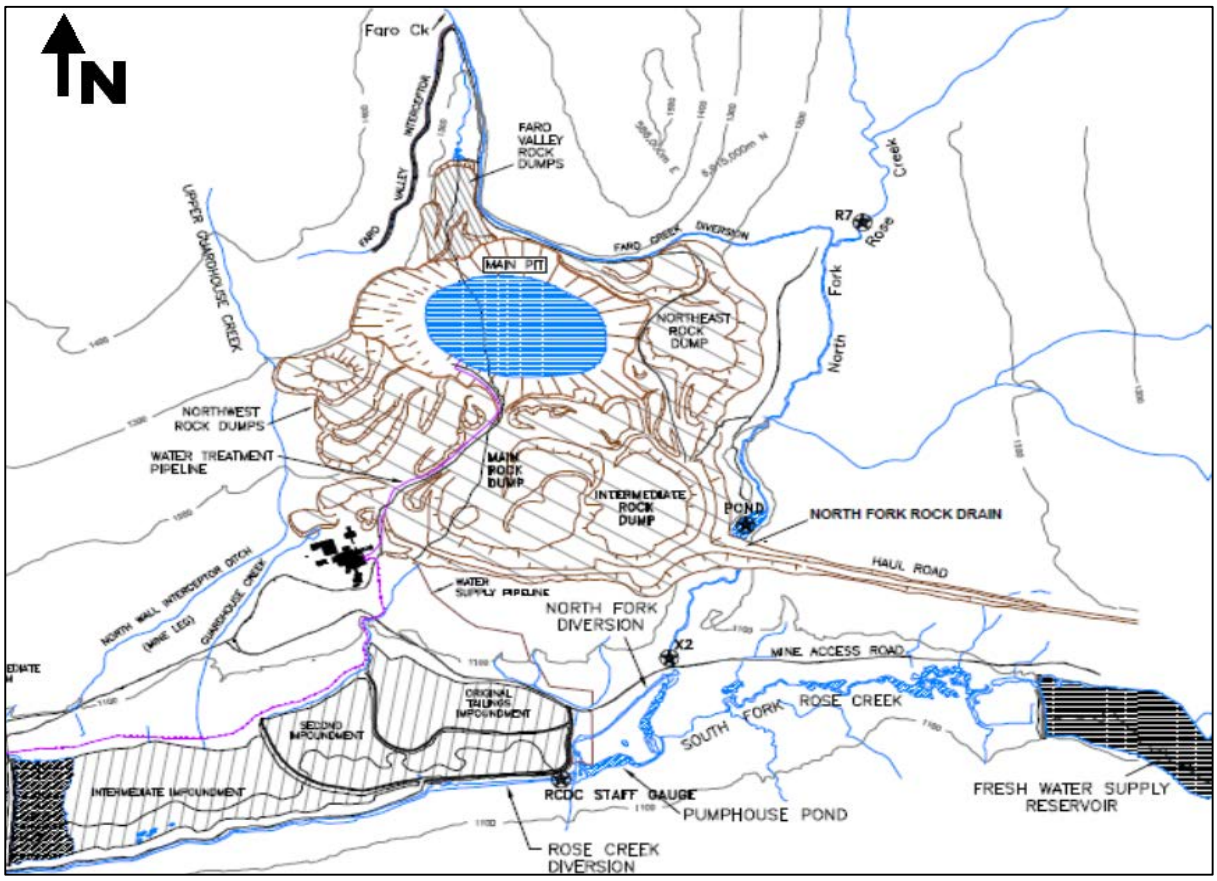


Figure 1-1. Location Plan for the North Fork Rock Drain along east side of the Faro Mine. Note that the fresh water supply reservoir shown on figure is now decommissioned.

Higher than typical and non-compliant concentrations of zinc (Zn) (0.5 mg/L is the maximum allowed) were noted at Water Quality Station NF2A (located on the right hand side of the discharge looking downstream) while seepage water at Station NF2B (located on the left side)

had compliant levels of Zn. RGC (2014) indicated that highly impacted seepage, likely from the Intermediate Dump (possibly the “Sulphide Cell”), was entering the NFRD underneath the haul road embankment. A February/March 2014 drilling program was initiated by RGC and 6 wells were drilled and tested but no contaminated seepage was located within these wells, where measured. During the 2014 summer high flow periods, the concentration of Zn in the seepage water was still elevated but below the upper acceptable discharge limits. It was expected that zinc concentrations exceeding the discharge limits, as were observed in the winter of 2013/2014, would again prevail this winter (2014/2015), if no mitigation measures were undertaken.

BGC Engineering Inc. (BGC) was contracted to complete designs and supervise construction for the interim measures, which were aimed at mitigating the concentration of zinc in the NFRC during winter of 2014/15 while a long term plan was developed by YG. These are not meant to be long term measures.

As part of the construction management services provided by BGC, an as-built report was to be prepared to document the final constructed works. YG requested that the as-built report be separated into two separate documents one for the upstream and on for the downstream elements. This report therefore documents the mitigation measures on the downstream side of the rock drain; the upstream works, completed to allow access to the upstream headpond, are documented under separate cover.

1.2. Project Overview and Report Contents

Following the initial review of options in late-July, as summarized in BGC (2014a), YG elected to proceed with the option that relied upon partial collection of the impacted seepage. YG retained BGC to provide design engineering and construction management for the NFRD Seepage Interception System (SIS), comprised of three major aspects, as follows:

1. Downstream Access Road (DSAR) – Construction of access road and turnaround / laydown area downstream of the rock drain.
2. Downstream Seepage Collection System (DSSC) – Construction of seepage collection sump on the downstream side, along with required pump infrastructure, power supply and heat traced pipeline to the Faro Pit.
3. Upstream elements – Construction of an access road to the headpond for the installation of a diversion berm followed by future access for small vehicles. These elements are documented under a separate report.

Given the short time frame for proposed design and construction activities (proposed to be completed by fall 2014), the lack of design input values and design criteria and the numerous uncertainties with proposed interim water segregation and mitigation measures, this project was undertaken on a “best efforts” approach. Also, no specific water quality objectives, resultant water quantities or compliance locations were specified as design criteria for the SIS, although compliance with the water discharge criteria was hoped to be the final outcome.

Additional details on the design objectives and the project aspects, elements and design changes are provided in Section 2.0.

This as-built document covers the construction of the DSAR and DSSC over a period of approximately four months, from the start of clearing and grubbing activities at the DSAR area on October 8, 2014 to the demobilization on January 30, 2015. This as-built report covers the following main topics:

- Key personnel and responsibilities
- Design objectives and elements
- Significant design changes
- Summary of construction activities and schedule, including as-built details
- Summary of construction management activities
- Recommendations for on-going monitoring and construction completion activities.

The design and layout of the DSAR, DSSC and required pump infrastructure, power supply and heat traced pipeline to the Faro Pit were provided originally in the BGC's issued-for-construction (IFC) Revision 0 of the Drawings and Specifications dated September 3, 4 and 25, 2014 and October 8, 2014, the IFC Drawings from the pumping station supplier dated November 3, 2014 and the electrical IFC Drawings from Dorward Engineering Services Ltd. dated January 16, 2015. Given the number of design changes, the IFC drawings are not included in this document, although some of their drawing numbers are referred to in the text. This original design has been superseded and this as-built report documents those changes made during construction and the final arrangement.

1.3. Project Personnel and Responsibilities

YG and AANDC manage the FMC site and hence, acts in the role of the Owner. YG's and AANDC's responsibilities included the decision making on methods and elements, overall direction and delivery of the planned construction work, contract management, environmental management and coordination between the different consultants, contractors and the care and maintenance contractor currently working on FMC.

BGC was retained to support the development of seepage collection options, engineering design of the NFRD SIS and the related construction management, given that field fitting would be required. BGC responsibilities included construction monitoring and field verification of the works, field decisions on design and construction modifications and measurement of the Work for payment purposes. In addition, BGC was also requested to develop a Sediment and Erosional Control Plan provided under BGC (2014). The performance of these measures noted on the plan was monitored by an independent environmental monitor contracted by YG, comprised of the following companies; Minnow Environmental Inc. (Minnow), Ecological Logistics & Research Ltd. (ELR) and Laberge Environmental Services (Laberge). The environmental monitoring results obtained from this program are not included herein.

CH2M Hill Canada Ltd. (CH2M) was retained by YG on two project aspects; a seconded project manager to the YG team and electrical engineering support to the design team.

Pelly Construction Ltd. (PCL) was retained by YG to provide construction services for the NFRD SIS. PCL responsibilities included construction of the work in accordance with construction documents (drawings and specifications) and associated contractual requirements. Further, PCL was responsible for all health and safety aspects and environmental protection of the works.

NuLine Powerline Contractors Ltd. (Nuline) was sub-contracted by PCL to provide construction services for the NFRD SIS power supply, including power poles, cables, transformers and connect heat trace. Nuline also produced the final engineering design for the NFRD SIS power supply.

Precision Service & Pumps Inc.'s (Precision) role was two-fold. They were subcontracted by BGC to provide design services for the collection sump and associated sea-can container (C-Can). Later, they were sub-contracted by PCL to supply and install the NFRD SIS pump and C-Can.

Wildstone Group of Companies (Wildstone) was sub-contracted by PCL to provide construction services for the NFRD SIS pipeline from the C-Can to the Faro Pit.

Tlicho Engineering and Environment Services Ltd. (TEES) was contracted by YG to provide on-going care and maintenance services for the entire FMC. TEES is also responsible for overall health, safety and security control at FMC.

Underhill Geomatics LTD. (Underhill) was retained by BGC to provide professional surveying and geomatics support services for the NFRD SIS project. As part of the construction process, Underhill provided both baseline (preconstruction) and layout survey of the NFRD SIS elements and an as-built survey of the elements constructed by PCL.

1.3.1. Key Personnel

The following is a list of the key personnel involved in the course of the project:

- Faro Mine Care and Maintenance Project Manager – Karen Furlong (YG)
- NFRD SIS Project Manager – Chad Brassard (YG, on secondment from CH2M)
- Regulatory Manager – Patricia Randell (YG)
- Senior Project Manager – Dustin Rainey (YG)
- Faro Mine Site Managers – Boyd Barstad / Barry Wilson (TEES)
- Design Project Manager – Jim Cassie (BGC)
- Electrical Engineering Design – Wendell Thiessen (CH2M)
- Construction Field Engineer – Joan Roca (BGC)
- Construction Project Manager – Dan Russell (Pelly)
- Construction Site Superintendent – John Garvice (Pelly)
- Pump and Control House Sub-Contractor Project Manager – Mike Lamont (Precision)
- Power Supply Sub-Contractor Project Manager – John Seeheaver (Nuline)

- Pipeline Sub-Contractor Project Manager – Mike Bernier (Wildstone)
- Environmental Management – Patricia Randell (YG) / Erik Pit (YG)
- Environmental - Fisheries and Aquatics – Cynthia Russel (Minnow) / Chris Jastrebski (ELR)
- On-Site Environmental Monitoring – Nicholas de Graff (Laberge) / Doug Davidge (Laberge)

The organization chart of the NFRD SIS project can be found on Figure 1-2.

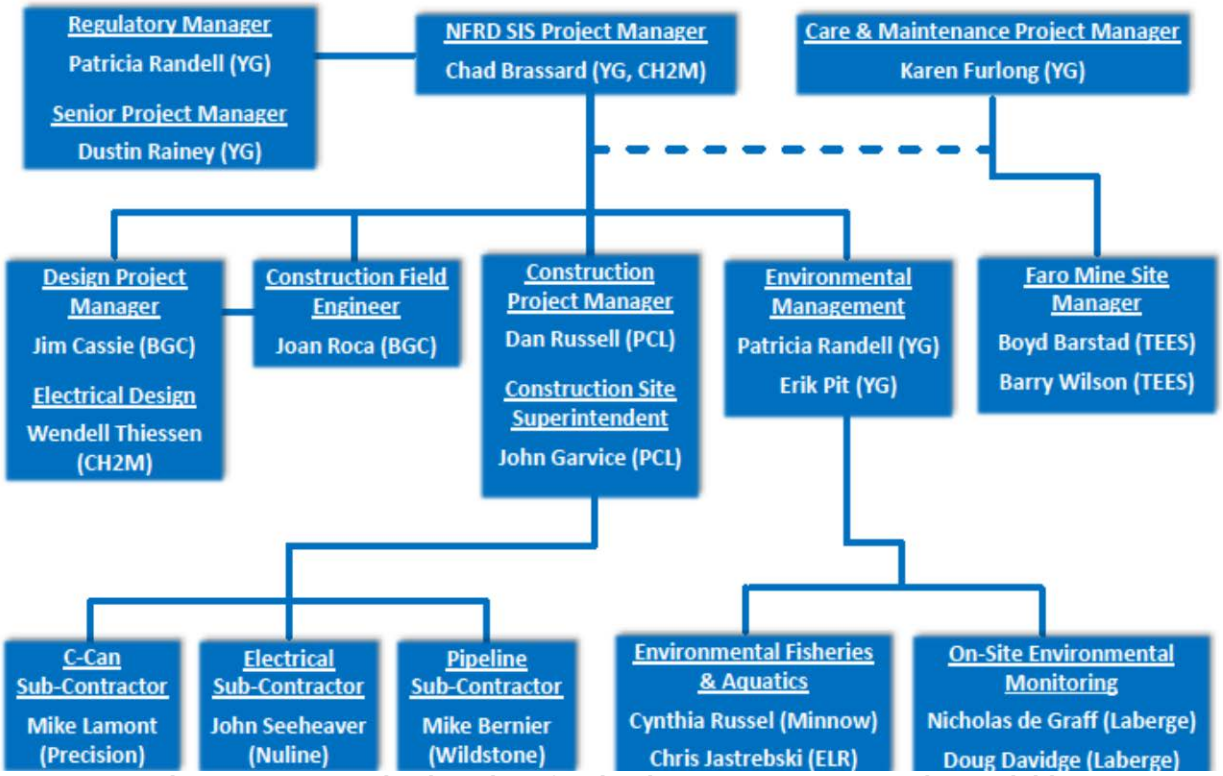


Figure 1-2. Organization chart for the downstream construction activities.

1.3.2. Site Visits

Regular site visits were conducted by YG representatives and staff. Dates and participants for each site visit are provided below:

- October 8 to 9, 2014 – Erik Pit and Chad Brassard (site visit)
- October 10, 2014 – Chad Brassard (site visit)
- October 28, 2014 – Erik Pit (site visit)
- October 29, 2014 – Peter MacKenzie (AANDC, site visit)
- December 12, 2014 – Dustin Rainey (site visit)
- January 15 to 16, 2014 – Chad Brassard (site visit)

2.0 ORIGINAL DESIGN AND CHANGES

2.1. Design Objectives

The NFRD structure forms a hydraulic constraint between the headpond on the upstream (US) side (Photo 2-1) and the seepage discharge on the downstream (DS) side (Photo 2-2).

Photo 2-1. View of the headpond on the upstream side of the rock drain (July 2014) with waste dumps on the far left. Note the North Fork Rose Creek inflow channel on the far right.

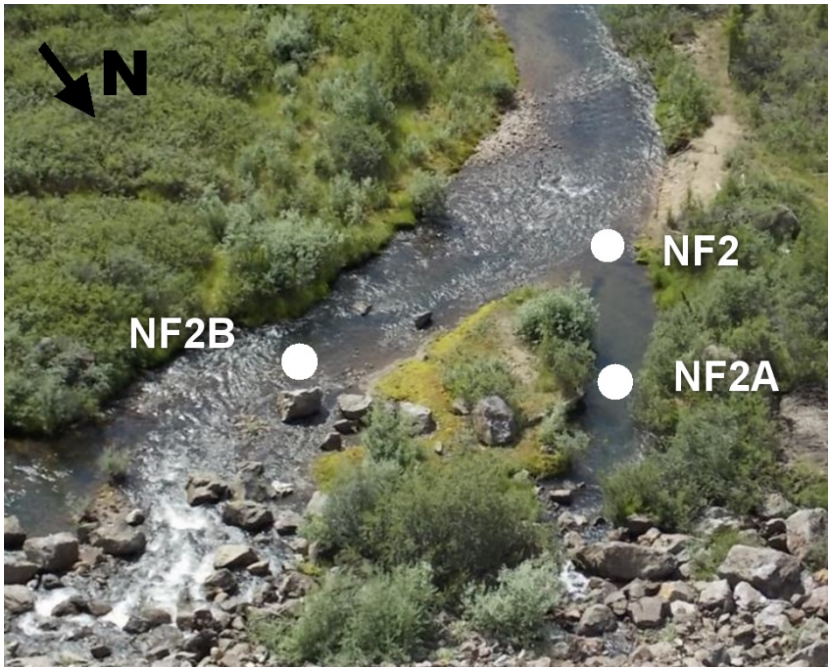


Photo 2-2. View of the seepage discharge on the downstream side of the rock drain with island located between the two streams (July 2014). Note the approximate locations of water quality stations referenced herein (NF2A on the right, NF2B on the left and NF2 in the background, by the right bank clearing).

As shown on Photo 2-2, the seepage discharge at the toe of the rock drain occurs in two separate streams of flow with an “island” separating the two streams. The impacted seepage has only been noted in the right stream (represented by Station NF2A) while the left side flow (represented by Station NF2B) does not contain any elevated Zn concentrations. As such, the objective of the NFRD SIS project was to collect and pump impacted water from NF2A side up to the Faro Pit, given it was the only potential water storage available on site. The pumping rate for seepage collection of 5 L/s was selected as the Faro Pit was nearly full, and it was necessary to preselect and procure a practically sized pump and associated pipeline system. Given that the flow quantity on the NF2A side is thought to vary up to 800L/s, the need for a diversion system at the upstream side was identified by BGC. A separate as-built report was prepared related to the upstream works, and is not mentioned further in this report. On the downstream side, it was necessary to segregate the less impacted fraction of the right hand side from the most impacted fraction. Therefore, the assessment of the conditions within the NF2A side and the installation of dedicated collection elements to divert the most impacted seepage to the manhole pump was required. Water diversion berms, a collection sump and pump arrangement and associated water pipeline were designed to complete the system.

As noted earlier, the design basis for this system was best efforts, in that no specific design criteria were developed and no specific investigations or assessments were done to support the development or design of the mitigation works. In addition, there was some significant uncertainty with the potential performance of some of the proposed elements. Given that context, aspects of field fitting for project components, along with observation aspects and project modifications were proposed.

BGC (2014a) contains a full description of the design objectives, as well as a discussion on the design assumptions, limitations and risks.

2.2. Original Design and Elements

Section 1.2 summarizes the three main elements to be constructed at the downstream area. Given the context of this report, the following sections provide a brief overview of the DSAR and DSSC only, along with required pump infrastructure, power supply and heat traced pipeline to the Faro Pit.

2.2.1. Downstream Access Road

The purpose of the DSAR is to provide access for the construction of the seepage collection system and associated infrastructure at the downstream area by articulated trucks followed by longer term access for smaller vehicles. The IFC version of Drawing FRNF-XD-02-07_Rev 0 shows the original design for the access road and laydown / spoil areas. The total original length of the DSAR was approximately 186 m, starting at the southeastern end of the existing S-Wells Cluster lay down area. The design consisted of a 9 m wide road constructed by placing sand and gravel on the prepared ground surface.

A spoil area was located on the northern side of the access (Stations 0+070 to 0+095), whereas the laydown and turn around areas were located on the southern side of the access road (Stations 0+140 to 0+186). At the end of the road, a working area and pump house pad had to be created.

Note that the IFC Drawing also contains the Specifications for the DSAR construction, including but not limited to the clearing and grubbing of the existing ground, the identification (proof roll test) and treatment (sub-excavation and backfilling) of soft spots, and the local wasting of unsuitable material at the designated spoil area.

2.2.2. Downstream Seepage Collection System

Based on the available information, a seepage interception system was designed as an option intended to segregate and collect the most impacted fraction of the water emerging at the NFRD toe. The original design for the DSSC is shown on the IFC version of Drawings FRNF-XD-02-08_Rev 0 and FRNF-XD-02-09_Rev 0.

In the design, a diversion of the NF2A flow and the dewatering of the stream bed was required. Then, the installation of two low permeability till core berms and a pump manhole backfilled with permeable rock was needed. Specific collection PVC pipes could then be installed to direct the most contaminated water to the manhole. Finally, the temporary stream diversion could be decommissioned.

Note that after clearing and grubbing, the original design shows the removal of the large rocks at the toe of the NFRD slope area to expose the seeps emerging under the rock fill. The plan was then to locate, determine the flow and the Zn concentration of the seeps emerging from the rock drain so that the system could separate the most contaminated water. The original design contemplated the modification of the water diversion and/or water collection system based on the assessment of the conditions within NF2A.

2.2.3. Pump and Control House

The original design included the installation of a pump station (C-Can) at the right side channel, above monitoring point 2A. Detailed pump and control house layout, including sections and details, are provided on the IFC Drawings FRNF-XD-02-10_Rev Nov3, FRNF-XD-02-11_Rev Nov3, FRNF-XD-02-12_Rev Nov3 and FRNF-XD-02-13_Rev Nov3 prepared by Precision.

The pump station was designed to maintain a flow rate of 5 L/s. Also, the pump station had to maintain pipeline pressure at reasonable levels to allow the pumping of water up to the elevation 1174 m, the highest elevation along the pipeline (approximately at Station 0+990). From Station 0+990 down the Faro pit, the design considered that the system will be gravity flow with discharge at the trench to the Faro Pit (Station 1+600).

The pump station consisted of a CMP sump, with one vertical turbine pump rated requiring approximately 7.5 kW power requirement. The pump had to be controlled with the level sensors, which will start and stop the pump at preselected water level in the sump.

The pumping system was to be hosted within an insulated steel shipping container (C-Can). Rails were specified in order to allow for skidding of the C-Can off the manhole during the summer period. Note that the C-Can had to be heated with a 575 volt electric heater sized to maintain a minimum temperature of 4ºC inside the C-Can.

2.2.4. Pipeline

The design included the installation of a heat-traced water pipeline from the C-Can to the Faro Pit. The IFC Drawing FRNF-XD-02-13_Rev 0 shows the general arrangement for the pipeline. The specific design details for the pipeline alignment and installation, including cross-sections for the road crossings and the installation of valves, are included on IFC Drawings FRNF-XD-02-14_Rev 0, FRNF-XD-02-15_Rev 0, FRNF-XD-02-16_Rev 0 and FRNF-XD-02-17_Rev 0. Note that the Specifications for the pipeline are also included on the drawings listed on this paragraph.

The original design included a pipeline running along the DSAR road up to the S-Well Cluster. At that point, the pipeline went up to the crest of the existing haul road (on top of the rock fill slope) and continued parallel to the pipelines from the S-Wells system up to the discharge at the Faro Pit. Note that two underground road crossings were required.

The design also showed the location of air/vacuum and drain valve structures along the route of the pipeline, protected by heated shelters to prevent freezing during operations on cold weather.

The pipeline system consisted of a 100 mm pre-insulated HDPE pipeline with the pressure rating along the route at DR11 and DR17 and containing heat tracing conduits.

2.2.5. Electrical Installation

The design for the required power supply to the pumping and heat trace systems is shown on the IFC Drawings FRNF-XD-02-18_Rev 0, FRNF-XD-02-19_Rev 0, FRNF-XD-02-20_Rev 0 prepared by CH2M-Hill. According to the design, the incoming 4160 V power feed from the haul road crest had to be extended by the installation of new 4160 V utility poles and #6 wires. Note that the new #6 wires had to be installed either on the new 4160 V utility poles or on the existing 69 kV utility poles at the crest of the haul road.

Power to the pumping station was to be supplied at 600 V (3 phase power) from three new pole mounted 150 kVA transformers (4160-600/347 V) located beside the C-Can. The installation of Teck cables from the new transformers to a quick disconnect panel mounted on the outside of the pumping station (C-Can) was required. Inside the C-Can, a single phase 120/240 V ac transformer had to be supplied.

The design showed a total of four heat tracing circuits (TC1, TC2, TC3 and TC4) controlled by an individual electronic thermostat controller mounted along the pipeline. The heat tracing circuits nearest to the C-Can (TC1 and TC2) were to be fed from the transformer and electrical panel in the C-Can. The other two heat tracing circuits (TC3 and TC4), located furthest away

from the C-Can, were to be fed from an additional 4160-120/240 V pole mounted transformer. Note that the installation of a new utility pole was required for the installation of this new pole mounted transformer.

2.3. Borrow Areas

The design indicated the use of small volumes of imported construction fill was required for the completion of the DSAR and DSSC, including approximately 1400 m^3 of Borrow A fill (sand and gravel), 50 m^3 of Borrow B fill (till) and 100 m^3 of Borrow C fill (rock protection fill). Given that the majority of the fill produced at the borrow areas was used for the construction of the upstream elements, the description of the borrow areas is summarized in the upstream mitigation works as-built report (2015).

2.4. Design Changes

Several design changes were introduced during construction in response to changed conditions identified during construction and the site conditions encountered or input received during construction from YG. The following is a summary of the key modifications introduced to the design drawings and specifications. A set of as-built drawings is included on Appendix A. A description of the design changes is also included on the daily Day Shift reports prepared by BGC (refer to Appendix B).

Note that Nuline's electrical design drawings by Dorward Engineering Services Ltd. included on Appendix A were issued after construction so they were intended to be as-built drawings. In addition, note that BGC and CH2M provided comments on Precision's (C-Can) and Nuline's (electrical) as-built drawings (refer to Section 5.0). The referred comments were not addressed by the time of preparing this report so the C-Can and electrical as-built drawings provided herein are considered to be draft versions. As per conversations with YG, definitive C-Can and electrical as-built drawings will be provided at a later stage on the final Operating and Maintenance Manual.

2.4.1. DSAR Upgrades

During pre-construction site visits performed on September 17, 22 and 23, 2014, YG, BGC and PCL noted that the road was recently upgraded by a third party before the mobilization of PCL to install monitoring wells close to the Creek (right side bank) and to provide access for monitoring within the DS area.

The Engineer noted that minimal work was required to upgrade the road so as to meet the design intent for construction equipment access. Further, YG commented that the construction activities related to the C-Can should be reduced due to cost and time constraints.

As agreed between YG, BGC and PCL, the required activities along the DSAR were followed:

- Minimal common excavation along the road to provide space for the installation of the pipeline and to slope back the existing cut slopes.

- Grading the existing road surfacing. A minimum width of 6 m was required.
- Modification of the clearing and grubbing limits as some areas were already cleared.
- Execution of smaller working and turn around areas at the end of the road. Non-local sand and gravel was already in-place to create roads and working areas.
- The spoil area will be located at the location originally intended for the turn-around area. In addition, no sub-excavation or the creation of a capping layer was to be completed.
- Placement of sand and gravel before Station 0+000 to create a straight section of road required for the delivery of the C-Can.

These activities were approved by the Engineer on October 8, 2014. The final configuration of the DSAR is shown on the as-built Drawing FRNF-XD-DS-01.

2.4.2. Working Area and Turn Around

The working area and turn around area had already been upgraded prior to initiation of this project (refer to Section 2.4.1). A reconfigured working area and turn-around area was created at the right hand side (looking downstream) Creek shore to provide access to the sump and the new control house pad. The local excavation of organics, roots and soft materials to a depth of 0.5 to 1 m was required on an area of approximately 259 m^2.

A platform of boulders and gravel was created for the pump house with boulders removed within NF2A. The rock platform was then overlain by a minimum of 0.5 m of General Rock Fill (GRF) from Borrow C (refer to detail 1 on as-built Drawing FRNF-XD-DS-01).

This change was approved by the Engineer as per conversations with YG on October 10, 2014.

2.4.3. DSSC Re-design

On October 10, 2014, the Contractor completed the removal of large boulders from the toe of the NFRD. Construction activities were temporarily suspended to assess the water discharge conditions within the NF2A channel. Preliminary observations performed by the Engineer before the demobilization from the Faro Mine showed the presence of four distinct emerging water flows at the downstream toe of the NFRD (refer to Photo 2-3).

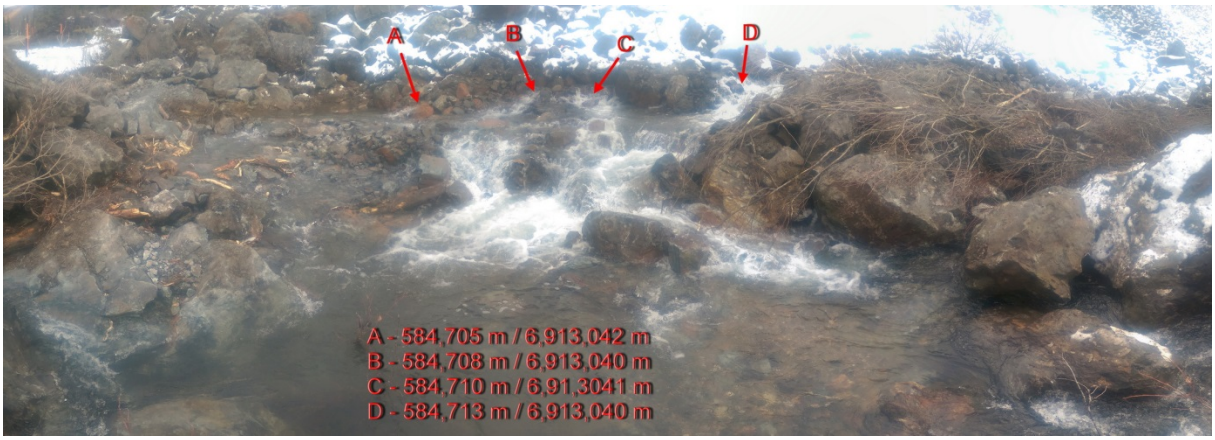


Photo 2-3. View of water emerging points A, B, C and D observed at the toe of the rock drain within the NF2A side (October 10, 2014). Looking upstream.

On October 16, 2014, BGC mobilized to site to assess the conditions within the NF2A area and to collect information regarding the water seeps at the toe of the NFRD. As per conversations with YG, the re-design of the DSSC and associated elements was required to divert and collect the most impacted water emerging at the rock fill toe as the reduction of the seepage flow within the NF2A was not possible. In addition, the simplification of both the collection and pumping systems was recommended since the most impacted water was found to be emerging close to the right hand side shore (looking DS) and the impact of glaciation on the observed water patterns over the winter months was unknown.

During a meeting held in Whitehorse on October 18, 2014, two different alternatives for the location of the manhole and seepage diversion system were presented and discussed with YG; a DSSC located close to the NFRD toe at the right hand shore (looking downstream) of the Creek and segregation of emerging point A (Option A), and a DSSC located in stream at the lowest point along the main NF2A channel and diversion of a fraction of the NF2A flow across the “island” by means of berms and trenches (Option B). The discussions covered the advantages, disadvantages and risks associated to the installation of the two different design concepts presented by BGC.

On October 20, 2014, YG selected the installation of the DSSC as per Option A. On October 21, 2014, YG instructed PCL to execute the DSSC as per the approved conceptual design. PCL mobilized to the Faro Mine site on October 24, 2014, to complete the installation of the DSSC. Note that construction activities continued at an hourly rate as directed by the Engineer on site.

As shown on Photo 2-4, Figure 2-1 and as-built Drawing FRNF-XD-DS-02, construction included the installation of a diversion berm between the first and second emerging points (points A and B on Photo 2-4). The berm was constructed with sand bags and the channel bed was modified to create two defined channels: the main NF2A channel (main channel close to the island between NF2A and NF2B streams), and a new diversion channel (small channel

close to the right hand shore). Note that the emerging points were renamed as NF2A-DIVW (A), NF2A-1 (B), NF2A-2 (C) and NF2A-3 for water monitoring stations.

Upon completion of the diversion berm, a 2 m deep excavation was executed at the right hand side shore of the Creek to install a 2.8 m deep HDPE corrugated manhole (sump). Following the installation of the perforated manhole it was protected with a geotextile wrapped around the outside, the sump excavation was backfilled with clean gravel and boulders from Borrow A (refer to Photo 2-4). Finally, the rock fill was overlain by a geotextile and a layer of sand and gravel from Borrow A.

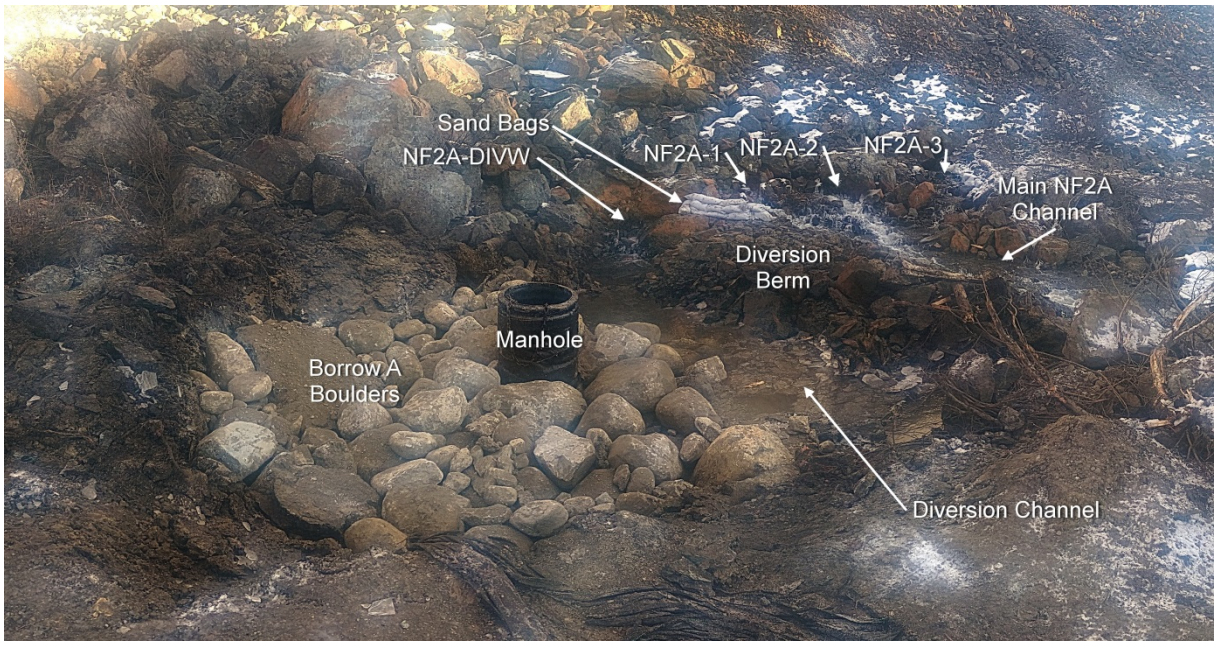


Photo 2-4. View of the diversion berm and channel created within the NF2A channel. Note the sump installed at the right hand side (looking downstream) of the Creek surrounded by a rock drain (October 25, 2014). Looking northeast.

The main NF2A channel collects the less impacted water flow from the three eastern (NF2A-1, NF2A-2 and NF2A-3) portions of the overall NF2A flow. The diversion channel collects the higher impacted water flow from the emerging point located further west (NF2A-DIVW) and divert it towards the rock fill and then to manhole. This distribution was selected based on the Zn concentrations returned by testing performed by TEES on water samples collected at the four emerging points. It was recognized that the seepage discharge flow rates and water qualities would change when ice formed during the winter.

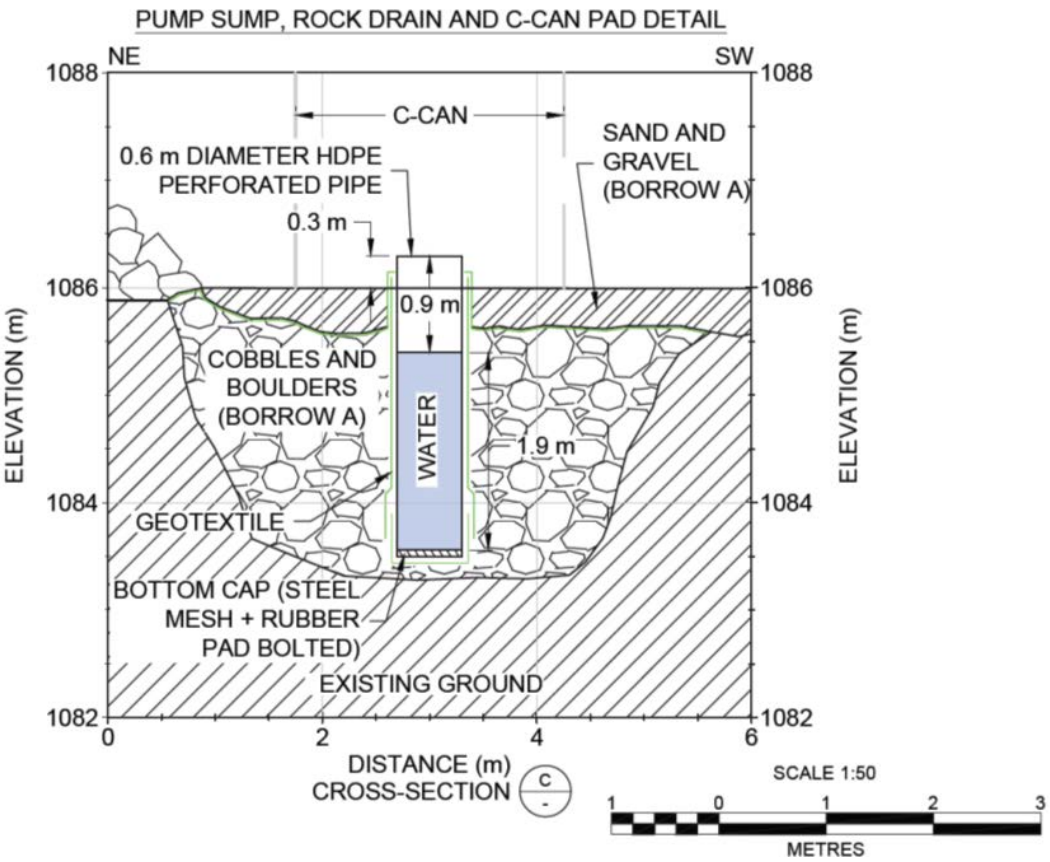


Figure 2-1. Schematic cross section showing the as-built details for the installation of the pumping manhole (sump) at the right hand (western) shore of the Creek.

The C-Can design was minimized and adjusted as per the new DSSC design. The main changes included the modification of C-Can dimensions and other internal elements. Also, some of the automatic functions of the pumping system were removed. The final control house design and pump is shown on as-built Drawings FRNF-XD-02-10 (AB)_Rev 2, FRNF-XD-02-11 (AB)_Rev 2, FRNF-XD-02-12 (AB)_Rev 2 and FRNF-XD-02-13 (AB)_Rev 2 by Precision.

2.4.4. Pipeline Crossings

The original design required the installation of a 600 mm corrugated double wall HDPE culvert at each road crossing for the protection of the pipeline. Inside the culvert, the installation of a 100 mm HDPE pipe was planned to protect of the electrical cables running in parallel to the pipeline. The 600 mm corrugated double wall HDPE casings were replaced by two parallel 300 mm steel pipes installed at a shallower elevation (approximately 2.2 m shallower at the first crossing and 1.1 m shallower at the second crossing). Thus no low spots were created along the pipeline.

This change was approved based on the following constraints:

- Pre-existing road crossings were executed following this approach.

- The relocation of pipeline crossings at a later stage (by TEES), if required, would have be complicated due to the presence of pipelines at different elevations.
- The steel pipes were already available on site.
- The smaller pipe diameter required smaller trench dimensions.
- The culverts were made of steel so they could be installed at a shallower elevation, and the excavation backfilled with material removed as part of the excavation.
- Deep excavations were not practical due to the presence of frozen ground.
- Deep excavations were not practical due to the presence of the existing pipelines.
- A second spare culvert could be installed inside the same trench. The minimum width of the trench was fixed by the width of excavator bucket.
- Pipeline would have a continuous gradient (pipeline slope) as no low point would be created under the road. As a result, the installation of 45º DR17 HDPE elbows and a drain valve at the second crossing were not required.

This change was approved by the Engineer on October 27, 2014.

The 100 mm HDPE conduit was not installed inside the 300 mm steel pipes. As shown on photo 2-5, the electrical cable was installed in a dedicated 300 mm steel pipe.

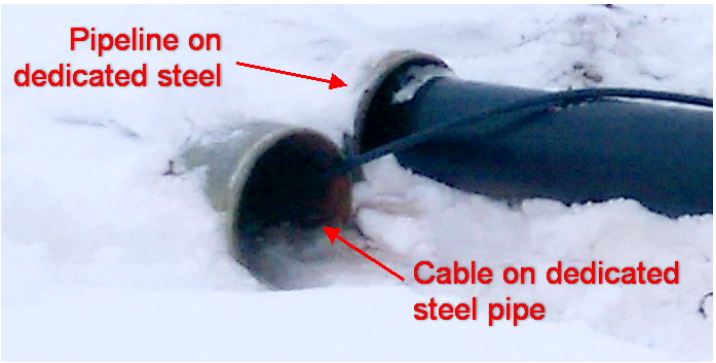


Photo 2-5. View electrical cable on dedicated steel pipe at the second crossing. Note that the 100 mm HDPE DR17 pipe is installed on a separate steel pipe.

2.4.5. Drain Valve Location

The installation of the drain valve at the second crossing was not required due to the revised road crossing design (refer to Section 2.4.6). Therefore, the drain valve could be installed at a different location along the pipeline.

The Contractor installed the available drain valve at a low spot identified along the DSAR close to the S-Wells cluster (approximately Station 0+005). The installation of the drain valve at this location will allow the drainage of the pipeline from the highest point along the DSAR (approximately Station 0+100) to the highest point along the pipeline.

This change was approved by the Engineer on October 27, 2014 as part of the modification of the road crossings.

2.4.6. Pipeline Alignment

The Contractor modified the alignment for the pipeline. The following is a list of the changes introduced during construction on the pipeline routing:

- Station 0+000 – The start of the pipeline was moved as per the new location of the C-Can during the re-design of the DSSC.
- Station 0+170 to 0+310 (field estimate of stations) –The pipeline was shifted a maximum of 10 m towards the southeast due to the presence of the S-Well infrastructure.
- Station 1+100 to 1+240 (field estimate of stations) –The pipeline alignment was shifted a maximum of 20 m towards the east (behind the existing Zone 2 C-Can) to avoid damaging existing infrastructure.
- Station 1+240 to 1+280 (field estimate of stations) – The alignment of the pipeline was modified so as to execute the pipeline crossing in parallel to the existing pipeline crossings.
- Station 1+280 to discharge at common ditch to Faro Pit – The pipeline was located at the western side of the existing S-Wells pipeline.

These changes were approved by the Engineer between December 3 and 4, 2014.

2.4.7. Dual Vacuum/Air Release Valve

The specified 25 mm Valmatic 101VV/22.3 dual vacuum breaker/air release valve was not available. An additional 25 mm Valmatic 22.3 Air Release Valve and an additional 25 mm Valmatic 101 VB Vacuum Breaker Valve were delivered to site and were installed in series at the required location. This change was approved by the Engineer to provide an equivalent dual valve.

2.4.8. Heated Enclosures

On December 16, 2014, the Contractor presented the concept design for the heated shelter for valves, including small insulated wooden shelters at valves #1, #3, #4 and #5, and a bigger insulated wooden shelter with an access door at valve #2. Refer to as-built Drawings FRNF-XD-DS-03 to 05 for the location of valves. The installation of a heater inside shelter #2 was required to keep the valve and pipe components from freezing, whereas the smaller shelters will be heated by means of providing extra lengths of thermocable, protected by additional sheets of insulation. According to the Contractor, power to feed the heater inside shelter #2 had to be obtained from the adjacent shack (housing for the S-Wells back-up generator).

On January 15, 2015, the Contractor decided to upgrade the shelters already installed at valves #1, #3, #4 and #5 to provide man access to all the valves. To heat the bigger shelters, the installation of heaters was then required inside the new shelters.

On January 18, 2015, the electrical sub-contractor informed that there was no available power to feed the heaters within the electrical installation. Meetings between YG, PCL, BGC, CH2M and Nuline were organized to discuss possible solutions. In the meantime, temporary heaters

were installed inside all shelters to keep the valves and pipeline components in working conditions.

On January 29, 2015, YG approved the installation of additional thermocable wrapped around the valves and pipeline components inside shelters #1, #2, #3 and #5. Also, YG approved the installation of additional insulation around all exposed elements to prevent heat loss. At shelter #4, a permanent heater will be installed by a third party at a later stage (refer to Section 5.0). It is important to note that no previous experience with this heating approach was available, BGC recommends the monitoring of valve components to verify that the system implemented was effective, including records for the temperature of the steel components and visual inspection of valves.

On January 30, 2015, the contractor mobilized personnel to the Faro Mine to complete the installation as approved by YG. Once the extra length of thermocable was spliced and wrapped around the valves, Roxul Comforbatt insulation was installed around the valves and pipes. As recorded on the day shift report for January 30, 2015, the Contractor also completed some of preliminary work related to the installation of the permanent heater at shelter #4. This activity will be completed at a later stage outside the scope of the NFRD SIS project. Therefore, the completion of this activity is not included on this report.

2.4.9. Upgrades to Existing 69 kV Overhead Line

The design called for new 4160 V wires to be installed under the existing 69 kV overhead line. The upgrade of the existing 69 kV overhead line was required to provide sufficient ground clearance as required by the applicable electrical codes.

The original 69 kV “chicken wing” style design was modified by moving the existing wires to new 250 mm cross arms installed on the existing 69 kV utility poles at a higher elevation. Then, the new 4160 V wires were installed on new cross arms installed at the elevation previously occupied by the 69 kV wires.

As-built Drawing FRNF-XD-DS-07 shows the location of the three 69 kV utility poles upgraded by the Contractor as approved by the Engineer on January 7, 2015. Refer to the electrical Drawing E-3-of-3 for a schematic showing the upgrades performed (Appendix A).

2.4.10. 500 kVA Transformer

The design required the installation of 3 x 150 kVA 4160-600/347 V pole mounted transformers at the downstream area to feed the pumping system and two heat tracing circuits. The installation of the 150 kVA transformers delivered to site was not possible due to incompatibilities with the existing electrical installation. The transformers initially delivered to the Faro Mine site were returned to Yukon Energy Corporation on December 10, 2014.

Due to time constraints related to the supply of new 150 kVA transformers (excessively long lead times for comparable units), a single 500 kVA/4160 V/347/600 V pad mounted transformer was delivered and installed at the downstream area. The change of the fuse disconnect

(upgraded from 400 A to 600 A) and the addition of a load break (safety shut down) for the transformer were also required.

The transformer was installed on a 1925 kg concrete vault to allow the entrance of cables from the bottom. As a result, the electrical cables had to be installed in a trench (1.1 m to 1.2 m wide x 0.5 m to 1.0 m deep). In addition, the placement of a bedding layer of sand and gravel for the cables was required.

These changes were performed by the Contractor prior to the electrical design being finalized, but were summarized on as-built Drawing FRNF-XD-DS-07 and electrical Drawing E-2-of-3 (Appendix A).

2.4.11. Upgrade of 4160 V Wires

The Contractor upgraded the size of the wires from a #6 to a #2 cable. The electrical sub-contractor explained that this change was required as the #6 cables will not support the ice loads required by the applicable codes.

These changes were performed by the Contractor prior to the overhead line design being finalized, but were summarized on the electrical Drawings E-2-of-3 and E-3-of-3 (Appendix A).

2.4.12. 4160 V Utility Poles

The location for the 4160 V utility poles was modified by the Contractor based on the observed site conditions. Note that as-built Drawing FRNF-XD-DS-07 shows the final location for the utility poles that were installed or upgraded as part of this project. The following is a summary of the changes introduced:

- Pole #1 (beside C-Can) – Moved approximately 25 m towards the northwest so as the pole will be close to the new 500 kVA transformer and aligned with the existing 69 kV pole at the haul road crest.
- Pole #2 (haul road crest) – Moved approximately 35 m towards the northwest so as the pole will be aligned with the existing 69 kV pole at the other side of the haul road.
- Pole #4 (brown shack) – Moved approximately 55 m towards the northeast due to the presence of the existing infrastructure. Note that Nuline decided to move the pole towards the northeast and not towards the southwest (towards the brown shack) so as to connect the 4160 V line into the second existing pole (from the brown shack) instead of the existing termination pole beside the brown shack (as per original design). Calculations performed by Nuline at a later stage showed that the stresses induced by the new wires installed from pole #4 to the existing 69 kV pole (pole #D) were not acceptable as per the applicable codes. As a result, the installation of a new 4160 V utility pole (pole #3) was required to reduce the stresses on pole #D.
- Pole #5 – Moved from the highest point along the pipeline to the Zone-2 area (approximately 240 m towards the north) as the original design showed a pole at the east side of the road, requiring a new road crossing. The local relocation of the pole at

the west side of the road was not practical due to the presence of the existing infrastructure.

These changes were performed by the Contractor prior to the overhead line design being finalized, but were also summarized on the electrical Drawings E-2-of-3 and E-3-of-3 (Appendix A).

2.4.13. Addition of New Anchors

The Contractor installed new anchor lines and push brace poles to anchor existing utility poles. As shown on Drawing FRNF-DSSC-07, the Contractor installed a new push brace pole at the existing poles #B and #F, and a new anchor line at pole #E.

These anchors were required to resist the new loads induced by the installation of new 4160 V wires on existing poles. This change was performed by the Contractor prior to the overhead line design being finalized, but were also summarized on the electrical Drawings E-2-of-3 and E-3-of-3 (Appendix A).

2.4.14. Addition of Grounding Meshes

Copper bare wire and grounding rods were incorporated by Nuline to ground the different elements as per the applicable electrical codes. Refer to Detail 1 on as-built Drawing FRNF-XD-DS-07 for details of the grounding mesh installed for the new utility pole, 500 kVA transformer, mounting panel and C-Can at the DS area. In addition, three utility poles (poles 1, 5 and B) were also grounded by means of copper bare wire and grounding rods. The location of these utility poles is also shown on as-built Drawing FRNF-XD-DS-07 (Appendix A).

This change was performed by the Contractor prior to the overhead line design being finalized, but were also summarized on the electrical Drawings E-2-of-3 and E-3-of-3 (Appendix A).

2.4.15. Addition of Splitter Boxes

The Contractor incorporated two splitter boxes at thermocable circuits TC1, TC2 and TC4. The addition of these splitter boxes was required as the installation of the specified cables on the specified 30 A disconnect fuses was not possible. Note that a 30 A disconnect fuse can accommodate cable sizes up to #8 Teck cables. No splitter box was added for thermocable circuit TC3 as the electrical cable could be directly connected to the disconnect fuse (smaller cable size).

The addition of short sections of #10 Teck cables was also required for the connection between the 30 A disconnect fuses and the associated splitter boxes within the same mounting panel. Also, bigger mounting panels with prefabricated concrete bases had to be supplied by the Contractor to accommodate all the elements.

These changes were performed by the Contractor prior to the electrical design being finalized, but were also summarized on electrical Drawing E-1-of-3 (Appendix A).

2.4.16. Mounting Panels

The design required the installation of mounting panels supported by aluminium channels buried into the existing ground. As commented on Section 2.4.15, bigger mounting panels were supplied by Nuline at each thermocable circuit to accommodate all equipment. Given the increased weight and wind loads for the new panels, Nuline supported the panels with 50 and 100 mm aluminium pipes and prefabricated concrete bases installed above grade. As a result, the mounting panels can be lifted and relocated with a fork lift or similar equipment if required during operations.

This change was performed by the Contractor prior to the overhead line design being finalized, but were also summarized on the electrical Drawings E-1-of-3 and E-2-of-3 (Appendix A).

2.4.17. Addition of Pump at Sump

On December 4, 2014, the Engineer noted that no water was flowing in the diversion channel and into the sump due to the glaciation of NF2A-DIVA seepage point. Seepage emerging at points NF2A-1 and NF2A-3 were also glaciated. As noted to YG, the installed DSSC would be compromised unless modifications within NF2A were introduced so water could reach the manhole.

On December 9, 2014, BGC presented seven different options for discussion purposes. Options included, but were not limited to, the modification of the diversion system, removal of ice plugs and the pumping of water from the NF2A channel to the C-Can sump.

On December 16, 2014, YG approved the installation of a Flygt 2610 pump 5.1 m downstream to the water sampling station NF2A and a 100 mm pre-insulated and heat traced pipeline from the new pumping location to the manhole. At 2.2 m from the pump outlet, a butterfly valve was installed to regulate the flow pumped to the manhole. A heat traced discharge hose was returning the water diverted at the butterfly pump to the pumping location.

The new pumping location was installed at the deepest point within the lower section of the NF2A main channel. This point was located downstream to the diversion berms previously installed. As a result, this location will receive all the water from all seeps emerging at the NF2A side of the rock drain with independence of their location, Zn concentration or flow. As such, no segregation of impacted NF2A flow was possible.

3.0 CONSTRUCTION

3.1. Construction Description

This section documents the construction activities performed by PCL during the construction of the DSAR, DSSC and associated pipeline, power supply and C-Can from October 8, 2014 to January 30, 2015. The activities performed during the development of borrow areas A and C are summarized in the upstream as-built document (2015).

The constructed DSAR is located on the southwestern side of the existing haul road. As shown on Photo 3-1, the access road starts close to the S-Wells area and ends at the right hand side (looking downstream) of the Creek. The remaining of the elements installed by PCL at the DS area, including the DSSC, C-Can and pumping system, were also located at the right hand side shore of the Creek (refer to Photo 3-1).

A pipeline and the required valves were installed from the C-Can to the Faro Pit. The installation of the required electrical elements to feed the NFRD SIS elements along the whole length of the pipeline was also completed by Pelly. As-built drawings FRNF-XD-DS-03 and FRNF-XD-DS-07 show general arrangements for the pipeline and the elements comprising the electrical installation (refer to Appendix A).

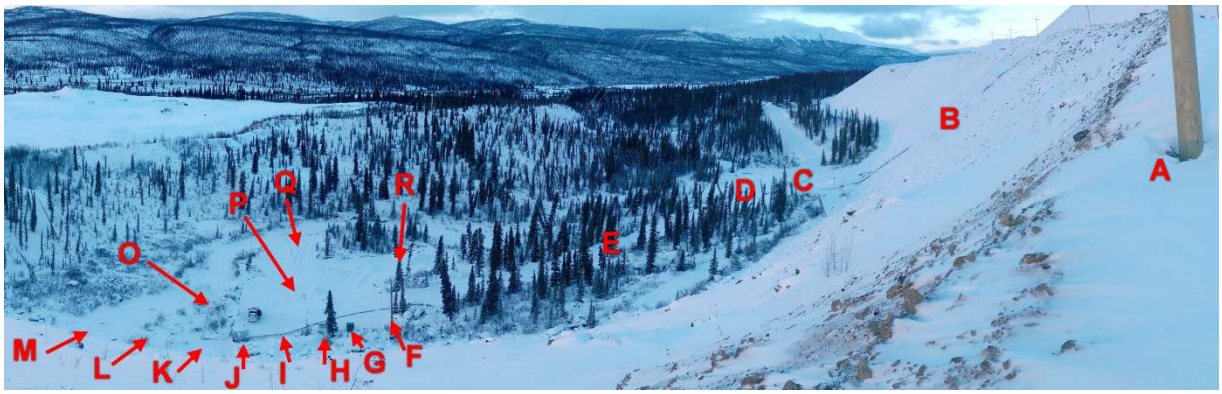


Photo 3-1. View of the DSAR, DSSC, pipeline and control house installed at the downstream area (January 21, 2015).

Note the 4160 V utility pole #2 (A), pipeline on NFRD slope (B), S-Wells Cluster (C), start of DSAR (D), DSAR (E), 4160 V utility pole #1 (F), 500 kVA transformer (G), mounting panel (H), Pipeline (I), C-Can (J), NF2A channel (K), "island" (L), NF2B channel (M), pump installed instream (O), turn around and working area (P), existing road and working area (Q), laydown and spoil area (R).

For a photographic record of the DS construction activities refer to the attached daily Day Shift Reports included on Appendix B.

3.2. Construction Activities

The following is a summary of the construction activities performed by PCL at the DS side of the NFRD.

3.2.1. Mobilization

The Contractor mobilized the required equipment to the downstream area on October 8, 2014 to start the clearing and grubbing. When required, the equipment was parked on a lay down area located in front of the S-Wells Cluster. The use of escort vehicles was required when moving equipment on the public section of the road from Borrow A or C to the DSAR area.

A list of the equipment used by PCL can be found on Section 3.4.

3.2.2. Clearing and Grubbing

The Contractor completed clearing and grubbing inside the limits marked by Underhill, during the pre-construction baseline survey, or by the Engineer, after the revaluation of upgrades to DSAR (refer to Section 2.4.1). On these areas, the Contractor removed both the vegetation and the superficial layer of organics by means of heavy equipment (dozer or excavator). Note that hand tools (power saw) were intermittently used to complete the controlled clearing of large trees close to the Creek. The material cleared was moved to the spoil area, as approved by the Engineer.

The areas close to the Creek were cleared with support of hand tools (power saw) to prevent disturbance and transport of fines into the Creek. Also silt fences were installed along the Creek shore prior to the clearing and grubbing operations. Finally, note that a part of the “island” was cleared with hand tools to allow the observation of the NFRD rock fill toe.

3.2.3. Proof-Roll Test and Sub-Excavation

The Contractor completed the proof roll test using the available articulated truck (loaded), excavator or dozer. The areas that were previously upgraded by a third party were also tested by proof-rolling.

As commented on Section 2.4.1, no sub-excavation was performed within the spoil area. In addition, a small zone (7.6 m x 5 m approximately) showing some deformation was identified within the access pad to the C-Can (Area 3). Details for Area 3 are included on as-built Drawing FRNF-XD-DS-01. The area was no sub-excavated as a geotextile overlain by a 0.5 m of sand and gravel from Borrow A was installed. This area did not show deformation at later stages.

3.2.4. Common Excavation

The Contractor mobilized an excavator to execute the following common excavations:

- DSAR northeastern cut – Excavation to provide a minimum road width of 6 m and to slope back the cut wall to a 2H:1V slope.
- Manhole – Excavation under water of a 2 m deep excavation for manhole and drain rock installation (see Figure 3).
- First pipeline crossing (Stations 0+350 to 0+400) – Excavation of a 1 m deep and 1.8 m wide trench (field estimated average).
- Second crossing (Stations 1+230 to 1+270) – Execution of a 1 m deep and 1.2 m wide trench (field estimated average).

No seepage was observed on the excavated walls along DSAR or trenches.

In addition, support from TEES (excavator) was required to execute the following excavations:

- Utility poles – 2.6 m deep excavations for new poles. Also, shallow excavations for the push brace poles and anchor lines.
- 500 kVA Transformer (refer to Section 2.4.11) – 1.5 m deep excavation for the transformer vault. Also, associated cable trenches.

3.2.5. Fill Placement

The placement of construction fill was completed using an articulated truck, a dozer and an excavator. The fill was compacted using a minimum of two passes of the same equipment or excavator bucket as approved by the Engineer.

Note that the Contractor created an intermediate stockpile of Borrow A sand and gravel beside the entrance gate to the S-Wells area with haul trucks to increase the production rates. An approximate volume of 44 m^3 remained on the stockpile when PCL demobilized.

Four different construction materials were used during construction:

- Turn-around area at the end of DSAR – Three different fills:
  - Area 1 – A 0.5 m thick layer of Borrow C GRF was placed over an approximate area of 259 m^2 to cover a platform of boulders (refer to Section 2.4.2)
  - Area 2 – A 0.2 m thick layer of Borrow A sand and gravel was placed over the existing sand and gravel to level the area between Area 1 and Area 3.
  - Area 3 – A 0.3 m thick layer of sand and gravel from Borrow A was placed over and area of 101.06 m^2 (access to C-Can). Note that at an area close to the manhole pad (approximately 38 m^2) the thickness was 0.5 m (refer to Section 3.2.3).
- Manhole pad (Area 4) – As shown on Photo 4 and Figure 3, some clean Borrow A gravel was placed to level the bottom of excavation (underwater). Once the manhole was installed, the excavation was backfilled with clean Borrow A boulders (underwater). On top, a 0.3 m thick layer of Borrow A sand and gravel underlain by a geotextile (approximately 22 m^2) was placed.

- DSAR Station 0+000 (Area 7) – A minimum of 0.3 m thick layer of sand and gravel from Borrow A was placed on the existing ground to create a straight section of road over an approximate area of 427 m^2.
- Road crossings – The bottom of the trenches was levelled with common material previously excavated. Once the steel culverts were installed, the trench was backfilled with existing common excavation material and compacted with the excavator bucket. Any particles larger than 0.5 m was removed prior to re-use.
- Heated Shelters – Borrow A sand and gravel was used to create a platform for the wooden enclosures for valves and to seal the perimeter of the shelter.
- Sand Bags – Borrow A sand to fill sand bags used at the DSSC diversion berm and C-Can.
- 500 kVA transformer – Borrow A sand and gravel was used to create a bedding layer for the cables and grounding copper cable on trenches and then to backfill trenches and vault excavation. Note that a warning tape was buried on top of the cables.

Refer to as-built Drawing FRNF-XD-DS-01 for a location of areas 1, 2, 3, 4 and 7.

3.2.6. Sediment and Control Measures

The required sediment and control measures were described on the sediment and control plan prepared by BGC (2014b). The description of the sediment and control measures implemented during construction can be found below:

- The limits for the required clearing and grubbing were clearly marked on the field. Clearing and grubbing activities were minimized to reduce disturbance of vegetated buffers.
- Road surfaces were properly graded to prevent the accumulation of runoff water.
- A fish fence was installed by the environmental monitor 80 m downstream to the confluence of NF2A and NF2B channels (end of the “island”). The salvaging of fish was completed before the execution of any activity inside the area of exclusion (30 m from the Creek shore).
- Silt fences were installed along the Creek shore. As shown on as-built Drawing FRNF-XD-DS-01, approximately 61 m of silt fences were installed before the execution of any construction activity within the exclusion area (30 m from the Creek shore).
- The removal of rocks or the installation of the DSSC and pumping manhole was performed with the continuous monitoring of the water turbidity on the Creek (by independent environmental monitor). As directed by the environmental monitor, construction activities were paused when the turbidity was close to the threshold limits. The instream works were only interrupted for 10 to 15 minutes.
- A geotextile, lot logs and some boulders were installed at the Creek (eastern) end of the manhole pad to protect it against erosion.
- Log lots were installed for the protection of the areas cleared on the “island”.

3.2.7. DSSC Installation

At the toe of the rock drain, seven large boulders (approximately 1.5 m diameter) were broken with an excavator equipped with a rock hammer (October 9, 2014). Then, the excavator removed the smaller boulders to expose the emerging seeps (October 10, 2014).

At a later stage (October 24, 2014), an excavator relocated the existing material within NF2A to create a diversion berm and the two diversion channels; the main NF2A channel (collecting the flow from NF2A-1, NF2A-2 and NF2A-3), and the diversion channel (collection the flow from NF2A-DIVW). At the right hand side shore (looking downstream), the pumping manhole and C-Can pad was installed respectively on October 24 and 25, 2014 (refer to Sections 3.2.4 and 3.2.5).

On January 15, 2015, the C-Can was mobilized to the downstream area and installed. Note that the installation of timber supports under the C-Can skids was required to level the C-Can. Also, that sand bags were installed around the perimeter to prevent the circulation of cold air under the C-Can. Following the C-Can installation, Precision completed the installation of the pumping system.

The Contractor completed the installation of the new pump and pipeline system to feed the manhole on January 16, 2015, including the 100 mm pre-insulated heat trace pipeline (DR11), insulation of the 90º elbow, connection of the pipeline to the manhole end, installation of heat trace and location of wooden supports to level the pipeline. Note that support from TEES was required to complete this installation, including but not limited to the following:

- Execution of a hole on the ice
- Fabrication of an A-frame to support the pump
- Supply and installation of a Flygt 2610 pump
- Supply and installation of a butterfly valve and discharge hose
- Connection of the pump, hoses and butterfly valve components.

The final configuration of the pump and pipeline installed at the NF2A channel is shown on Figure 3-1. The final configuration for the DSSC is included on as-built Drawing FRNF-XD-DS-02. Refer to as-built Drawings FRNF-XD-02-10(AB), FRNF-XD-02-11(AB), FRNF-XD-02-12(AB), FRNF-XD-02-22(AB) and 90008-06(AB) for the C-Can and pumping system draft as-built drawings by Precision.

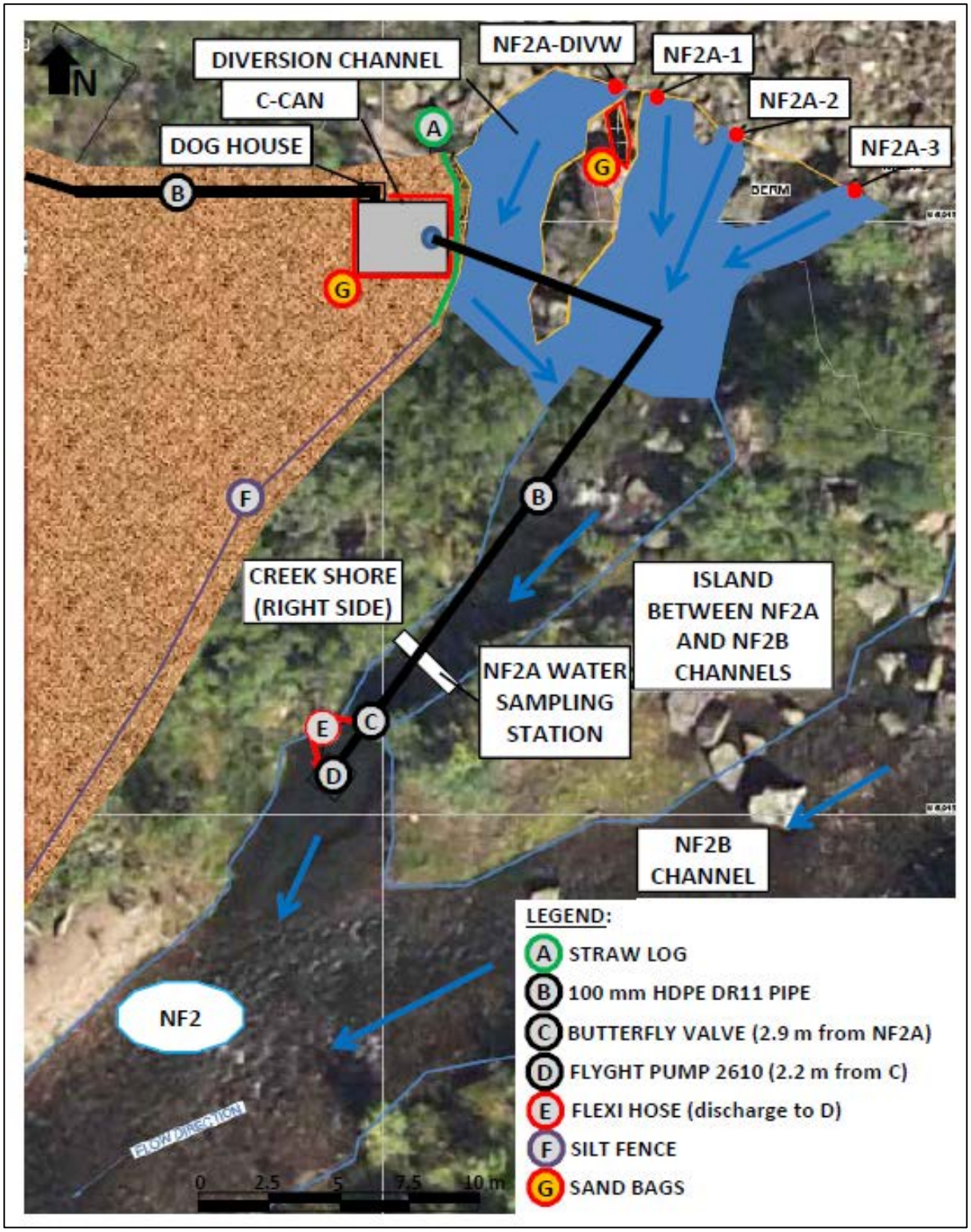


Figure 3-1. Schematic showing the as-built configuration for the DSSC installed, including the C-Can, pump within the NF2A channel and 100 mm HDPE DR11 pipelines.

3.2.8. Pipeline

The seepage water delivery pipeline consists of fused lengths of pre-insulated 100 mm HDPE pipes. Details for the final pipeline alignment and installation details are included on as-built Drawing FRNF-XD-DS-03 to 06.

At the beginning of September, 2014, YG and BGC arranged the procurement of the pipeline parts by Northlands Water & Sewer Supplies Ltd. and the pre-insulation of the 100 mm HDPE (DR 11/17) pipes by Urecon Ltd. in Calmar (Alberta).

Wildstone mobilized to site on December 2, 2014. Initially, the Contractor mobilized the 15 m long pipe lengths to the Faro Mine workshop and fused them to create 75 m long sections (each 75 m section comprised 5 fused pipes). Shorter sections were created by fusing two, three or four pipes to create shorter sections as required to accommodate the location of valves along the pipeline. Note that the DR17 pipes and the DR11 pipes were fused separately. Following fusing, the Contractor installed a backup ring and fused a stub end (DR11 or DR17 as appropriate) at both ends of each fused pipeline section. Afterwards, the thermocable was inserted inside each section. Finally, the contractor insulated the fused joints with insulation kits.

Subsequently, the fused pipeline sections were dragged to the intended location with a pickup truck. Protections under the pipes were installed to prevent damage of the insulation during the mobilization. The pipeline was located at the final position and bolted together. At the pipeline crossings, the pipeline was installed with support from a front loader from TEES. At the slope from the top of the haul road to the S-Wells Cluster, a flume was installed so the pipeline sections would slide without damage to the insulation. The installation was completed with support from a front loader and an excavation (TEES). After, the pipeline was anchored to the steel poles at the haul road crest with steel cables. Note that a redundant anchor point (pipe clamp) was installed after the second crossing.

Once the pipeline sections were in place, the drain/air/vacuum valve structures and required connection elements were installed along the pipeline. Wooden shelters were installed to protect the valves. Once Nuline spliced the thermocable and installed the thermocable sensors, the flanged connections were insulated and protected.

At a later stage, PCL remobilized to Faro Mine site to install additional insulation around the valves located inside the shelters to prevent heat loss (refer to Section 2.4.9).

The installation of the specified pipeline earth anchors and the relocation of the pipeline inside the flume at the toe of the slope time were not completed at the time to prepare this report. As commented with YG and TEES, these activities will be completed by TEES during this spring (2015) so they are not covered on this as-built document.

3.2.9. Power supply

The activities completed as part of the DSSC power supply were divided in three different groups:

1. Heat trace systems – The thermocable lengths previously installed by Wildstone were spliced at the pipeline flanged connections or valve locations. A mounting panel (MP) was installed for each thermocable circuit (refer to as-built Drawings FRNF-XD-DS-04, 05 and 07 for location of the mounting panels). Afterwards, the thermocable cables and sensors were connected to the electronic thermostat controller mounted on the panel.
2. Overhead transmission line – The existing 69 kV line was upgraded to create space for the new 4160 V wires (refer to Section 2.4.10). New 4160 V utility poles and anchors were installed (refer to Sections 2.4.13 and 2.4.14). Following the poles, new 4160 V wires were installed and connected to the existing 4160 V line (refer to Section 2.4.12). Note that the required power outages for the completion of these activities were coordinated with TEES. The as-built Drawing FRNF-XD-DS-07 shows the location for the new poles and upgraded poles. Details for the overhead transmission line are shown on the draft electrical Drawings E-2-of-3 and E-3-of-3 supplied in the final Operating and Maintenance Manual by PCL.
3. Electrical installation – The new 75 kVA pole mounted transformer and the new 500 kVA pad mounted transformer where installed by Nuline (refer to Section 2.4.11). A new mounting panel was installed for each transformer; one at the base of the 75 kVA utility pole and one beside the 500 kVA transformer (refer to draft electrical Drawings E-1-of-3, E-2-of-3 and E-3-of-3). Teck cables were installed between the following elements (refer to as-built Drawing FRNF-XD-DS-07):
    - From the 500 kVA transformers to the associated mounting panel (refer to Section 2.4.11)
    - From the 75 kVA transformer to the associated mounting panel
    - From the 500 kVA mounting panel to C-Can (refer to Section 2.4.11)
    - From the C-Can to the mounting panels for the first two thermocable circuits (TC1 and TC2)
    - From the 75 kVA transformer to the mounting panels for the last two thermocable circuits (TC3 and TC4).

    Afterwards, the cables were connected at both ends (refer to Section 2.4.15). Note that the elements within the same mounting panels were also connected. Finally, Nuline energized the circuits and tested all components. Certificates compiling the testing results and as-built drawings for the electrical installation are to be supplied in the final Operations and Maintenance Manual by PCL.

It is important to mention that, on January 19, 2014, the second thermocable circuit (TC2) was not active due to a ground fault. The pumping system and the rest of the pipeline components were working properly. Nuline remobilized to the Faro Mine site and reconnected the circuit. According to Nuline, all tests performed during the following shift returned normal results.

Nuline concluded that the circuit was of good working condition and demobilized from site. No further issues were observed on this circuit until demobilization (January 30, 2015).

In addition, note that Nuline remobilized to install additional lengths of thermocable inside shelters #1, #2, #3 and #5. The electrical installation for a heater on shelter #4 was not completed before demobilization (refer to Section 2.4.9). Also, note that YG informed that the installation of containment for the 500 kVA transformer was required for environmental reasons. As commented with YG, these pending activities will be completed by a third party so it will not be included on this as-built document.

3.2.10. Demobilization

The required construction activities were completed by Pelly on January 30, 2015. As commented with YG, the completion of some activities was postponed either until this spring or summer (2015). A list of the actions to be completed and recommendations, as summarized on the BGC Field Memorandum 4 (refer to Appendix C), is included on Section 5.0.

All personnel were demobilized from site on January 30, 2015 after completion of upgrades on the heated shelters (refer to Section 2.4.9). All equipment was also demobilized from site.

3.3. Schedule

The following summarizes the key activities associated with the construction at the downstream side of the NFRD:

- September 16, 2014 – Mobilization to Faro Mine site. Pre-construction survey.
- October 6, 2014 – ELR completed the salvaging of fish from the Creek.
- October 8, 2014 – Start of DSAR construction. Clearing and grubbing for spoil area.
- October 10, 2014 – Removal of boulders within NF2A. Construction activities suspended and demobilization of PCL and BGC.
- October 16, 2014 – Remobilization of BGC to assess conditions within NF2A.
- October 21, 2014 – YG instructs PCL to execute the DSSC as per BGC conceptual design.
- October 24, 2014 – PCL re-mobilizes to Faro Mine site. Start DSSC construction.
- October 25, 2014 – DSSC completed, including C-Can pad. Completion of DSAR.
- October 27, 2014 – Pipeline crossings installed.
- October 29, 2014 – Underhill completed the as-built survey for the DSAR and DSSC. PCL completes the maintenance of sediment and control measures and demobilizes.
- December 1, 2014 – PCL re-mobilizes. Verification of pipeline components.
- December 2, 2014 – Mobilization of Wildstone. Start of pipeline installation.
- December 8, 2014 – Mobilization of Nuline to start Electrical installation Stage 1.
- December 16, 2014 – Shelter #2 is upgraded, but no heater is installed. Wildstone demobilizes from site although Engineer notes that pipeline activities were not completed. PCL informs that they will complete the pending activities.

- December 17, 2014 – The Stage 1 activities that could be completed at this stage are finalized. Demobilization of Nuline.
- December 18, 2014 – PCL completes the activities that could be completed at this stage, including the installation of a pipeline from C-Can to pump at NF2A channel. Then, demobilizes.
- January 6, 2015 – Mobilization of PCL and Nuline. Start of overhead transmission line activities.
- January 9, 2015 – Mobilization of the second Nuline team. Start of electrical installation Stage 2. Also, continues with the pending activities from Stage 1.
- January 13, 2015 – Completion of overhead transmission line. Demobilization of the first Nuline's team.
- January 14, 2015 – Mobilization of Precision.
- January 15, 2015 – Installation of C-Can. PCl decides to upgrade all shelters. The overhead transmission line team remobilizes to install a new pole at the brown shack (Nuline).
- January 16, 2015 – Nuline officially completes the overhead transmission line installation. Also, completes the connection of all electrical components. Tees completes installation of the pumping system to feed the manhole. The first Nuline's team demobilizes.
- January 17, 2015 – Nuline energizes all systems and starts the testing stage. Precision starts local pumping tests (C-Can).
- January 18, 2015 – The pipeline is connected to the C-Can and water is pumped into the system. Precision Nuline inform that heater installation could not be completed.
- January 19, 2015 – Precision completes the commissioning of the pumping system and demobilizes.
- January 20, 2015 – Nuline completes the testing of all components and demobilizes. No power was available for the heaters on shelters.
- January 22, 2015 – Additional insulation is installed on shelters. Demobilization.
- January 29, 2015 – YG approved the modification of the heating concept for heated shelters.
- January 30, 2015 – PCL re-mobilizes and completes installation. Completion of NFRD SIS construction project and full demobilization from Faro Mine site.

3.4. Equipment

The following equipment was used during construction of the downstream elements by PCL:

- A CAT 330C excavator (CAT330) was used for the common excavation, clearing and grubbing, removal of rocks within NF2A channel, DSSC, pipeline crossings and to load fill into haul trucks at the intermediate stockpile.
- A CAT D6R dozer (D6) was used to clear and grub the required areas and spread construction fill.
- Two CAT 773B haul trucks (CAT773) were used to haul Borrow A fill from the borrow source to the intermediate stockpile beside the entrance gate to S-Wells area.

- A Deere 400D articulated truck (Deere400) was used to haul Borrow A fill from the intermediate stockpile to the DSAR area. Also, Borrow C fill from the borrow source to the DSAR area.
- A CAT 988H front loader (CAT988) was used to load construction fill into haul trucks at borrow areas A and C.
- A CAT 14H grader (grader) was used to grade the DSAR, maintain access roads (removal of snow/mud), and to create drainage ditches.
- Two light towers (an Ingersoll Rand and an Allmand ML8) were used to illuminate the construction areas.
- A Nuline's KUBOTA SVL90 track loader (track loader) was used to support the installation of cables, mounting panels and electrical components.
- A Nuline's TEREX elevating platform (elevating platform) was used for the installation of new 4160 V wires, the upgrade of the existing 69 kVA utility poles and for the installation and connection of transformers.
- A Nuline's TEREX auger (auger) was used to support the installation of poles, anchor lines, push-brace poles, transformers and electrical wires.

The following equipment from TEES was used by PCL to support construction activities:

- A CAT 336E excavator (CAT336) was used for the common excavation for the 500 kVA transformer vault, cable trenches and new utility poles. The excavations for the utility poles were also backfilled with the CAT336. In addition, the CAT 336 provided support during the installation of pipeline and protection flume sections.
- A CASE back hoe (back hoe) was used to backfill the excavation for the 500 kVA transformer vault and cable trenches. Also, to mobilize some sand and gravel for the execution of the heated shelter's platforms.
- A SELLICK S100 fork lift (fork lift) was used to load or unload the 75 kVA transformers and pipeline parts.
- A VOLVO L150G front loader (front loader) was used to unload the pre-insulated pipeline sections and C-Can. Also, to support the installation of pipeline sections at road crossings and slope to S-Wells area.
- An HIAB 300-5 hiab (hiab) was used for the mobilization and unloading of the C-Can at the DSSC area.

4.0 CONSTRUCTION MANAGEMENT

4.1. Daily Inspection Reports

During the complete construction period, BGC completed daily shift reports (DSR) to record the key field activities, conversations and agreements between the different parties involved on the construction, including PCL, and to provide an update on the issues recorded. A copy of day shift report was submitted daily to YG and PCL.

The prepared day shift reports cover the period from the mobilization of equipment to the downstream area (September 8, 2014) to the demobilization of PCL's personnel upon completion of NFRD SIS construction activities (January 30, 2015). The following is a summary of the BGC personnel present on site during the construction for the downstream elements:

- October 8 to 10, 2014 – Joan Roca (construction verification)
- October 16 to 17, 2014 – Jim Cassie and Joan Roca (site visit)
- October 21, 2014 – Joan Roca (delivery of construction materials)
- October 24 to 29, 2014 – Joan Roca (construction field verification)
- December 1 to 18, 2014 – Joan Roca (construction field verification)
- January 6 to 22, 2015 – Joan Roca (construction field verification)
- January 30, 2015 – Joan Roca (construction field verification).

Note that no reports were produced during standby times or the Christmas holidays, including the following periods:

- From the demobilization on October 10, 2014 to remobilization on October 24, 2014
- From the demobilization on October 29, 2014 to remobilization on December 1, 2014
- From the demobilization on December 18, 2014 to remobilization on January 6, 2015
- From the demobilization on January 22, 2015 to remobilization on January 30, 2015.

A compilation of the day shift reports produced by BGC during the construction activities at the downstream side of the NFRD is included on Appendix B. Note that YG requested that the original shift reports be separated into two separate documents on the basis of upstream versus downstream elements. The shift reports on Appendix B therefore cover the work constructed on the downstream side of the rock drain; the upstream works are documented under separate cover.

4.2. XRF Analyzer Surveys

The design specifications required the execution of field tests to identify the presence of material showing extensive alteration of sulphides. As stated on the design drawings, materials showing alteration and high metals content could not be used as construction fill close to the Creek due to potential for environmental impact.

As part of the construction management activities, BGC completed a testing program to identify fill sources that may contain high metals content. This section summarizes the XRF testing activities performed by BGC at the downstream area. Therefore, the summary of the XRF

testing activities associated to the upstream construction activities is included under a separate cover.

4.2.1. XRF Analyzer

The portable X-ray fluorescence (XRF) analyzer is a device widely used due to its low-cost and rapid turn-around for results. The XRF analyzer provides elemental concentrations, determined by XRF spectrometry, of samples collected on the field.

The main advantage of this testing equipment is that the samples can be prepared and tested on site. There is no need to ship the samples to a conventional laboratory. As a result, the execution of field tests provides rapid test results, allowing for an increased sample density and ability to make field decisions regarding the use of construction materials.

The equipment used by BGC was a Thermo Scientific Niton XRF Analyzer, model XL3t 500. It was rented to Elemental Controls Limited (ECL). A certificate of calibration for the XRF analyzer used by BGC was issued by ECL when the equipment was rented and shipped (refer to Appendix D for a copy of the certificates).

4.2.2. Sample Collection and Preparation

The primary objective of the BGC sampling was to characterize fill sources for the material to be placed close to or into the Creek. The selection of the number and location of samples was performed based on the volume of fill to be hauled to the construction area.

BGC collected a total of seven fill samples; three grab samples of unsorted GRF from Borrow C, two grab samples of Borrow A sand and gravel placed at the DSSC area, and two rock samples from the rock broken with the rock hammer within the NF2A. The distribution of the samples collected during construction activities is shown on Drawing FRNF-XD-DS-08 (refer to Appendix D).

The samples were collected at different construction phases. Sampling during PCL's activities at the borrow areas, as well as during fill placement operations at the DS area, was completed by BGC.

After collection, the samples were stored in plastic zip-lock bags. A unique reference number was given to each and every sample collected. The samples were transported to the XRF testing location and logged on the BGC testing data sheets.

Before testing, the samples were dried to reduce the moisture content. According to the ECL, the moisture on samples could attenuate the beam of x-Ray, affecting the test results. When possible, the samples were air dried. In some occasions, the samples were dried with a heater due to time constraints.

4.2.3. XRF Test Results

The XRF analyzer was calibrated every time it was turned on (daily basis). At a first stage, a routine factory calibration was automatically performed by the XFR analyzer. Then, BGC

performed tests on reference materials provided by ECL. The results were checked against the available laboratory certificates of analysis for the reference materials. These tests were performed to ensure the ongoing performance of the equipment. Finally, BGC performed a verification of the analyzer settings to ensure that the equipment was reading the required parameters.

Upon verification, the available fill samples were tested by BGC either on the field, workshop, or main office. The testing station located at the workshop is shown on Photo 4-1. A total of 10 tests were completed by BGC as part of the characterization of the construction fills.

Photo 4-1. XRF testing location. Workshop located at the main gate area, Faro Mine (September 25, 2014).

In some cases more than one test was performed on some of the collected samples at the discretion of the BGC personnel. These additional tests were performed to compare different specimens within the same sample. For example, rock samples showing red or orange staining were compared to rock samples with no staining. This information was used to provide information to be used during the field visual verifications of construction fill.

Figure 4-1 illustrate the Zinc (Zn) concentrations, expressed in parts-per-million (ppm), measured by the XRF analyzer. A complete record of the results returned by the XRF analyzer, showing elemental concentrations for each sample tested, is included on Appendix D.

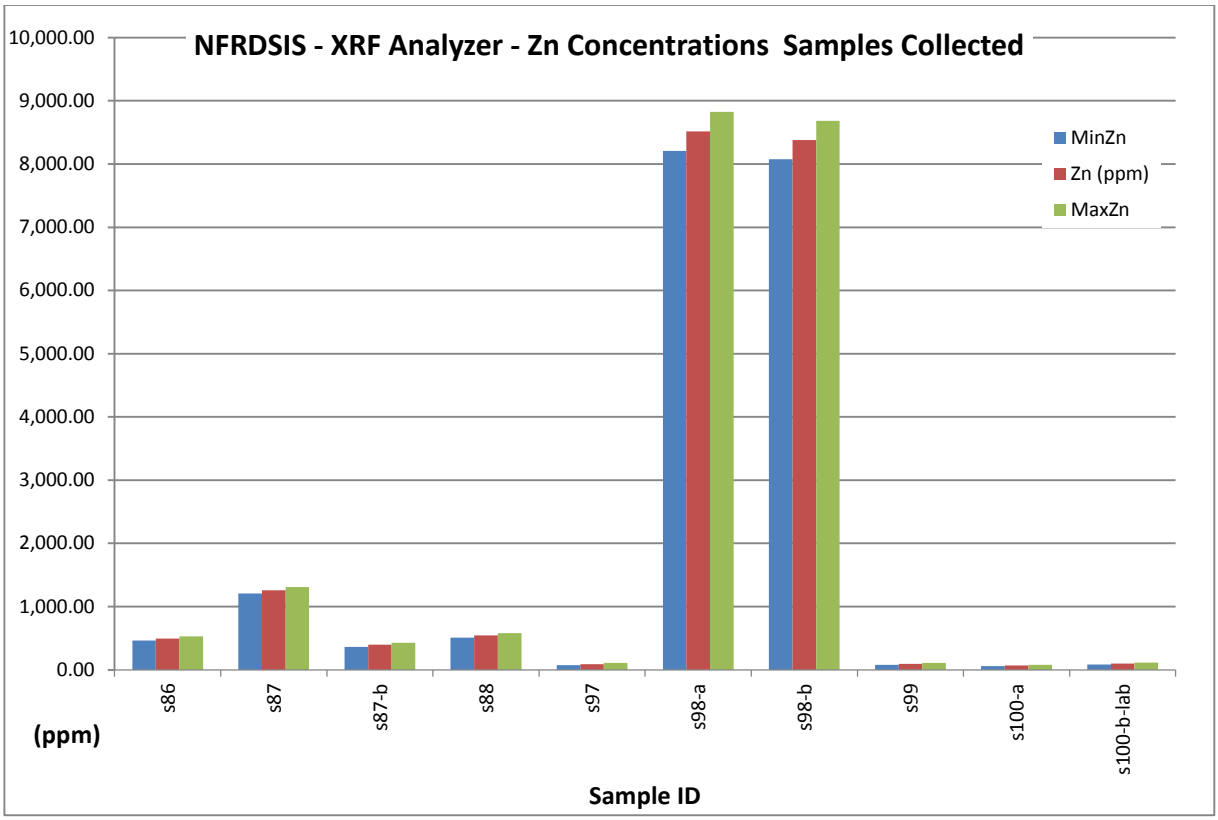


Figure 4-1. Summary of Zn concentrations returned by the XRF analyzer during field tests performed on samples collected during construction activities at DSSC and DSAR.

As shown on Figure 4-1, seven samples returned Zn concentrations below 0.1% (1,000 ppm). The maximum Zn concentration observed during testing was almost 0.9% (9,000 ppm). Note that these high Zn concentration was returned by two tests performed on samples collected within NF2A showing reddish or orangish staining for the calibration of the visual observations performed on site. The average Zn concentration for the materials used for construction (S98-a and S98-b not included) is 0.04% (381 ppm).

Based on the observations performed by BGC during testing, the Engineer marked areas not suitable as a source for approved construction fill. In general, the Engineer did not approve the use of fill from areas where XRF analyzer tests returned Zn concentrations above 1% (1,000 ppm). In addition, BGC recommended that close monitoring from PCL field supervisors was required when developing areas where a test result was showing concentrations close to 1%. As noted previously, the selection of the sources for approved fill was based on the visual observation of the fill at the borrow source, and then supported by the XRF analyzer.

4.2.4. Testing of Existing NFRD Rock Fill

Additional samples from the existing NFRD rock fill were collected and tested as guidance for acceptable fill material. The purpose of this test was to observe the Zn concentrations on the existing NFRD rock fill for comparison purposes.

A total of 11 samples were collected at the toe of the existing NFRD. Samples from both the upstream and downstream sides, as well as from the NF2A and NF2B sides, were collected. For ease of reference, Samples S21 to S24 where collected at the downstream toe of the NFRD within NF2A channel. Samples S25 to S27 were collected at the downstream toe of the NFRD within NF2B channel. Samples S28 and S29 at were collected at the upstream toe of the NFRD (at NF2B side of the headpond). Samples S30 and S31 were collected at the US toe of the NFRD (at the NF2A side of the US headpond). After collection, the samples were prepared and tested with the XRF analyzer.

A summary of the Zn concentrations, expressed in parts-per-million (ppm), returned by the XRF analyzer on samples from the existing NFRD, is shown on Figure 4-2. The complete record of the results returned by the XRF analyzer, showing elemental concentrations for each sample tested, is included on Appendix D.

As shown on Figure 4-2, the samples collected at the toe of the NFRD within NF2A area presented higher concentrations than the samples collected at the NF2B side. In general, the test results returned Zn concentrations below 0.16% (1,600 ppm). Note that the maximum values returned by the XRF analyzer (Samples S28 and S29-b) are test results performed on samples presenting intense orange staining on all sample faces.

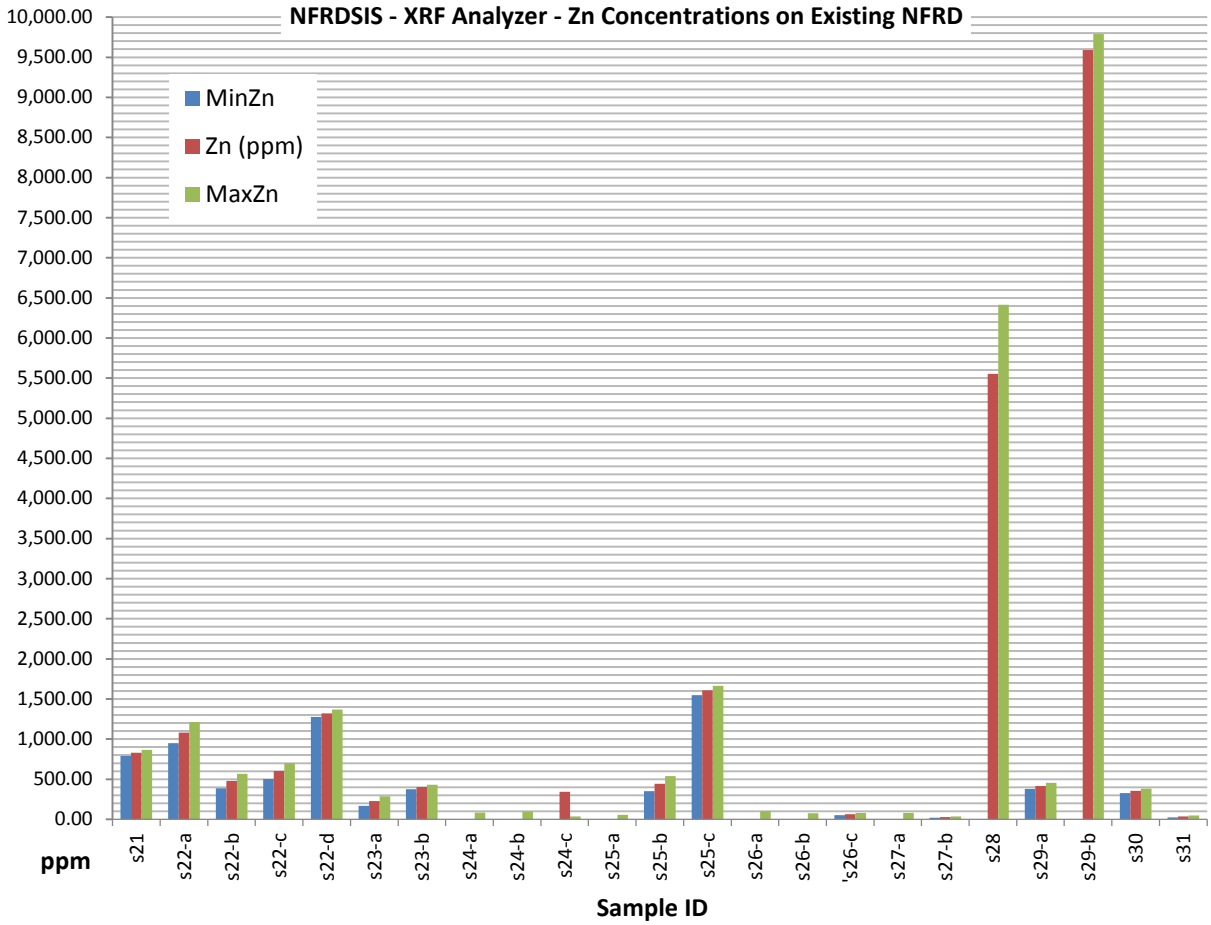


Figure 4-2. Summary of Zn concentrations returned by the XRF analyzer during field tests performed on samples collected on the existing NFRD toe (upstream and downstream areas).

4.2.5. XRF Comparison to Traditional Laboratory Methods

On November 20, 2014, BGC shipped five representative samples to SGS Canada Inc. for the execution of elemental analysis at a conventional laboratory. The purpose of this test was to compare the Zn concentrations obtained at the laboratory with the Zn concentrations returned by the XRF field analyzer to understand how spectrometer is affected by field procedures.

A comparison between the laboratory test results and the field test results is presented on Table 4-1. Comparable Zn concentrations were returned from the laboratory and field tests. Sample S67 is the one presenting the greatest difference, being the laboratory Zn concentration 331.89 ppm lower than the lower limit returned during the field tests. In general, the field tests returned higher Zn concentrations than the laboratory test, except for the tests performed on Sample S47 which are comparable (27.66 ppm difference). This could indicate the field test results are conservative (on the upper side). Therefore, the acceptance/rejection of construction fill based on the results returned by field tests will also be conservative.

Results indicate that in-field XRF spectrometry is comparable to traditional laboratory methods and provides the additional benefits of rapid analysis and fast data integration into construction procedures.

Table 4-1. Summary of Zn concentrations returned by conventional XRF laboratory tests and XRF field tests.

ID	Zn Lab Concentration (ppm)*	Zn Field XRF Concentration (ppm)**	
		Lower Limit	Upper Limit
Sample S47	110	57.66	82.34
Sample S61	180	302.21	355.79
Sample S67	190	521.89	599.87
Sample S81	120	153.49	196.09
Sample S100	80	85.08	111.90

*Zn concentrations reported on the laboratory certificate of analysis are expressed in % and not ppm. Laboratory technicians converted % to ppm as per BGC request for information only.
**XRF Field Zn readings (ppm) were expressed as: Sample 47 = 70 +/- 12.34; Sample 61 = 329 +/- 26.79; Sample 67 = 560.88 +/- 38.99; Sample 81 = 174.79 +/- 21.30; Sample 100 = 98.49 +/- 13.41.

4.3. Environmental

As part of the construction management activities, BGC observed the performance of the sediment and control measures installed by PCL. The observations performed by BGC are summarized on the daily shift reports (refer to Appendix B).

It is important to mention that BGC provided coordination between PCL and the environmental monitor during instream works as the instream construction activities had to be paused when the turbidity levels were close to the threshold values.

All construction areas were protected by the Contractor as per the requirements listed on the sediment and control plan, as approved by the independent environmental monitor and the Engineer.

4.4. As-Built and Pay Quantities

As part of the construction management services, the collection of field data was required in order to evaluate the progress of the Works and to provide recommendations for certification to YG. The observations performed by BGC were also used to assess whether the Work completed conformed generally with the design documents. At a final stage, the information collected was used to prepare the as-built documents and drawings.

The collection of construction data was performed based on two approaches. Firstly during construction, BGC and PCL performed field measurements of the various constructed

elements. Secondly, an independent surveyor was mobilized to the Faro Mine to complete post-construction borrow and as-built surveys for the DSAR and DSSC diversion berms and channel. Note that no as-built surveys were completed for the pipeline, power supply or pumping system. Note that the Engineer collected UTM coordinates for the elements not covered on the as-built survey so as to produce as-built drawings.

The information collected by BGC and Pelly on site was recorded on the daily shift reports produced by BGC (refer to Section 4.1). Information included but was not limited to:

- Daily progress of the works
- PCL equipment present on site.
- Dimensions of the areas sub-excavated after failing proof-roll tests (in m^3)
- Dimensions of the areas covered by geotextile (in m^2)
- DSAR/DSSC dimensions (in m)
- DSAR/DSSC fill thicknesses (in m)
- Distribution of fill types along the DSAR and DSSC
- Usage for equipment working at hourly rates (DS construction activities)
- Location and quantity for the sediment and erosion elements installed (in m)
- Materials delivered to the Faro Mine site by PCL
- Location for the new utility poles, mounting panels and heated shelters (UTM coordinates obtained with a hand held GPS)
- Approximate pipeline as-built alignment (UTM coordinates obtained with a hand held GPS).

A description of the activities completed by the independent surveyor and the information compiled is included on Section 4.5.

At the end of construction, the information collected was used to validate the invoices produced by PCL for the different NFRD SIS elements, and to produce a set of as-built drawings (refer to Appendix A).

4.5. Surveying

As part of the construction services, Underhill provided a baseline and layout surveys of SIS elements. At the end of construction, Underhill provided post-construction borrow and as-built surveys of the DSAR and DSSC earthworks. In addition, Underhill provided post-construction documentation including calculation of borrow quantities (reviewed and signed) and provision of digital as-built surveys (Appendix E).

On September 16, 2014, Underhill mobilized two surveyors to the Faro Mine site to complete the baseline and layout surveys. Control stakes and bench marks were installed at the DSSC area and along the DSAR and Pipeline. Underhill completed the baseline and layout surveys of SIS elements on September 19, 2014, once Engineer and Contractor confirmed that no more elements or control stakes were required in order to complete the works as per the design documents. On October 27, 2014, Underhill mobilized a surveyor to the Faro Mine site to

complete the post-construction borrow and as-built surveys for the earthworks at the downstream area. This activity was completed by Underhill on October 29, 2014. At a later stage, Underhill provided calculations of borrow quantities and the digital as-built surveys of the NFRD SIS elements.

A table of quantities for the DSAR construction is included on as-built Drawing FRNF-XD-DS-01.

5.0 Outstanding Activities and Recommendations

As commented with YG, some construction activities could not be completed before demobilization of PCL on January 30, 2015. These activities will have to be completed by others at a later stage outside the scope of the NFRD SIS construction project.

The following is a summary the outstanding activities, as described on the daily shift reports, and recommendations for its completion:

- Installation of earth anchors along the pipeline (Section 3.2.8). The installation of fill piles every 20 m as per Detail 7 on design Drawing FRNF-XD-02-17 is recommended to prevent damage of the pipeline. The completion is assumed to occur in summer 2015.
- Relocation of pipeline inside the flume at the toe of the rock fill drain (Section 3.2.8). The pipe should be relocated inside the pipeline flume for added protection. If required, the electrical cable along the pipeline should also be relocated inside the flume. Then, the elements should be tied together. The completion is assumed to occur in summer 2015.
- Secondary containment for the 500 kVA transformer (Section 3.2.9). The installation of a secondary containment, including the execution of the required earthworks, is required as the transformer is located approximately 25 m from the Creek. Note that no conceptual design for the required containment was available at the time of producing this report. The completion is assumed to occur in spring 2015.
- Installation of heater inside shelter #4 (Sections 3.2.8 and 3.2.9). The installation of a permanent heater and connection to existing power supply, including the supply and installation of the electrical components, is required. Note that this shelter is currently being by means of a temporary heater powered with a portable generator (light tower). The completion is assumed to occur as soon as practicable.
- Completion of the Operating and Maintenance Manual. As commented with YG on February 10, 2015, some issues or outstanding documentation were noted after the review of the latest available version (February 9, 2015), as follows:
    - Include a description of the complete system
    - Include a troubleshooting section for the complete system
    - Add a reference to the modified location for the 75 kVA transformer pole
    - Note the number of poles upgraded by Nuline
    - Include signed test certificates compiling all tests performed
    - Mention the existence of a pump within NF2A stream and pipeline to feed the manhole
    - Incorporate specific comments on ongoing monitoring and maintenance
    - Correct or clarify discrepancies between dimensions provided on the text and the one shown on as-built drawings and diagrams
    - Update distances (cable lengths) thermocable circuits and from transformers to mounting panels

- Replace as-built C-Can and electrical drawings with finals after addressing all comments.

Additional recommendations performed by BGC for on-going monitoring and construction completion activities include the following:

- Visual monitoring of DSAR northern cut slope stability during frost-free conditions. If required, the cut slopes shall be graded or modified.
- Maintenance of ditches and silt fences to prevent erosion of road fill and to prevent saturation of the subgrade.
- Grading of the DSAR trafficable surface after the winter season (during frost free conditions).
- Visual monitoring of stock piled materials at spoil area during and after rain events. If required, the piles shall be graded or modified and new sediment and control measures implemented.
- Monitoring of water flows and Zn concentrations at emerging points, diversion channels, pumping sump (C-Can) and NF2A channel (Section 2.4.3). If required, modify the diversion berms at the toe of the rock drain or interrupt the pumping of water at the C-Can. It may also be necessary to modify or change the location or depth of the sump pump at NF2A feeding the manhole sump.
- Removal/relocation of the pumping system located downstream to NF2A water sampling station (Section 2.4.15). Note that the system is currently installed on top of the ice cover within the NF2A main channel. The completion of this activity is assumed to occur at the end of this winter (2015).
- Verification of the performance of the heating approach used at shelters #1, #2, #3 and #5 (Section 2.4.8). The monitoring of the following parameters is recommended:
  - Temperature for the valve components inside the insulated shelters (all shelters) to verify that they are not frozen.
  - Water temperature at the pipeline inlet (C-Can) and outlet (discharge to common ditch).

In the event that the heating approach is found to be deficient, an alternative heating system should be implemented when subzero air temperatures occur to ensure that the integrity of the pipeline is not compromised.

Note that some of these recommendations were listed on the Field Memorandum 3 (refer to Appendix C), which summarizes the recommended operation, maintenance and inspection procedures for the installed pipeline.

6.0 SUMMARY

This report documents the remedial activities undertaken at the downstream side of the NFRD during construction of the Downstream Access Road, Downstream Seepage Collection System, Pipeline, Electrical Installation and Pumping System. As requested by YG, activities related to the construction of the remedial measures undertaken on the upstream side of the NFRD are documented under a separate cover (BGC 2015).

Section 2.3 includes a complete summary of the design changes, including the redesign of the DSSC after the assessment of the conditions within the NF2A channel and the modifications of the transformer sizes and to the overhead line. Notwithstanding the deviations from the original Drawings and Specifications, the downstream elements were constructed in general conformance with the original design and they are expected to perform according to the design intent, which was a best efforts approach. It is important to record that limitations related to the collection and pumping of water at 5 L/s with a low Zn concentration and risks related to the glaciation of emerging points were noted by BGC during the presentation of DSSC design concepts.

Comments on the outstanding activities and its assumed completion time are listed on Section 5.0, including the following:

- Installation of earth anchor piles along the pipeline
- Relocation of pipeline inside the protection flume (toe of rock fill slope, S-Wells area)
- Installation of heater inside shelter #4 (and associated electrical installation)
- Secondary containment for the 500 kVA transformer (and associated earthworks)
- Completion of the Operating and Maintenance Manual.

The additional recommendations performed by BGC are also listed on Section 5.0., including:

- Visual monitoring of DSAR northern cut slope stability
- Maintenance of sediment and control elements
- Grading of trafficable surfaces after the winter season
- Visual monitoring of stock piled material at spoil area during and after rain events
- Monitoring of water flows and Zn concentrations within the DSSC and pumping system
- Removal/relocation of pumping system located downstream to NF2A water sampling station
- Verification of the performance of the heating approach used for heated shelters.

7.0 CLOSURE

We trust the above satisfies your requirements at this time. Should you have any questions or comments, please do not hesitate to contact us.

Yours sincerely,

BGC ENGINEERING INC.
per:

ISSUED AS DIGITAL DOCUMENT. SIGNED HARDCOPY ON FILE WITH BGC ENGINEERING INC.

Joan Roca, M.Sc., E.I.T.(BC)
Geotechnical Engineer

ISSUED AS DIGITAL DOCUMENT. SIGNED HARDCOPY ON FILE WITH BGC ENGINEERING INC.

James W. Cassie, M.Sc., P.Eng.
Principal Geotechnical Engineer

Reviewed by:

Gerry Ferris, M.Sc., P.Eng.
Principal Geotechnical Engineer

JR/JWC/GF/gc/mm

REFERENCES

Robertson Geoconsultants Inc. 2014. Progress Report – 2014 Winter Drilling Program, NFRC Reach, Faro Mine, Yukon. Letter report prepared for Yukon Government, Project No. 118026, March 31, 2014.

BGC Engineering Inc., 2014a. Design Brief, NFRD Seepage Interception System, Faro Mine. Draft report prepared for the Yukon Government, September 22, 2014, 24 pages and two appendixes.

BGC Engineering Inc. 2014b. Sediment and Erosion Control Plan, NFRD Seepage Interception System, Faro Mine. Plan prepared for the Yukon Government, September 25, 2014.

BGC Engineering Inc., 2015. Upstream As-Built Report, Faro Mine. Report prepared for the Yukon Government, March 18, 2015, 37 pages and 5 appendixes.

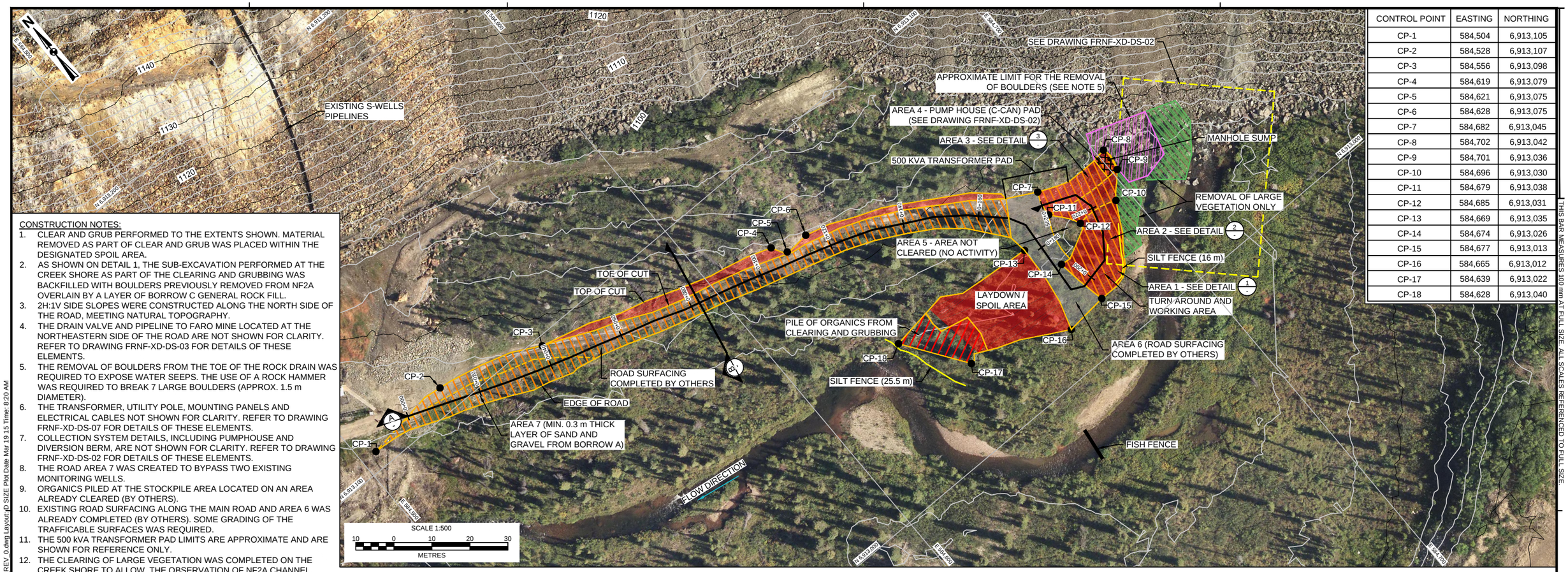
APPENDIX A
AS-BUILT DRAWINGS

LIST OF AS-BUILT DRAWINGS

Drawing Number	Drawing Title	Drawing Date
FRNF-XD-DS-01	Downstream Access Road - As-Built General Arrangement and Typical Cross-Sections	March 17, 2015
FRNF-XD-DS-02	Downstream Seepage Collection System - As-Built General Arrangement	March 17, 2015
FRNF-XD-DS-03	Pipeline to Faro Pit - As-built General Arrangement	March 17, 2015
FRNF-XD-DS-04	Pipeline to Faro Pit - As-Built Plan and Profile - Sheet 1	March 17, 2015
FRNF-XD-DS-05	Pipeline to Faro Pit - As-Built Plan and Profile - Sheet 2	March 17, 2015
FRNF-XD-DS-06	Pipeline to Faro Pit - As-Built Details	March 17, 2015
FRNF-XD-DS-07(AB)*	Power Supply - As-Built General Arrangement	March 17, 2015
FRNF-XD-DS-10 (AB)*	C-Can General Lay Out	January 12, 2015
FRNF-XD-DS-11 (AB)*	Pump and Piping Arrangement	January 12, 2015
FRNF-XD-DS-12 (AB)*	Electrical and Pump Detail	January 12, 2015
FRNF-XD-DS-22 (AB)*	C-Can Details and Dog House	January 12, 2015
90008-06 (AB)*	Equipment Tags, Piping	January 12, 2015
E-1-of-3**	Power Layout (by Nuline)	January 16, 2015
E-2-of-3**	Power Layout (by Nuline)	January 16, 2015
E-3-of-3**	Power Layout (by Nuline)	January 16, 2015

* Draft as-built Drawings produced by Precision. Definitive as-built Drawings are to be supplied with the final Operating and Maintenance Manual.

** Nuline IFC electrical design drawing produced by Dorward Engineering Services Ltd. These drawings are also considered to be draft as-built drawings for the electrical installation as they were produced after construction. Definitive as-built Drawings are to be supplied with the final Operating and Maintenance Manual.



CONTROL POINT	EASTING	NORTHING
CP-1	584,504	6,913,105
CP-2	584,528	6,913,107
CP-3	584,556	6,913,098
CP-4	584,619	6,913,079
CP-5	584,621	6,913,075
CP-6	584,628	6,913,075
CP-7	584,682	6,913,045
CP-8	584,702	6,913,042
CP-9	584,701	6,913,036
CP-10	584,696	6,913,030
CP-11	584,679	6,913,038
CP-12	584,685	6,913,031
CP-13	584,669	6,913,035
CP-14	584,674	6,913,026
CP-15	584,677	6,913,013
CP-16	584,665	6,913,012
CP-17	584,639	6,913,022
CP-18	584,628	6,913,040

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE.

CONSTRUCTION NOTES:

1. CLEAR AND GRUB PERFORMED TO THE EXTENTS SHOWN. MATERIAL REMOVED AS PART OF CLEAR AND GRUB WAS PLACED WITHIN THE DESIGNATED SPOIL AREA.
2. AS SHOWN ON DETAIL 1, THE SUB-EXCAVATION PERFORMED AT THE CREEK SHORE AS PART OF THE CLEARING AND GRUBBING WAS BACKFILLED WITH BOULDERS PREVIOUSLY REMOVED FROM NF2A OVERLAIN BY A LAYER OF BORROW C GENERAL ROCK FILL.
3. 2H:1V SIDE SLOPES WERE CONSTRUCTED ALONG THE NORTH SIDE OF THE ROAD, MEETING NATURAL TOPOGRAPHY.
4. THE DRAIN VALVE AND PIPELINE TO FARO MINE LOCATED AT THE NORTHEASTERN SIDE OF THE ROAD ARE NOT SHOWN FOR CLARITY. REFER TO DRAWING FRNF-XD-DS-03 FOR DETAILS OF THESE ELEMENTS.
5. THE REMOVAL OF BOULDERS FROM THE TOE OF THE ROCK DRAIN WAS REQUIRED TO EXPOSE WATER SEEPS. THE USE OF A ROCK HAMMER WAS REQUIRED TO BREAK 7 LARGE BOULDERS (APPROX. 1.5 m DIAMETER).
6. THE TRANSFORMER, UTILITY POLE, MOUNTING PANELS AND ELECTRICAL CABLES NOT SHOWN FOR CLARITY. REFER TO DRAWING FRNF-XD-DS-07 FOR DETAILS OF THESE ELEMENTS.
7. COLLECTION SYSTEM DETAILS, INCLUDING PUMPHOUSE AND DIVERSION BERM, ARE NOT SHOWN FOR CLARITY. REFER TO DRAWING FRNF-XD-DS-02 FOR DETAILS OF THESE ELEMENTS.
8. THE ROAD AREA 7 WAS CREATED TO BYPASS TWO EXISTING MONITORING WELLS.
9. ORGANICS PILED AT THE STOCKPILE AREA LOCATED ON AN AREA ALREADY CLEARED (BY OTHERS).
10. EXISTING ROAD SURFACING ALONG THE MAIN ROAD AND AREA 6 WAS ALREADY COMPLETED (BY OTHERS). SOME GRADING OF THE TRAFFICABLE SURFACES WAS REQUIRED.
11. THE 500 kVA TRANSFORMER PAD LIMITS ARE APPROXIMATE AND ARE SHOWN FOR REFERENCE ONLY.
12. THE CLEARING OF LARGE VEGETATION WAS COMPLETED ON THE CREEK SHORE TO ALLOW THE OBSERVATION OF NF2A CHANNEL, ISLAND AND ROCK DRAIN TOE. SEDIMENT AND CONTROL ELEMENTS INSTALLED TO THE APPROVAL OF THE THE ENGINEERING AND ENVIRONMENTAL MONITOR.

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT. 2012. CONTOUR INTERVAL IS 2 m.
3. PROJECTION IS NAD83, UTM ZONE 8N.
4. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

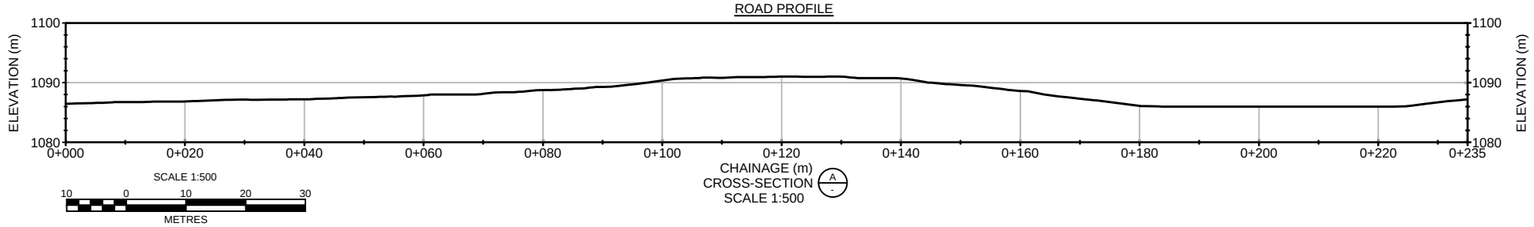
TABLE 1: QUANTITIES

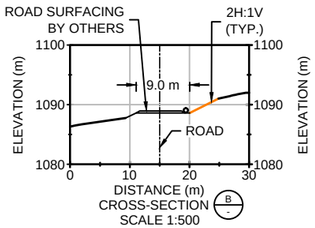
DESIGNATION	AREA (m²)	VOLUME (m³)
SAND AND GRAVEL	-	162
GEOTEXTILE	68	N/A
GENERAL ROCK FILL	-	130 m³

TABLE NOTES:

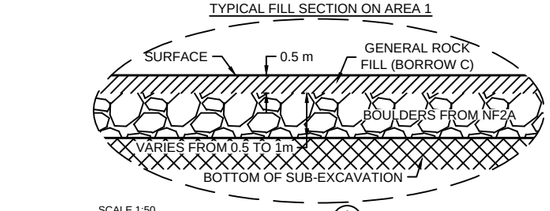
1. FILL QUANTITIES BASED ON FIELD ESTIMATES OF THE AVERAGE FILL THICKNESS AND AREAS REPORTED BY SURVEYOR (UNDERHILL GEOMATICS LTD.).
2. GEOTEXTILE AREA BASED ON FIELD ESTIMATES PREFORMED BY THE ENGINEER AND CONTRACTOR.
3. VOLUME OF THE TEMPORARY STOCKPILE OF BORROW A AT THE ENTRANCE GATE TO S-WELLS AREA NOT INCLUDED (44 m³).

ROAD PROFILE

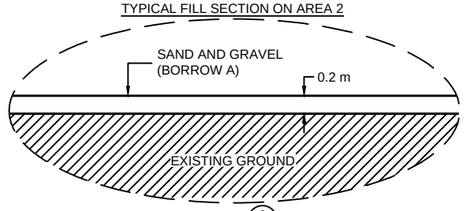




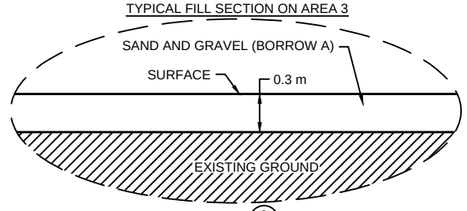
TYPICAL FILL SECTION ON AREA 1



TYPICAL FILL SECTION ON AREA 2



TYPICAL FILL SECTION ON AREA 3



NOTE: SOFT AREA WITHIN AREA 3 (APPROXIMATELY 38 m²) COVERED WITH GEOTEXTILE OVERLAIN BY A 0.5 m THICK LAYER OF BORROW A SAND AND GRAVEL

LEGEND

- EXISTING TOPOGRAPHY
- CONSTRUCTION LIMITS
- PIPELINE
- EXISTING FILL
- CLEARED AND GRUBBED AREA
- ORGANICS FROM CLEARING AND GRUBBING
- ROAD
- PUMPHOUSE PAD (C-CAN)

REVISION INFORMATION	REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
	0	15	03	17	CR	JR	JWC	GWF	AS-BUILT 2015

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: CR	CHECK DRAWING: CJT	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM
DESIGN BY: JR	CHECK DESIGN: GWF		TITLE: DOWNSTREAM ACCESS ROAD - AS-BUILT GENERAL ARRANGEMENT
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015	CLIENT: Yukon Government	SCALE: AS SHOWN / DWG NO.: FRNF-XD-DS-01 / REV.: 0
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015		

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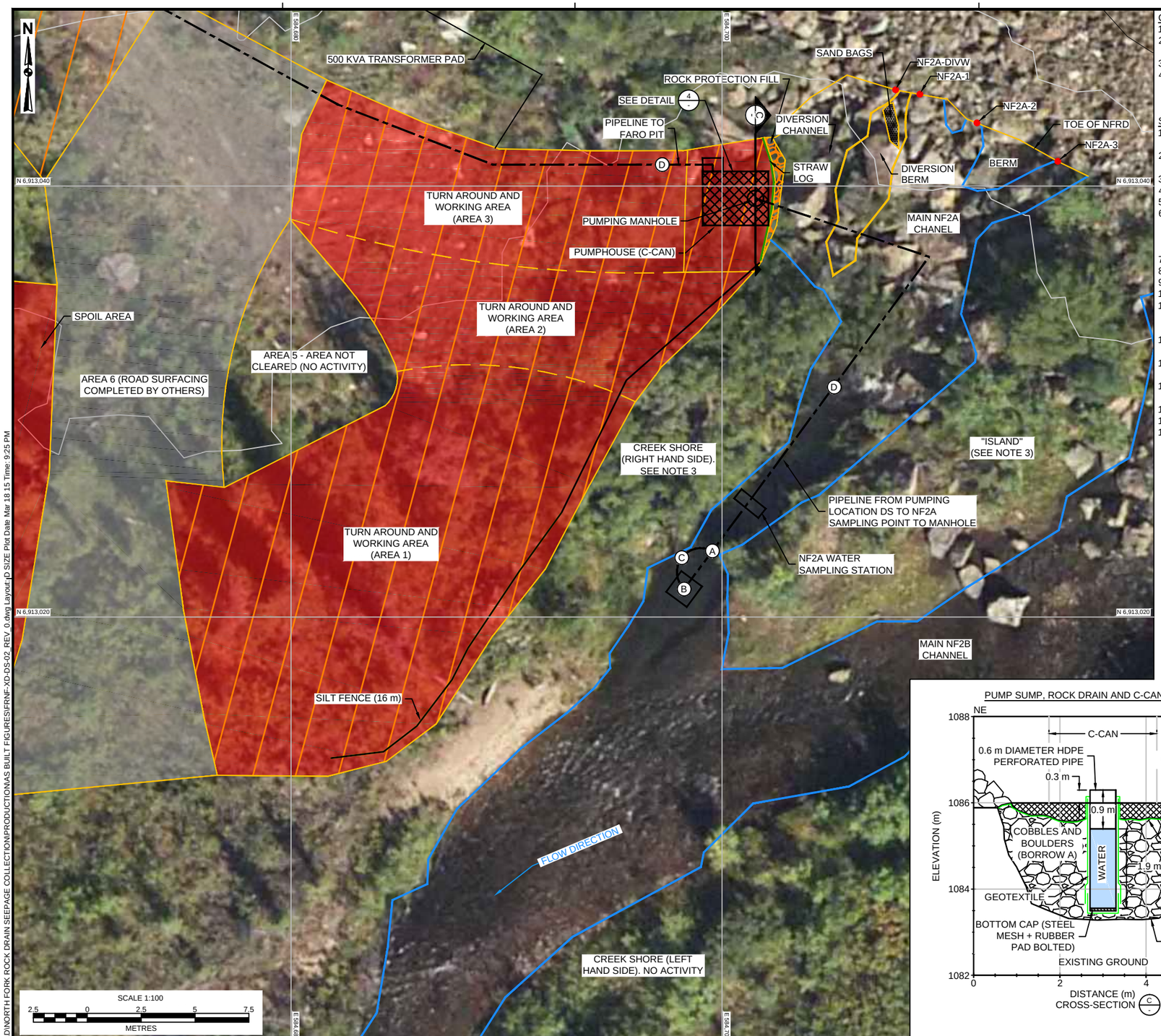

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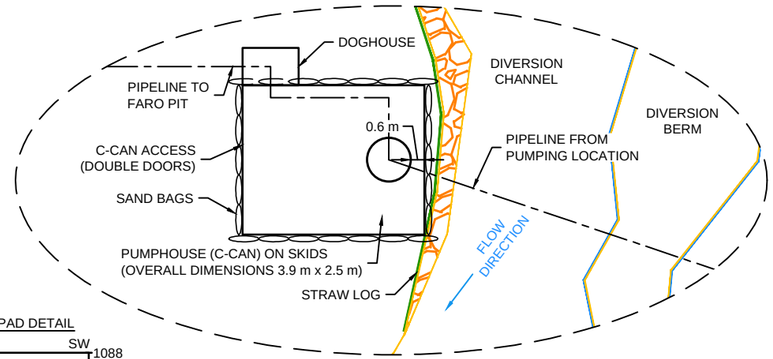
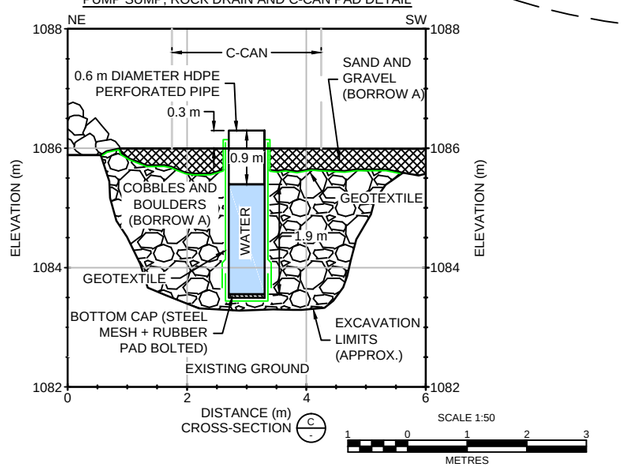
SPECIFIC NOTES:

1. DIVERSION BERM, DIVERSION CHANNEL, MAIN NF2A CHANNEL, EMERGING POINTS, PUMPHOUSE PAD, AND UPSTREAM ACCESS ROAD ELEMENTS AS PER AS-BUILT SURVEY COMPLETED BY UNDERHILL GEOMATICS LTD. ON OCTOBER 29, 2014.
2. LOCATION FOR PIPELINE FROM SUMP PUMP DOWNSTREAM TO NF2A, PUMP SUMP, BUTTERFLY VALVE AND FLEXI HOSE IS APPROXIMATE (FIELD ESTIMATE).
3. LARGE VEGETATION REMOVED AT CREEK SHORE (RIGHT HAND SIDE) AND ISLAND.
4. BOULDERS REMOVED WITHIN THE NF2A CHANNEL TO EXPOSE THE SEEPS UNDER THE ROCK DRAIN.
5. DIVERSION BERM CONSTRUCTED WITH EXISTING MATERIAL WITHIN THE NF2A CHANNEL.
6. GEOTEXTILE WAS INSTALLED ON TOP OF THE ROCK DRAIN AROUND THE MANHOLE. THE SAND AND GRAVEL PLACED ON TOP OF THE GEOTEXTILE WAS WRAPPED WITH THE GEOTEXTILE AT THE CREEK EDGE TO PREVENT EROSION. ROCK PROTECTION FILL WAS INSTALLED AT THE FACE TO HOLD THE GEOTEXTILE IN PLACE AND PREVENT EROSION. THE ROCK PROTECTION FILL WAS LOCALLY SOURCED (FROM NF2A CHANNEL).
7. PERFORATED MANHOLE WAS WRAPPED WITH GEOTEXTILE TO PROTECT MIGRATION OF FINES INSIDE THE SUMP.
8. THE BOTTOM OF THE MANHOLE WAS SEALED TO PREVENT THE MIGRATION OF FINES INSIDE THE SUMP.
9. SAND BAGS INSTALLED AROUND THE PERIMETER OF THE C-CAN TO SEAL THE AREA AND PREVENT HEAT LOSS.
10. PIPELINE CONNECTION AT C-CAN PROTECTED WITH AN INSULATED WOODEN DOG HOUSE TO PREVENT HEAT LOSS.
11. STRAW LOGS WERE INSTALLED AT THE EDGE OF THE PUMPHOUSE PAD AND ISLAND TO PREVENT EROSION AND TRANSPORT OF SEDIMENTS INTO THE CREEK. AT THE CREEK SHORE (RIGHT HAND SIDE) SILT FENCES WERE ALSO INSTALLED.
12. NO IN-STREAM WORKS COMPLETED UNTIL THE SALVAGING OF FISH WAS COMPLETED BY THE INDEPENDENT ENVIRONMENTAL MONITOR.
13. THE TURBIDITY OF THE WATER WAS MONITORED BY THE INDEPENDENT ENVIRONMENTAL MONITOR DURING IN-STREAM CONSTRUCTION ACTIVITIES.
14. A BUTTERFLY VALVE AT THE PUMP SUMP OUTLET REGULATES THE FLOW INTO THE MANHOLE. THE FLEXY PIPE DISCHARGES THE WATER DIVERTED AT THE BUTTERFLY VALVE INTO THE PUMP SUMP LOCATION.
15. PUMP SUMP INSTALLED DOWNSTREAM TO NF2A LOCATIONS IS A FLIGHT PUMP 2610 SERIES.
16. ALL PIPELINE SECTIONS ARE INSULATED AND HEAT TRACED.
17. THE GEOTEXTILE USED FOR CONSTRUCTION OF THE DOWNSTREAM ACCESS ROAD, C-CAN PAD AND MANHOLE WAS NON WOVEN GEO-ARMTEC 250.



PUMP SUMP, ROCK DRAIN AND C-CAN PAD DETAIL



LEGEND

- EXISTING TOPOGRAPHY
- CONSTRUCTION LIMITS
- PIPELINE
- EXISTING FILL
- CLEARED AND GRUBBED AREA
- ROAD
- PUMPHOUSE PAD (C-CAN)
- SANDBAGS
- (A) BUTTERFLY VALVE
- (B) FLIGHT PUMP (2610)
- (C) FLEXI HOSE (DISCHARGE)
- (D) 100mm PIPELINE (HDPE, DR11)

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE.

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REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	15	03	17	CR	JR	JWC	GWF	AS-BUILT 2015

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: CR	CHECK DRAWING: CJT
DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: DOWNSTREAM ACCESS ROAD - AS-BUILT GENERAL ARRANGEMENT

SCALE:	DWG NO.:	REV.:
AS SHOWN	FRNF-XD-DS-02	0

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT. 2011. CONTOUR INTERVAL IS 2 m.
3. PROJECTION IS NAD83, UTM ZONE 8N.
4. THE 100 mm DR 11/17 HDPE PIPES WERE PRE-INSULATED WITH URETHANE INSULATION BY URECON LTD. IN CALMAR (SEPTEMBER 2014).

5. PIPELINE INSTALLATION (FARO MINE WORKSHOP):

5.1. THE 100 mm DR 11/17 HDPE PRE-INSULATED PIPE SECTIONS (15 m LONG) WERE FUSED TO CREATE 75 m LONG PIPELINE SECTIONS. SHORTER PIPELINE SECTIONS WERE FUSED (BUTT FUSION JOINTS) AS REQUIRED TO ACCOMMODATE THE LOCATION OF VALVES (30 m LONG, 45 m LONG AND 60 m LONG SECTIONS).
5.2. A 100 mm BACKING RING (EPOXY COATED) AND A 100 mm DR 11/17 STUB END (160 PSI) WAS INSTALLED AT BOTH ENDS OF EACH 75 m PIPELINE SECTION TO CREATE FLANGED CONNECTIONS.
5.3. THE CONSTANT WATT THERMOCABLE (C13-240) WAS INSTALLED INSIDE THE THERMOCABLE CHANNEL ON THE 75 m LONG PIPELINE SECTIONS.
5.4. INSULATION KITS WERE USED TO INSULATE THE FLANGED CONNECTIONS AFTER THE INSTALLATION OF THE THERMOCABLE.

6. PIPELINE INSTALLATION (FIELD ACTIVITIES):

6.1. THE 75 m LONG PIPELINE SECTIONS WERE MOBILIZED TO THE FINAL POSITION, CONNECTED WITH FULL THREAD STUDS AND NUTS (16 x 130 mm A193 B7 ZINC). A NITRILE GASKET WAS INSTALLED AT EACH FLANGED CONNECTION.
6.2 DR 11 PIPELINE SECTIONS WERE INSTALLED UPSTREAM TO SHELTER 2. DR 17 PIPELINE SECTIONS WERE INSTALLED DOWNSTREAM TO SHELTER 2.
6.3. THE THERMOCABLE SECTIONS WERE SPLICED WITH S1334 COJ SPLICE KITS ON THE FIELD.
6.4. AT EACH THERMOCABLE CIRCUIT, THE THERMOCABLE SENSORS (URTD-06 GREY AND RED), POWER FEEDER KITS (PFK-1) AND THE ELECTRONIC CONTROLLER (UTC 2030- 01) WERE INSTALLED AND CONNECTED.
6.5. THE EXPOSED FLANGED CONNECTIONS WERE INSULATED WITH INSULATION KITS.

7. PIPELINE ALIGNMENT:

7.1. THE PROPOSED PIPELINE ROUTE WAS VERIFIED WITH TEES PERSONNEL IN THE FIELD TO AVOID INTERFERENCE WITH EXISTING PIPELINES.
7.2 DR 11 PIPELINE SECTIONS INSTALLED ALONGSIDE OF THE DOWNSTREAM ACCESS ROAD UP TO THE S-WELLS CLUSTER.
7.3. DR 11 PIPELINE INSTALLED ON TOP OF THE ROCK FILL SLOPE FROM THE EXISTING S-WELLS CLUSTER TO THE FIRST CROSSING (EXISTING HAUL ROAD).
7.4 DR 11 PIPELINE INSTALLED UNDERGROUND IN A DEDICATED 300 mm STEEL CULVERT FOR THE FIRST ROAD CROSSING. REFER TO DRAWING FRNF-XD-DS-04 AND FRNF-XD-DS-06 FOR DETAILS OF THE FIRST ROAD CROSSING.
7.5. DR 11 PIPELINE INSTALLED FROM THE FIRST CROSSING TO SHELTER 2 (VACUUM BREAKER VALVE).
7.6. DR 17 PIPELINE INSTALLED ALONGSIDE EXISTING PIPELINE (S-WELLS) CLUSTER FROM SHELTER 2 TO THE EXISTING ZONE II C-CAN.
7.7. DR 17 PIPELINE INSTALLED BEHIND THE EXISTING ZONE II C-CAN UP TO THE SECOND ROAD CROSSING.
7.8. DR 17 PIPELINE INSTALLED UNDERGROUND IN A DEDICATED 300 mm STEEL CULVERT FOR THE SECOND CROSSING. REFER TO DRAWING FRNF-XD-DS-05 AND FRNF-XD-DS-06 FOR DETAILS OF THE FIRST ROAD CROSSING.
7.9. DR 17 PIPELINE INSTALLED ALONGSIDE EXISTING PIPELINE (S-WELLS) FROM THE SECOND CROSSING TO TERMINATION AT STA 1+513 WITH DISCHARGE INTO EXISTING DITCH TO THE FARO PIT.

8. INSTALLATION OF VALVES:

8.1. A 50 mm FLANGED DRAIN GATE VALVE WITH DRAIN DISCHARGE TO DAY LIGHT WAS INSTALLED AT THE LOWEST POINT AT THE TOE OF THE ROCK FILL SLOPE TO THE EXISTING S-WELLS CLUSTER (STATION 0+178). REFER TO DRAWINGS FRNF-XD-DS-04 AND FRNF-XD-DS-06 FOR VALVE LOCATION AND INSTALLATION DETAILS.
8.2. A 25 mm VALMATIC 101 VB VACUUM BREAKER VALVE WAS INSTALLED AFTER THE FIRST CROSSING (STATION 0+383). REFER TO DRAWINGS FRNF-XD-DS-04 AND FRNF-XD-DS-06 FOR VALVE LOCATION AND INSTALLATION DETAILS.
8.3. A 25 mm VALMATIC 22.3 AIR RELEASE VALVE AND A 25 mm VALMATIC 101 VB VACUUM BREAKER VALVE WERE INSTALLED TO CREATE A DUAL VACUUM/AIR RELEASE VALVE AT THE HIGHEST ELEVATION ALONG THE PIPELINE (STATION 0+960). REFER TO DRAWINGS FRNF-XD-DS-04, FRNF-XD-DS-05 AND FRNF-XD-DS-06 FOR VALVE LOCATION AND INSTALLATION DETAILS.
8.4. 2 X 25 mm VALMATIC 22.3 AIR RELEASE VALVES WERE INSTALLED ALONG THE PIPELINE (STATIONS 0+610 AND 1+277). REFER TO DRAWINGS FRNF-XD-DS-04, FRNF-XD-DS-05 AND FRNF-XD-DS-06 FOR VALVE LOCATION AND INSTALLATION DETAILS.
8.5. ALL VALVES INSTALLED ALONG THE PIPELINE WERE PROTECTED BY WOODEN SHELTERS DESIGNED AND INSTALLED BY THE CONTRACTOR (REFER TO FRNF-XD-DS-06).
8.6. BORROW A SAND AND GRAVEL WAS USED TO CREATE A PAD FOR THE SHELTERS (APPROXIMATELY 2.5 m x 2.5 m).
8.7. ADDITIONAL LENGTHS OF THERMOCABLE AND ROXUL COMFORBATT INSULATION WERE WRAPPED AROUND THE VALVE COMPONENTS AND PIPELINE INSIDE SHELTERS 1, 2, 3 AND 5 TO PREVENT HEAT LOST DURING OPERATIONS ON COLD WEATHER. SHELTER 4 IS HEATED BY MEANS OF A HEATER.

9. HEATER INSTALLATION AT SHELTER 4 NOT COMPLETED BEFORE DEMOBILIZATION. SHELTER 4 WILL BE TEMPORARILY HEATED WITH A PORTABLE HEATER FED FROM A LIGHT TOWER UNTIL THE PERMANENT HEATER WILL BE INSTALLED. HEATER INSTALLATION TO BE COMPLETED BY OTHERS OUTSIDE THE NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM CONSTRUCTION PROJECT.
10. THE LOCATION OF THE PUMPHOUSE (C-CAN) IS APPROXIMATE AND IT IS SHOWN FOR REFERENCE ONLY. FOR DETAILS AND LOCATION OF THE PUMPHOUSE PAD, MANHOLE AND SUMP PUMP REFER TO DRAWING FRNF-XD-DS-02. REFER TO CONTRACTOR'S OPERATING AND MAINTENANCE MANUAL FOR PUMP AND PUMPHOUSE AS-BUILT DRAWINGS PRODUCED BY PRECISION SERVICE & PUMPS INC.
11. REFER TO THE GENERAL OPERATING AND MAINTENANCE MANUAL FOR DETAILS OF THE POWER SUPPLY AND PUMPING SYSTEM. BGC FIELD MEMORANDUM 3 CONTAINS ADDITIONAL PIPELINE OPERATION, INSPECTION AND TROUBLESHOOTING RECOMMENDATIONS.
12. A PUMP SUMP WAS INSTALLED DOWNSTREAM TO THE NF2A WATER SAMPLING STATION TO TEMPORARY FEED THE MANHOLE SUMP. REFER TO DRAWING FRNF-XD-DS-02 FOR DETAILS OF THE TEMPORARY PUMP SUMP AND THE TEMPORARY PIPELINE TO THE MANHOLE SUMP. NOTE THAT A BUTTERFLY VALVE WAS INSTALLED AT THE OUTLET OF THE PUMP SUMP TO REGULATE THE FLOW PUMPED TO THE PUMPING MANHOLE (C-CAN).
13. REFER TO CONTRACTOR'S OPERATING AND MAINTENANCE MANUAL FOR DETAILS OF THE ELECTRICAL INSTALLATION, INCLUDING TESTING CERTIFICATES FOR THE APPROVAL OF THE THERMOCABLE CIRCUITS.
14. THE PIPELINE WAS INSTALLED ON TOP OF FROZEN GROUND SO LOCAL MOVEMENT OF THE PIPELINE COULD OCCUR DURING SUMMER / SPRING 2015. THE ANCHORING BY FILL STOCKPILES ALONG THE PIPELINE EACH 20 m BY FILL WAS POSTPONED. THE ANCHORING OF THE PIPELINE EACH 20 m AS SHOWN ON DETAIL 7 (DESIGN DRAWING FRNF-XD-05-16) IS REQUIRED DURING FROST FREE CONDITIONS.
15. NO AS-BUILT SURVEY OF THE PIPELINE ELEMENTS WAS COMPLETED AT THE END OF CONSTRUCTION. THE INFORMATION SHOWN ON DRAWINGS FRNF-XD-DS-03, FRNF-XD-DS-04 AND FRNF-XD-DS-05 IS BASED ON FIELD ESTIMATES AND HAND HELD UTM COORDINATES COLLECTED ON THE FIELD BY BGC AND IT IS APPROXIMATE.
16. NO PRESSURE TESTING OF THE COMPLETED PIPELINE PERFORMED AFTER CONSTRUCTION AS PER REQUIREMENTS FROM THE YUKON GOVERNMENT.
17. A PROTECTION FLUME WAS INSTALLED ON TOP OF THE ROCK FILL SLOPE FROM THE HAUL ROAD TO THE EXISTING S-WELLS CLUSTER FOR PROTECTION OF THE PIPELINE DURING INSTALLATION. BOTH THE PIPELINE AND THE FLUME WERE ANCHORED WITH STEEL CABLES TO THE ANCHOR POLES SHOWN ON DRAWING FRNF-XD-DS-04. A SECONDARY ANCHOR SYSTEM (PIPE CLAMP) WAS INSTALLED FOR THE PIPELINE AT THE DOWNSTREAM SIDE OF THE FIRST ROAD CROSSING.
18. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

LEGEND

- SEEPAGE DISCHARGE PIPELINE
- △ MOUNTING PANEL (MP)
- ● SHELTER/VALVE
- + STATION MARKER
- TC THERMOCABLE CIRCUIT

DRAFT

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	15	03	17	DK	JR	JWC	GWF	AS-BUILT 2015

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: DK	CHECK DRAWING: CJT
DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: PIPELINE TO FARO PIT - AS-BUILT - GENERAL ARRANGEMENT PLAN AND GENERAL NOTES

SCALE:	DWG NO.:	REV.:
1:2,500	FRNF-XD-DS-03	0

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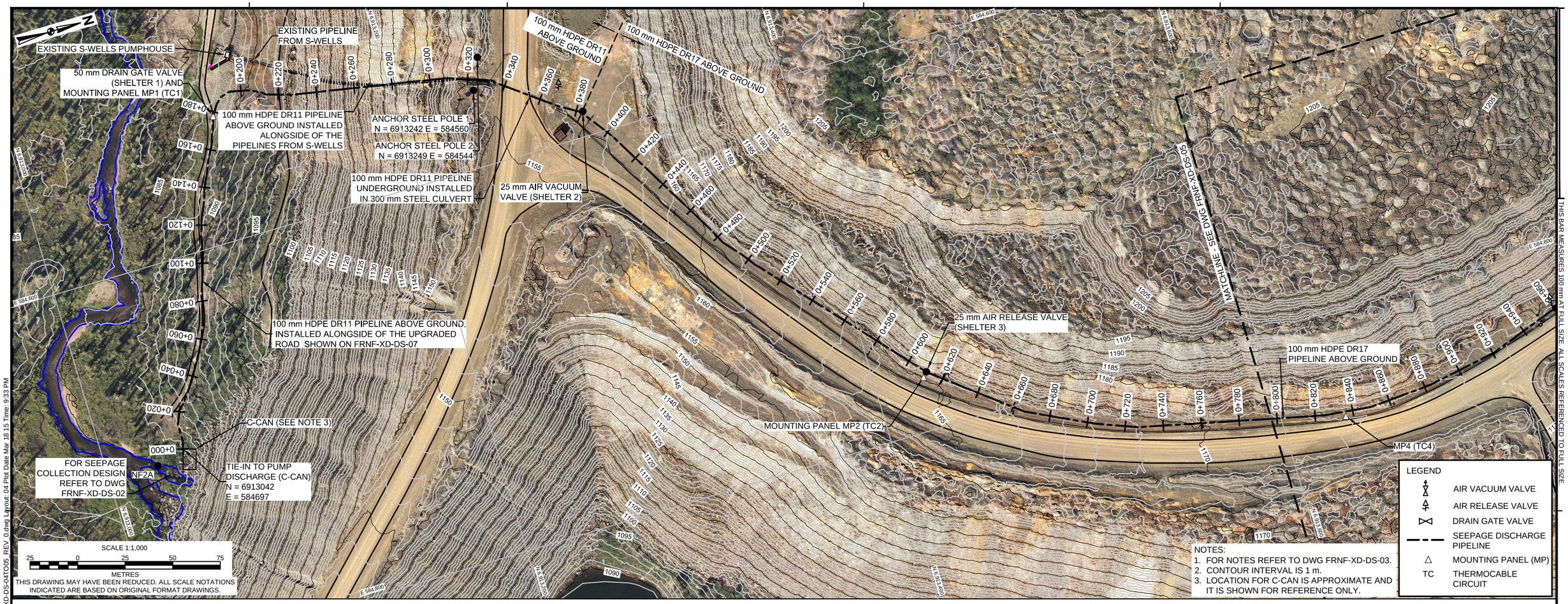

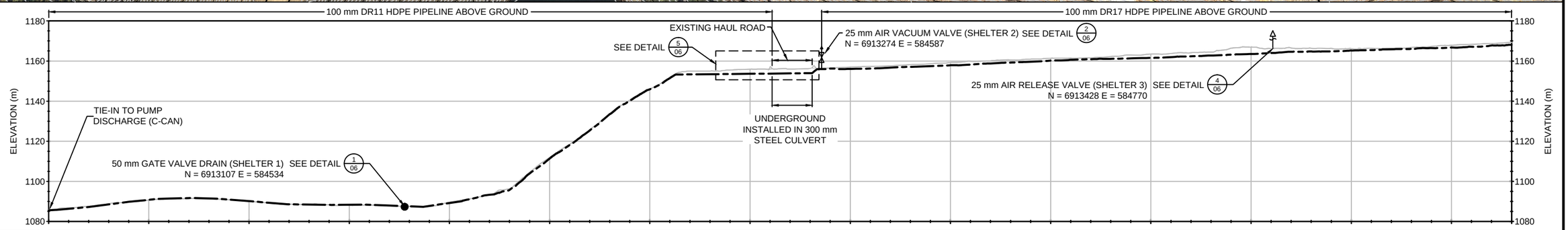

HORIZONTAL CHAINAGE (m)	0+000	0+050	0+100	0+150	0+200	0+250	0+300	0+350	0+400	0+450	0+500	0+550	0+600	0+650	0+700	0+730
EXISTING GROUND ELEVATION (m)	1085.86	1090.66	1089.99	1088.17	1089.63	1111.91	1146.07	1155.91	1156.97	1159.26	1161.39	1163.46	1166.95	1166.15	1167.80	1169.27

VERTICAL SCALE = 1:1,000
HORIZONTAL SCALE = 1:1,000

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

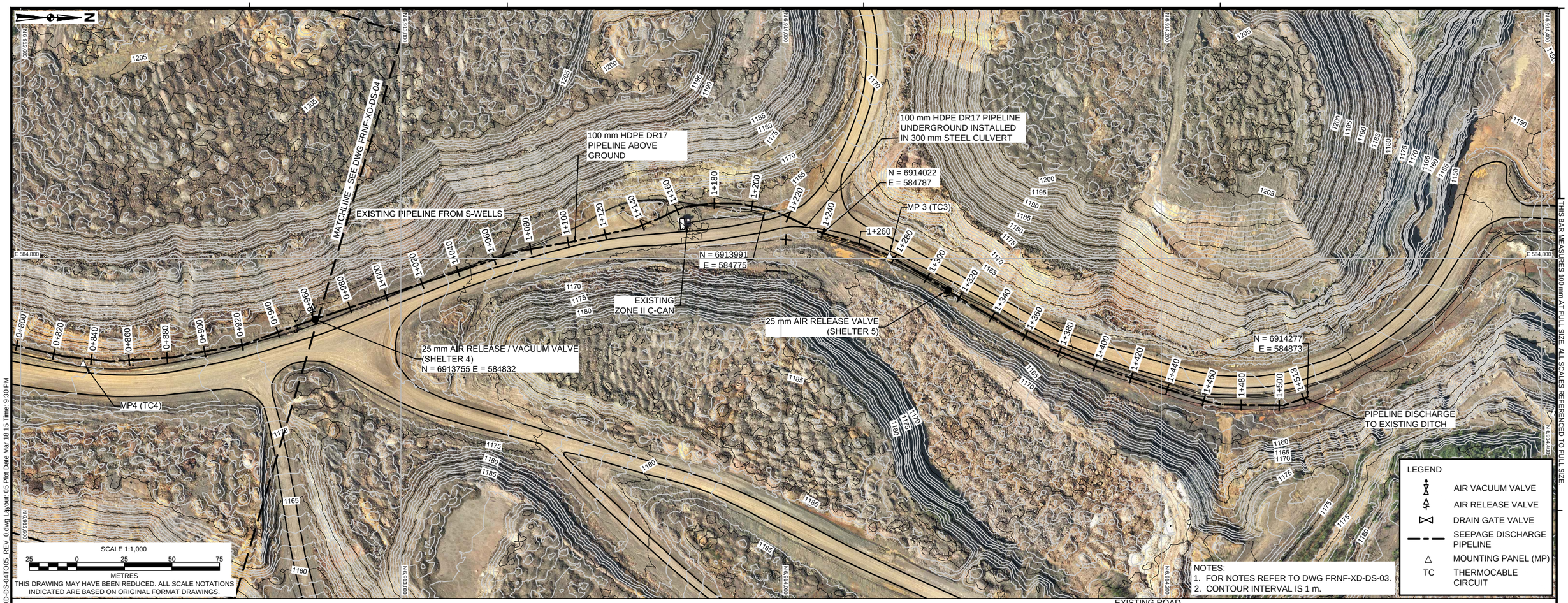
TITLE: PIPELINE TO FARO PIT - AS-BUILT PLAN AND PROFILE SHEET 1

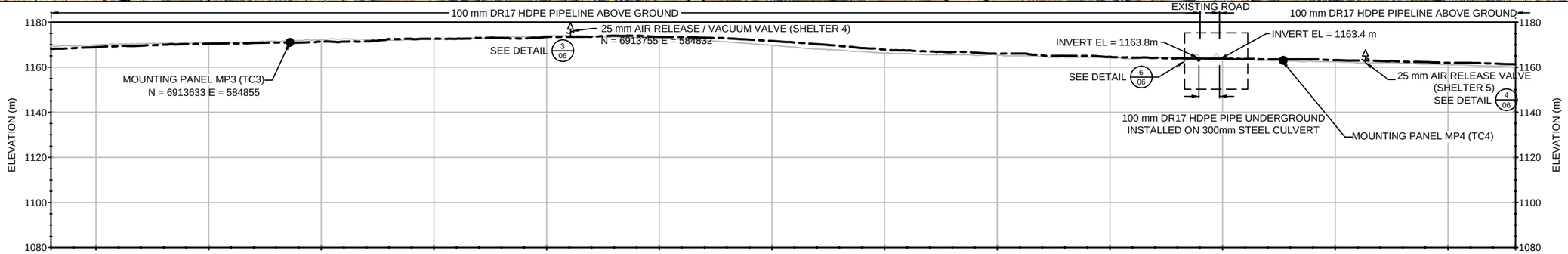
SCALE:	DWG NO.:	REV.:
1:1,000	FRNF-XD-DS-04	0

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE.

X:\Projects\0533 YK-Gov\007\CAD\NORTH FORK ROCK DRAIN SEEPAGE COLLECTION\PRODUCTION\AS BUILT FIGURES\FRNF-XD-DS-04TOE5_REV 0.dwg Layout: 04 Plot Date: Mar 19 15 Time: 9:33 PM

REVISION INFORMATION





HORIZONTAL CHAINAGE (m)	0+730	0+750	0+800	0+850	0+900	0+950	1+000	1+050	1+100	1+150	1+200	1+250	1+300	1+350	1+380
EXISTING GROUND ELEVATION (m)	1169.27	1169.87	1170.94	1172.12	1172.46	1173.97	1173.00	1169.74	1166.29	1165.46	1164.19	1163.50	1162.39	1161.11	1160.16

VERTICAL SCALE = 1:1,000
HORIZONTAL SCALE = 1:1,000

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	15	03	17	DK	JR	JWC	GWF	AS-BUILT 2015

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

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DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: PIPE TO FARO PIT - AS-BUILT PLAN VIEW AND PROFILE SHEET 2

SCALE:	DWG NO.:	REV.:
1:1,000	FRNF-XD-DS-05	0

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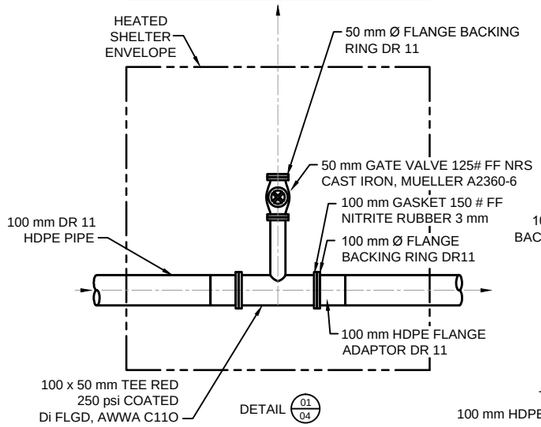
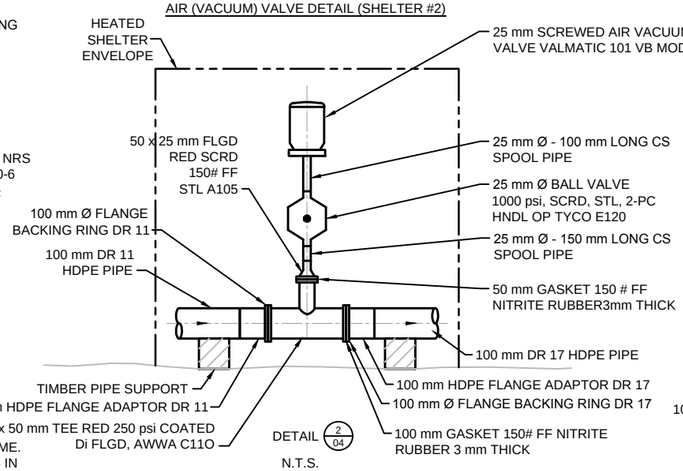
DRAIN VALVE DETAIL PLAN VIEW (SHELTER #1)

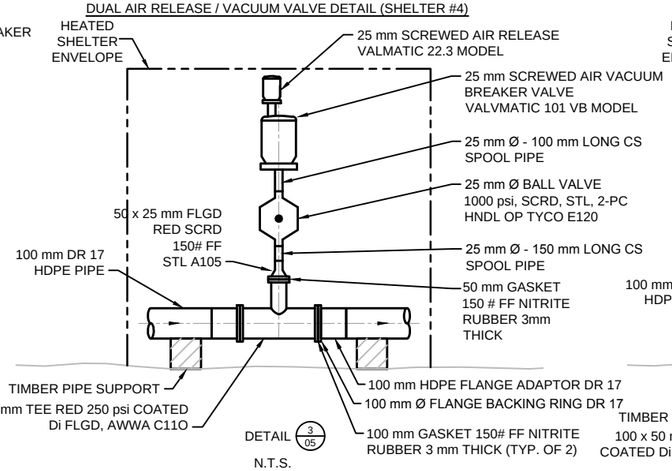


NOTE: HEATED SHELTER DESIGN BY CONTRACTOR. 50 x 100 Mm WOOD FRAME. 400 mm STUD CENTER CONSTRUCTION USING 89 mm WOOD SCREWS IN STUD FRAMING. ROXUL INSULATION INSTALLED AT SHELTER WALLS AND CEILING. FRONT DOOR INSULATED WITH 19 mm ENERGY SHIELD. REFER TO PELLY'S OPERATIONS AND MAINTENANCE MANUAL FOR DETAILS OF HEATED SHELTERS.

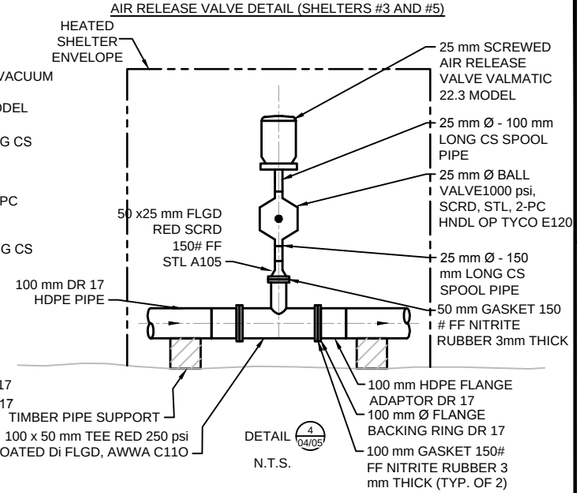
AIR (VACUUM) VALVE DETAIL (SHELTER #2)



DUAL AIR RELEASE / VACUUM VALVE DETAIL (SHELTER #4)

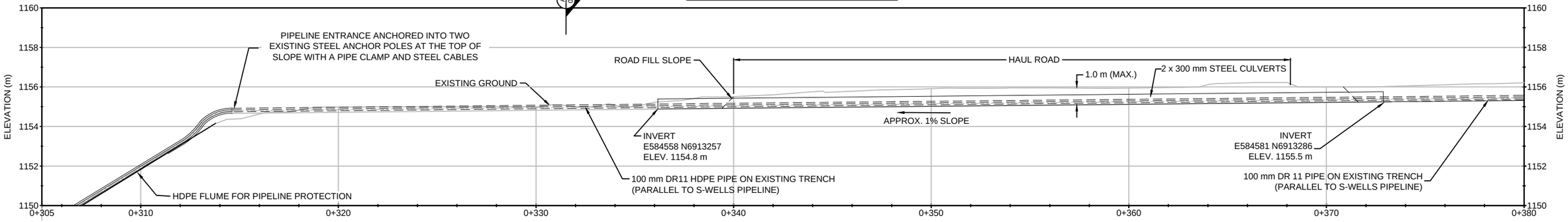


AIR RELEASE VALVE DETAIL (SHELTERS #3 AND #5)



THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE.

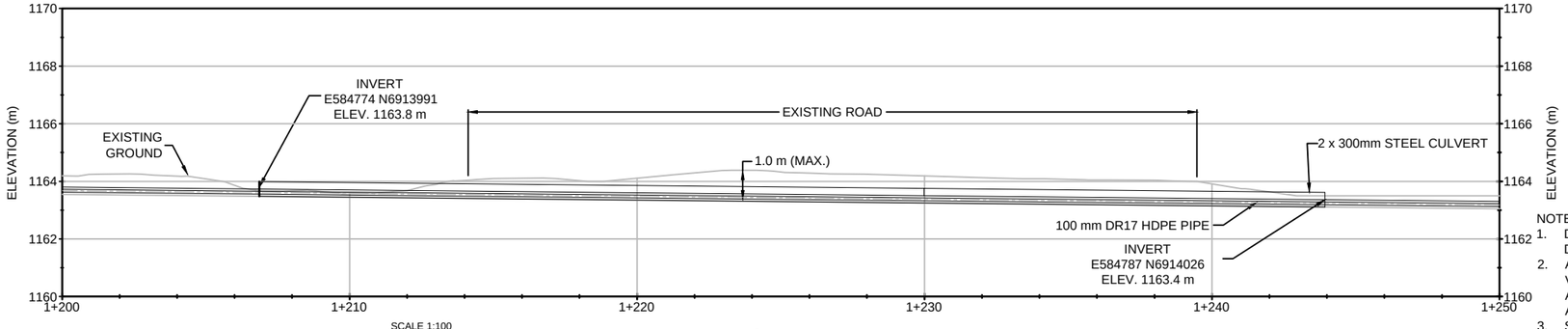
FIRST ROAD CROSSING CROSS-SECTION DETAIL



SCALE 1:100
2.5 0 2.5 5 7.5
METRES

DETAIL 5/04

SECOND ROAD CROSSING CROSS-SECTION DETAIL

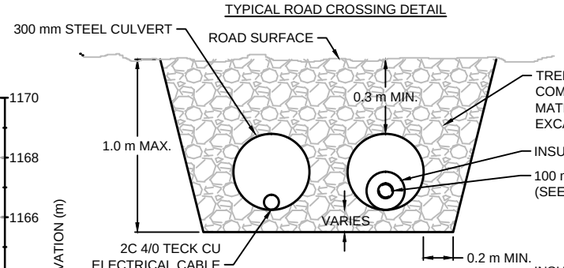


SCALE 1:100
2.5 0 2.5 5 7.5
METRES

DETAIL 6/05

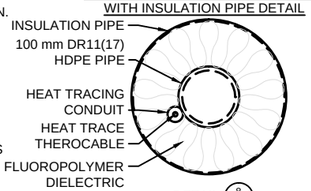
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON ORIGINAL FORMAT DRAWINGS.

TYPICAL ROAD CROSSING DETAIL



NOTES:
1. DETAIL 8 SHOWN FOR REFERENCE ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILS OF HEAT TRACE SYSTEM.
2. ADDITIONAL LENGTH OF THERMOCABLE WAS WRAPPED AROUND VALVES AND PIPE COMPONENTS AT SHELTERS #1, #2, #3 AND #5. ADDITIONAL ROXUL INSULATION WAS INSTALLED ON TOP OF VALVES AND PIPE COMPONENTS.
3. SHELTER #4 WAS HEATED BY MEANS OF A 1500 WATTS TEMPORARY HEATER.
4. FOR GENERAL NOTES REFER TO FRNF-XD-DS-03
5. INFORMATION FOR THE PIPELINE CROSSINGS BASED ON AS-BUILT SURVEY BY UNDERHILL GEOMATICS ON OCTOBER 29, 2014.

TYPICAL 100 mm DR11(17) HDPE PIPE WITH INSULATION PIPE DETAIL



REVISION INFORMATION

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0	15	03	17	DK	JR	JWC	GWF	AS-BUILT 2015

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DRAWN BY: DK	CHECK DRAWING: CJT	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM
DESIGN BY: JR	CHECK DESIGN: GWF		TITLE: PIPELINE TO FARO PIT - AS-BUILT DETAILS
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015	CLIENT: Yukon Government	SCALE: AS SHOWN / DWG NO.: FRNF-XD-DS-06 / REV.: 0
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015		

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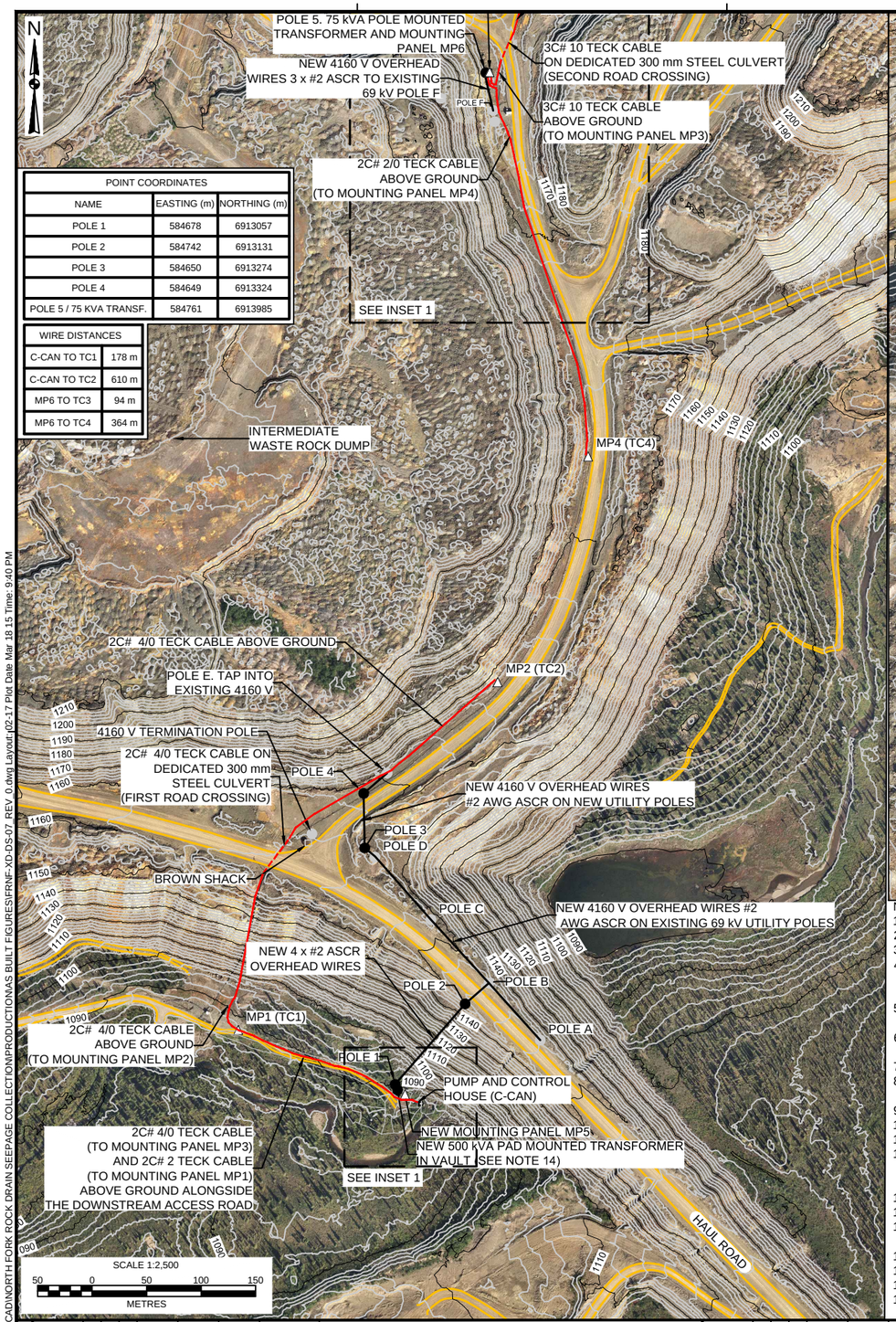
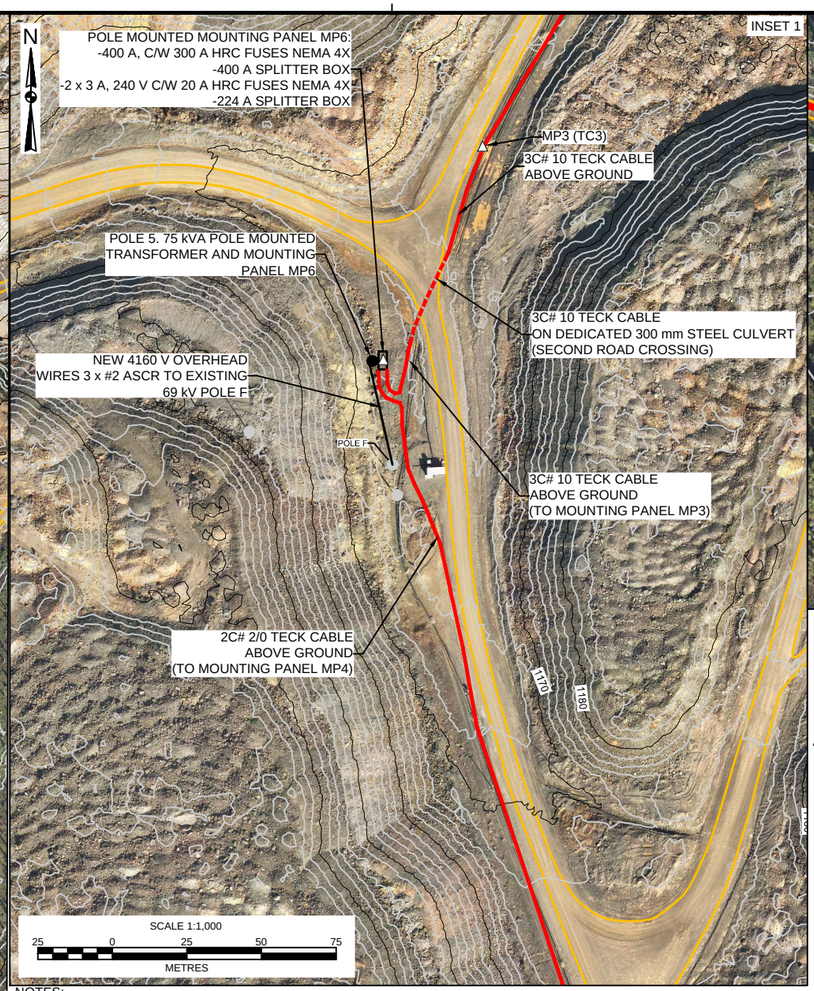
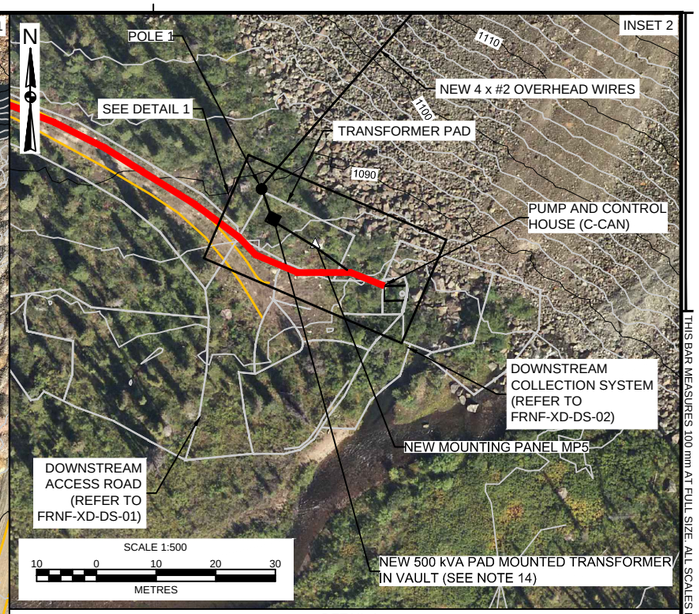


POINT COORDINATES		
NAME	EASTING (m)	NORTHING (m)
POLE 1	584678	6913057
POLE 2	584742	6913131
POLE 3	584650	6913274
POLE 4	584649	6913324
POLE 5 / 75 KVA TRANSF.	584761	6913985

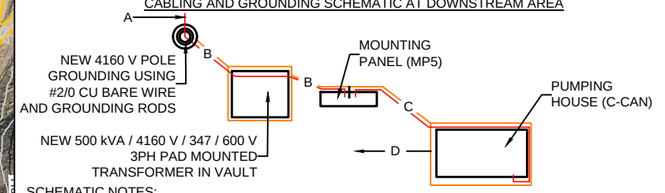
WIRE DISTANCES	
C-CAN TO TC1	178 m
C-CAN TO TC2	610 m
MP6 TO TC3	94 m
MP6 TO TC4	364 m





THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE.

DETAIL 1
CABLING AND GROUNDING SCHEMATIC AT DOWNSTREAM AREA



SCHEMATIC NOTES:
1. A - 4 x #2 ASCR OVERHEAD WIRES (FROM POLE 1 TO POLE 2).
2. B - 2 x 3C-500 MCM CU TECK90 AND #2/0 CU BARE WIRE FOR GROUNDING DIRECT BURIED ON THE SAME TRENCH(SEE NOTES 3 AND 4).
3. C - 3C #2CU 5 kV TECK90 CABLE AND #2/0 CU BARE WIRE FOR GROUNDING ABOVE GROUND ON WOODEN SUPPORTS.
4. D - 2C #2 TECK CU TO MOUNTING PANEL MP1 (APPROX. 180 m) AND 2C #2 TECK CU TO MOUNTING PANEL MP2 (APPROX 630 m). BOTH CABLES INSTALLED ABOVE GROUND ALONGSIDE PIPELINE.
5. MP5 INCLUDES : 1 x 600A 3P SWITCH WITH A 200A FUSE, 1 x 600A, 600V 3PH SPLITTER THROUGH, AND 1 x 100A 3P 100A FUSE.

NOTES:
1. FOR DETAILS OF THE UPGRADES PERFORMED ON EXISTING 69 kV POLES REFER TO ELECTRICAL INSTALLATION DRAWINGS (BY OTHERS).
2. THE LOCATION OF THE C-CAN IS APPROXIMATE AND IT IS SHOWN FOR REFERENCE ONLY. FOR DETAILS OF C-CAN REFER TO DRAWING FRNF-XD-DS-02 AND THE C-CAN AS-BUILT DRAWINGS (BY OTHERS).
3. FOR DETAILS OF THE OVERHEAD TRANSMISSION LINE, TRANSFORMERS AND MOUNTING PANELS REFER TO ELECTRICAL INSTALLATION DRAWINGS (BY NULINE POWERLINE CONTRACTORS LTD.).
4. ELECTRICAL CABLES FROM NEW 4160V UTILITY POLE TO 500 kVA PAD MOUNTED TRANSFORMER AND FROM 500 kVA PAD MOUNTED TRANSFORMER TO MOUNTING PANEL WERE INSTALLED ON A TRENCH AS RECOMMENDED BY ELECTRICAL SUB-CONTRACTOR. WARNING TAPE WAS INSTALLED 0.3 m ON TOP OF THE CABLE DURING BACKFILLING OF TRENCH. THE ELECTRICAL CALBES WERE UNDERLAIN BY A MIN. OF 0.2 m THICK LAYER OF SAND AND GRAVEL FROM BORROW A.
5. CABLE TRENCH CONSISTED ON A 1.1 m TO 1.2 m WIDE BY 0.5 m TO 1.0 m DEEP TRENCH EXCAVATED ON NATURAL GROUND. THE TRENCHES WERE BACKFILLED WITH COMMON EXCAVATED MATERIAL AND SAND AND GRAVEL FROM BORROW A.
6. A NEW ANCHOR WAS INSTALLED ON THE EXISTING 69 kVA UTILITY POLE E AND ON THE NEW 4160 V UTILITY POLE 5. 2 ANCHORS WERE INSTALLED ON THE NEW 4160 V UTILITY POLES 1, 3 AND 4. ANCHOR CABLES WERE PROTECTED WITH GUARDLINES.
7. A PUSH BRACE POLE WAS INSTALLED ON THE EXISTING 69 kVA UTILITY POLES B AND F.
8. EXISTING 69 kV UTILITY POLES A, B AND C UPGRADED BY MOVING THE EXISTING 69 kV WIRES TO NEW CROSS ARMS INSTALLED ON THE SAME POLE AT A HIGHER ELEVATION. THE EXISTING UTILITY POLE A WAS NOT UPGRADED.
9. CONNECTION TO THE EXISTING 4160 V, 3 PH, 4 WIRE OVERHEAD LINE ON THE EXISTING 4160 V UTILITY POLE E.
10. CONNECTION TO THE EXISTING 4160 V, 3 PH, 4 WIRE OVERHEAD LINE ON THE EXISTING 4160 V UTILITY POLE F.
11. NEW CROSS ARMS INSTALLED ON THE EXISTING 69 kV POLES B, C, D AND E FOR THE INSTALLATION OF THE NEW 4160 V WIRES.
12. GROUNDING FOR POLES 1, B, 5, TRANSFORMERS AND MOUNTING PANELS WERE INSTALLED AS PER THE APPLICABLE CODES LISTED ON THE ELECTRICAL DESIGN DRAWINGS. SEE DETAIL 1 FOR A GROUNDING SCHEMATIC AROUND C-CAN, MOUNTING PANEL, 500 kVA TRANSFORMER AND NEW UTILITY POLE AT THE DOWNSTREAM AREA. THE REQUIRED COPPER CABLE AND GROUNDING RODS INSTALLED AS RECOMMENDED BY THE ELECTRICAL SUB-CONTRACTOR.
13. NEW GROUNDING INSTALLED AT POLE 1, 5 AND B.
14. THE 500 kVA TRANSFORMER IS ON A 1925 kg PRECAST CONCRETE VAULT BY LAFARGE (PROD. NO. 9219, 1939 m X 1730 m X 1 m).
15. FOR LOCATION OF MOUNTING PANELS (MP) REFER TO PIPELINE AS-BUILT DRAWINGS FRNF-XD-DS-04 AND FRNF-XD-DS-05. REFER TO ELECTRICAL INSTALLATION DRAWINGS (BY OTHERS) FOR DETAILS ON THE MOUNTING PANELS.
16. POLES A, B, C AND D ARE EXISTING 60 kVA UTILITY POLES.
17. POLES 1, 2, 3, 4 AND 5 ARE NEW 4160 V UTILITY POLES.
18. POLES E AND F ARE EXISTING 4160 V UTILITY POLES.
19. ELECTRICAL CABLES TO MOUNTING PANELS WERE LAID ABOVE GROUND ALONGSIDE THE PIPELINE, INSIDE THE PIPELINE PROTECTION FLUME AND ON DEDICATED 300 mm STEEL CULVERT (ROAD CROSSINGS). REFER TO DRAWING FRNF-XD-DS-03 FOR DETAILS OF THE PIPELINE ALIGNMENT.

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	15	03	17	DK	JR	JWC	GWF	AS-BUILT 2015

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: DK	CHECK DRAWING: CJT
DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

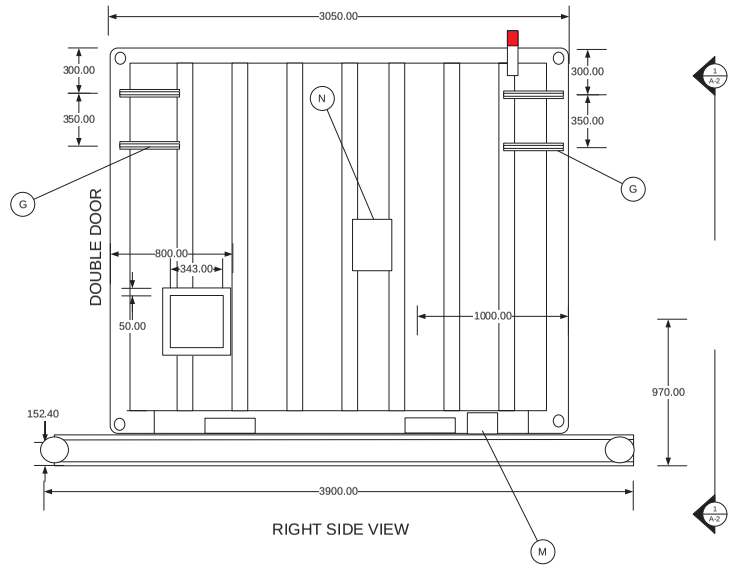
CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

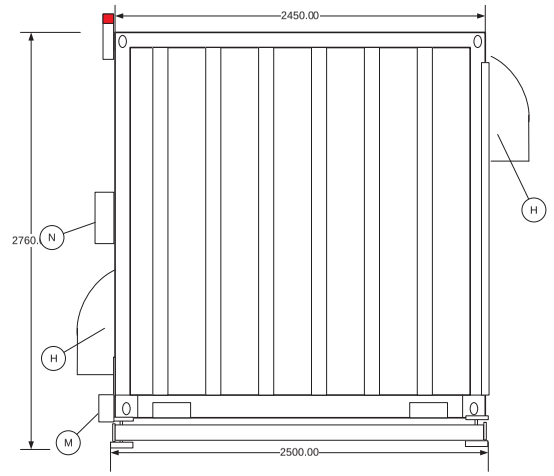
TITLE: POWER SUPPLY - AS-BUILT GENERAL ARRANGEMENT

SCALE:	DWG NO.:	REV.:
AS SHOWN	FRNF-XD-DS-07	0

X:\Projects\0533 YK-Gov\007\CAD\NORTH FORK ROCK DRAIN SEEPAGE COLLECTION\PRODUCTION\AS BUILT FIGURES\FRNF-XD-DS-07 REV 0.dwg Layout: 02-17 Plot Date: Mar 18 15 Time: 9:40 PM

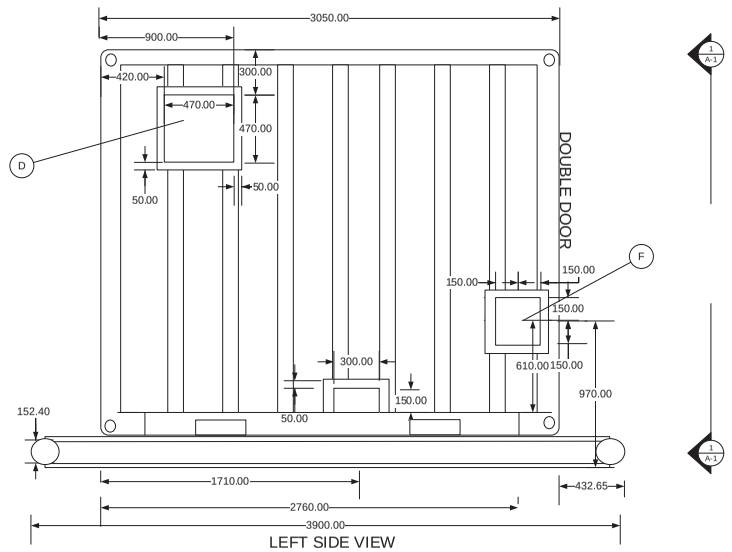


RIGHT SIDE VIEW

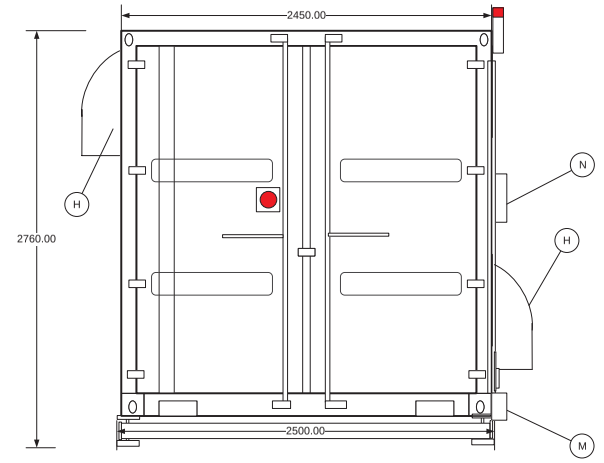


1/A-2 SECTION

RIGHT VIEW, SOLID END

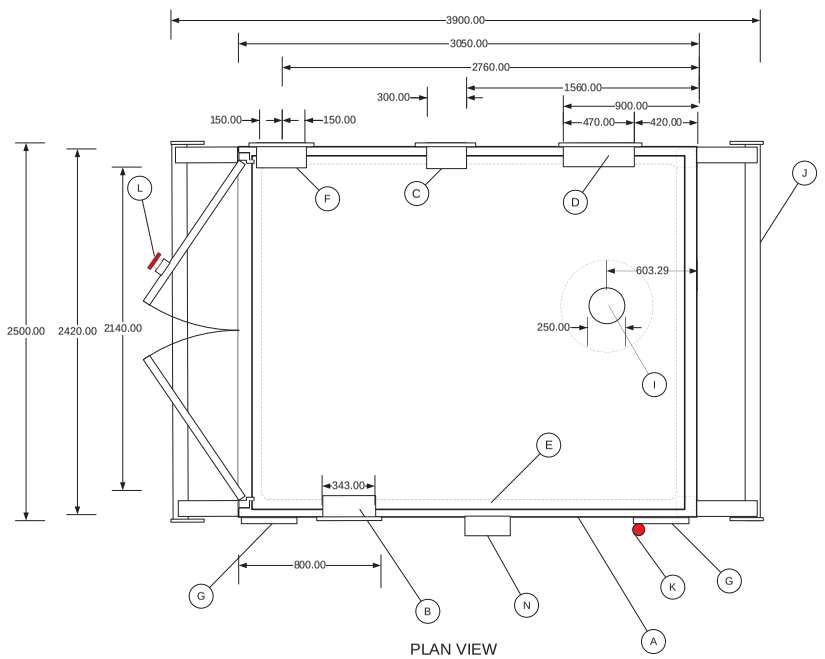


LEFT SIDE VIEW



1/A2 SECTION

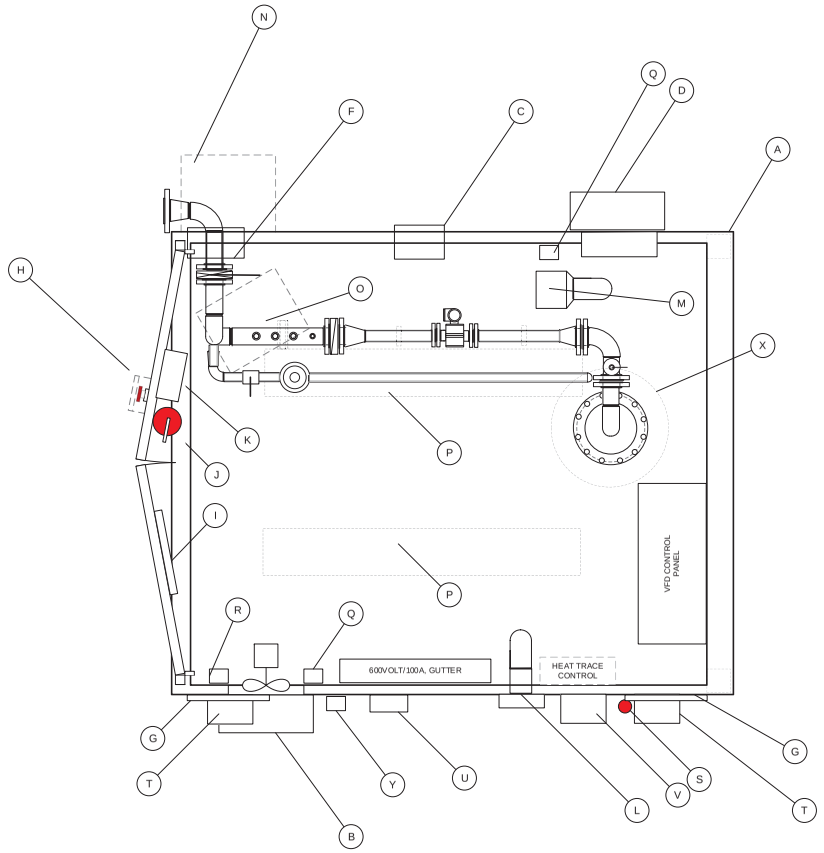
LEFT VIEW, DOUBLE DOORS



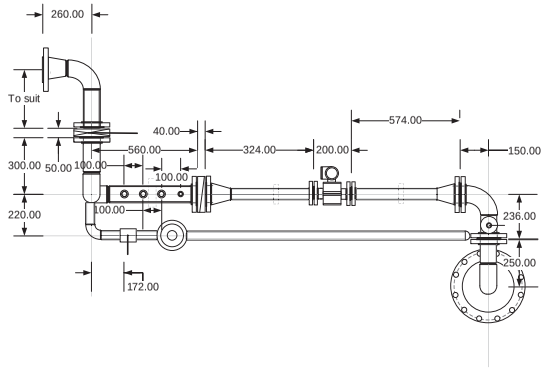
PLAN VIEW

EQUIPMENT LAYOUT
A - 10' C-CAN
B- C- 343mm(13.5") X 343mm,(13.5") EXHAUST FAN OPENING.
C- 300mm(12") X 150mm(6") EMERGENCY DRAIN
D- 470mm(18.5")X 470mm(18.5") INLET LOUVRE OPENING
E- 50mm(2") SPRAY FOAM INSULATION
F- 300(12") X 300mm(12"), PIPE DISCHARGE OPENING
G- 38mm(1 ½") UNISTRUT, GALV, EXTERIOR LIGHT MOUNTS
H- LOUVER STORM HOODS, INLET AND EXHAUST
I- 250mm (10") CLEAR OPENING, WELL HEAD
J- 150mm(6") STEEL "I" BEAM SKID FRAME
K- ALARM BEACON
L- EMERGENCY STOP BUTTON
M- SUMP VENT
N-MAIN POWER , POSI-MAX POWER DISTRIBUTION PANEL 9P
EXTERIOR FINISH
LIGHT MACHINE GREY
* INTERIOR FINISH
* WALLS AND CEILING TO BE SPRAY FOAM INSULATED
* UNDERSIDE OF C-CAN TO BE SPRAY FOAM INSULATED

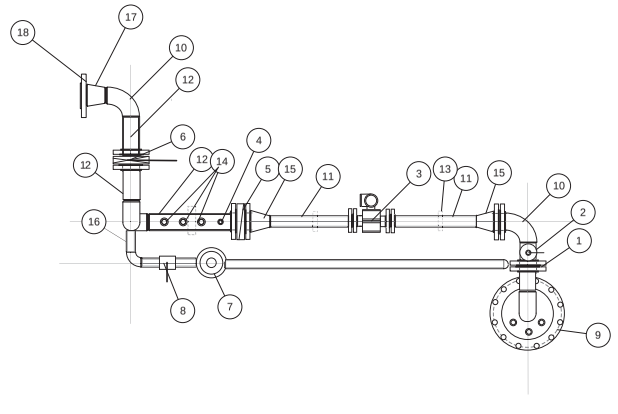
PRECISION SERVICE AND PUMPS INC. 1334 RIVERSIDE ROAD ABBOTSFORD, BC	YUKON GOVERNMENT			
	FARO MINE NORTH FORK ROCK DRAIN, SEEPAGE INTERCEPTION SYSTEM C-CAN GENERAL LAY OUT			
DATE: NOV 01 2014	SIZE	FSCM NO	DWG NO	REV
			FRNF-XD-02-10,AB	2 12/01/15
DRAWN BY: M LAMONT	SCALE 1 : 25	8951	SHEET 1 OF 4	



EQUIPMENT SCHEDULE
A- 10' C-CAN
B- 343mm(13.5") X 343mm,(13.5") EXHAUST FAN OPENING.C/W STORM HOOD
C- 300mm(12") X 150mm(6") EMERGENCY DRAIN
D- 470mm(18.5")X 470mm(18.5") INLET LOUVRE OPENING,C/W STORM HOOD
F- 300(12") X 300mm(12"), PIPE DISCHARGE OPENING
G -38mm(1 ½") UNISTRUT, GALV, EXTERIOR LIGHT MOUNTS
H- EMERGENCY PUMP STOP C/W PLASTIC COVER
I- EMERGENCY EXIT C/W PANIC HARDWARE
J-FIRE EXTINGUISHER, 5LB ABC
K-BASIC FIRST AID KIT
L- OUTSIDE SUMP VENT
M- SUMP FAN
N- INSULATED DOG HOUSE FOR DISCHARGE PIPE
O- UNIT HEATER
P FLUORESCENT LIGHTS X 2
Q- 110VOLT RECEPTACLES, DUPLEX
R- LIGHT SWITCH
S- V- ALARM BEACON, O2,LEL, CO2 TEMP
T- 500 WATT EXTERIOR FLOOD LIGHT C/W PHOTO CELL SWITCH X 4
U- MAIN POWER , POSI-MAX POWER DISTRIBUTION PANEL 9P
V- HEAT TRACE JUNCTION BOX
X- 600mm (24") SUMP OUTLINE
Y- LEVITOM NEMA L14-13, 30A-125/150V RECEPICAL



PIPING AND WELL
HEAD DETAIL
DIMENSIONAL

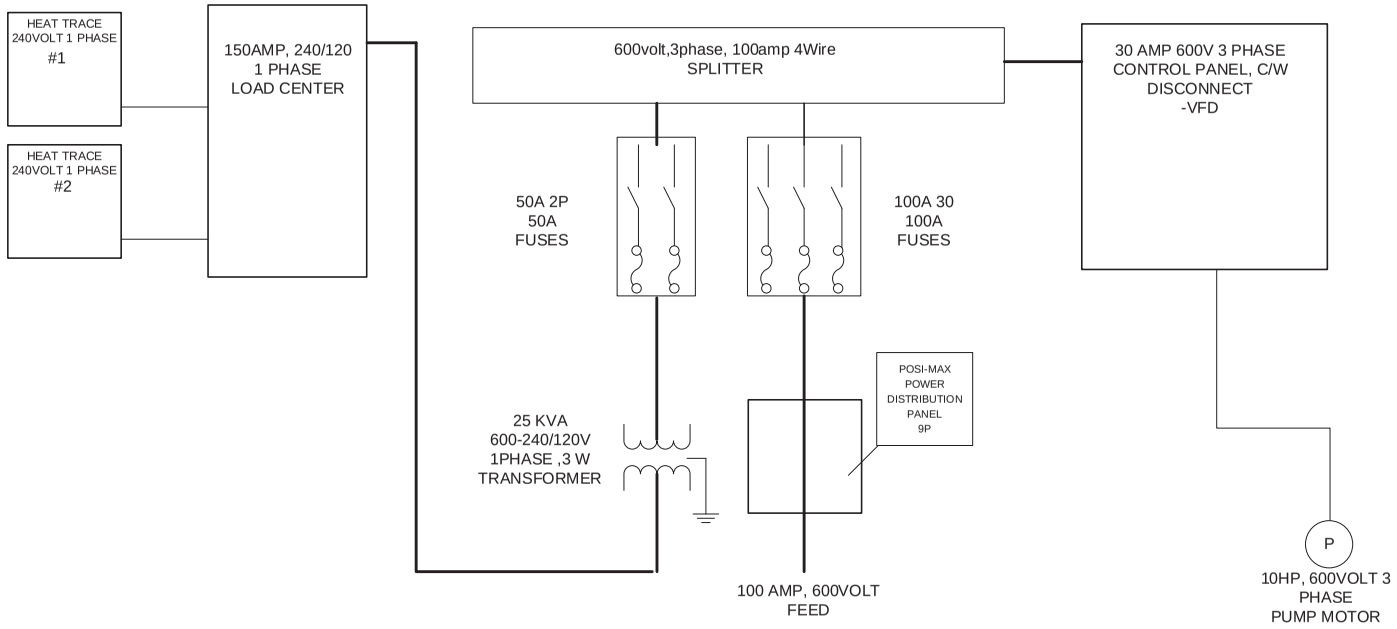


PIPING AND WELL
HEAD DETAIL

BILL OF MATERIALS
1 - 80mm (3") ANSI FLANGE 150LB, RF
2 -25mm (1") FLOWMATIC AIR RELIEF VALVE
3 - 50mm (2") ENDRESS AND HAUSER PRO MAG 50P50
4 - 100mm (4") LIQUID FILLED GAUGE C/W 12mm BALL VALVE
5 - 80mm (3") SILENT CHECK, WAFER STYLE, FLOWMATIC
6- 80mm (3") BUTTERFLY VALVE, ISOLATION
7- 37mm 1.5" N.O., PRV VALVE AND AUTO DRAIN, CLA VAL
8- 37mm (1.5" SS BALL VALVE
9- 250mm (10") ANSI BLIND FLANGE, 150#, RF,WELL HEADC/W 80mm 90 ELBOW AND FLANGE DISCHARGE, 3 X 1"
THREADED OPENINGS
10- 80mm (3") SCH 40 304 SS WELD ON ELBOW
11- 50mm (2") SCH 40 304 SS PIPE
12- 80mm (3") SCH 40 304 SS PIPE
13-80mm (3") SS PIPE STAND X 3
14- 25mm (1") THREAD O LETS FOR FUTURE SENSORS, PH, EC, ETC
15- 80mm (3") X 50mm(2") CONCENTRIC WELD ON REDUCER 304SS
16- 37mm(1.5") X 100mm (1.5") BRASS NIPPLE
17- 100mm(4") x 80mm(3") CONCENTRIC REDUCER, WO, 150#
18- 100mm (4") 150#, SO, RF, FLANGE

PRECISION SERVICE AND PUMPS INC. 1334 RIVERSIDE ROAD ABBOTSFORD, BC	YUKON GOVERNMENT FARO MINE NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM PUMP AND PIPING ARRANGEMENT			
DATE: NOV 01 2014	SIZE	FSCM NO	DWG NO FRNF-XD-02-11	Rev 2 12/01/15
DRAWN BY: M LAMONT	SCALE 1 : 20	8951	SHEET 2 OF 4	

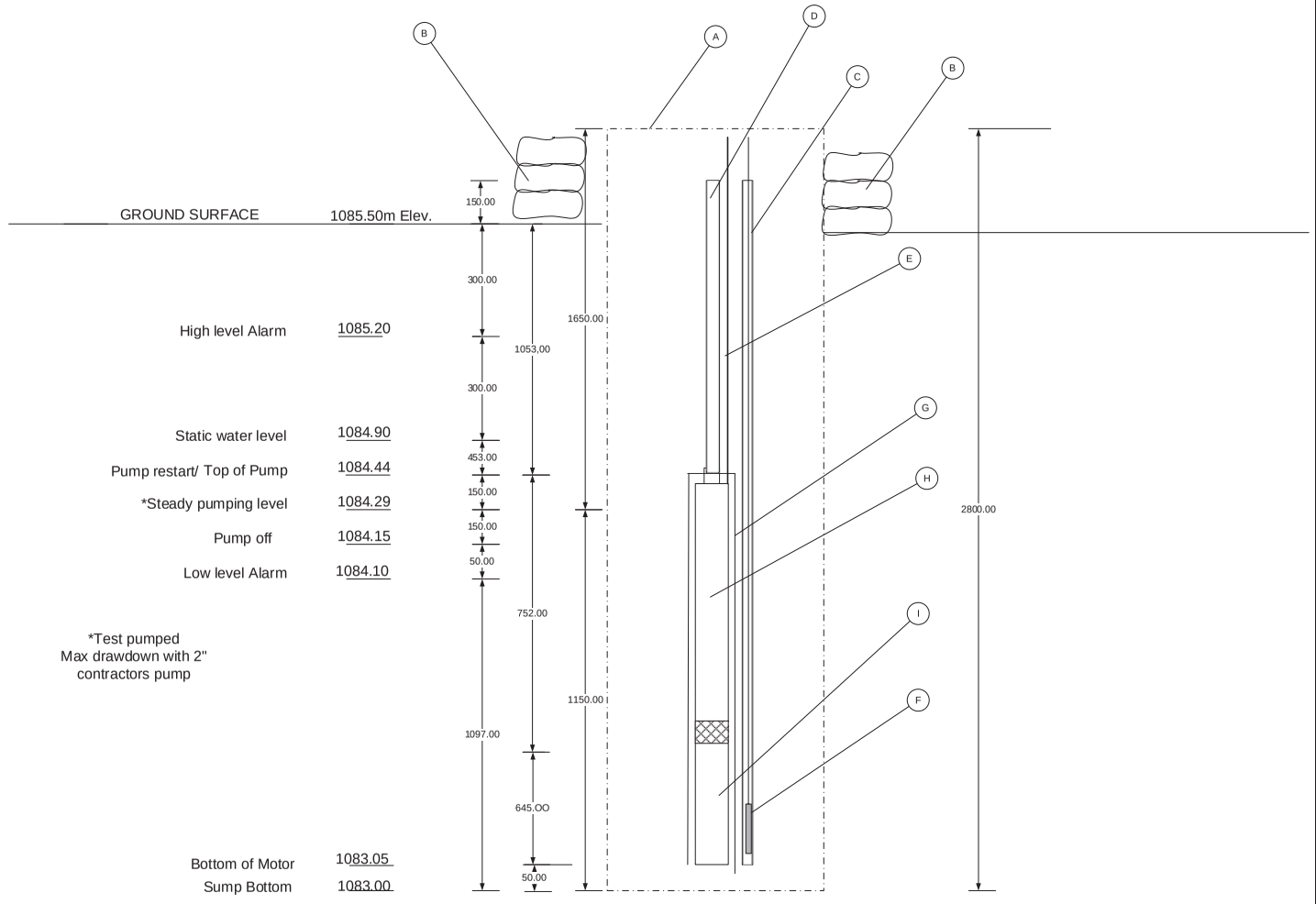
POWER SUPPLY ARRANGEMENTS



LOAD CENTER BREAKER PANEL

POSITION	RATING	CIRCUIT
	2P 25A,CB	UH — 240Volt,3000Watt UH c/w built in Thermostat
	1P 15A,CB	INTERIOR LIGHT
	1P 15A,CB	EXTERIOR LIGHT
	1P 15A,CB	UTILITY PLUG
	1P 15A,CB	UTILITY PLUG
	1P 15A,CB	HEAT TRACE PLUG, DISCHARGE
	1P 15A,CB	TEMP CONTROLLER — RELAY — TEMPERATURE CONTROLLER RELAY CIRCUIT
	1P 15A,CB	RELAY — FAN ACTUATORS — FAN ACTUATORS LOUVRE ACTUATORS CIRCUIT
	2P 30A,CB	240VOLT HEAT TRACE #1
	2P 30A,CB	240VOLT HEAT TRACE #2
	2P 30A,CB	Exterior 125/230volt,30 amp Receptical
	2P 30A,CB	SPARE
	2P 30A,CB	SPARE
	2P 15A,CB	M — SUMP FAN
	1P 15A,CB	UPS — ALARMS/ SENSORS

BILL OF MATERIAL
A- 600Mm(24") DIA. HDPE, PERFORATED WITH 25mm HOLESSTARTING 500MM DOWN FROM THE TOP
B- SAND BAGS, SEAL BETWEEN GROUND AND BOTTOM OF C-CAN
C- 31mm(1.25") PVC CLASS 200 , DIP TUBE
D- 80mm (3") SCH 40 , 304 SS THREADED DROP PIPE
E- #10-4 FLAT JACKETED SUB WIRE(POWER TO PUMP)
F- P/T ENDRESS AND HAUSER, WATERPILOT,FMX 167-F1APE1C7
G - 200mm (8") PVC FLOW SLEEVE AND TOP ADAPTER TO 80mm
H- GRUNDFOS 85S100-9-8 PUMP END , 304 SS
I- GRUNDFOS 10 HP,575VOLT 3PHASE, 150mm(6") DIAMETER



SUMP DETAIL

NTS

PRECISION SERVICE AND PUMPS INC.
1334 RIVERSIDE ROAD
ABBOTSFORD, BC

YUKON GOVERNMENT

FARO MINE
NORTH FORK ROCK DRAIN
SEEPAGE INTERCEPTION SYSTEM
ELECTRICAL AND PUMP DETAIL

DATE: NOV 01 2014

DRAWN BY: M LAMONT

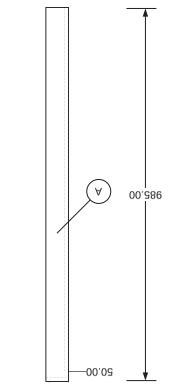
SIZE	FSCM NO	DWG NO	REV
		FRNF-XD-02-12.AB	2 12/01/15

SCALE		SHEET	
1 : 2	8951		3 OF 4

PRECISION SERVICE AND PUMPS INC. 1334 RIVERSIDE ROAD ABBOTSFORD, BC	YUKON GOVERNMENT FARO MINE NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM C-CAN DETAILS AND DOG HOUSE
DATE: NOV 01 2014	SIZE: F FSCM NO: DWG NO: FRNF-XD-02-22.AB REV: 2 12/01/15
DRAWN BY: M LAMONT	SCALE: 1 : 10 8951 SHEET: 4 OF 4

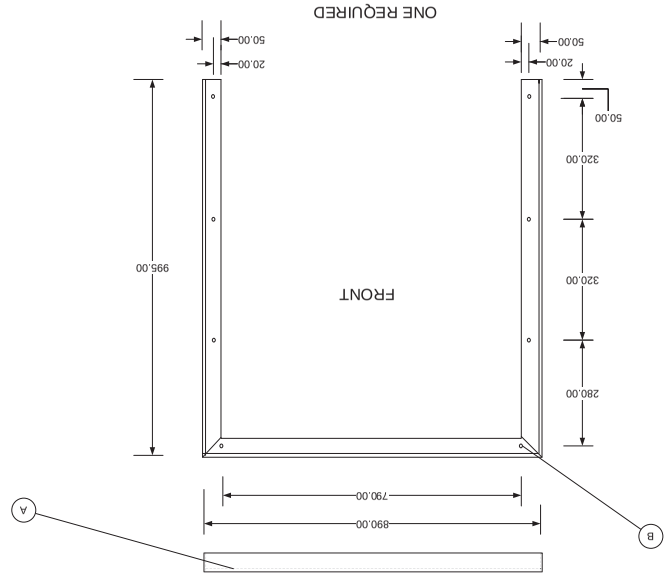
SIDE VIEW

B- 9.5mm,3/8" HOLES
A- 50mm, 2" X 50mm,2" X 6mm,¼" ALUMINUM ANGLE FRAME
BILL OF MATERIAL

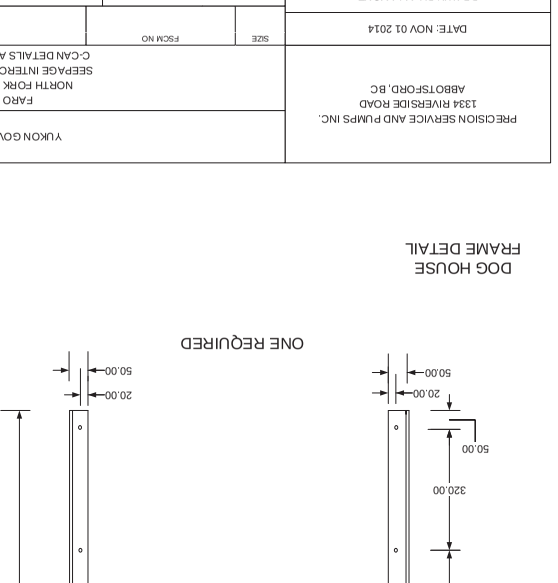


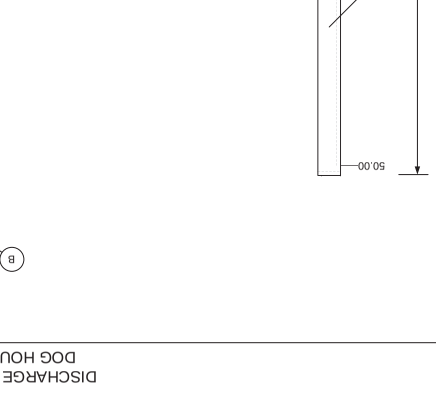
DOG HOUSE FRAME DETAIL

ONE REQUIRED



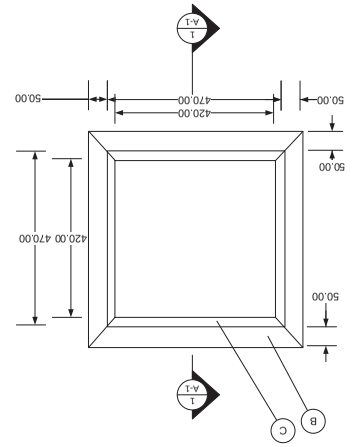
DISCHARGE PIPE DOG HOUSE



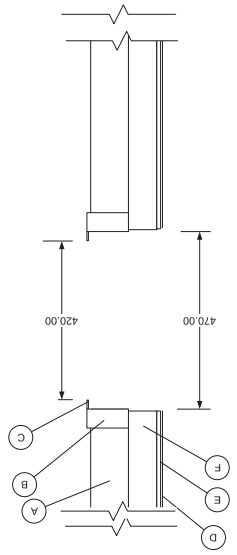


BILL OF MATERIAL
A- 50mm, 2" X 50mm,2" X 6mm,¼" ALUMINUM ANGLE FRAME
B- 12.5mm,½" PLYWOOD D GRADE
C- 2X4 SPRUCE STUDS
FASTENERS REQUIRED
#8-1.5 WOOD SCREWS, QTY 100
#8-½" WOOD SCREWS, QTY 25
SELF TAPING SCREWS , SS ¼" X 1" LONG, QTY 60
ADHESIVES TO GLUE INSULATION TO PLYWOOD, QTY 3 TUBES(SMALL)
FINISH
TWO COATS LIGHT GREY OUTSIDE ONLY, ALKLID ENAMEL

INLET LOUVRE DETAIL FARO NFRD



INLET LOUVER DETAIL



SECTION INLET LOUVRE DETAIL

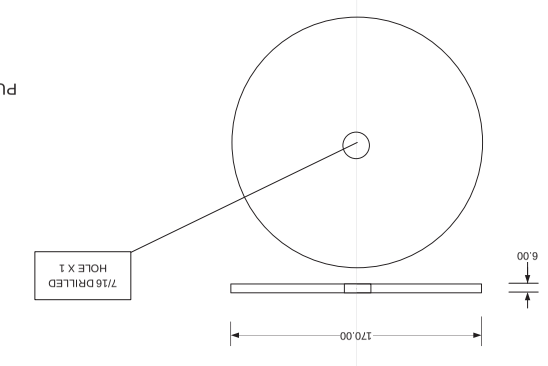
F- 2X4 WOOD FRAMING C/W SPRAY FOAM INSULATION
E- 13mm (.50") PLYWOOD SHEETING
D- STEEL CLADDING, (WHITE)
C- 38mm(1.5" X 6mm(.250") STEEL FLAT BAR FRAME
B- 100mm,(4") X 50mm(2") STEEL BOX FRAME
A- C-CAN .10'
BILL OF MATERIALS

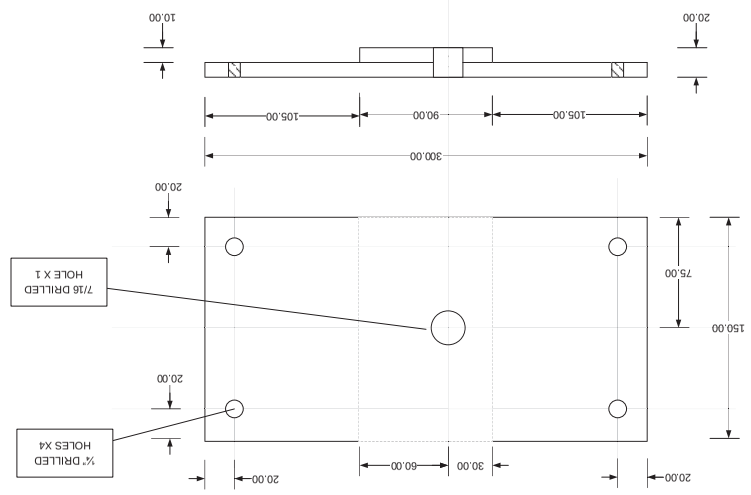
NTS

FINISH- TWO COATS MACHINE GREY ON CS SUPPORT PLATE
H- ½ NC THREAD EYE
G-½" 6mm ALUMINUM BACKING PLATE
F- C-CAN ROOF;
E- BUTYL SEALANT
D- 3/8" 10mm, SUPPORT PLATE, CS
C- ½" PLATED FLAT WASHER
B- ½" NC PLATED HEX NUT
A- ½" NC PLATED REDI ROD
BILL OF MATERIAL

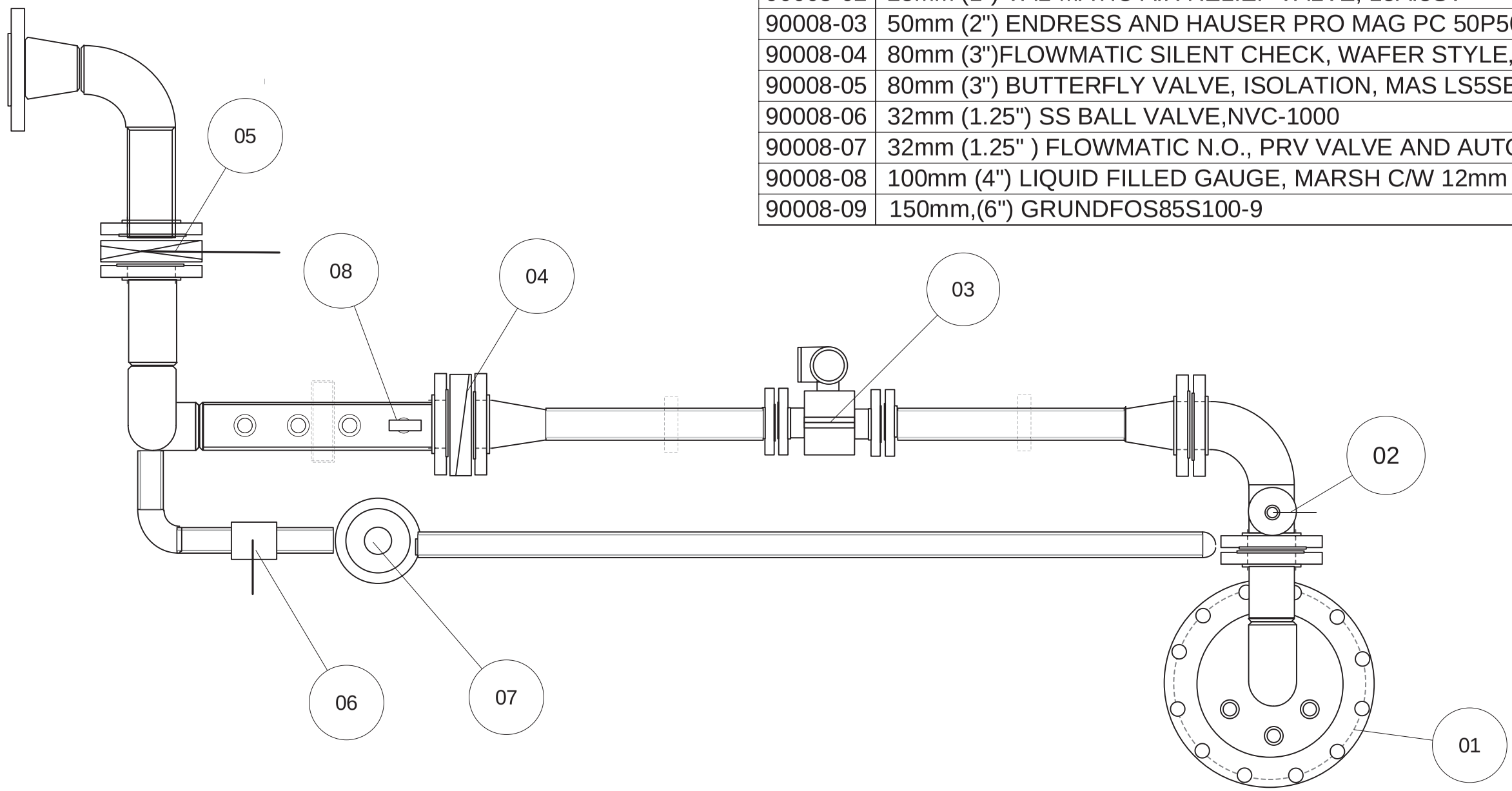
PUMP LIFTING EYE BOLT DETAIL

NTS





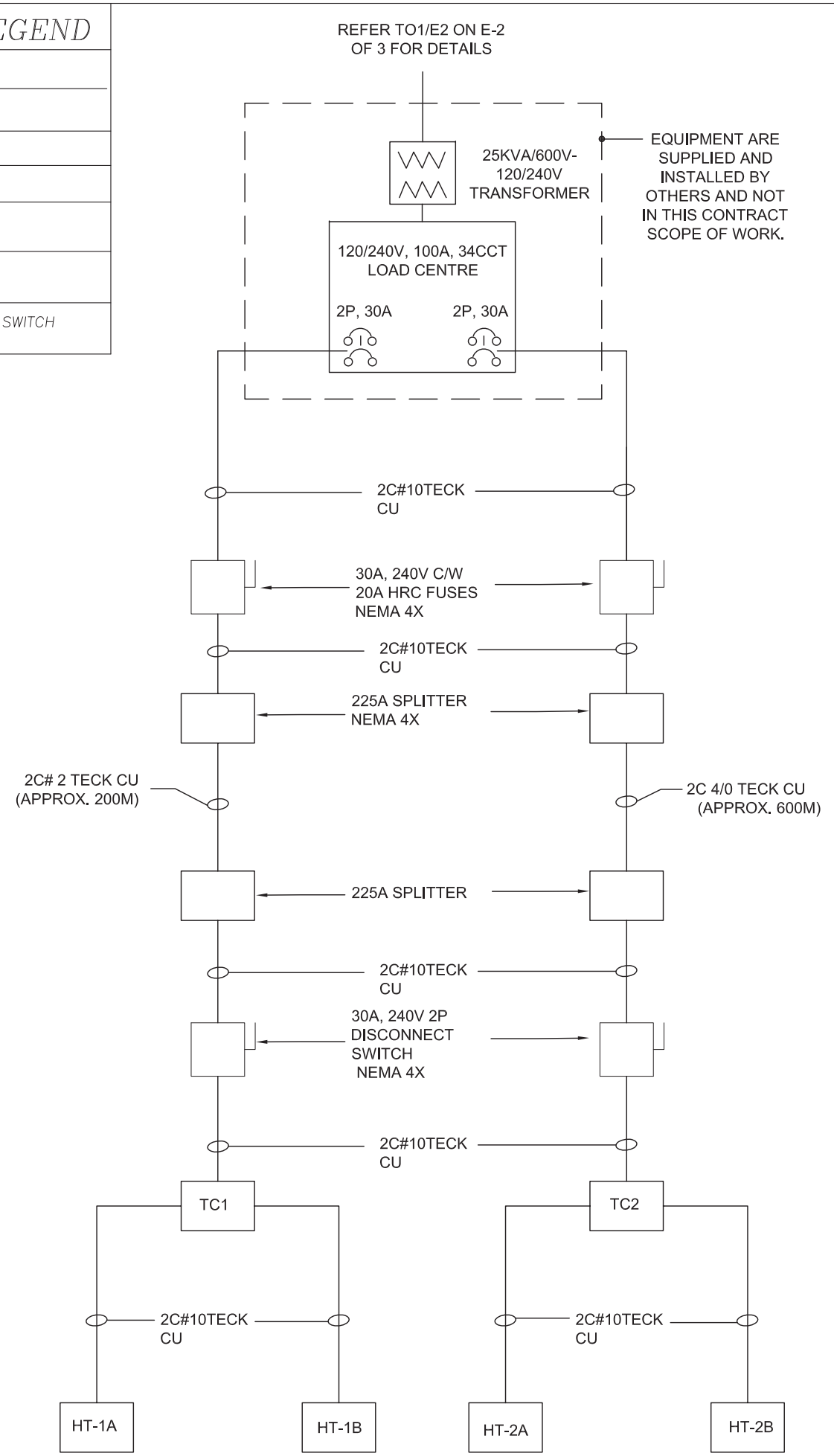
EQUIPMENT TAGS, PIPING	
TAG #	DESCRIPTION
90008-01	250mm(10") X 80mm (3") FABRICATED WELL HEAD
90008-02	25mm (1") VAL-MATIC AIR RELIEF VALVE, 15A.3SV
90008-03	50mm (2") ENDRESS AND HAUSER PRO MAG PC 50P50ERGASR10BAA
90008-04	80mm (3")FLOWMATIC SILENT CHECK, WAFER STYLE,2427X
90008-05	80mm (3") BUTTERFLY VALVE, ISOLATION, MAS LS5SBLH
90008-06	32mm (1.25") SS BALL VALVE,NVC-1000
90008-07	32mm (1.25") FLOWMATIC N.O., PRV VALVE AND AUTO DRAIN,C 403B0DE010
90008-08	100mm (4") LIQUID FILLED GAUGE, MARSH C/W 12mm BALL VALVE
90008-09	150mm,(6") GRUNDFOS85S100-9

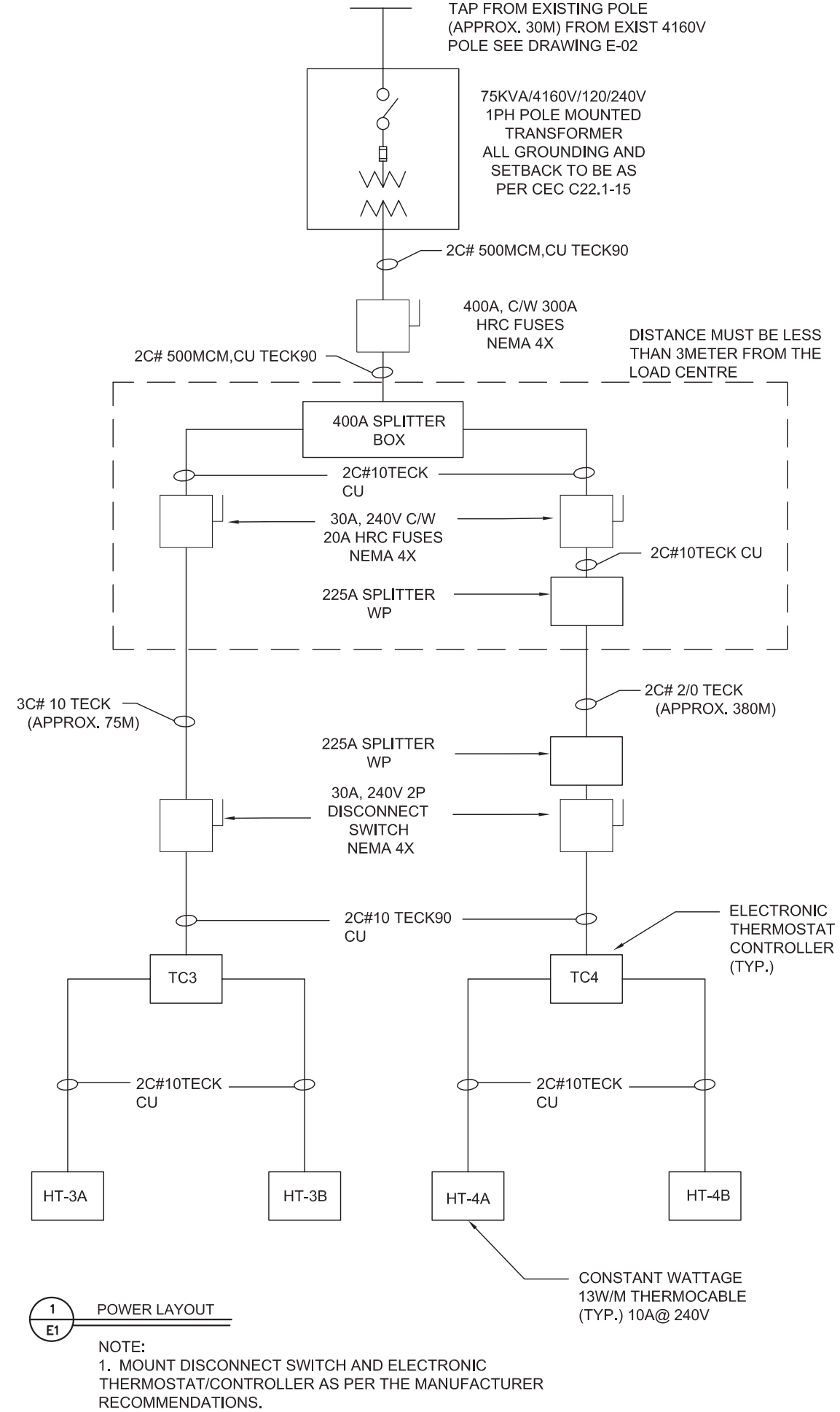


PRECISION SERVICE AND PUMPS INC. 1334 RIVERSIDE ROAD ABBOTSFORD, BC	YUKON GOVERNMENT			
	FARO MINE NORTH FORK ROCK DRAIN, SEEPAGE INTERCEPTION SYSTEM EQUIPMENT TAGS, PIPING			
DATE: DEC 17 2014	SIZE	FSCM NO	DWG NO 90008-06,AB	REV 2 12/01/15
DRAWN BY: M LAMONT	SCALE 1 : 5	90008	SHEET	

ELECTRICAL LEGEND

○	POLE
—)	ANCHOR
—∞—	3 PH O/H LINE
--------	3 PH U/G LINE
T	TRANSFORMER
—⊃|—	3 PH GANG SWITCH
□	FUSED DISCONNECT SWITCH





1/E1 POWER LAYOUT

NOTE:
1. MOUNT DISCONNECT SWITCH AND ELECTRONIC THERMOSTAT/CONTROLLER AS PER THE MANUFACTURER RECOMMENDATIONS.
2. FINAL LOCATION OF ALL ELECTRICAL DEVICES SHALL BE COORDINATED ON SITE.

GENERAL NOTES

1. DES TO PROVIDED DESIGN ONLY, CONSTRUCTION SUPERVISION AND CONTRACT ADMINISTRATION IS THE RESPONSIBILITY OF OTHERS, CONTRACTOR TO INFORM THE ENGINEER FOR ANY CHANGES REQUIRED BY THE OWNER, OWNER REPRESENTATIVE, AHJ AND THE ENGINEER OF RECORDS.

2. INSTALLATION MUST MEET THE REQUIREMENTS OF:
1. CEC C22.1–15
2. NBCC 2010
3. CAN/CSA C22.3 NO. 1–01
4. CAN/CSA C22.3 NO. 1–06
5. CAN/CSA C22.3 NO. 1–10
6. CAN/CSA C22.3 NO. 7–06
7. CAN/CSA C22.3 NO. 7–10
8. CAN/CSA C22.3 NO. 7–94
9. CAN/CSA C22.3 NO. 1–M87
10. ALBERTA ELECTRICAL UTILITY CODE– LATEST EDITION.
11. INDUSTRY STANDARDS.

PROFESSIONAL ENGINEER YUKON F. R. DORWARD TERRITORY

REVISIONS:

NO.	DATE	BY	DESCRIPTION
01	01/15/15	YS/RD	ISSUED FOR CONSTRUCTION

FAPO MINE - NORTH FORK
PERMIT TO PRACTICE
Signature
Date Jan 16/2015
PERMIT NUMBER: PP001
Association of Professional Engineers of Yukon

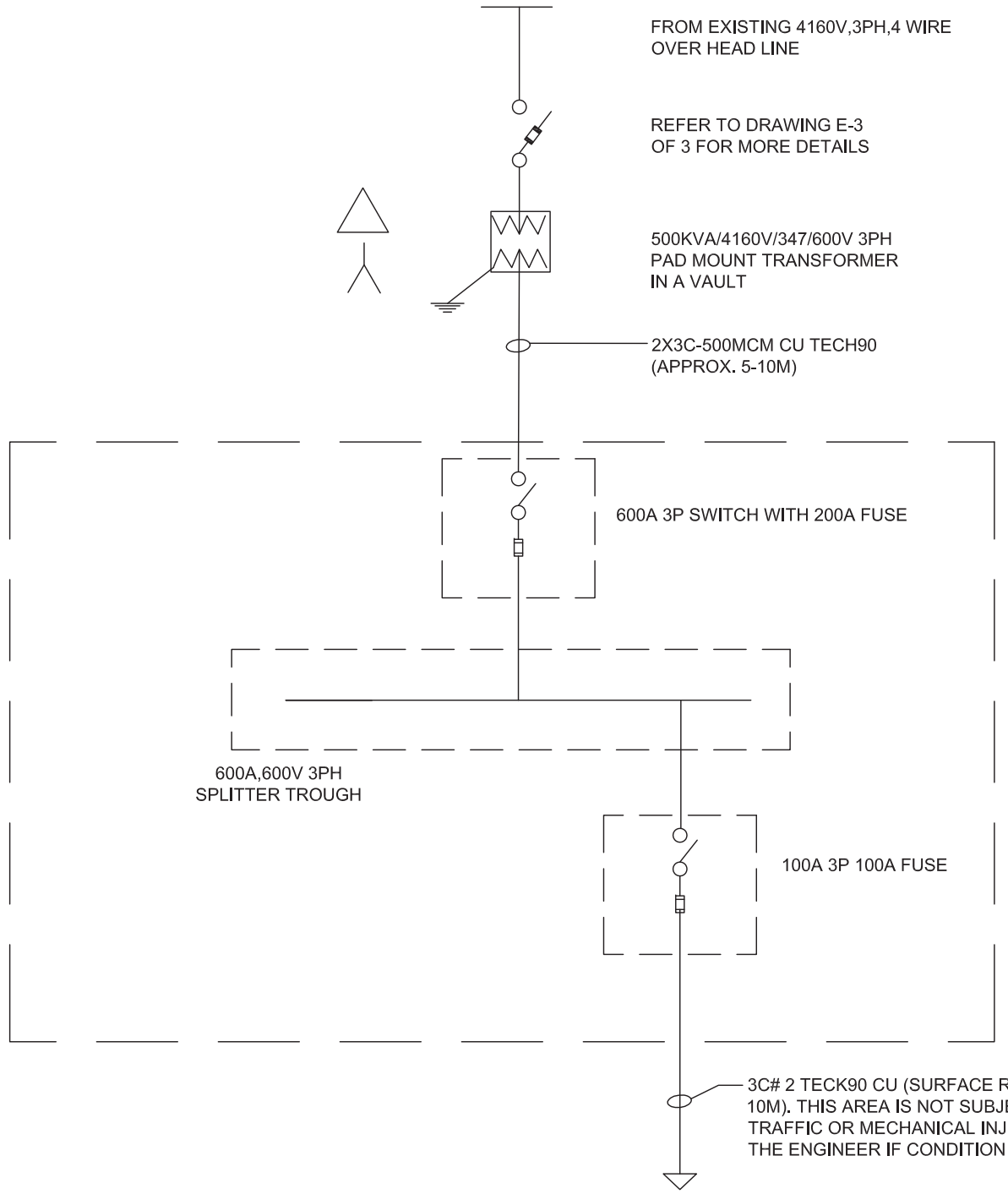
DORWARD ENGINEERING SERVICES LTD.
CONSULTING ELECTRICAL ENGINEERS
UNIT 402 - 309 STRICKLAND ST., WHITEHORSE, YUKON CANADA Y1A 2J9
Phone: (867) 668-6668 Fax: (867) 633-4561 Email: dorward@ees.org

PROJECT:
NORTH FORK ROCK DRAIN SEEPAGE POWER DISTRIBUTION

DRAWING TITLE:
POWER LAYOUT

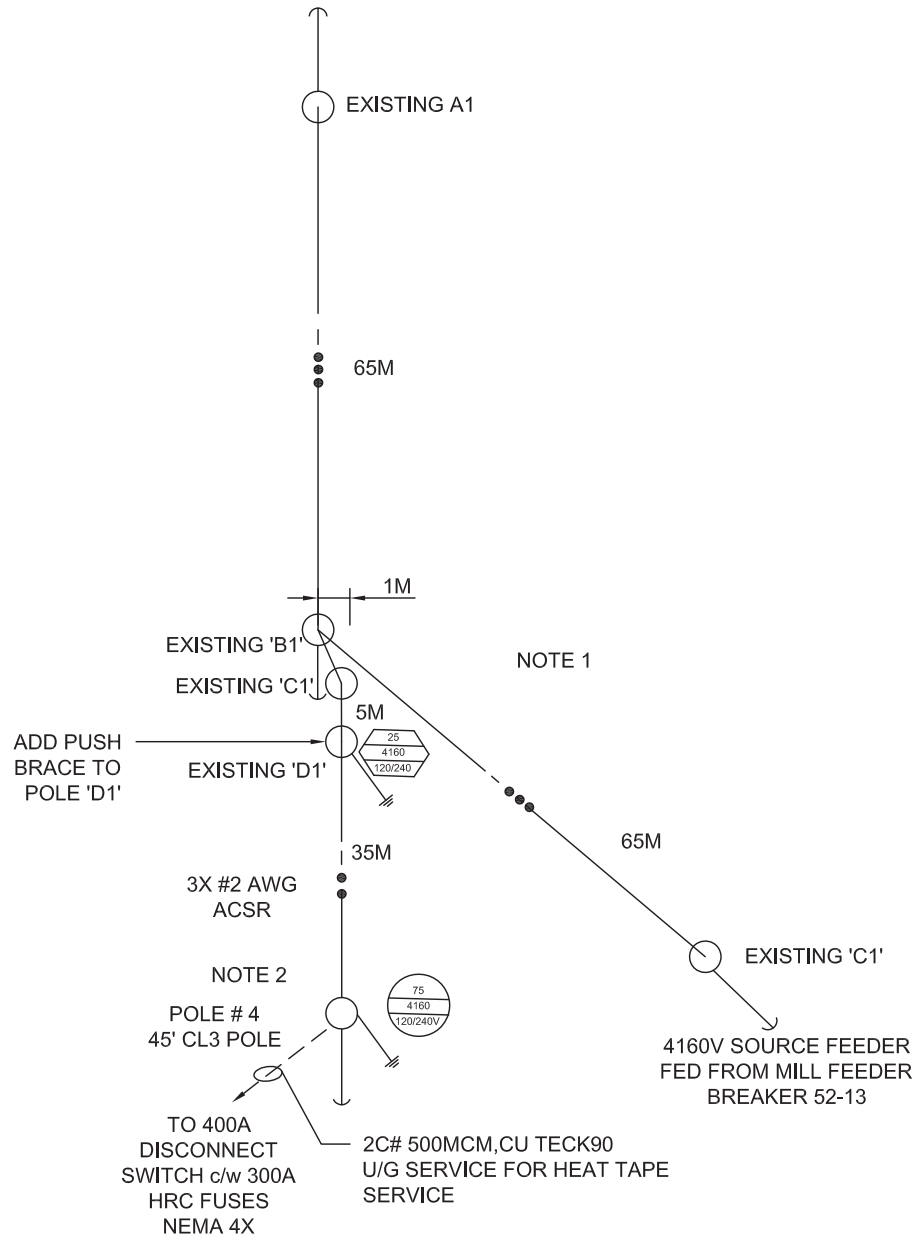
SCALE:	NTS
DATE:	JANUARY ,2015
DESIGN:	YP SHARMA
DRAWN:	JK KAUSHAL
CHECKED/APPROVED:	R. DORWARD
APPROVED FOR CONSTRUCTION	

PROJECT NUMBER:	SHEET:
2015-10FM	E-1 OF 3



1 / E2 POWER LAYOUT

NOTE:
1. C-CAN AND ALL ASSOCIATED EQUIPMENT ARE SUPPLIED AND INSTALLED BY OTHERS, REFER TO PRECISION SERVICE & PUMP INC. FOR MORE DETAILS. INFORM THE SUPPLIER/INSTALLER WHERE CONFLICT ARISE.



2 / E2 POWER LAYOUT

NOTE:
1. SEE SEPARATE SHEET FOR DETAILS OF POLE EXISTING 'D'.
2. SEE SEPARATE SHEET FOR DETAILS OF POLE #4.

GENERAL NOTES

1. DES TO PROVIDED DESIGN ONLY, CONSTRUCTION SUPERVISION AND CONTRACT ADMINISTRATION IS THE RESPONSIBILITY OF OTHERS, CONTRACTOR TO INFORM THE ENGINEER FOR ANY CHANGES REQUIRED BY THE OWNER, OWNER REPRESENTATIVE, AHJ AND THE ENGINEER OF RECORDS.

2. INSTALLATION MUST MEET THE REQUIREMENTS OF:
1. CEC C22.1–15
2. NBCC 2010
3. CAN/CSA C22.3 NO. 1–01
4. CAN/CSA C22.3 NO. 1–06
5. CAN/CSA C22.3 NO. 1–10
6. CAN/CSA C22.3 NO. 7–06
7. CAN/CSA C22.3 NO. 7–10
8. CAN/CSA C22.3 NO. 7–94
9. CAN/CSA C22.3 NO. 1–M87
10. ALBERTA ELECTRICAL UTILITY CODE– LATEST EDITION.
11. INDUSTRY STANDARDS.

PROFESSIONAL ENGINEER YUKON F. R. DORWARD TERRITORY

REVISIONS:

NO.	DATE	BY	DESCRIPTION
01	01/15/15	YS/RD	ISSUED FOR CONSTRUCTION

FAPO MINE - NORTH FORK
PERMIT TO PRACTICE
Signature
Date Jan 16/2015
PERMIT NUMBER: PP001
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Phone: (867) 668-6668
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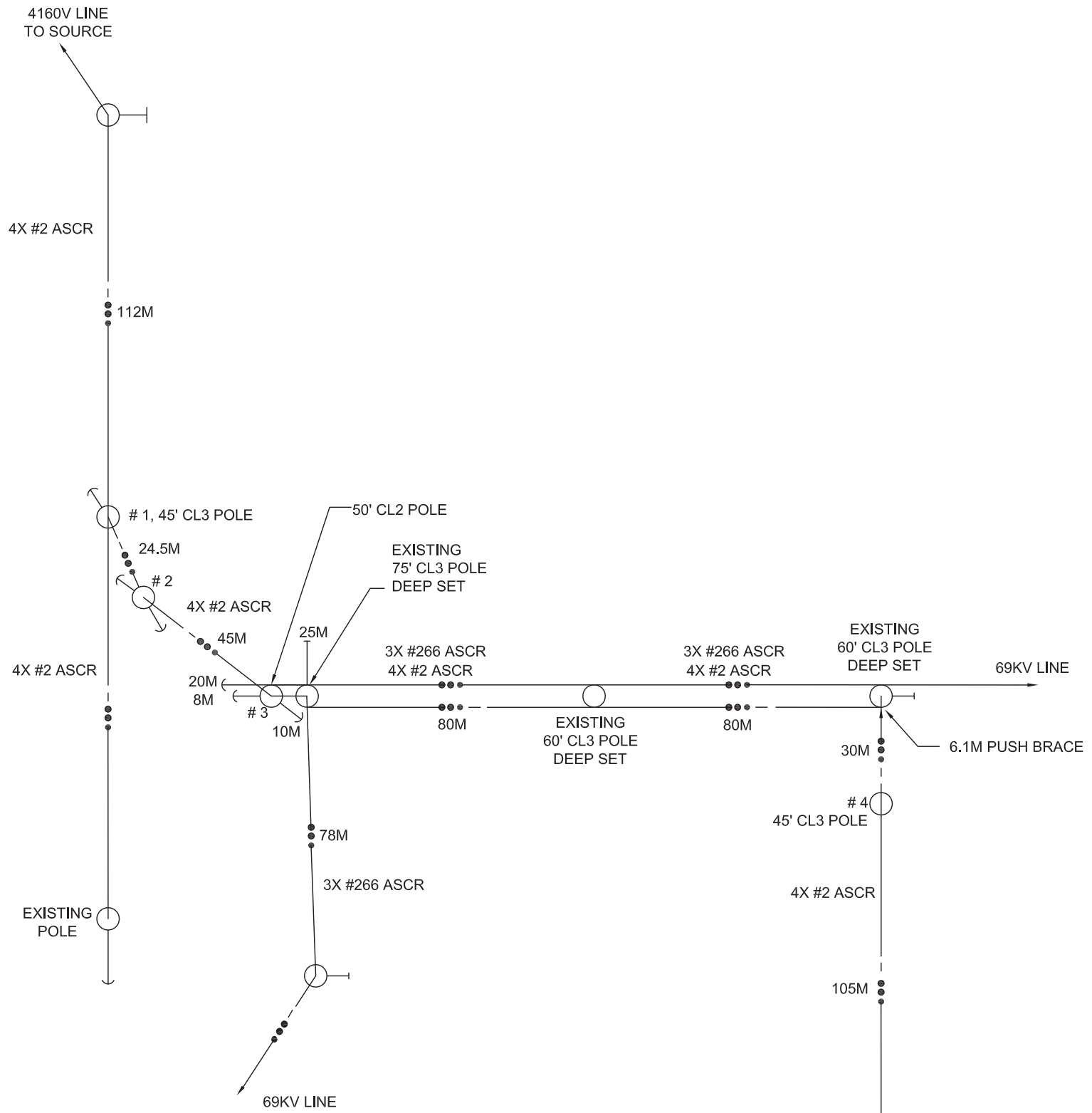
Email: dorward@ees.org

PROJECT:
NORTH FORK ROCK DRAIN SEEPAGE POWER DISTRIBUTION

DRAWING TITLE:
POWER LAYOUT

SCALE:	NTS
DATE:	JANUARY, 2015
DESIGN:	YP SHARMA
DRAWN:	JK KAUSHAL
CHECKED/APPROVED:	R. DORWARD
APPROVED FOR CONSTRUCTION	

PROJECT NUMBER:	SHEET:
2015-FM	E-2 OF 3



1 / E3 POWER LAYOUT

NOTEs:

1. THE GROUND TO LOWEST CONDUCTOR CLEARANCE AT CENTER OF ROAD (45 METERS SPAN) BETWEEN POLES #2 AND #3 AS 33.4FT AT -6 DEGREES CELSIUS.
2. THE GROUND TO LOWEST CONDUCTOR CLEARANCE AT CENTER OF ROAD (30 METERS SPAN) BETWEEN POLES EXIST 60'CL3 POLE AND POLE #4 AS 28.3 FT. AT -6 DEGREES CELSIUS.
3. THE VERTICAL DISTANCE BETWEEN 69KV CKT AND 4160V CKT ON POLES EXIST 75'CL3 AND TWO 60'CL3 POLES IS 2.5 METERS.

GENERAL NOTES

1. DES TO PROVIDED DESIGN ONLY, CONSTRUCTION SUPERVISION AND CONTRACT ADMINISTRATION IS THE RESPONSIBILITY OF OTHERS, CONTRACTOR TO INFORM THE ENGINEER FOR ANY CHANGES REQUIRED BY THE OWNER, OWNER REPRESENTATIVE, AHJ AND THE ENGINEER OF RECORDS.

2. INSTALLATION MUST MEET THE REQUIREMENTS OF:
1. CEC C22.1–15
2. NBCC 2010
3. CAN/CSA C22.3 NO. 1–01
4. CAN/CSA C22.3 NO. 1–06
5. CAN/CSA C22.3 NO. 1–10
6. CAN/CSA C22.3 NO. 7–06
7. CAN/CSA C22.3 NO. 7–10
8. CAN/CSA C22.3 NO. 7–94
9. CAN/CSA C22.3 NO. 1–M87
10. ALBERTA ELECTRICAL UTILITY CODE– LATEST EDITION.
11. INDUSTRY STANDARDS.

PROFESSIONAL ENGINEER YUKON R. R. DORWARD TERRITORY

REVISIONS:

NO.	DATE	BY	DESCRIPTION
01	01/15/15	YS/RD	ISSUED FOR CONSTRUCTION

FAPO MINE – NORTH FORK
PERMIT TO PRACTICE
Signature
Date Jan 16/2015
PERMIT NUMBER: PP001
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PROJECT:
NORTH FORK ROCK DRAIN SEEPAGE POWER DISTRIBUTION

DRAWING TITLE:
POWER LAYOUT

SCALE:	NTS
DATE:	JANUARY, 2015
DESIGN:	YP SHARMA
DRAWN:	JK KAUSHAL
CHECKED/APPROVED:	R. DORWARD
APPROVED FOR CONSTRUCTION	

PROJECT NUMBER:	SHEET:
2015-FM	E-3 OF 3

APPENDIX B
BGC DAY SHIFT REPORTS

LIST OF DAY SHIFT REPORTS

Day Shift Report Reference	Shift	Date
20141006_NFRDSIS_DSR_32_DS As-Built	Day	October 6, 2014
20141007_NFRDSIS_DSR_33_DS As-Built	Day	October 7, 2014
20141008_NFRDSIS_DSR_34_DS As-Built	Day	October 8, 2014
20141009_NFRDSIS_DSR_35_DS As-Built	Day	October 9, 2014
20141010_NFRDSIS_DSR_36_DS As-Built	Day	October 10, 2014
20141024_NFRDSIS_DSR_37_DS As-Built	Day	October 24, 2014
20141025_NFRDSIS_DSR_38_DS As-Built	Day	October 25, 2014
20141026_NFRDSIS_DSR_39_DS As-Built	Day	October 26, 2014
20141027_NFRDSIS_DSR_40_DS As-Built	Day	October 27, 2014
20141028_NFRDSIS_DSR_41_DS As-Built	Day	October 28, 2014
20141029_NFRDSIS_DSR_42_DS As-Built	Day	October 29, 2014
20141201_NFRDSIS_DSR_43_DS As-Built	Day	December 1, 2014
20141202_NFRDSIS_DSR_44_DS As-Built	Day	December 2, 2014
20141203_NFRDSIS_DSR_45_DS As-Built	Day	December 3, 2014
20141204_NFRDSIS_DSR_46_DS As-Built	Day	December 4, 2014
20141205_NFRDSIS_DSR_47_DS As-Built	Day	December 5, 2014
20141206_NFRDSIS_DSR_48_DS As-Built	Day	December 6, 2014
20141207_NFRDSIS_DSR_49_DS As-Built	Day	December 7, 2014
20141208_NFRDSIS_DSR_50_DS As-Built	Day	December 8, 2014
20141209_NFRDSIS_DSR_51_DS As-Built	Day	December 9, 2014
20141210_NFRDSIS_DSR_52_DS As-Built	Day	December 10, 2014
20141211_NFRDSIS_DSR_53_DS As-Built	Day	December 11, 2014
20141212_NFRDSIS_DSR_54_DS As-Built	Day	December 12, 2014
20141213_NFRDSIS_DSR_55_DS As-Built	Day	December 13, 2014
20141214_NFRDSIS_DSR_56_DS As-Built	Day	December 14, 2014
20141215_NFRDSIS_DSR_57_DS As-Built	Day	December 15, 2014
20141216_NFRDSIS_DSR_58_DS As-Built	Day	December 16, 2014
20141217_NFRDSIS_DSR_59_DS As-Built	Day	December 17, 2014

Day Shift Report Reference	Shift	Date
20141218_NFRDSIS_DSR_60_DS As-Built	Day	December 18, 2014
20150106_NFRDSIS_DSR_61_DS As-Built	Day	January 6, 2015
20150107_NFRDSIS_DSR_62_DS As-Built	Day	January 7, 2015
20150108_NFRDSIS_DSR_63_DS As-Built	Day	January 8, 2015
20150109_NFRDSIS_DSR_64_DS As-Built	Day	January 9, 2015
20150110_NFRDSIS_DSR_65_DS As-Built	Day	January 10, 2015
20150111_NFRDSIS_DSR_66_DS As-Built	Day	January 11, 2015
20150112_NFRDSIS_DSR_67_DS As-Built	Day	January 12, 2015
20150113_NFRDSIS_DSR_68_DS As-Built	Day	January 13, 2015
20150114_NFRDSIS_DSR_69_DS As-Built	Day	January 14, 2015
20150115_NFRDSIS_DSR_70_DS As-Built	Day	January 15, 2015
20150116_NFRDSIS_DSR_71_DS As-Built	Day	January 16, 2015
20150117_NFRDSIS_DSR_72_DS As-Built	Day	January 17, 2015
20150118_NFRDSIS_DSR_73_DS As-Built	Day	January 18, 2015
20150119_NFRDSIS_DSR_74_DS As-Built	Day	January 19, 2015
20150120_NFRDSIS_DSR_75_DS As-Built	Day	January 20, 2015
20150121_NFRDSIS_DSR_76_DS As-Built	Day	January 21, 2015
20150122_NFRDSIS_DSR_77_DS As-Built	Day	January 22, 2015
20150130_NFRDSIS_DSR_78_DS As-Built	Day	January 30, 2015

BGC INTERNATIONAL
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:00 am	8:00 pm
Project #:	0533-010-06	**Weather:**	Overcast, snowing	
Subject:	Day Shift Report	**Work Areas*:**	DSSC	
Date:	20141006	**Record #:**	*20141006_NFRDSIS_DSR_32*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +2.8 °C (Max = +6.4 °C; Min = -0.9 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	ELR salvaged fish from DS areas.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Erik Pit (YG), NF2A, NF2B, NF2
Dan Russell (Pelly)
John Garvis (Pelly)
Shipeng Zheng (Pelly)
Chris Jastrebski (ELR), NF2A, NF2B, NF2
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, BC, no activity)
Dozer (CAT D6R, #1604, yellow, parked at USAR, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, no activity)
Grader (CAT 14H, #1407, yellow, parked on top of haul road, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow C, no activity)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)

Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, yellow, parked at BA, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
• ELR salvaged fish on the section from the rock drain to the fish fence installed downstream to NF2 on October 4, and maintained the fish fence (removal of organics). • Engineer installed a wooden rod to observe water elevations at NF2A during construction of the plug-dike at the US side of the rock drain.
Pipeline (PL)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	Status at the end of the shift (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	-	-	-
	General Rock Fill	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
DSSI	NF2A, right bank. US to fish fence installed by ELR	Hand tools	The Engineer installed a 1.10 m long graduated wooden rod to observe the water pond elevation during construction of the plug-dike. Engineer measured a water elevation of 1,084.64 m by means of a level. Water was at 0.10 m mark on the rod. Water was at 1.58 m mark at steel rod installed at NF2.	2

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes: None.

Photos:

Photo 1: 20141006_NFRDSIS_DSSI_P202_ELR salvaging fish at NF2B with a fish net_Looking NE

Photo 2: 20141006_NFRDSIS_DSSI_P203_Graduated rods at DS area to observe water elevations

BGC INTERNATIONAL
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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:45 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	DSSC	
Date:	20141007	**Record #:**	*20141007_NFRDSIS_DSR_33*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -2.5 °C (Max = -0.6 °C; Min = -4.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Erik Pit (YG), NF2
John Garvis (Pelly), BC
Shipeng Zheng (Pelly)
Chris Jastrebski (ELR), NF2
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, no activity)
Dozer (CAT D6R, #1604, yellow, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, no activity)
Grader (CAT 14H, #1407, yellow, removing snow)
Front Loader (CAT988H, #2316, yellow, Borrow C, no activity)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)

Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, yellow, parked at BA, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
• ELR maintained the fish fence installed downstream to NF2. • Engineer observed water elevations at NF2A. Water elevation measured was 1,084.63 m.
Pipeline (PL)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	Status at the end of the shift (Open, Closed or N/A)	**-**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	Rock Protection Fill	-	-	-
	General Rock Fill	-	-	-
D	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
DSSI	NF2A, right bank.	Hand tools	Engineer measured a water elevation of 1,084.63 m.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes: None.

BGC INTERNATIONAL
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	DSSC, DSAR	
Date:	20141008	**Record #:**	*20141008_NFRDSIS_DSR_34*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -6.6 °C (Max = -1.7 °C; Min = -11.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	• ELR maintained fish fence at DS areas. • The need of silt fences installed between the creek and the organic material piled at the spoil area was identified (DSAR construction area). See Communication 1 below.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (YG/CH2M, BA, DSAR, DSSC
Erik Pit (YG), DSAR, DSSC, NF2
John Garvis (Pelly), DSAR, DSSC
Shipeng Zheng (Pelly)
Chris Jastrebski (ELR), DSAR, DSSC, NF2
Doug Davidge (Labarge), DSAR, DSSC, NF2
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, DSAR, 4 hours)
Dozer (CAT D6R, #1604, yellow, DSAR, 2.5 hours)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)

Light Tower/Generator (Allmand ML8, yellow, no activity)
Grader (CAT 14H, #1407, yellow, DSAR)
Front Loader (CAT988H, #2316, yellow, no activity)
Front Loader (Deere TC54H, yellow, Haul Road, unloading pipes delivered to site)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, yellow, parked at BA, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
The Contractor completed clearing and grubbing for the laydown area and spoil area (refer to Communication 1 below).
Downstream Seepage Collection (DSSC)
• ELR maintained the fish fence installed downstream to NF2 (**Photo 5**). • Engineer observed water elevations at NF2A. Water elevation measured was 1,084.54 m.
Pipeline (PL)
100 mm DR 11 HDPE pipes, 100 mm DR17 HDPE pipes, and corrugated pipes (pipeline road crossings) were delivered to site (**Photos 1** and 2), and were unloaded by the Contractor at the northeastern side of the haul road, before the intersection (as approved by Tees).

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Joan, Chris, Erik, Doug. DSAR, Clearing and grubbing.	
	Discussion and Recommendations	
	• The Contractor and Engineer visited the area to be cleared and grubbed for the laydown and spoil area. Based on the topography of the area and existing work recently performed as part of the installation of some monitoring wells, the area to be cleared was slightly shifted so as to provide access from the southern side (instead of the northeastern side along the road). • YG, ELR and Labarge commented that a silt fence will be required along the western limit of the area to be cleared so as to prevent transport of sediments into the creek (note that fish fence was installed further US). Also, recommended that the fence should be installed once the organic soil is disturbed so as to work on disturbed soil and not digging a trench on intact frozen ground.	
	Corrective Actions or Improvements	
	Contractor to install silt fence along the western clearing and grubbing limit.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

2	John, Joan. DSAR alignment.	
	Discussion and Recommendations	
	• Engineer pointed out that some upgrades of the access road were recently performed so as to install some monitoring wells close to the creek. The road had been widened and capped with some gravel and sand. After some conversations with YG, and based on the observations performed, the Engineer commented that there was no need for another upgrade of the road unless it was required to provide access to Contractor's equipment, including the elements to be installed as part of the in-stream works. • Contractor recommended that the road should be widened in some points to have a width of at least 6 m. Also, the current alignment at the first 10 m of road (Station 0+000 to 0+010) should be modified to create a straight road. • Engineer commented that road will be widened as required, but no more than the required 6 m wide (field fit). Regarding the existing curve on the first 10 m of road, Engineer commented that the presence of the monitoring wells and the need to create a straight road to ensure that they will not be damaged during the delivery of the C-Can will be commented with YG. • Contractor evaluated the volume of work required to upgrade the DSAR and place a capping layer on the laydown area, and decided to postpone activities to the next day shift.	
	Corrective Actions or Improvements	
	Engineer to comment on the need of creating a straight road to overcome the monitoring wells located at the right hand side of the road.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
DSSC	NF2A, right bank.	Hand tools	Engineer measured a water elevation of 1,084.54 m. Water level at NF2A could not be observed as there was ice covering the graduated rod. The Engineer estimated that water was at 1.50 mark.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
DSAR	CP-2, CP-3, CP-4, CP-5, CP-6	CAT 330 and Dozer D6	Contractor cleared and grubbed the laydown area, turn around area, and working areas at the end of the DSAR. Some modifications were introduced as the area southwest to CP-3 & CP-4, and the area at Station 0+180 to 0+186 were both already cleared, and a platform constructed. Clearing and grubbing for B1 and the island between NF2A & NF2B was postponed to prevent disturbance and potential erosion/transport of sediments into the creek until the in-stream works will commence.	6, 7, 8

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, the Contractor plans to make the required work to widen the DSAR, place sand and gravel from Borrow A to cap the required sections of road and working areas, and to break/remove big rocks on NF2A area.

Photos:

Photo 1: 20141008_NFRDSIS_Haul Road_216_Corrugated pipes delivered to site_Looking W

Photo 2: 20141008_NFRDSIS_Haul Road_P217_Insulated 4" DR-11 HD HDPE pipe delivered to site

Photo 3: 20141008_NFRDSIS_DSAR_P218_Overview of DSAR area_Looking SW

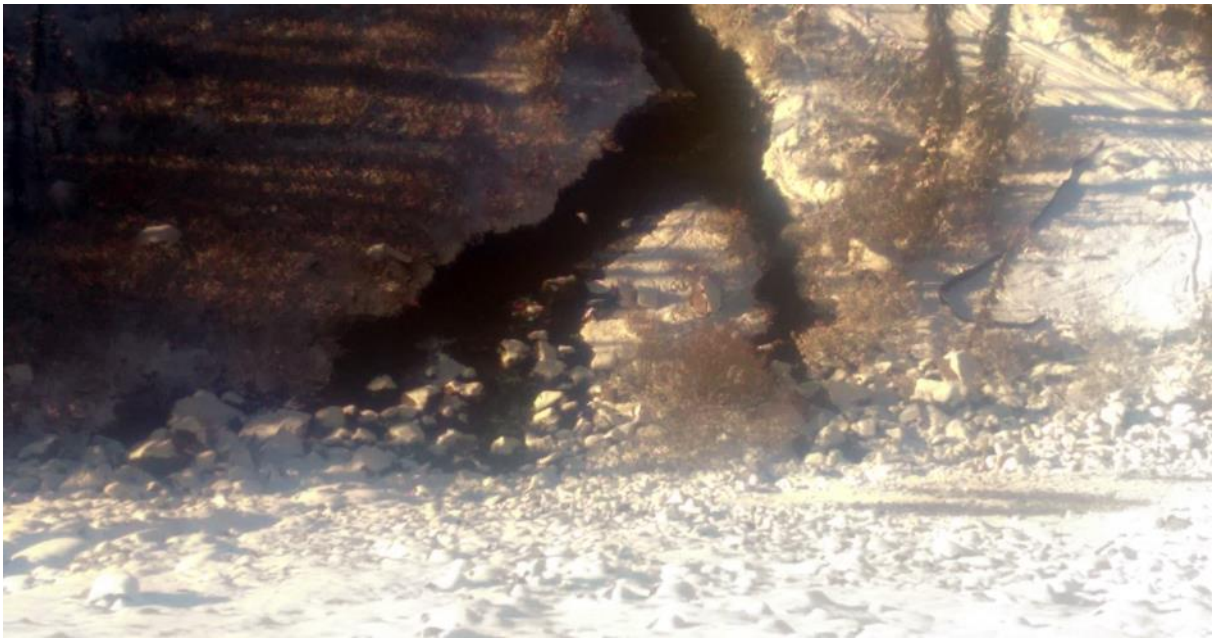

Photo 4: 20141008_NFRDSIS_DSSC_P219_Overview of NF2A, NF2B and NF2_Looking SW

Photo 5: 20141008_NFRDSIS_NF2_P220_Fish fence installed DS to NF2_Looking SW

Photo 6: 20141008_NFRDSIS_DSAR_P221_View of existing road and cleared area_Looking S

Photo 7: 20141008_NFRDSIS_DSAR_P222_CAT 330 clearing trees_Looking S

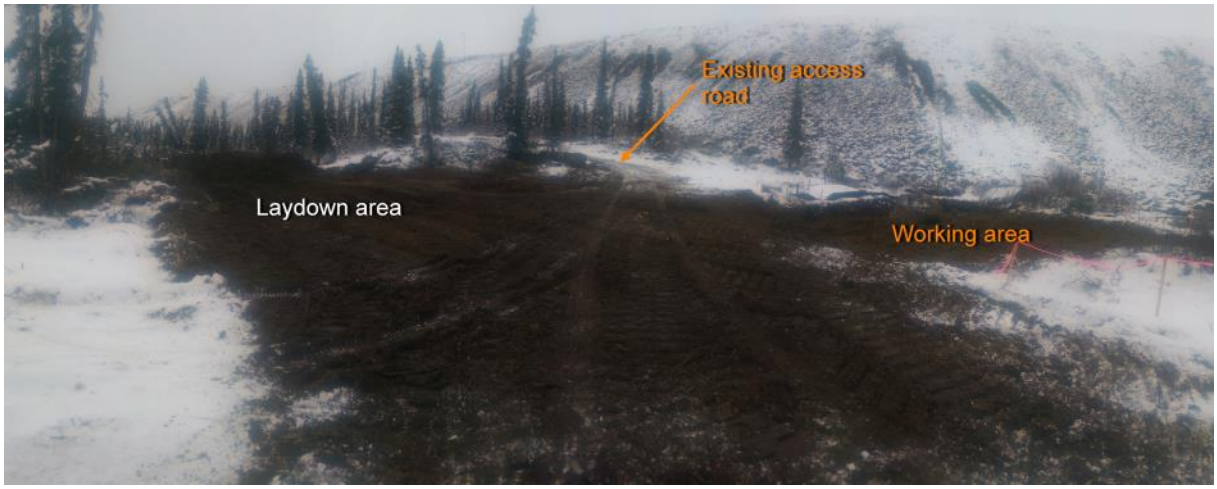

Photo 8: 20141008_NFRDSIS_DSAR_P223_Area cleared and grubbed at the end of shift_Looking NE

Photo 9: 20141008_NFRDSIS_DSSC_P224_Overview of NF2A, NF2B and island_Looking S

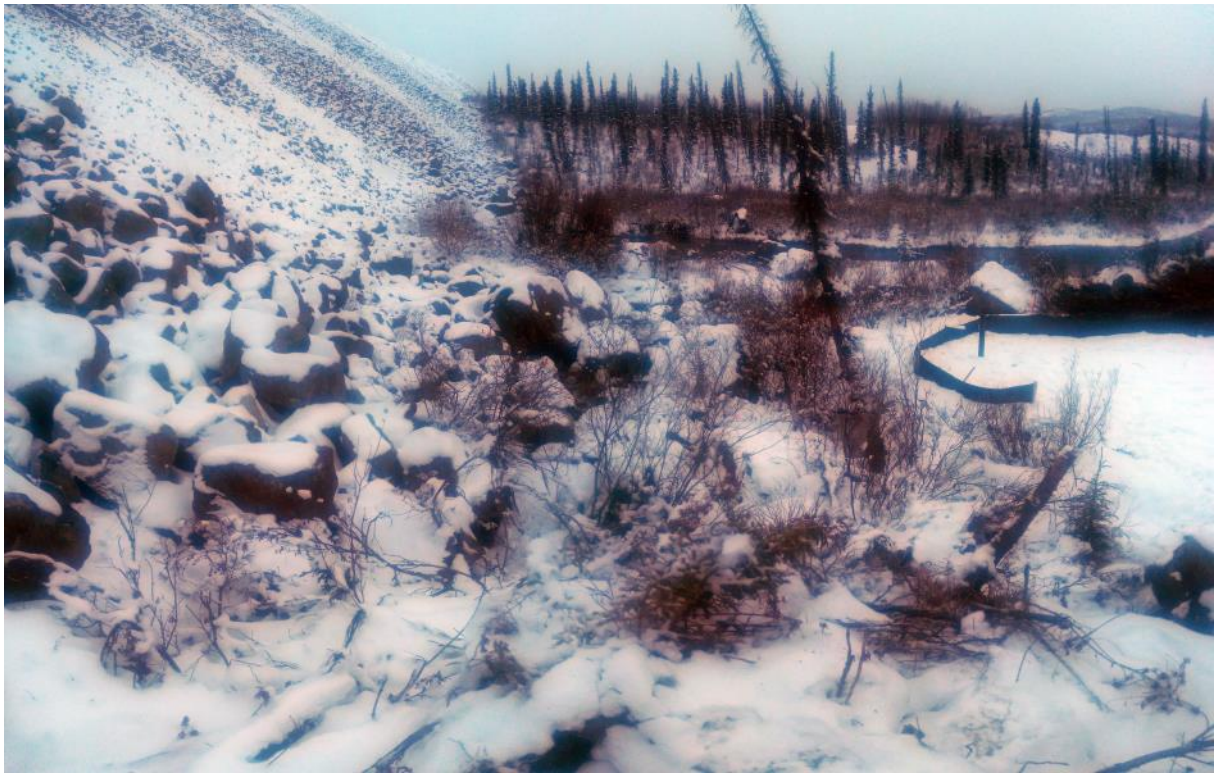

Photo 10: 20141008_NFRDSIS_DSSC_P225_Overview of rocks at toe of rock drain_Looking SE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	7:00 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	BC, DSAR, DSSC	
Date:	20141009	**Record #:**	*20141009_NFRDSIS_DSR_35*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -3.5 °C (Max = +0.4 °C; Min = -7.3 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	• The Contractor maintained road access to DSAR area with a grader to allow safe hauling of construction fill to DSAR (**Photo 1**). • The Contractor reminded that no personnel shall be close to the CAT330 when breaking rocks with the rock hammer.
1.2	Environmental	• ELR maintained fish fences at DS area. • ELR collected 5 samples from the water emerging at DS face of rock drain, NF2A side (**Photo 2**). See summary of test results on **Photo 10**. • ELR and Labarge monitored turbidity levels at NF2A during in-stream works with excavator CAT330. • The Contractor marked the location of monitoring wells at DSAR with orange paint (**Photo 3**). • The Contractor installed silt fences at DSAR area, between the creek and the organic material piled at the spoil area (**Photo 9**). See Issue tracking list below for details on this activity.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20141008_NFRDSIS_DSR_34_2 Silt fence to be installed DSAR	Contractor installed the silt fence along the western clearing and grubbing limit. Contractor to re-install some sections to ensure that no gaps can be found under the fence (**Photo 9**), and to install a new section to ensure that the Creek is protected along the whole length of the spoil/laydown area limits. **OPEN**	Contractor
20141008_NFRDSIS_DSR_34_3 DSAR alignment	Engineer confirmed that the alignment at the beginning of DSAR will be slightly adjusted to preserve the monitoring wells and to ensure that there will be sufficient room for the delivery of the DSSC elements. Contractor started construction of DSAR. **CLOSED**	N/A

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (YG/CH2M), DSAR, DSSC
Erik Pit (YG), DSAR, DSSC, NF2
Chris Jastrebski (ELR), DSAR, DSSC, NF2
Doug Davidge (Labarge), DSAR, DSSC, NF2
John Garvis (Pelly), DSAR, DSSC
Shipeng Zheng (Pelly)
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, DSAR)
Dozer (CAT D6R, #1604, yellow, DSAR)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, no activity)
Grader (CAT 14H, #1407, yellow, DSAR and access roads)
Front Loader (CAT988H, #2316, yellow, Borrow A)
Front Loader (Deere TC54H, yellow, DSAR, transported rock hammer)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #319, yellow, parked on top of haul road, no activity)
Articulated Truck (Deere 400D, #7402, yellow, DSAR)

4. Summary of activities:

Downstream Access Road (DSAR)
The Contractor widened existing road to ensure a minimum width of 6 m, and started placing and spreading Borrow A gravel and sand to create the straight section from Station 0+000 to 0+020 as per comments with the Engineer. The big diameter in-stream rocks within NF2A area were identified by the Engineer and Contractor, and then broken with CAT330 equipped with a rock hammer. Contractor installed silt fences to protect the Creek from sediment rich runoff water.
Downstream Seepage Collection (DSSC)
ELR maintained the fish fence installed downstream to NF2. ELR and Labarge collected water samples at the DS face of rock drain, and monitored turbidity levels DS to NF2. The Engineer observed water elevations at NF2A. Water elevation measured was 1,084.57 m.
Pipeline (PL)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	John, Joan, Chris, Erik, Doug. Monitoring of water quality	
	Discussion and Recommendations	
	YG, ELR, LABARGE and the Engineer visited the rock drain face at NF2A to identify the points at which water was emerging. No clear points could be identified due to the presence of rocks, but sampling locations were defined based on the observations performed during the visit. Tests on water samples collected (chemical analysis) were completed by Tees before the end of the shift (**Photo 10**).	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan, Chad. DSSC, NF2A	
	Discussion and Recommendations	
	Engineer, YG and Contractor visited the area to observe the rocks present at the rock drain face and NF2A area (in-stream) to identify the large diameter rocks to be broken with the rock hammer. YG reminded to Contractor that rock breaking shall be performed with special care to prevent disturbance of the sediments at the bottom of the creek, and reduce turbidity. The rocks were identified, the CAT 330 was equipped with the rock hammer, and Contractor started activities (4:00 pm). Activity was completed in one hour. Note that the turbidity levels on the creek were monitored by Labarge and ELR during in-stream activities.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

3	John, Joan. DSAR capping material. Borrow A	
	Discussion and Recommendations	
	Contractor and Engineer commented that coarse gravel and sand was required as construction fill for DSAR construction. Contractor recommended that the loader should take fill from the upper gravel layers observed on previous site visits to ensure that the appropriate grain sizes were used. Engineer commented that they should proceed as per Contractor's recommendations, and then communicate any change on fill characteristics to the Engineer.	
	Corrective Actions or Improvements	
	Contractor to use fill excavated from the upper layers of gravel and sand.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Gravel and Sand	Front Loader	The Contractor was excavating gravel and sand, and then loading it to a haul truck.	-
B1	-	-	-	-
C	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
DSSC	NF2A, right hand side bank (looking DS)	Hand tools	The Engineer measured a water elevation of 1,084.57 m. Water level at NF2A could not be observed as there was ice covering the graduated rod. Engineer estimated that water was at 1.52 mark. The turbidity levels on the creek were monitored by Labarge and ELR during in-stream activities (**Photo 7**). No waiting time was required as the thresholds levels were not reached.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
DSAR	Station 0+000 to 0+020	Dozer and haul truck	Gravel and Sand	BA	Contractor was placing and spreading fill to create a straight section of road.	5

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
DSSC/NF2A	NFRD face	CAT330	The Contractor was breaking large diameter rocks. Some rocks were too big and CAT330 would not be able to move them.	6, 8

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Contractor plans to continue with DSAR construction by capping road and working areas with pit run from Borrow A, and to remove broken rocks within NF2A to expose water emerging at rock drain face.

Photos:

Photo 1: 20141009_NFRDSIS_DSAR_P256_Grader removing snow from access to DSAR_Looking E

Photo 2: 20141009_NFRDSIS_DSSC_P257_ELR collecting water samples at rock drain_Looking NW

Photo 3: 20141009_NFRDSIS_DSAR_258_Contractor marking location of monitoring wells_Looking W

Photo 4: 20141009_NFRDSIS_DSAR_P259_Area cleared and grubbed at right side bank_Looking SE

Photo 5: 20141009_NFRDSIS_DSAR_P260_D6 spreading BA gravel and sand at Station 0+000_Looking W

Photo 6: 20141009_NFRDSIS_DSSC_P261_CAT330 breaking rocks at NF2A_Looking NE

Photo 7: 20141009_NFRDSIS_NF2_P262_Turbidity observed DS to rock breaking area_Looking SW

Photo 8: 20141009_NFRDSIS_DSSC_P263_Rocks broken by CAT330 with rock hammer_Looking NE

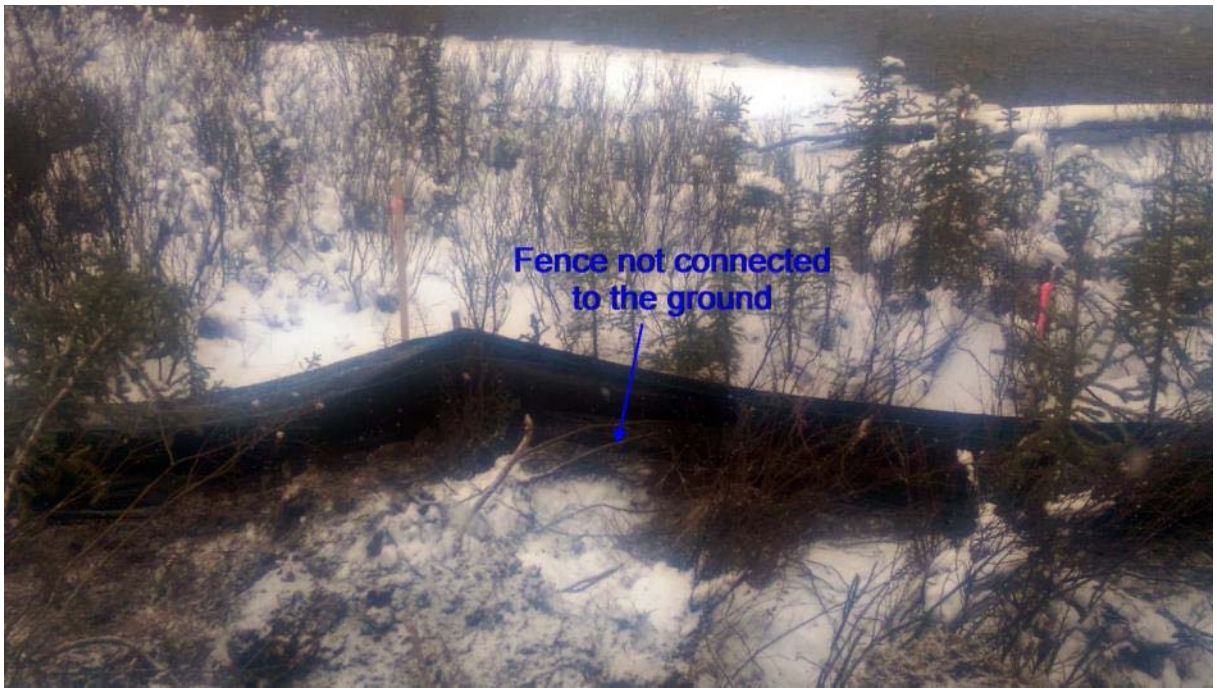

Photo 9: 20141009_NFRDSIS_DSAR_P264_Sections of silt fence to be reinstalled_Looking W

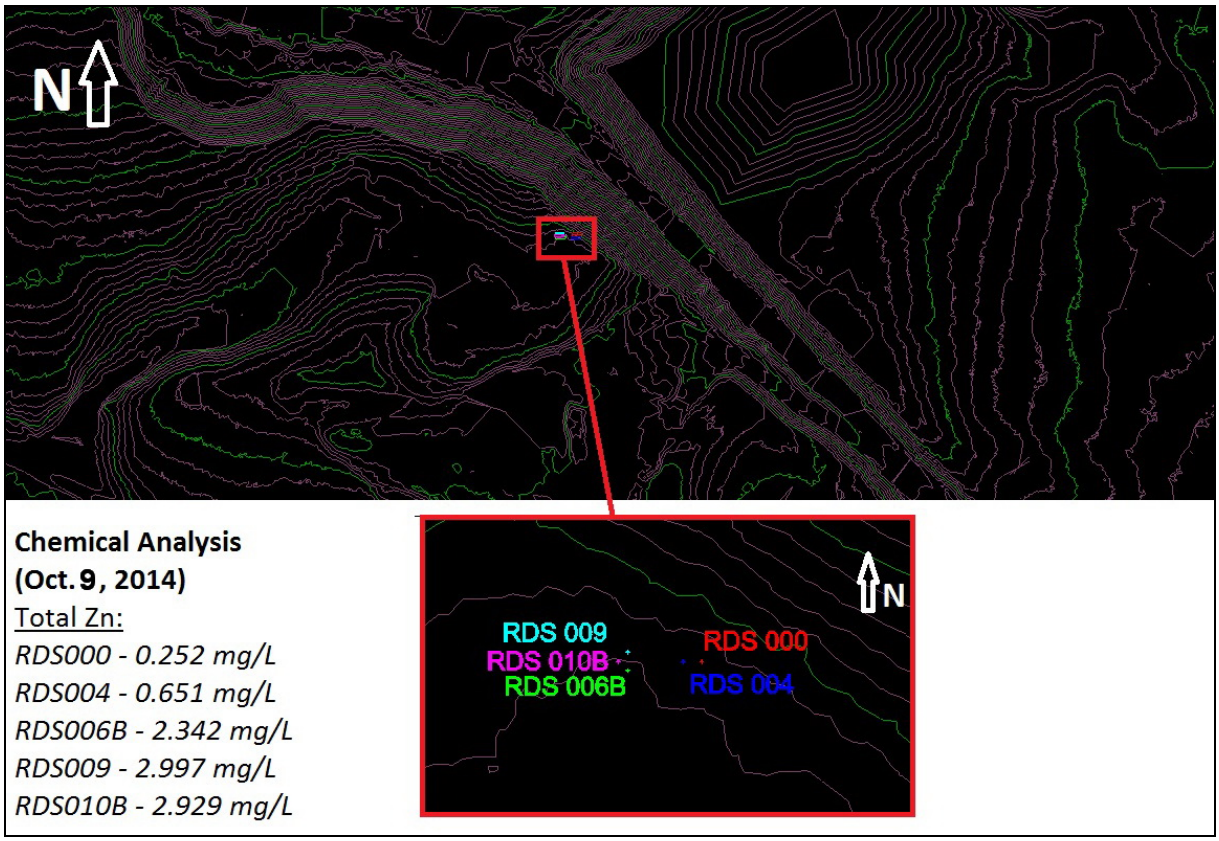

Photo 10: 20141009_NFRDSIS_DSSC_P265_Location of water sampling at rock drain and tests results

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	8:30 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	BC, DSAR, DSSC	
Date:	20141010	**Record #:**	*20141010_NFRDSIS_DSR_36*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +4.4 °C (Max = +8.4 °C; Min = +0.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Contractor hauled fill with two CAT 773 haul trucks from Borrow A and C to an intermediate stockpile located at the entrance to S-Wells area, and then from the intermediate stockpile to DSAR construction area. A pilot escort truck was used to escort the haul trucks on the public road section. Contractor commented this activity with Tees, and informed the Department of Highways and Public Works by phone.
1.2	Environmental	• Labarge maintained fish fences at DS area. Fish fence collapsed sometime after the in-stream works performed by the Contractor were completed. The installation of a new fish fence and the salvaging of fish will be required prior to the execution of further in-stream works. • Labarge monitored turbidity levels at NF2 during in-stream works with excavator CAT330 (**Photos 3** and **4**). Construction activity had to be paused for a short period of time (less than 5 minutes) as turbidity levels at creek were close to the threshold values. Construction activities continued as soon as Labarge confirmed that the turbidity levels at DS to NF2 were acceptable. • Contractor installed silt fences and lot logs at right bank and island between NF2A and NF2B to prevent the transport of sediments into the creek (**Photo 7**).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141008_NFRDSIS_DSR_34_2 Silt fence to be installed DSAR	Contractor re-installed silt fence as per Engineer's recommendations and installed a new section a new section to ensure that the creek is protected along the whole length of the spoil/laydown area limits. New sections of silt fence were installed close o CP-6, but need to be properly installed into the ground. **OPEN**	N/A

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (YG/CH2M), DSAR, DSSC
Doug Davidge (Labarge), DSSC, NF2
John Garvis (Pelly), BC, BA, DSAR, DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, DSAR)
Dozer (CAT D6R, #1604, yellow, DSAR)
Light Tower/Generator (Ingersoll Rand, light brown, BC, no activity)
Light Tower/Generator (Allmand ML8, yellow, no activity)
Grader (CAT 14H, #1407, yellow, DSAR and access roads)
Front Loader (CAT988H, #2316, yellow, Borrow A)
Front Loader (Deere TC54H, yellow, DSAR, no activity)
Haul Truck (CAT 773B, #317, yellow, parked on top of haul road, no activity)
Haul Truck (CAT 773B, #318, yellow, DSAR)
Haul Truck (CAT 773B, #319, yellow, DSAR)
Articulated Truck (Deere 400D, #7402, yellow, DSAR)

4. Summary of activities:

Downstream Access Road (DSAR)
Contractor continued placing and spreading BA fill at DSAR construction. At the same time, CAT330 was placing the rocks removed from NF2A and rock drain face at the area cleared and grubbed located northeast to CP-5 and CP-6 to create a platform. Then, Contractor started using BC fill (general rock fill) material to cover the rock platform as BA material being delivered was found to be too fine (**Photo 5**). Finally, Engineer removed an existing silt fence and Contractor re-installed it at the limit of fill recently placed to prevent transport of sediment into the creek.

Downstream Seepage Collection (DSSC)
Contractor removed the rocks within the creek to expose the rock drain face and observe the water emerging from the rock drain (**Photo 11**). Engineer collected coordinates for the four distinct locations at which water was emerging (**Photo 12**), as follows: A. E 584,705 / N 6,913,042 (m) | B. E 584,708 / N 6,913,040 (m) C. E 584,710 / N 6,913,041 (m) | D. E 584,713 / N 6,913,040 (m) Labarge monitored turbidity levels DS to NF2. Engineer observed water elevations at NF2A. Water elevation measured was 1,084.67 m. Note that water elevation at NF2A increased 2 cm at 9:30 am (30 minutes after Contractor started removing rocks from rock drain face) and then decreased to El. 1,084.67 m 30 minutes later (once activity was completed).
Pipeline (PL)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	John, Joan, Doug. Monitoring of water quality	
	Discussion and Recommendations	
	The Contractor started removing rocks from rock drain face and NF2A stream at 8:00 am. Labarge monitored the turbidity levels on the creek during operations with CAT 330. Turbidity levels close to the threshold values were reported by Labarge at 8:25 am, so activity was paused until acceptable turbidity values were reported by Labarge (5 minutes later). The removal of rocks was completed at 10:00 am. Labarge informed that the fish fence located DS to NF2 collapsed 5 minutes after the completion of the removal of rocks (**Photo 4**). The installation of a new fish fence and the salvage of fish from the rock drain face to the new fish fence installed will be required before in-stream works could continue.	
	Corrective Actions or Improvements	
	YG, Engineer, Labarge and ELR to comment on the installation of a new fish fence	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
2	John, Joan, Chad. DSAR Fill, Borrow A and Borrow C	
	Discussion and Recommendations	
	The Contractor informed that the fill observed at Borrow A (BA) area was too fine for construction of the access road. The Engineer commented that a visit to BA could be organized to find a location with coarser fill for construction purposes. YG recommended the use of Borrow C (BC) fill as the hauling distance from BC to DSAR was almost the same than from BA to DSAR. Also, noted that the BA was the source for gravel and sand used by Tees for other activities so Contractor should minimize the use of coarser fill if it was limited.	

	Corrective Actions or Improvements	
	The Contractor continued construction activities with general rock fill from BC (**Photos 5** & **6**).	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
3	John, Joan. DSAR activities	
	Discussion and Recommendations	
	After some conversations with YG, the Engineer commented to the Contractor that activities at DSAR construction will be postponed until the assessment of the conditions within NF2A (observation of emerging points) and redesign of DSSC is completed (probably after the long weekend). Therefore, recommended the Contractor to complete the activities planned for the current day shift, including the capping of the area cleared and grubbed at the right side bank, and then visit the work area to ensure that all the required silt fences were in place, and pending issues closed before the long weekend.	
	Corrective Actions or Improvements	
	Contractor to complete planned activities for the day shift and to observe site conditions before the end of the shift.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
4	Justin, Joan. DSAR Silt Fences	
	Discussion and Recommendations	
	At the end of the shift, Engineer visited the DSAR area and observed the following: a. The silt fence along the western spoil/laydown limits was not properly installed, and a section was missing b. The required silt fence along the new BC general rock fill placed at the right side bank close to NF2A was not installed c. No silt fences had been installed on the island between NF2A and NF2B Contractor commented that the silt fence along the spoil/laydown limits will be reinstalled, but no more silt fences could be installed as they had no more silt fences on site. Engineer removed existing silt fences and lot logs that were installed at the right side bank, and recommended the Contractor that the recycled elements should be reinstalled at the water edge to prevent the transport of sediments into the creek.	
	Corrective Actions or Improvements	
	Contractor to reinstall elements as per Engineer's recommendations.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN.** Engineer visited the area after an hour and no Contractor representative was present. Some sections of silt fence were not properly installed in the ground.

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Gravel and Sand	Front Loader	Contractor excavated gravel and sand, and then loading it to a haul truck	-
B1	-	-	-	-
C	General Rock Fill	CAT 365	Contractor excavated fill from lower bench and loading it to two haul trucks	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
DSSC	NF2A, right bank.	Hand tools	• Engineer measured a water elevation of 1,084.67 m. • The turbidity levels on the creek were monitored by Labarge during in-stream activities (refer to Communication 1 above). • Contractor did not complete the installation of silt fences as recommended by Labarge and the Engineer (see Communication 4 above).	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
DSAR	STN 0+020 to 0+025	Dozer and haul truck	Gravel and Sand	BA	Contractor completed the straight section of road by placing and spreading fill from intermediate stockpile at the entrance to S-Wells area.	-
DSAR	Area at northeast of CP-5 and CP-6	Dozer and haul truck	General Rock Fill	BC	Contractor placed and spread fill on top of the platform of rocks created by the CAT330.	5

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- No activity is expected on site until the assessment of conditions within NF2A stream (emerging points) and the redesign of the DSSC is completed.
- Contractor parked all equipment at Borrow A area at the end of the shift and demobilized.

Photos:

Photo 2: 20141010_NFRDSIS_DSAR_P267_Overview of USAR at the beginning of shift_Looking SW

Photo 3: 20141010_NFRDSIS_DSSC_268_Contractor removing rocks from rock drain face_Looking NE

Photo 4: 20141010_NFRDSIS_NF2_P269_Fish fence showing some deformation_Looking SW

Photo 5: 20141010_NFRDSIS_DSAR_P270_D6 spreading BC fill on top of platform of rocks_Looking W

Photo 6: 20141010_NFRDSIS_DSAR_P271_Overview of working platform from CP-6_Looking N

Photo 7: 20141010_NFRDSIS_NF2B_P272_Lot log located by Contractor at the island_Looking SE

Photo 8: 20141010_NFRDSIS_BA_P274_Overview of Borrow A at the end of shift_Looking NW

Photo 9: 20141010_NFRDSIS_DSAR_P276_Overview of DSAR at the end of shift_Looking SW

Photo 10: 20141010_NFRDSIS_DSSC_P277_Overview of DSSC at the end of shift_Looking SW

Photo 11: 20141010_NFRDSIS_DSSC_P278_Overview of DSSC after removal of rocks_Looking NE

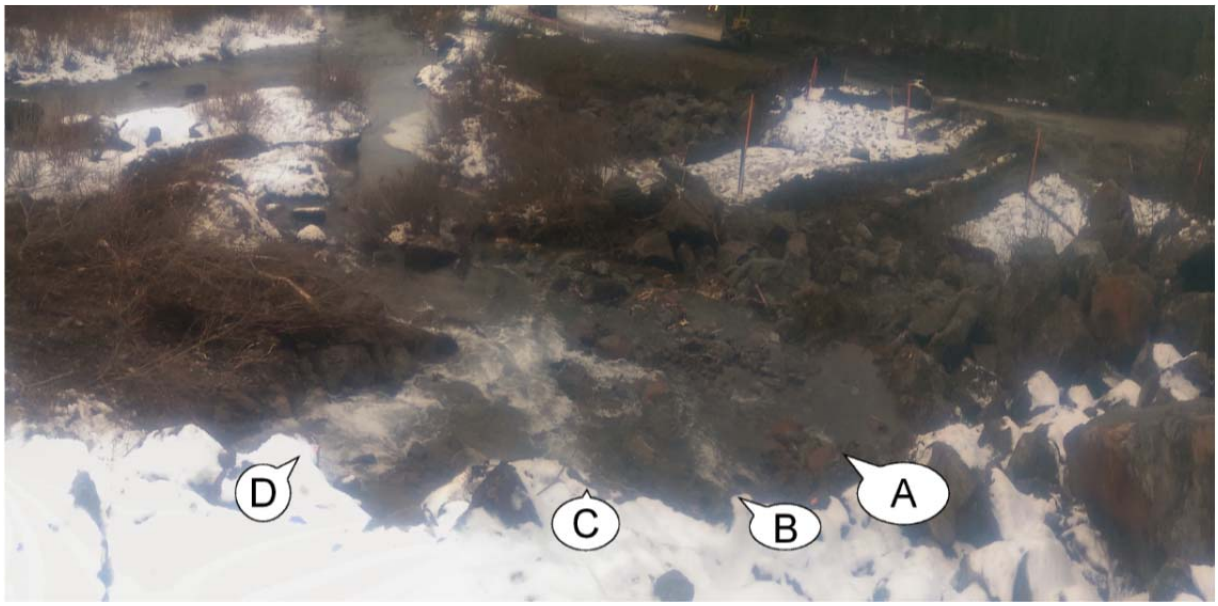

Photo 12: 20141010_NFRDSIS_DSSC_P279_Overview of DSSC after removal of rocks_Looking SW

BGC INTERNATIONAL
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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	DSSC	
Date:	201410024	**Record #:**	*20141024_NFRDSIS_DSR_37*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: +0.1 °C (Max = +2.9 °C; Min = -2.8 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Contractor hauled construction fill with Deere 740 haul truck to the DS area. A pilot escort truck was used to escort the haul truck on the public road section. A section of the road to S-wells area was graded to provide adherence (snow and ice was observed on the road).
1.2	Environmental	• Labarge and ELR maintained the fish fence at the DS area. • Contractor created a small berm to contain the sediment rich water within the excavation area (excavation for the manhole to be installed as part of the DSSC). A small outlet at the DS side was provided to maintain water flow. • Labarge and ELR monitored turbidity levels at NF2 during in-stream works with CAT 330 excavator (Photo 2). No interruptions of construction activities were required. Environmental monitors reported turbidity levels below the threshold values during construction.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141010_NFRDSIS_DSR_36_1 Collapse of fish fence at Creek	ELR installed a new fish fence and salvaged fish upstream to the fence. **CLOSED**	N/A
20141008_NFRDSIS_DSR_36_4 Silt fences at DSAR	No update. **OPEN**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, DSAR, DSSC
Jake Conn (Pelly), BA, DSAR, DSSC
Darcy Clair (Pelly), BA, DSAR, DSSC
Jeff Foster (Pelly), BA, DSAR, DSSC
Nick de Graff (Labarge), NF2, NF2A, NF2B, DSSC
Jonathan Lowey (ELR), NF2, NF2A, NF2B, DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, no activity)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, DSAR, 2 hours)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, 1 hour)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, Borrow A, no activity)
Articulated truck (Deere 400D, #7402, yellow, DSSC, 1 hour)

4. Summary of activities:

Downstream Access Road (DSAR)
Grader was removing ice and snow at some sections along the road (mainly on steep slopes). This activity was completed before construction fill was hauled from Borrow A to the DSSC area
Downstream Seepage Collection (DSSC)
Contractor filled sand bags with sand from Borrow A (two persons for a total of 3.5 hours). Then, the CAT 330 was mobilized from the Borrow An area to the DSSC area. Then, started working at NF2A area. Diversion berms were installed to separate the water emerging from the right hand side (higher Zn concentrations) from the water emerging from three different points at the center and left hand side (lower Zn concentrations). The berms were built with existing material and sand bags (Photos 1, 4, 9 and 10). The CAT 330 also removed some material from the new channels created to facilitate water flow. The excavation for the manhole started once a small berm was created to contain sediment rich water (Photos 3 and 4). The CAT 330 completed excavation to an approximate depth of 2 m. Excavation was completed in 4.5 hours. Note that no water was pumped out. Then, the CAT 330 smoothed the excavation bottom with the bucket and then installed the manhole. Note that the installation of the manhole was done with the support of the CAT 330 (2.5 hours). The placement of rock fill around the manhole was not completed before the end of the shift.

Pipeline (PL)
No activity.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	John, Joan. DSSC Manhole	
	Discussion and Recommendations	
	The Engineer and Contractor commented the details of the manhole to be installed at the DS area: • Contractor will use a section of the 600 mm diameter corrugated HDPE pipe to build the manhole. A minimum length of 2 m was required. • Manhole has to be perforated all along and around the manhole diameter to allow free water flow (in and out). Contractor commented that they will use a 1 inch diameter drill. • A cap to close the bottom end of the pipe has to be installed. Dump areas close to the CH2M hill offices were visited to identify elements that could be used to cap the pipe. Two different steel meshes and a rubber pad were collected. • A sock of geotextile will be installed at the bottom end of the pipe. Then, geotextile should be installed to wrap the remaining length of pipe. Provide overlap between geotextile layers. Geotextile can be tied with wire or a similar element. • A flat plate or mesh should be attached to the bottom end. The material placed to backfill the excavation will sit on top of the plate to keep the manhole in place, and vertical. • Rock Protection Fill or similar fill will be used to backfill the excavation. Use caution to prevent damage of the pipe. Then, a layer of geotextile and a 0.3 m layer of sand and gravel will be placed on top. The manhole should extend at least 0.2 m from the sand and gravel surface. • More gravel and sand will be placed as required to create a pad for the 10 foot pumping house that will be installed at a later stage. • The need for a rip rap layer to protect the sand and gravel will be evaluated. • The installation of silt fences or other sediment control elements will have to be evaluated.	
	Corrective Actions or Improvements	
	The Contractor assembled the parts to construct the manhole. The HDPE pipe was perforated along and around the whole diameter. A circular steel mesh and a circular section of rubber pad were bolted to the HDPE pipe to cap the bottom end. The geotextile sock was then installed and tied with wires. Then, more geotextile was installed to wrap the remaining length of pipe. Finally, a rectangular steel mesh was bolted to the bottom end (Photo 5). The Contractor completed the manhole in 6.5 hours (including activity described on communication 2 below). Note that more than one person was working on the fabrication of the manhole at the same time (a cumulative of 12 hours).	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

2	John, Jeff, Darcy, Joan. DSSC manhole installation.	
	Discussion and Recommendations	
	The installation of the manhole was not possible as it was floating on the water (Photo 5). The Contractor commented that the manhole was not permeable and water was not entering. Note that no access was possible to observe the interior of manhole as it was not safe (the upper part was too high). This hypothesis was discarded when water was added into the pipe and the pipe was still floating. The Contractor then commented that there was air trapped on the corrugated parts of the HDPE pipe. It was agreed that holes will be perforated on the corrugated parts of the HDPE pipe. Note that all the wholes previously perforated were on the areas in between corrugated sections (see Photo 8).	
	Corrective Actions or Improvements	
	The manhole was placed on the ground, and the geotextile removed. Then, holes were drilled on the corrugated parts of the HDPE pipe. Afterwards, the geotextile pieces were re-installed by means of wires. Finally, the manhole was installed at the desired location.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
3	Joan, John. Backfill material at DSSC.	
	Discussion and Recommendations	
	The Engineer noted that the Contractor delivered Borrow A material to the DS area (coarse rounded cobbles and boulders, with trace sand and gravel). The Contractor commented that the angular fill from Borrow C could damage the HDPE pipe during filling operations so the use of Borrow A material was recommended. The Engineer reminded that the backfill had to be permeable to allow water flow in/out. Also, recommended that the finer fraction should not be placed as part of the backfill.	
	Corrective Actions or Improvements	
	Contractor placed the Borrow A cobbles and boulders to backfill the manhole.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
4	Joan, John. Placement of construction fill to backfill the manhole.	
	Discussion and Recommendations	
	The Engineer noted that manhole was not vertical (Photo 7). The initial loads of rocks placed by the CAT 330 were possible displacing the manhole. The Contractor commented that they will place more backfill and then push the manhole with the bucket to relocate the manhole. Some material was required to hold the manhole in place to ensure that it will not move again. The Engineer recommended relocating the manhole with care to prevent any damage of the pipe or geotextile.	
	Corrective Actions or Improvements	
	Activity not completed before the end of the shift. Contractor to continue backfilling during the next day shift.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Cobbles and boulders	Deere 400 and CAT 988	Contractor loaded one truck of coarse cobbles and boulders to backfill the manhole at the DSSC area.	-
B1	-	-	-	-
C	-	-	-	-
	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
DSSC	In-stream, right hand side	CAT 330	Contractor installed a berm to create a pond at the right hand side channel. The berm was installed prior to the excavation of the sump for the manhole. An opening at the DS side allowed the controlled flow of water. Note that ELR and Labarge monitored in-stream water quality during excavation.	2, 4

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
DSSC	In-stream (manhole)	CAT 330	Cobbles and boulders	BA	Excavator was placing construction fill around the manhole to backfill the excavated sump. Activity not completed by the end of the shift.	6

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
DSSC	In-stream (manhole)	CAT 330	The Contractor excavated a sump for the installation of the manhole. The approximate dimensions of the excavation were 6 m wide x 4 m long x 2 m deep. The excavator completed the excavation on 4.5 hours.	3

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
DSSC	In-stream (manhole)	Hand tools	The Contractor installed geotextile to wrap the manhole constructed. Note that the geotextile had to be removed and re-installed to perforate more holes on the HDPE corrugated pipe (refer to Communication 2 above).	5

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
DSSC	In-stream, manhole location	Cobbles, gravel and sand	The Engineer collected a sample (S99) from the material that the Contractor will use to backfill the manhole sump. The sample will be tested with XRF analyzer to observe Zn content.	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to complete the backfilling of the manhole, and the placement of Borrow A material. Also, Contractor will install sediment and control elements.
- The mobilization time for the CAT330 excavator from Borrow A to the DSSC was approximately 1 hour.

Photos:

Photo 1: 20141024_NFRDSIS_DSSC_P280_Segregation of water emerging at Point A from the water flowing at Points B, C & D_Looking NE

Photo 2: 20141024_NFRDSIS_NF2_P281_ELR collecting water sample from the creek_Looking SW

Photo 3: 20141024_NFRDSIS_DSSC_282_CAT 330 excavating manhole sump_Looking NE

Photo 4: 20141024_NFRDSIS_DSSC_P283_Sediment rich water ponded during the excavation of manhole sump at the right hand side_Looking NE

Photo 5: 20141024_NFRDSIS_DSSC_P284_Manhole floating on ponded water_Looking N

Photo 6: 20141024_NFRDSIS_DSSC_P285_Excavator backfilling the manhole sump_Looking SW

Photo 7: 20141024_NFRDSIS_DSSC_P286_Manhole displaced by the rocks placed to backfill the manhole sump_Looking SW

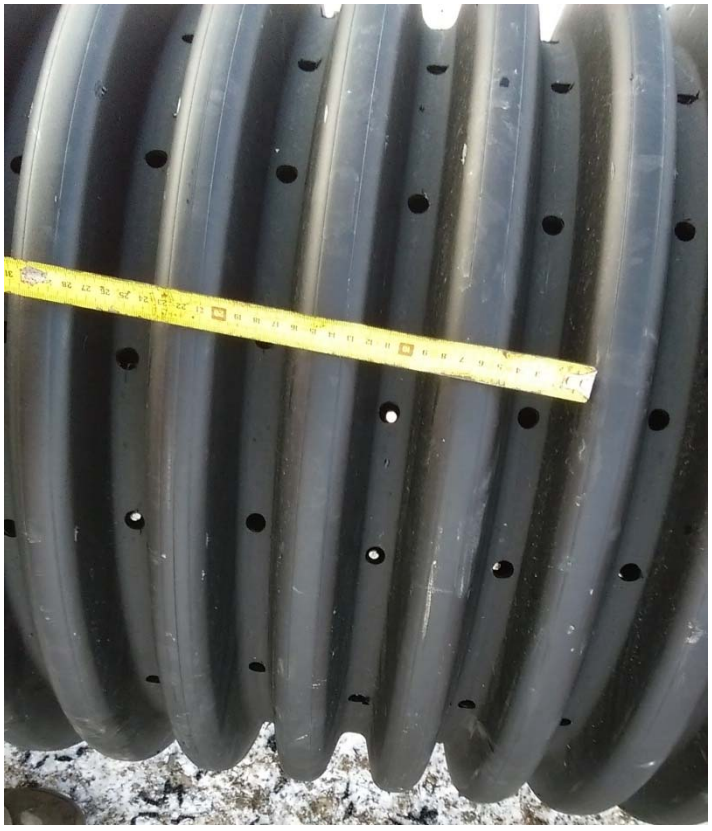

Photo 8: 20141024_NFRDSIS_DSSC_P287_Holes perforated along and around the HDPE pipe

Photo 9: 20141024_NFRDSIS_DSSC_P288_Detail of water emerging at Point A (NF2A)_Looking N

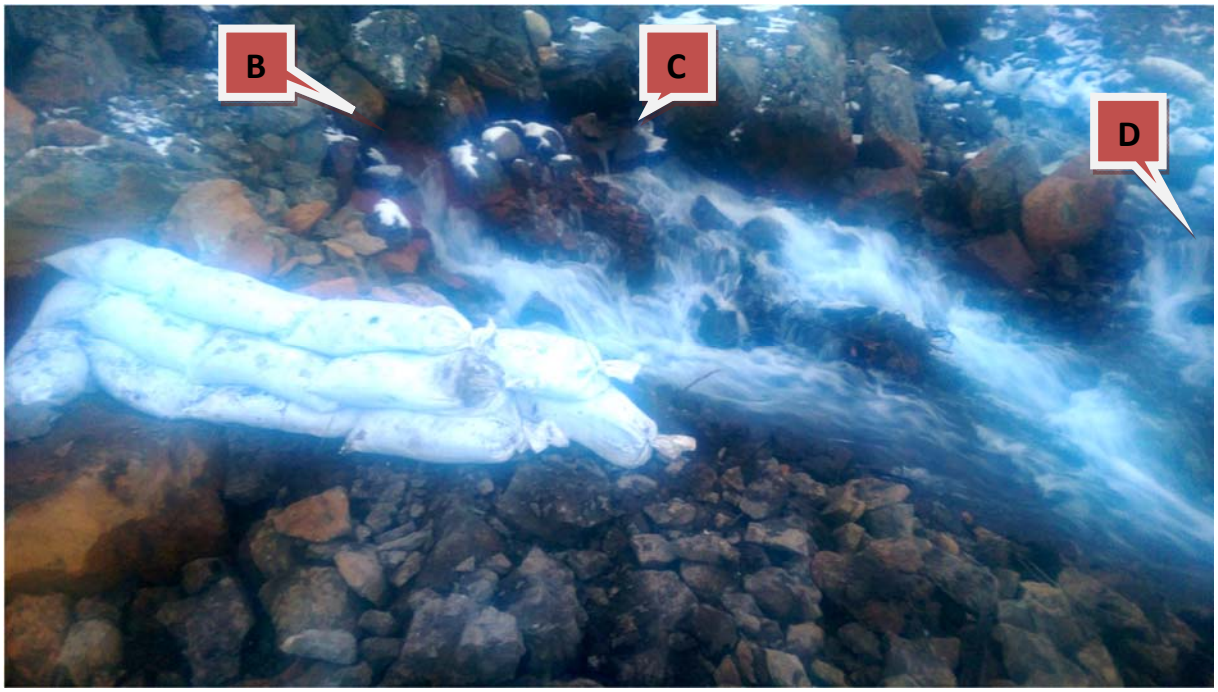

Photo 10: 20141024_NFRDSIS_DSSC_P289_Detail of water emerging at Points B, C and D_Looking NE

BGC INTERNATIONAL
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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:40 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	DSSC	
Date:	201410025	**Record #:**	*20141025_NFRDSIS_DSR_38*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -4.4 °C (Max = -0.5 °C; Min = -8.2 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	• Labarge and ELR maintained the fish fence at the DS area. • Contractor installed new sediment control measures at DS area. Also, re-installed short sections of existing silt fences that were not properly installed. A total of two persons, 2 hours each. • Labarge and ELR monitored turbidity levels at NF2 during in-stream works. No interruptions of construction activities were required. The turbidity levels reported by Labarge and ELR were below the threshold values (**Photo 2**). • Engineer, ELR and Labarge organized a site visit to observe conditions at construction areas (see Communications 3 and 4 below). The sediment control elements to be installed by the Contractor were discussed. Also, the existing sediment and control elements were inspected.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141008_NFRDSIS_DSR_36_4 Silt fences at DSAR	The Contractor installed silt fences, geotextiles and a straw logs to control sediment at DS area. Also, re-installed silt fence along the western limit of the spoil area. **CLOSED**	Contractor

20141024_NFRDSIS_DSR_37_4 Backfill of manhole sump	The Contractor placed more construction fill around the manhole and corrected the position of the manhole with the excavator bucked. No damage was observed on the manhole. **CLOSED**	N/A

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, DSAR, DSSC
Jake Conn (Pelly), BA, DSAR, DSSC
Darcy Clair (Pelly), BA, DSAR, DSSC
Jeff Foster (Pelly), BA, DSAR, DSSC
Nick de Graff (Labarge), NF2, NF2A, NF2B, DSSC
Jonathan Lowey (ELR), NF2, NF2A, NF2B, DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, DSSC, 6 hours)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, Borrow A, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, 2 hours)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, Borrow A, no activity)
Articulated truck (Deere 400D, #7402, yellow, DSSC, 2.5 hours)

4. Summary of activities:

Downstream Access Road (DSAR)
Contractor placed a geotextile and a layer of Borrow A sand and gravel to provide access to the manhole pad (pumping house).
Downstream Seepage Collection (DSSC)
Contractor completed the backfill of the manhole sump with CAT 330. Then, placed a geotextile on top of the rock fill. The geotextile was placed to prevent contamination of the permeable RF around the manhole with fines (**Photo 4**). A layer of Borrow A sand and gravel was placed on top of the geotextile to create a pad for the pump house (**Photo 7**). A geotextile was placed at the NE side (creek shore) to wrap the layer of sand and gravel to prevent erosion (**Photo 6**). Note that the thickness of the layer of sand and gravel was variable (an estimated average thickness of 0.3 m).

Then, some rocks were placed to hold the geotextile in place. These rocks were removed from the channel beside the manhole to facilitate water flow (rocks fallen into the channel during backfilling operations). Finally, a straw log installed at the edge to intercept sediment rich water (**Photos 5, 6 and 7**). Then, the CAT 330 was de mobilized from the DSSC area.
Pipeline (PL)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Joan. DSSC manhole sump backfill	
	Discussion and Recommendations	
	The Engineer noted that the Contractor delivered Borrow A material to the DS area (coarse rounded cobbles and boulders, with trace sand and gravel). As commented on the previous shift, the Engineer reminded that the backfill had to be permeable to allow water flow in/out. Also, recommended that the finer fraction should not be placed as part of the backfill.	
	Corrective Actions or Improvements	
	The Contractor placed the Borrow A cobbles and boulders to backfill the manhole (**Photos 1 and 3**). The fine fraction discarded was placed to fill a ditch located immediately beside the manhole pad (at the southwestern side).	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
2	John, Jeff, Darcy, Joan. DSSC manhole verticality.	
	Discussion and Recommendations	
	The Engineer reminded that the manhole was not vertical. The initial loads of rock fill dumped with the CAT 330 displaced the manhole. The Contractor commented that more rock fill will be placed and then push the manhole with the bucket to correct verticality. Some material was required around the manhole to hold it in place.	
	Corrective Actions or Improvements	
	The Contractor corrected the position of the manhole and completed the backfill of the manhole sump. No damage was observed.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
3	Nick, Jonathan, Joan, John. DSSC and DSAR sediment and control elements.	
	Discussion and Recommendations	
	A site visit was organized to observe the working area and evaluate the need of sediment of control measures. The Engineer pointed out that an email with observations from ELR was received. A summary of the observations performed can be found below: 1. Bend and fix the geotextile placed under the layer of sand and gravel (pump house pad). The eastern end of the layer of sand and gravel will then be wrapped to prevent erosion.	

	2. A straw log will be placed to intercept sediments from the pump house pad. If required, place a new piece of geotextile or silt fence section to prevent erosion of pump house pad fill. 3. Re-install existing silt fence along the creek shore. The silt fence was not properly anchored into the ground. Also, install a new section of silt fence along the Borrow C fill placed on previous shifts. 4. Re-install existing silt fence along the material at the spoil area. The silt fence was not properly anchored into the ground. 5. The removal of the observed wood debris was not required 6. The protection of the island between NF2A and NF2B was not required. Note that straw logs had been installed on previous shifts.
	Corrective Actions or Improvements
	The Contractor installed new sections of silt fence, installed straw log, and re-installed existing silt fences within DSSC and DSAR areas.
	Status at the end of the shift (Open, Closed or N/A) — **CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Cobbles and Boulders	Deere 400 and CAT 988	Contractor loaded a truck of coarse cobbles and boulders to backfill the manhole at the DSSC area.	-
	Gravel and Sand	Deere 400 and CAT 988	Contractor loaded 3 trucks of sand and gravel to create a pad for the pumping house and access platform. Note that the construction fill hauled to the DSSC area was loaded beside the entrance gate to the s-wells area. As commented on the day shift report from October 10, 2014, an intermediate pile of Borrow A sand and gravel was created to speed up construction process.	-
B1	-	-	-	-
C	-	-	-	-
	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
DSSC	Manhole and pump house pad	CAT 330 and hand tools	ELR / Labarge monitored in-stream water quality during in-stream construction activities.	2

DSSC and DSAR	Working platform, spoil area and pump house pad	Hand tools	A site visit to observe the DS construction areas was organized (see Communication 3). Contractor installed sediment control elements along the creek at various points.	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
DSSC	In-stream (manhole)	CAT 330 and Deere haul truck	Cobbles and Boulders	BA	The backfilling of the manhole sump was completed. As requested by the Engineer, the Contractor placed some additional rocks to create a flatter platform prior to the installation of the geotextile.	1, 3
DSSC	In-stream (manhole)	CAT 330 and Deere haul truck	Gravel and Sand	BA (see Section 6 above)	Excavator placed a layer of sand and gravel to create a pad for the pumping house. Then, placed more sand and gravel to create an access to the pumping house area. Engineer estimated an average layer thickness of 0.3 m.	5, 6, 7

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
DSSC	In-stream, manhole location	Hand tools	Contractor installed a geotextile on top of the material placed to backfill the manhole sump (one section of 7.3 m long)	4
DSAR	Access to pump house	Hand tools	Contractor installed a geotextile on top of the existing soft ground (one section of 7.6	-

			m long). The area failed proof roll test so the placement of a geotextile was recommended. Geotextile was overlain by a layer of gravel and sand.	

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
DSSC	In-stream, manhole location	Cobbles, gravel and sand	Engineer collected a sample (S100) from the Borrow A construction fill that the Contractor was using to backfill the manhole sump. Also, tested samples S99 and S100 with the XRF analyzer. Both samples returned low Zn concentrations (below 100 ppm).	1

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The demobilization time for the CAT330 excavator was approximately 1 hour.

Photos:

Photo 1: 20141025_NFRDSIS_DSSC_291_CAT 330 loading boulders and cobbles to be placed to backfill the manhole sump_Looking N

Photo 2: 20141025_NFRDSIS_DSSC_P292_Overview of the turbidity on NF2A at the end of the island between NF2A and NF2B_Looking NE

Photo 3: 20141025_NFRDSIS_DSSC_P293_Rock fill placed around the manhole_Looking E

Photo 4: 20141025_NFRDSIS_DSSC_P294_Contractor placing a layer of geotextile on top of the rock fill placed around the manhole_Looking NE

Photo 5: 20141025_NFRDSIS_DSSC_P295_Sand and gravel for pump house pad around the manhole being placed on top of geotextile_Looking NE

Photo 6: 20141025_NFRDSIS_DSSC_P296_Sand and gravel layer wrapped with a geotextile at the creek edge_Looking NE

Photo 7: 20141025_NFRDSIS_DSSC_P297_Pumphouse pad, manhole and straw log_Looking SE

Photo 8: 20141025_NFRDSIS_DSSC_P298_Detail of water at 0.9 m from the top of manhole

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:25 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Overcast, light snow	
Subject:	Day Shift Report	**Work Areas*:**	DSSC, Haul Road	
Date:	201410026	**Record #:**	*20141026_NFRDSIS_DSR_39*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -4.9 °C (Max = -2.0 °C; Min = -7.7 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The upper end of the manhole was covered with a wooden board and secured with a boulder (refer to Communication 2 below).
1.2	Environmental	Labarge and ELR removed the fish fence at the DS area.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, DSAR, DSSC, haul road
Jake Conn (Pelly), BA, haul road
Darcy Clair (Pelly), BA, haul road
Jeff Foster (Pelly), BA, haul road
Nick de Graff (Labarge), NF2, NF2A, NF2B, DSSC
Jonathan Lowey (ELR), NF2, NF2A, NF2B, DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, no activity)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, Borrow A, no activity)

Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, Borrow A, no activity)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Engineer and Contractor covered the upper end of the manhole for health and safety reasons.
Pipeline (PL)
The Contractor and Engineer visited the site to observe conditions along the proposed location of the pipeline, including the two crossings on the haul road. It was noted that Tees was moving the heat traced pipes located downstream to the second crossing (Station 1+250).

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Joan. Pipeline crossings on haul road.	
	Discussion and Recommendations	
	Contractor commented that they would like to start the installation of culverts at the haul road crossings. These culverts are required as part of the installation of the heat traced line. The Engineer commented that YG should confirm that Pelly is under contract for those activities before they can start. The Engineer will contact YG. Also, noted that Tees recommended the use of the available 12'' steel culverts for the crossings. Confirmation on the cost of the required steel culverts and couplings has to be obtained from Tees. Then, The Engineer has to obtain YG approval.	
	Corrective Actions or Improvements	
	• YG informed that the required works at the haul road crossings could be performed under the hourly rates for the DSSC. • Tees commented that the required steel culverts and couplings can be used at no cost for Pelly or YG. • The Engineer did not receive confirmation from YG on the typology of crossing to be executed (deep 24" diameter HPDE culverts or shallow 12" diameter steel culverts). Engineer noted that acceptance will likely be received during the next day shift.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

2	John, Joan. DSSC manhole. Health and Safety risk.	
	Discussion and Recommendations	
	Engineer pointed out that the upper end of the manhole was not covered or protected. Also, noted that it was not signaled. Engineer commented that there was a risk that someone could fall into the manhole, and recommended that the manhole should be covered.	
	Corrective Actions or Improvements	
	Contractor covered the upper end of the manhole with a wooden board, and it was pained with orange spray. Then, the wooden board was secured with a boulder (**Photos 2, 3** and **4**).	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
3	John, Joan. Pipeline parts.	
	Discussion and Recommendations	
	Contractor informed that two new packages were delivered to site. Also, that all the required parts for the pipeline installation have now been received. The Engineer observed two packages containing parts required for the completion of the pipeline installation (**Photos 5** and **6**). The Engineer requested a list of the elements delivered to check if the total quantities match the design lengths and units.	
	Corrective Actions or Improvements	
	Contractor to provide a list of the elements received and to check on site that all elements are clearly identified and that no parts are missing.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
B1	-	-	-	-
C	-	-	-	-
	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), the Contractor also plans to start the execution of the pipeline crossings at the haul road, if approval is received from YG.
- Engineer observed some ice at the channels and seepage points during a visit to the DSSC area (**Photo 1**). No thick layers of ice or ice plugs blocking the water flow were observed. On the channels, water was flowing under the ice.
- Underhill is mobilizing personnel to the Faro Mine site so the as-built survey can start during the following shift.

Photos:

Photo 1: 20141026_NFRDSIS_DSSC_P299_Diversion berm and seepage points A, B, C & D_Looking NE

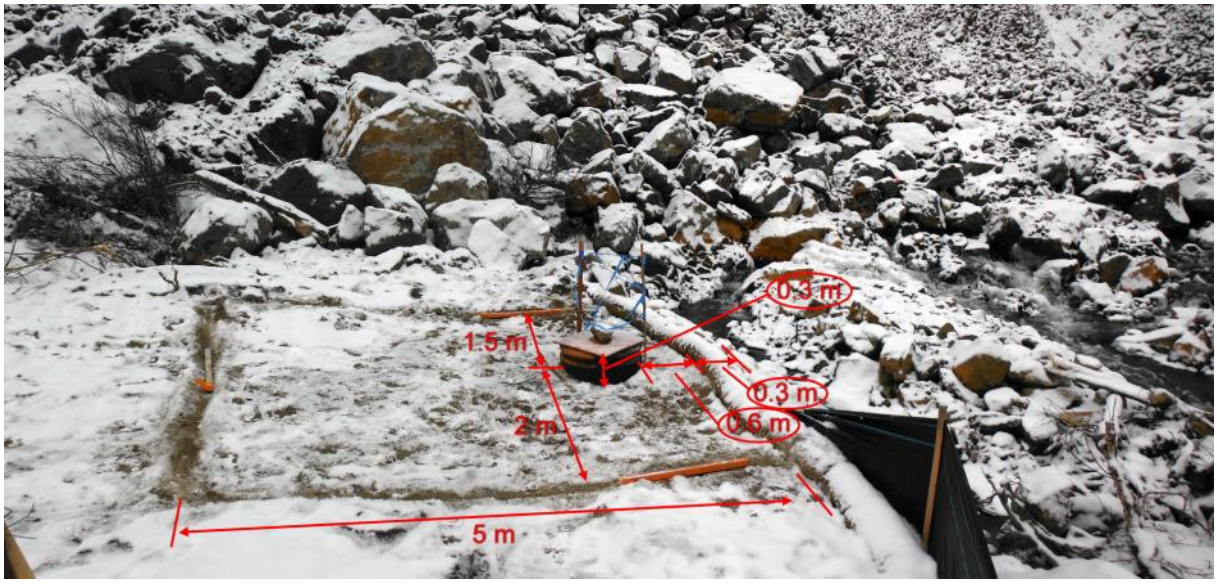

Photo 2: 20141026_NFRDSIS_DSSC_P301_Pumphouse pad and marks showing location of the manhole_Looking NE

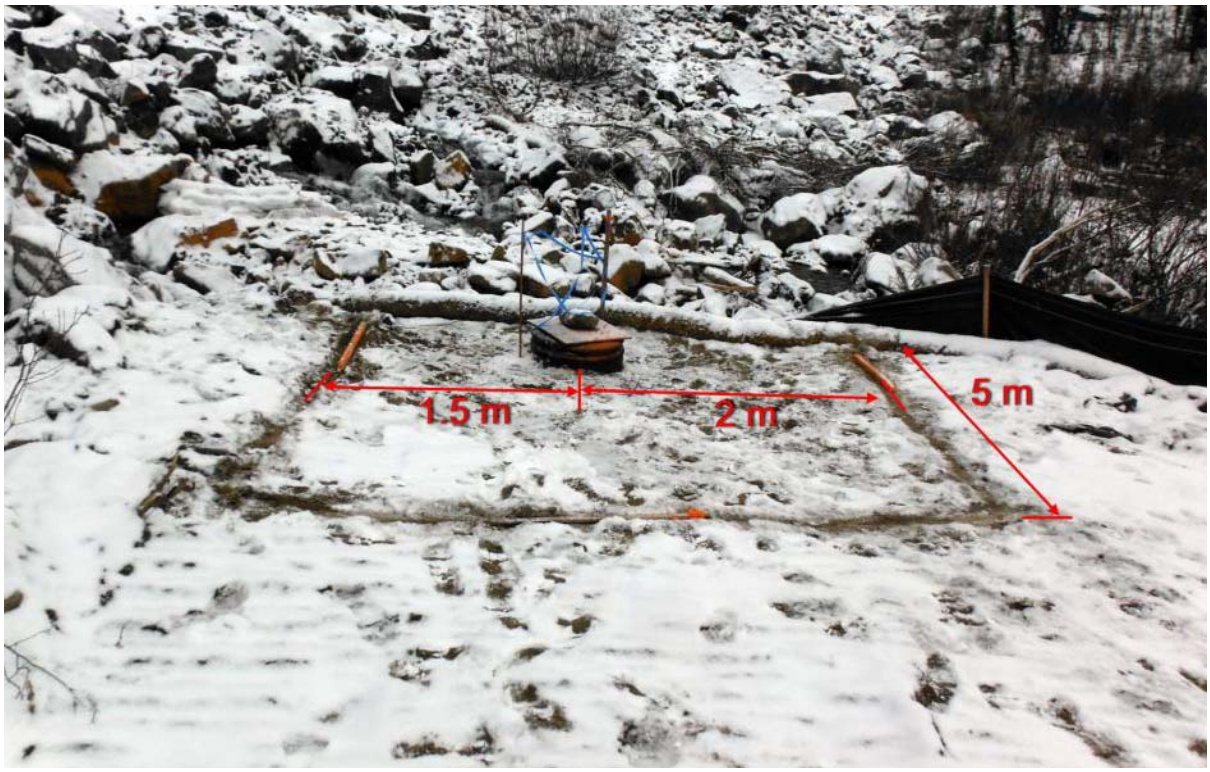

Photo 3: 20141026_NFRDSIS_DSSC_300_Pumphouse pad and marks showing location of the manhole_Looking E

Photo 4: 20141026_NFRDSIS_DSSC_P302_Pumphouse pad with marks showing a rectangle of 5 m x 3.5 m for reference_Looking E

Photo 5: 20141026_NFRDSIS_DSSC_P304_View of one of the two packages delivered to site (vacuum breaker air valves)

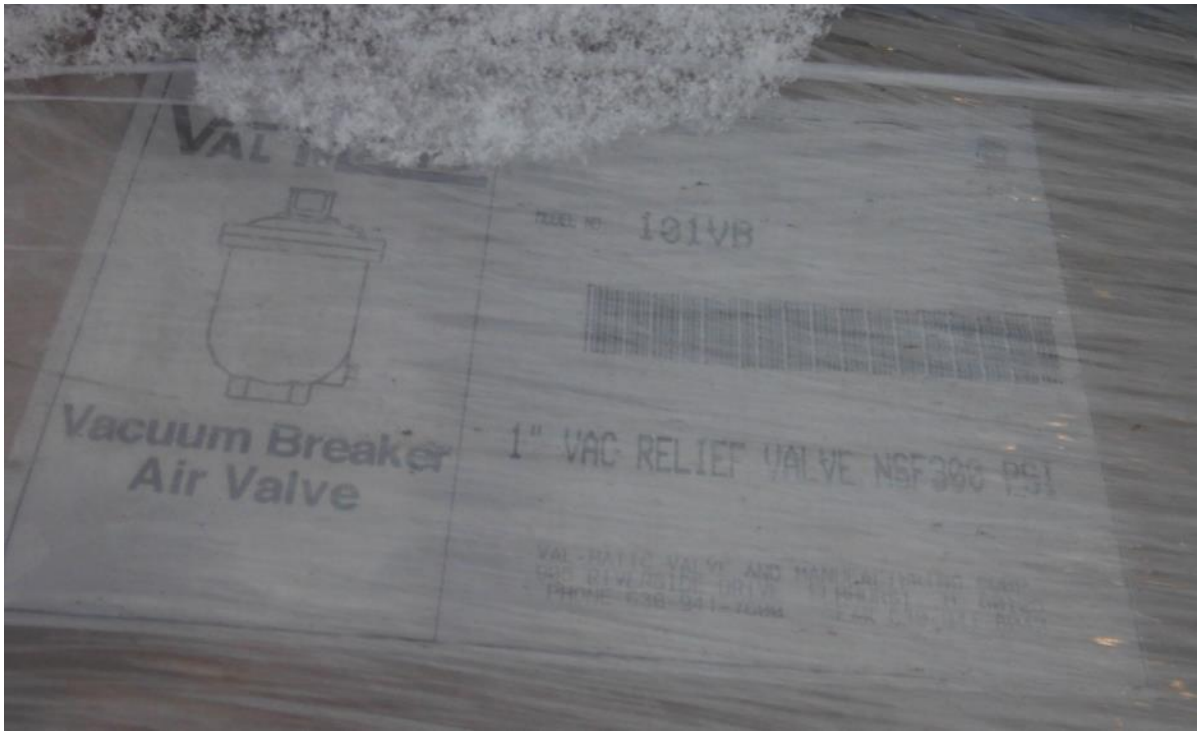

Photo 6: 20141026_NFRDSIS_DSSC_P305_Detail of the sticker on one of the boxes

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	Haul Road	
Date:	201410027	**Record #:**	*20141027_NFRDSIS_DSR_40*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -4.8 °C (Max = -3.0 °C; Min = -6.5 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141026_NFRDSIS_DSR_39_1	Approval from YG has been received for the completion of the pipeline crossings as per the proposed alternative (see Communication 1). **CLOSED**	N/A
20141026_NFRDSIS_DSR_39_3	Contractor to provide documents showing the elements shipped to the Faro Mine site. Also, to verify that all elements have been received and properly stored. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BA, DSAR, DSSC
Jake Conn (Pelly), BA
Darcy Clair (Pelly), BA
Jeff Foster (Pelly), BA
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, pipeline crossings, 9 hours including mobilization time)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)

Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, pipeline crossings, 2 hours including mobilization time)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #317, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #318, yellow, Borrow A, no activity)
Haul Truck (CAT 773B, #319, yellow, Borrow A, no activity)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity (**Photo 10**).
Downstream Seepage Collection (DSSC)
No activity (**Photo 10**).
Pipeline (PL)
Contractor completed the pipeline crossings at the haul road. The first crossing executed was the one between Stations 0+350 and 0+400. Then, the Contractor mobilized the equipment to the second crossing between Stations 1+230 and 1+270. The execution of both crossings was performed following the same procedure (refer to Communication 1). Firstly, the D9 dozer was used to break the frozen ground (**Photo 5**). Then, the CAT 330 excavator was used complete the excavation of the trenches (**Photo 2**), and install the steel culverts (**Photo 6**). Then, the CAT 330 backfilled and compacted the trenches with the sand and gravel material previously excavated (**Photo 4**).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. Pipeline crossings on haul road.
	Discussion and Recommendations
	The Engineer communicated that approval for the use of 12” steel culverts and the execution of shallower pipeline crossings was received from YG. As discussed during the previous shift, the construction of the pipeline crossings will be as follows: a. Execution of 0.5 to 1 m deep trenches to install culverts. b. Installation of 12” steel culverts (pipes) on the trench (**Photo 1**). Four sections of the available 12” steel pipe are required at each crossing (a total of 8 sections). Four joint couplings are also required. Tees will supply the required elements at no cost for YG. c. The alignment for the second crossing will be modified to prevent interferences with the existing culverts installed at the same depth from road invert. The previous alignment, at a deeper elevation, was crossing from the left hand side of the existing pipeline to the

right hand side. The alignment was also modified to facilitate the relocation of the pipelines at a later stage (if required). The pipeline, as per the new alignment, will be installed at the left hand side of the existing pipeline crossing.

d. There won't be a lower point at the second crossing so the installation of the drain valve will not be required. Pipes to be slopped DS at the second crossing to facilitate drainage.
e. Common material excavated will be evaluated to see if it could be reused as construction fill. If so, trenches will be backfilled with the excavated material. On the contrary, sand and gravel fill from Borrow A will be used as backfill material.

The Contractor commented that they will divert traffic during construction activities. Also, The Contractor commented that the ground was frozen, so the D9 dozer will be used to start the excavation of trenches. Then, the Contractor will switch to the CAT330 excavator to complete the excavation, install the culverts and backfill the trenches.

The Engineer reminded that large diameter particles encountered during excavation shall be removed. As stated on the relevant drawings, large particles should not be included as part of the construction backfill. Further, the Engineer commented that the areas at the inlet and outlet of the culverts should be smoothed and reshaped to facilitate the installation of the pipeline.

Corrective Actions or Improvements

- Contractor installed signs along the road to divert traffic. Also, informed Tees's personnel during the morning toolbox meeting.
- Contractor completed excavation for the trenches and installed the culverts. The excavated material was mainly gravel and sand from existing road capping layer. The large diameter particles or chunks of frozen ground observed during excavation were removed from backfill material (**Photo 9**).
- Contractor compacted the trenches with CAT 330, firstly with the bucket and then by driving on top more than two passes.
- Contractor graded the road with a grader to return the road to its initial state.
- Excess of excavated material was used to create protection berms around the crossings.
- Areas at inlet and outlet were smoothed with the CAT 330 to facilitate the future installation of the pipeline. The Engineer commented to Contractor that gentle transitions shall be provided to ensure that the pipes will be easily installed (large bend radius).

Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

Contractor and Engineer to comment on possible options to remove the turbidity curtain.

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	N/A	GPS	Underhill completed the as-built survey at the borrow area.	8
C	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
Pipeline	Stations 0+350 to 0+400	CAT330	Sand and gravel previously excavated	N/A	The Contractor backfilled the trench previously excavated. The trench was filled with the material excavated once the oversized particles were removed.	4
Pipeline	Stations 1+230 to 1+270	CAT330	Sand and gravel previously excavated	N/A	The Contractor backfilled the trench previously excavated. The trench was filled with the material excavated once the oversized particles were removed.	7

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
Pipeline	Stations 0+350 to 0+400	D9 Dozer + CAT330	The Contractor excavated a trench for the installation of two 12” steel pipes. The trench was an average of 1 m deep and 1.8 m wide. The grading of the pipes was monitored with a bubble level.	2
Pipeline	Stations 1+230 to 1+270	D9 Dozer + CAT330	The Contractor excavated a trench for the installation of two 12” steel pipes. The trench was an average of 1 m deep and 1.2 m wide. The grading of the pipes was monitored with a bubble level.	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to clean the areas around the pipeline crossings (removal of all excess material).
- Underhill arrived at 3:00 pm and completed activities at Borrow A. The plan for the next shift is to start with the survey activities at Borrow C.
- Engineer observed some ice at the channels and seepage points during a visit to the DSSC area. No ice blocking the water flow was observed. Water was flowing under the ice at all points.

Photos:

Photo 1: 20141027_NFRDSIS_Pipeline_P306_Four sections of steel pipes for culverts_Looking E

Photo 2: 20141027_NFRDSIS_Pipeline_P307_Trench excavation at the first crossing_Looking NE

Photo 3: 20141027_NFRDSIS_Pipeline_308_Tees decommissioning an existing pipeline_Looking NE

Photo 4: 20141027_NFRDSIS_Pipeline_P309_Backfilling of the trench with existing fill_Looking NE

Photo 5: 20141027_NFRDSIS_Pipeline_P310_D9 Dozer breaking the frozen ground layers_Looking NE

Photo 6: 20141027_NFRDSIS_Pipeline_P311_Contractor installing steel pipes at the trench for the second crossing_Looking NE

Photo 7: 20141027_NFRDSIS_Pipeline_P312_Excavator piling boulders removed from backfill material_Looking S

Photo 8: 20141027_NFRDSIS_BA_P313_Underhill collecting GPS points at Borrow A_Looking NW

Photo 9: 20141027_NFRDSIS_Pipeline_P314_Frozen ground aggregate removed from backfill material for trench

Photo 10: 20141027_NFRDSIS_DSAR_P316_View of the DS area_Looking SW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	Haul Road	
Date:	201410028	**Record #:**	*20141028_NFRDSIS_DSR_41*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -5.8 °C (Max = -3.9 °C; Min = -7.6 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141026_NFRDSIS_DSR_39_3 Equipment delivered by Pelly	Contractor to provide documents showing the elements shipped to the Faro Mine site. Also, to verify that all elements have been received and properly stored. **OPEN**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Erik Pit (YG), DSSC, NF2A, NF2B, NF2
John Garvis (Pelly), BA, DSAR, DSSC
Jake Conn (Pelly), BA
Darcy Clair (Pelly), BA
Jeff Foster (Pelly), BA
John John (Underhill), BC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, pipeline crossings)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)

Grader (CAT 14H, #1407, yellow, Borrow A, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, no activity)
Haul Truck (CAT 773B, #317, yellow, Haul Road, no activity)
Haul Truck (CAT 773B, #318, yellow, Haul Road, no activity)
Haul Truck (CAT 773B, #319, yellow, Haul Road, no activity)
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity (**Photo 1**).
Downstream Seepage Collection (DSSC)
The Contractor and the Engineer executed a pumping test at the DSSC. A portable 2" pump was used to pump water from the manhole (**Photo 6**). Once the ice cap on the manhole was broken with a steel bar, the Contractor installed the hose and started pumping operations (**Photo 7**). The static water level before the pump test was observed at -0.9 m from the manhole top. The Contractor was able to lower the water level inside the manhole 0.75 m (from -0.9 m to -1.65 m). The pumping could not continue as the available hose could not be extended to lower elevations (it was too short). The Engineer estimated that the water elevation manhole was dropping at an average of 0.1 m/min (faster at the beginning and slower at the end). Then, the Contractor interrupted the pumping of water. The water level inside the manhole returned to the initial -0.9 m in 1.3 minutes. Water entering the manhole was observed on the perforated section (**Photo 8**).
Pipeline (PL)
The Contractor cleaned the crossing areas with CAT 330 excavator (a total of 3 hours including mobilization time). The excess of excavated material stockpiled in the area was removed or reused to create berms around the culvert inlet and outlet areas (**Photo 9**). The fraction of material removed was locally wasted on the haul road berms.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	-	
	Discussion and Recommendations	
	-	
	Corrective Actions or Improvements	
	-	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	-	-	-	-
C	-	GPS	Underhill started the as-built survey at the borrow area (lower platform). Activity not completed during the day shift.	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift (day shift), Contractor plans to demobilize from the Faro Mine site. No activity will be completed until the start of the Pipeline and Power Supply Works.
- During the following shift (day shift), Underhill will complete the as-built survey, including the Borrow C, the DSSC area and the DSAR area.
- Engineer observed some ice at the channels and seepage points during a visit to the DSSC area (**Photos 2, 3 and 5**). No ice blocking the water flow was observed. Water was flowing under the ice at all points (**Photo 4**).

Photos:

Photo 1: 20141028_NFRDSIS_DSSC_P317_Overview of the DS area_Looking SW

Photo 2: 20141028_NFRDSIS_DSSC_319_Water emerging at points A, B, C & D_Looking NE

Photo 3: 20141028_NFRDSIS_DSSC_P320_Water from point A flowing under the ice cap_Looking NE

Photo 4: 20141028_NFRDSIS_DSSC_P321_Water at point C flowing under the ice cap_Looking NE

Photo 5: 20141028_NFRDSIS_Pipeline_P322_Overview of NF2A area_Looking SW

Photo 6: 20141028_NFRDSIS_DSSC_P323_Contractor installing the 2” on the manhole_Looking E

Photo 7: 20141028_NFRDSIS_DSSC Manhole_P324_Water level lowering during pumping test

Photo 8: 20141028_NFRDSIS_ DSSC Manhole_P325_Detail of water entering the manhole

Photo 9: 20141028_NFRDSIS_Pipeline Crossing_P326_View of the safety berm at oulet_Looking NE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	8:00 am	6:30 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	Haul Road	
Date:	20141029	**Record #:**	*20141029_NFRDSIS_DSR_42*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -5.1 °C (Max = -1.9 °C; Min = -8.3 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141026_NFRDSIS_DSR_39_4 Equipment delivered by Pelly	Contractor presented documentation showing the elements shipped to the Faro Mine site. Also, verified that the packing lists received with each delivery were in line with the shipping documents. All parts were properly stored. No verification of the content of the boxes was performed. **CLOSED**	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, BA, Workshop, Haul Road
Jake Conn (Pelly), BD, BA
Darcy Clair (Pelly), BD, BA
Jeff Foster (Pelly), BD, BA
Shipeng Zheng (Pelly), BD, Workshop, Haul Road
John John (Underhill), DSAR, DSSC, BC

Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Excavator (CAT 330C, #3302, yellow, no activity)
Dozer (CAT D6R, #1604, yellow, Borrow A, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, Borrow A, no activity)
Light Tower/Generator (Allmand ML8, yellow, Borrow A, no activity)
Grader (CAT 14H, #1407, yellow, Haul Road, no activity)
Front Loader (Deere TC54H, yellow, Borrow A, Borrow A, no activity)
Front Loader (CAT988H, #2316, yellow, Haul Road, no activity)
Haul Truck (CAT 773B, #317, yellow, Haul Road, no activity). **Photo 3**
Haul Truck (CAT 773B, #318, yellow, Haul Road, no activity). **Photo 3**
Haul Truck (CAT 773B, #319, yellow, Haul Road, no activity). **Photo 3**
Articulated truck (Deere 400D, #7402, yellow, Borrow A, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
Underhill completed the as-built survey for the access road and the associated sediment and control elements installed by Pelly. Then, started the as-built survey of DSSC area.
Downstream Seepage Collection (DSSC)
Underhill completed the as-built survey for the diversion berm, the diversion channels, the seepage points within NF2A (A, B, C, and D), and manhole area. Then, started the as-built survey of the pipeline crossings.
Pipeline (PL)
No construction activity (**Photo 7**). Underhill completed the as-built survey for the two pipeline crossings (**Photo 4**). Then, started the as-built survey of the Borrow C area. The Contractor checked the different parts delivered to the Faro Mine site. The packing lists were compared with the information received from Pelly (shipping lists). The Contractor did not open the boxes and packaging to verify the content or the quantities (refer to Communication 1).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John (Pelly), Joan. Pipeline parts delivered to Faro Mine site.
	Discussion and Recommendations
	Pelly submitted a list of the pipeline parts shipped to the Faro Mine site. The Contractor informed that the packing lists and the packages received were observed. Also, that the parts on the list were received and stored on site. The Engineer recommended the Contractor to open the boxes as no inspection of the boxes to verify quantities was possible (**Photo 6**). Also, commented that YG will probably ask for this inspection in order to approve Pelly's invoices. The Contractor commented that the packages or/and boxes will not be opened to prevent disturbance to the different parts.

	Corrective Actions or Improvements	
	Some of the boxes could be verifies as they were already opened. The rest of the elements could not be verified.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
4	Joan, John (Pelly), R. Anderson (Tees). Demobilization of equipment.	
	Discussion and Recommendations	
	Pelly informed Tees that some equipment will be parked on top of the haul road (**Photo 3**). The Contractor explained that the trucks used to haul the referred equipment will not be able to drive on the ramp to the Borrow A area. Also, informed that their plan was to demobilize equipment every time they have a truck available so some equipment could be parked at the Faro Mine for some weeks. Tees commented that there was enough space on the haul road so the equipment could be parked on the southwestern side of the road. In addition, the Engineer recommended the Contractor that all the parts and elements should be properly stored, including the geotextiles and silt fences not used during construction.	
	Corrective Actions or Improvements	
	The Contractor parked the excavators, haul trucks, front loader and dozers on top of the haul road. Also, informed that the geotextiles and other parts were stored either on the haul road or the workshop.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
5	Joan, John (Pelly). Re-mobilization.	
	Discussion and Recommendations	
	The Contractor explained that all equipment and personnel will be demobilized from site at the end of the shift. No Pelly personnel will return to the Faro Mine site until approval from YG is received (Pipeline, Power Line and C-Can installation). As commented with Tees, some equipment could be rented from Tees if Pelly needs some support during the next stages of construction. The Engineer reminded that the Contractor will have to coordinate the different sub-contractors, parts and equipment required to complete the next stages of construction.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Gravel and sand	GPS	Underhill completed the as-built survey of the remaining of the sand and gravel piled at the entrance to the S-Wells area. This intermediate stockpile was used by the Contractor to speed up the construction of the DSAR.	5
C	N/A	GPS	Underhill completed the as-built survey at the borrow area.	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Engineer observed some ice at the channels and seepage points during a visit to the DSSC area (**Photos 1** and **2**). No ice blocking the water flow was observed. Water was flowing under the ice at all points.
- Contractor completed the construction activities that could be performed at this stage and demobilized from site.
- Underhill completed the as-built survey, including the Borrow C, the DSSC area and the DSAR area. Underhill demobilized from site at the end of the shift.
- BGC demobilized from site at the end of the shift. No activities will be performed related to the NFRD SIS until the Pipeline, Power Line and C-Can will be installed. In the meantime, Tees will continue with water quality sampling and testing at the DS area.

Photos:

Photo 1: 20141029_NFRDSIS_DSSC_P330_View of ice cap at the diversion channel_Looking NE

Photo 2: 20141029_NFRDSIS_DSSC_331_Ice and snow observed around points B, C & D_Looking E

Photo 3: 20141029_NFRDSIS_Haul Road_P332_Haul trucks parked at the haul road_Looking SE

Photo 4: 20141029_NFRDSIS_Pipeline_P336_Underhill performing as-built survey at the first crossing_Looking NW

Photo 5: 20141029_NFRDSIS_DSAR_P337_Underhill surveying the remaining of BA stockpile at the entrance to S-Wells area_Looking W

Photo 6: 20141029_NFRDSIS_Haul Road_P338_Pipeline parts delivered to Faro Mine site

Photo 7: 20141029_NFRDSIS_Pipeline_P340_Inlet area at the second crossing_Looking SW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	-	
Date:	20141201	**Record #:**	*20141201_NFRDSIS_DSR_43*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -26.9 °C (Max = -23.5 °C; Min = -30.2 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The Engineer reviewed Wildstone's health and safety plan (HASP) and provided some comments to Pelly, including: • The specific risks associated to the pipeline activities and the remedial measures should be included on the HASP • The emergency response procedures should be updated to incorporate the Faro Mine site procedures
1.2	Environmental	The Engineer observed that the surface of the US pond was frozen (**Photo 1**). Some snow was also observed on top of the ice. The remaining sections of turbidity curtain were still in place (refer to Communication 2). At the DS area, the Engineer observed an ice cap on all the channels, including NF2A and NF2B (**Photo 2, 3, 4, 6 & 7**). Water flowing under the ice was observed within NF2A through holes made by Tees. An ice cap was also observed inside the manhole (**Photo 5**). The Engineer and Contractor observed water under the ice cap through a hole in the ice (a water depth of 1.6 m was measured). The holes in the ice were made by Tees to collect water samples within NF2A.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
-	-	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), BD, BA, Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity (**Photo 1**).
Downstream Seepage Collection (DSSC)
The Contractor and Engineer visited the seepage collection area. The NF2A and NF2B channels were frozen along the whole length (**Photo 2**). Water flowing under the ice was observed at all water sampling points within NF2A.
Pipeline (PL)
The Contractor and Engineer observed the pipeline parts previously delivered to Faro Mine. The quantities were reviewed to ensure that no elements were missing (refer to Communication 1).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John (Pelly), Joan. Pipeline parts delivered to Faro Mine site.
	Discussion and Recommendations
	The Contractor and the Engineer visited the pipeline parts stored at the workshop and haul road. These parts were delivered to the Faro Mine site on previous day shifts. The purpose of the visit was to observe the quantities delivered and compare them with the number of parts ordered to Northlands. This activity was required before the parts could be handed over to Wildstone as part of the installation of the heat traced pipeline. The Engineer and Contractor observed the following: • The delivery of the new backup rings and associated bolts/nuts is still pending. These parts were ordered to Northlands last week. These parts should arrive to the Faro Mine site before December 5, 2014. • One 1” air vacuum valve (APCO 1501T model) and one 1” air release/vacuum valve (APCO

	1500TC model) were ordered. Three valves were delivered to the field in three separate boxes. The three boxes have the same label and the information provided is vague. At the time of the visit it was unclear why three valves were delivered instead of two. Also, it was unclear if the valves were the appropriate ones. It was agreed that a visit with Wildstone will be organized as soon as they are on site to inspect the valves. • The 1" XS ERW STL API-5L-B/A53-B pipe (2 m long) was not found. The Contractor commented that the part was delivered on previous shifts. The Engineer commented that the Contractor should look for the missing pipe. Also, that a new pipe should be ordered if the one delivered could not be found. The Contractor commented that the pipe is a very common product so there should not be delays associated to the delivery of a new one (if required). • Two UTC 2030-01 Electronic Controllers were found to be on the Faro Mine site. Four electronic controllers were ordered. The Contractor informed that the two units missing were sent to Precision.	
	Corrective Actions or Improvements	
	• Contractor to confirm if the 2 m long 1" XS ERW STL API-5L-B/A53-B pipe is on the Faro Mine site. If not, the Contractor should order a new one. • Wildstone to inspect the air valves delivered to confirm that they are the appropriate ones. If not, the Engineer and/or Contractor should contact Northlands so they can supply the required ones. • Contractor to provide an update on the delivery of the new parts ordered to Northlands.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
ID	**Summary *(time, personnel, work area and description)***	
2	John (Pelly), Joan. Pipeline installation. Wildstone.	
	Discussion and Recommendations	
	The Contractor informed that Wildstone will not arrive before 2:00 pm. The Engineer pointed out that all personnel should leave the Faro Mine site before 5:30 pm. Therefore, there won't be a lot of time for construction after the orientation, kick-off meeting and other preliminary tasks (planning, tents, etc.).	
	Corrective Actions or Improvements	
	Wildstone did not mobilize to site before the end of the shift. The Contractor commented that Wildstone will arrive to the Faro Mine site at the beginning of the next shift.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Wildstone did not arrived to the Faro Mine site before the end of the shift. The Contractor plans to start pipeline activities tomorrow morning (after the orientation and kick-off meeting).
- Pelly's equipment is still parked on top of the haul road. The demobilization was not completed by Pelly. Note that some of the equipment was dismantled so it is not on working conditions.

Photos:

Photo 1: 20141201_NFRDSIS_DS_P342_View of the access road and DSSC area_Looking SW

Photo 2: 20141201_NFRDSIS_DSSC_343_NF2A and NF2B covered with ice and snow_Looking S

Photo 3: 20141201_NFRDSIS_DSSC_P344_View of the diversion channel and manhole within NF2A_Looking NE

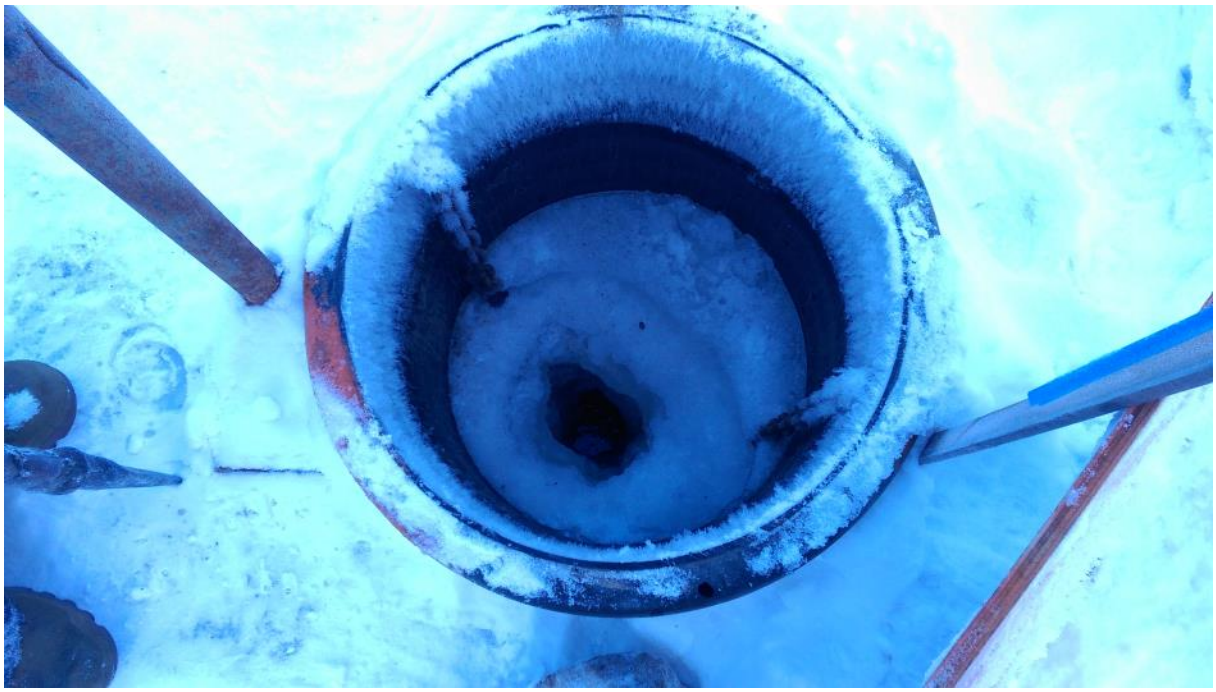

Photo 4: 20141201_NFRDSIS_DSSC_P345_Water observed under the ice cap on the manhole

Photo 5: 20141201_NFRDSIS_DSSC_P346_Water emerging points at rock drain covered with ice and snow_Looking NE

Photo 6: 20141201_NFRDSIS_DSSC_P347_View of NF2A covered with ice and snow_Looking S

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Snowing	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141202	**Record #:**	*20141202_NFRDSIS_DSR_44*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -23.0 °C (Max = -16.6 °C; Min = -29.3 °C)

1. General

#	Description	Comments
1.1	Health and Safety	• The risks associated with the pipeline installation were reviewed during the toolbox meeting. The remedial measured to be implemented to mitigate the risks were also commented. Wildstone laborers signed the H&S documents after the kick-off meeting. Wildstone will update and sign the H&S documentation every morning (after the morning toolbox meeting). • Tees removed some snow from the left (north) hand side of the haul road. This activity was performed as part of the removal of snow at the Faro Mine site. • Contractor started the installation of tents beside the haul road. The Contractor wants to fuse the pipeline sections inside the tents. The Engineer reminded that gas monitors inside the tents will be required to ensure that oxygen levels are the appropriate ones at all times.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	Status/ Observations	Action Required By
20141201_NFRDSIS_DSR_43_1 Pipeline parts delivered to site	The 2 m long 1" XS ERW STL API-5L-B/A53-B pipe is still missing. Contractor to supply a new pipe if the one delivered is found to be missing. Also, Contractor to update on the delivery of the new backup rings and associated bolts and nuts. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, haul road, pipeline installation)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
Wildstone started the installation of tents at the left hand side (north) of the Haul Road. The tents will provide shelter during the fusing of pipeline sections. This activity was not completed before the end of the shift as the Contractor decided to change the location for the fusing operations. Two hours before the end of the shift, Wildstone mobilized the equipment to Bay 11 (refer to Communication 3). Wildstone fused a stub end at the end of a DR 17 pipeline section (including back-up ring).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Kim & Joan. Pipeline parts
	Discussion and Recommendations
	• A visit was organized to observe the pipeline parts delivered to site. The Engineer commented that all the parts were delivered except some backup rings and the associated bolts and nuts. The Contractor informed that they should be delivered to site before the end of the week. In addition, the Engineer informed that the 2 m long 1" XS ERW STL API-

	5L-B/A53-B was missing. The Contractor will have to supply a new pipe if the one previously delivered has been lost. Wildstone checked the parts and commented that they will start the installation of the pipeline with the available parts. • The Engineer requested Wildstone to comment on the adequacy of the air valves delivered to site. Wildstone observed the three boxes that were delivered to site and confirmed that they were the correct ones.	
	Corrective Actions or Improvements	
	• Contractor to confirm if the 2 m long 1" XS ERW STL API-5L-B/A53-B pipe is on the Faro Mine site. If not, the Contractor should order a new one. • Contractor to provide an update on the delivery of the new parts ordered to Northlands.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
ID	**Summary *(time, personnel, work area and description)***	
2	John, Kim & Joan. Pipeline installation	
	Discussion and Recommendations	
	The Engineer and Contractor commented the key elements to be considered during the installation of the pipeline, including: a. Wildstone will fuse pipes until they have pipeline lengths of 80 m. Then, a stub end and a backup ring will be installed for the flanges connection. The Engineer and Contractor commented that a meeting to review the location of air valves and flanged connections should be organized to effectively distribute the elements along the pipeline. b. The thermocable will be installed inside the 80 m long sections of pipeline. The connections between consecutive 80 m long sections will be performed at a second stage by the electrical sub-contractor. The Engineer commented that the thermocable installed inside the 80 m long sections should be tested to confirm that they were properly installed. This could be difficult if the electrical works can't be completed in parallel. Therefore, the team should find a way to test the thermocable if no power is available. c. The fused 80 m long pipeline sections will be mobilized with a truck. No support from Tees is required except for the mobilization of sections to the DS area (downslope from the top of the haul road to the s-wells area). Contractor to comment on the need of an excavation (when and for how long). The Engineer reminded that the pipeline sections should be protected when mobilized to minimize damage to the insulation.	
	Corrective Actions or Improvements	
	• Organize a meeting to comment on the distribution of flanged connections and air valves. • Protect pipes during mobilization to minimize damage to insulation. • Comment on options to test the thermocables installed on the 80 m long sections. • Contractor to comment on the need of Tees's equipment (excavator, dozer and loader).	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

ID	Summary *(time, personnel, work area and description)*	
3	John, Kim & Joan. Pipeline fusing location.	
	Discussion and Recommendations	
	The Engineer observed that the Contractor was mobilizing the heat traced pipes and equipment to the workshop located close to the main gate (Bay 11). The Contractor informed that the use of that building to fuse the pipeline sections was approved by Tees. According to the Contractor, the fusing of pipe sections will be faster (increased productivity) and the laborers will be working on a safer environment (shelter). In addition, explained that the tents that were being installed at the haul road will be disassembled as they will not be used. The Engineer accepted the use of the workshop, but pointed out the following: • The workshop floor is concrete. Contractor to implement the required measures to prevent damage to the pipeline insulation. The Engineer suggested the use of a sacrificial flume or tarp. • The fused 80 m long pipeline sections will have to be pushed outside the workshop (there is no enough space inside the workshop). The Contractor shall ensure that the pipeline sections do not interfere will Tees's activities. • The workshop is located far away from the installation points. Therefore, the pipeline sections would have to be dragged for a longer distance. The mobilization of the pipeline sections shall be performed so as to prevent damage to the insulation. • The use of a front loader from Tees will be required to move pipeline sections to the workshop.	
	Corrective Actions or Improvements	
	The Contractor mobilized all the equipment to the workshop. Some pipeline sections were also mobilized to the workshop by Tees (Front Loader, 2 hours). Then, the Contractor fused a stub end to one of the pipeline sections.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Wildstone arrived to the Faro Mine site at 8:00 am. A kick-off meeting was held at the lunch area to introduce the project, the relevant personnel, comment on the pipeline details, and review the health and safety risks and remedial measures. All Wildstone labourers attended the meeting. John (Pelly) and Joan (BGC) also attended the meeting.
- Contractor will continue fusing pipeline parts at Bay 11 during the following shift.

Photos:

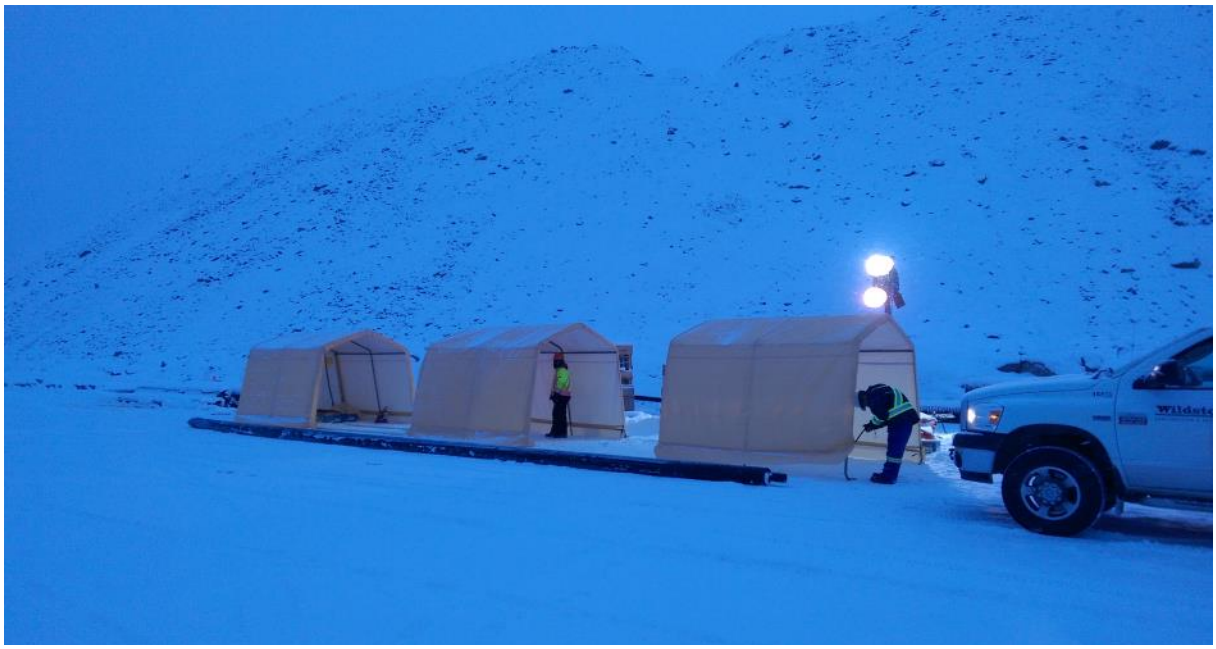

Photo 1: 20141202_NFRDSIS_Pipeline_P348_Tents being installed beside the haul road_Looking N

Photo 2: 20141202_NFRDSIS_Pipeline_P349_Light tower installed to illuminate the working area

Photo 3: 20141202_NFRDSIS_Pipeline_350_Detail of workshop concrete floor

Photo 4: 20141202_NFRDSIS_Pipeline_P351_Front loader mobilizing pipeline sections to workshop

Photo 5: 20141202_NFRDSIS_Pipeline_P352_Contractor dragging a 4" DR17 pipe section by hand

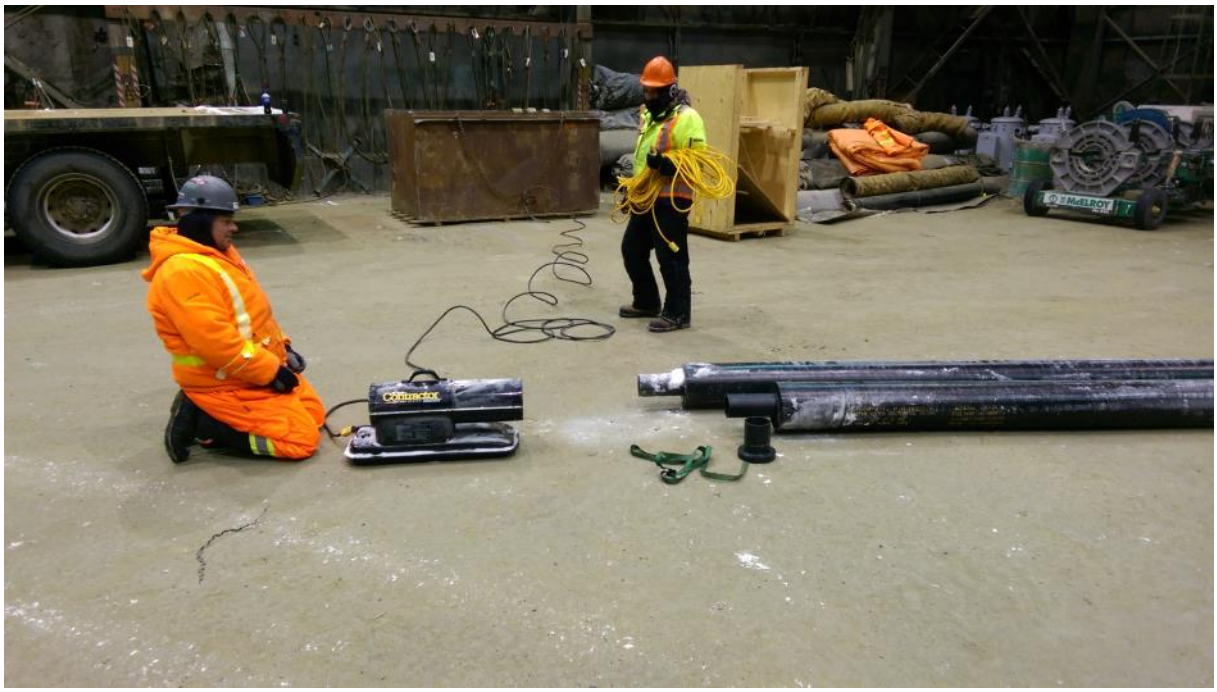

Photo 6: 20141202_NFRDSIS_Pipeline_P353_Contractor warming up the end of a pipe section

Photo 7: 20141202_NFRDSIS_Pipeline_P354_Stub end being fused to the end of a pipeline section

Photo 8: 20141202_NFRDSIS_Pipeline_P355_Stub end fused to the end of a pipe section. Note the backup ring also installed (red)

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Sunny with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141203	**Record #:**	*20141203_NFRDSIS_DSR_45*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -16.5 °C (Max = -14.0 °C; Min = -18.9 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Wildstone updated the HASP so as to include specific measures to mitigate the risks associated to the pipeline installation works. Also, to incorporate the emergency procedures from the Faro Mine site (Tees's emergency plan).
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141201_NFRDSIS_DSR_43_1 Pipeline parts delivered to site	No update. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, haul road, parked at Haul Road, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
The Contractor completed two lengths of DR17 HDPE pipe. Each length is comprised of 5 fused sections of DR17 HDPE pipe (**Photo 4**). Note that each pipe is 15.2 m long, so the total length is 76 m (= 15.2 m x 5 pipes). Then, the Contractor started a new length by installing a backup ring and fusing a stub end. Finally, fused another section of DR17 pipe. At the end of the shift, the Contractor installed a total of 4 backup rings (**Photos 3** and **6**), 4 stub ends (fused to a pipe end), 9 fuses at pipe joints (**Photos 5** and **7**), and the insulation at the 9 pipe joints (**Photos 7, 8, 9** and **10**). Note that the thermocable was also installed at the two completed 76 m long lengths of DR17 HDPE pipe. Tees spend 1 hr mobilizing pipe sections to the workshop entrance (**Photo 1**).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. Pipeline installation
	Discussion and Recommendations
	The Contractor and Engineer commented the distribution of flanged connections and valves along the DR17 and DR11 sections of pipe. It was agreed that the Contractor will fuse pipe sections to a total length of 76 m (= 5 pipes x 15.2 m). Then, flanged connection will be installed (backup ring and stub end). Shorter sections will be prepared (fused) to accommodate the valves along the pipeline. For instance, a 30 m section comprised of 2 fused pipe lengths will probably be required at the DR11 section. Valves locations will slightly be modified to match the pipeline lengths fused by the Contractor. Note that cutting pipes will slow down the production process. The Engineer reminded that the valves could be slightly moved if they are located on a higher point to release the air accumulated. • For the DR17 pipeline sections, the pipes will be fused at the workshop Bay 11. Then, the Contractor will drag them to its installation position with a truck. • For the DR11 pipeline sections along the DSAR, the pipes will be fused at the workshop Bay 11. Then, the Contractor will drag them to its installation position at the DS area with a truck. This activity will be performed during a period of low traffic (likely on the weekend).

	• For the DR11 pipeline sections downslope (from the top of the haul road to the S-Wells area), the pipes will be fused at the workshop Bay 11. Then, the Contractor will drag them to the Haul Road crossing. A flume will be then installed on top of the rockfill to prevent the damage of the pipes. Then, the Contractor will slide the pipeline sections downslope and anchored. The connections of the thermocables at flanged connections shall be performed before the pipe is placed on the slope. The Engineer commented that this activity should be planned. The risks should be identified and the measures to mitigate them should be implemented. The Engineer reminded that the mobilization of pipeline sections should be performed on a controlled manner to minimize damage to the insulation. The insulation on pipes should be observed to ensure that pipes are dragged in the appropriate direction (not against the insulation overlap).	
	Corrective Actions or Improvements	
	Contractor to comment on the installation of pipeline sections on the slope.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
ID	**Summary *(time, personnel, work area and description)***	
2	John, Joan. Pipeline connection at C-Can	
	Discussion and Recommendations	
	The Engineer and Contractor commented the requirements for the connection of the pipeline at the C-Can. A flanged end with a backup ring shall be installed. The pipeline will be connected to an elbow located outside the C-Can (at the northern side). The Contractor and Engineer pointed out that the elbow on the C-Can was facing the wrong direction. The outlet should be facing the W (9 o'clock) instead of the E (3 o'clock). Also, that the elbow was 3" and the pipeline 4".	
	Corrective Actions or Improvements	
	The Engineer contacted Precision by phone and email to comment on the elbow issues. Precision commented that the issues identified could be easily solved. Precision modified the elbow orientation and diameter.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will continue fusing pipes at the workshop Bay 11.

Photos:

Photo 1: 20141203_NFRDSIS_Pipeline_P356_DR 17 pipe sections piled at the entrance to the workshop. Note the completed 76 m long pipeline section being dragged by a truck

Photo 2: 20141203_NFRDSIS_Pipeline_P357_Truck dragging a 76 m long pipeline section

Photo 3: 20141203_NFRDSIS_Pipeline_358_Pipe dragged with a truck

Photo 4: 20141203_NFRDSIS_Pipeline_P359_76 m long pipeline section outside the workshop.

Photo 5: 20141203_NFRDSIS_Pipeline_P360_Overview of working area. Note pipeline sections being warmed up and pipe joint recently completed

Photo 6: 20141203_NFRDSIS_Pipeline_P361_Detail of stub end, backup ring and thermocable at flanged connection

Photo 7: 20141203_NFRDSIS_Pipeline_P362_Pipeline joint and insulation to be installed

Photo 8: 20141203_NFRDSIS_Pipeline_P363_Contractor installing insulation on pipeline joint

Photo 9: 20141203_NFRDSIS_Pipeline_P364_Contractor installing protection for the insulation at pipeline joint

Photo 10: 20141203_NFRDSIS_Pipeline_P365_View of completed insulation at pipeline joints

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:20 pm
Project #:	0533-010-06	**Weather:**	Sunny	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141204	**Record #:**	*20141204_NFRDSIS_DSR_46*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -21.0 °C (Max = -15.5 °C; Min = -26.5 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141201_NFRDSIS_DSR_43_1 Pipeline parts delivered to site	No update. **OPEN**	Contractor
20141203_NFRDSIS_DSR_45_1 Pipeline on slopping ground	The Contractor explained the procedure to the Engineer. See Communication 1. **CLOSED**	N/A

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, haul road, parked at Haul Road, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)

No activity.

Downstream Seepage Collection (DSSC)

The Engineer visited DS area to observe the emerging points and channels within NF2A. Ice and snow covering the area was observed, including on top of the channels (**Photos 7, 8** and **9**). Some holes in the ice were also observed. The holes observed were executed by Tees with an ice auger to collect water samples (**Photos 11** and **15**). The Engineer noted the following:

1. An ice cap was observed inside the manhole. Water was observed under the ice through a hole executed on the ice cap. The water level was at a lower elevation than it was when the manhole was installed.
2. The emerging point NFRC-DIVW was covered with ice and snow. No hole in the ice was observed. The Engineer created a hole on the ice with a rock hammer (**Photo 10**). No water could be observed on the whole executed at the marked emerging point. More exploratory holes are required to confirm the presence of water flowing under the ice at the diversion channel.
3. The NFRC-SBP point was covered with ice and snow. A hole in the ice was observed (**Photo 15**). Water under the ice was observed (**Photo 16**). It was unclear if the water under the ice was ponded or if it was moving very slowly.
4. The emerging points NF2A-1, NF2A-2 and NF2A-3 were covered with snow and ice (**Photos 12, 13** and **14**). A single hole in the ice located about 1 m downstream to point NF2A-2 was observed (**Photo 11**). Water flowing under the ice was observed through the hole. The Engineer tried to break the ice at the emerging points with a rock hammer but the ice was too thick. The activity was postponed as there was not enough time.
5. The ice at NF2A sampling point was broken (**Photo 18**). Static water under the ice was observed. A second thick layer of ice was observed under the static water (about 20 cm under the superficial ice layer). It was unclear if there was water under the second layer of ice as it was not broken or perforated. The Engineer did not break the second layer of ice as it was too thick and the conditions were not safe.
6. The superficial layer ice at NF2 sampling point was broken (**Photos 17** and **19**). A second layer of ice was observed under the first one (**Photo 19**). No water was present in between the two layers of ice. Water flowing under the second layer of ice was observed.

The Engineer postponed the exploration activities at the DSSC area. A second person was required

for safety (activities on frozen water) and the ice was too thick to execute exploratory holes by hand.
Pipeline (PL)
The Contractor completed the 76 m long DR17 HDPE pipeline length started on the previous shift. Then, completed two more DR17 HDPE pipeline lengths (76 m long each), including the associated stub ends, backup rings, thermocable and insolation at joints. Afterwards, started a DR11 HDPE pipeline length. The fusing of DR11 HDPE pipes (5 sections, 15.2 m long each) and the associated stub ends and backup rings were completed. The installation of the thermocable and insulations at joints along the DR11 length was not completed by the end of the shift (**Photo 5**). The Engineer noted that the Contractor increased the productivity during the shift. A tot of 7 backup rings, 7 stub ends (fused to a pipe end), 15 fuses at pipe joints, and the insulation at 12 pipe joints were installed by the Contractor. Note that thermocable was also installed at the 3 new DR17 HDPE pipeline lengths. The Engineer and Contractor marked the approximate location for the connection between the C-Can and the DR11 HDPE heat traced pipeline. Tees spend 1 hr mobilizing pipe sections to the workshop entrance.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Joan. Pipeline installation downslope.	
	Discussion and Recommendations	
	The Contractor explained that sections of flume will be connected (bolted) and then installed at the slope. The installation will be performed with an excavator (Tees) to hold the flume sections. Then, the Contractor will anchor the flume with steel cable. The Contractor mobilized to site some ¼" steel cable. The cable will be anchored to the existing steel poles at the top of the slope. The fused pipeline sections will be slide downhill. They will be secured with a truck. It is important to note that the pipeline will be first placed into the steel culverts (road crossing). The Contractor wants to place the pipeline inside first to ensure that there won't be geometric problems caused by the banding radius of the pipeline. In addition, the Contractor confirmed that the DR11 HDPE pipeline sections will be dragged to the DS area. Then, they will be installed at the final position and bolted. The Engineer reminded that the mobilization of pipes shall be performed on a controlled manner so as to minimize the damage to the insulation.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
ID	**Summary *(time, personnel, work area and description)***	
2	John, Joan. Pipeline connection at C-Can.	

	Discussion and Recommendations	
	The Engineer and Contractor visited the DSSC area to mark the location were the DR11 HDPE pipeline finishes. According to the information available from Precision (Drawing FRNF-XD-02-011, Sheet 2 of 4), the pipeline will be connected to an elbow that will be at 1.95 m from the manhole center.	
	Corrective Actions or Improvements	
	The Engineer and Contractor marked the distance on the ground (**Photo 7**)	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
ID	**Summary *(time, personnel, work area and description)***	
3	John, Joan. Pipeline crossing with existing heat traced line (S-Wells area).	
	Discussion and Recommendations	
	The Engineer and Contractor visited the S-Wells area to observe the configuration of the existing heat traced line to the Faro pit. The pipeline from the DSSC C-Can will arrive from the right hand side (East) and has to go on the left hand side (West). The reason is that, once it is on the top of the haul road, the plan is to install the new heat traced pipeline at the left hand side (West) of the existing one. Three options were commented: 1. Installing the new pipeline at the right hand side (East) along the slope. Then, crossing the existing pipeline before entering the culverts (at Haul Road crossing). This option was discarded as there is limited space from the top of the slope to the culverts. Also, the big bend radius of the pipes could create problems. 2. Crossing under the existing pipeline close to the S-Wells C-Can (far away from the slope toe). The existing pipeline is raised from the floor with wooden pedestals. This option was discarded as the change in direction that will be required once the new pipeline crosses the existing one is too tight. The use of transition elbows will likely be required slowing down the process. 3. Create a gentle bend on the pipe on top of the rock drain (S-Wells) and cross under the existing pipeline very close to the toe of the slope. Then, continue uphill. Note that the existing pipeline was also lifted from the ground with wooden pedestals. The Contractor and Engineer commented that option 3 was the option presenting lower risk.	
	Corrective Actions or Improvements	
	Contractor to cross the existing pipeline as per option 3.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will continue fusing DR11 pipes at the workshop (Bays 7 and 11). Also, they plan to start preparing the flume that will be placed downslope to protect the pipeline. If possible, some completed pipeline sections will be mobilized to its definitive location. There should be reduced traffic as some Tees' personnel will not be on site.

Photos:

Photo 1: 20141204_NFRDSIS_Pipeline_P366_Completed DR 17 pipeline sections (76 m long) at Bay 7

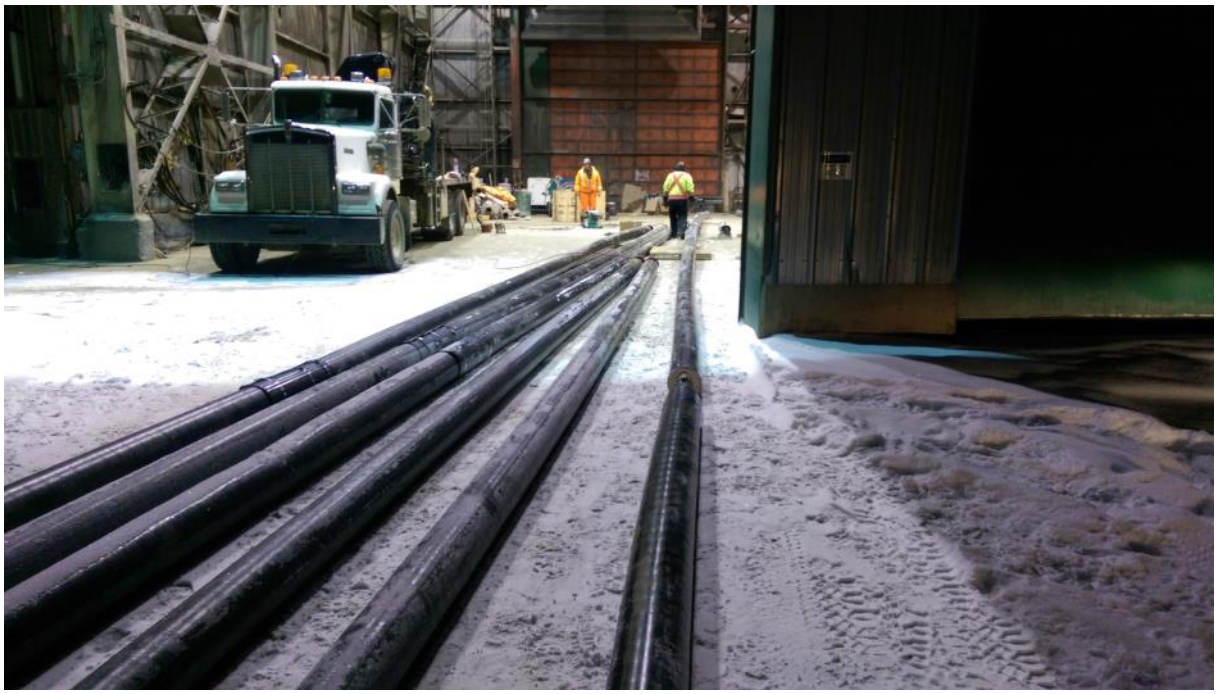

Photo 2: 20141204_NFRDSIS_Pipeline_P367_Completed pipeline sections at Bay 7 (end of the shift)

Photo 3: 20141204_NFRDSIS_Pipeline_368_New air heater installed to keep pipe ends warm

Photo 4: 20141204_NFRDSIS_Pipeline_P369_Contractor moving a pipe into the workshop Bay 11

Photo 5: 20141204_NFRDSIS_Pipeline_P370_Detail of fused DR11 4“ HPDE pipes

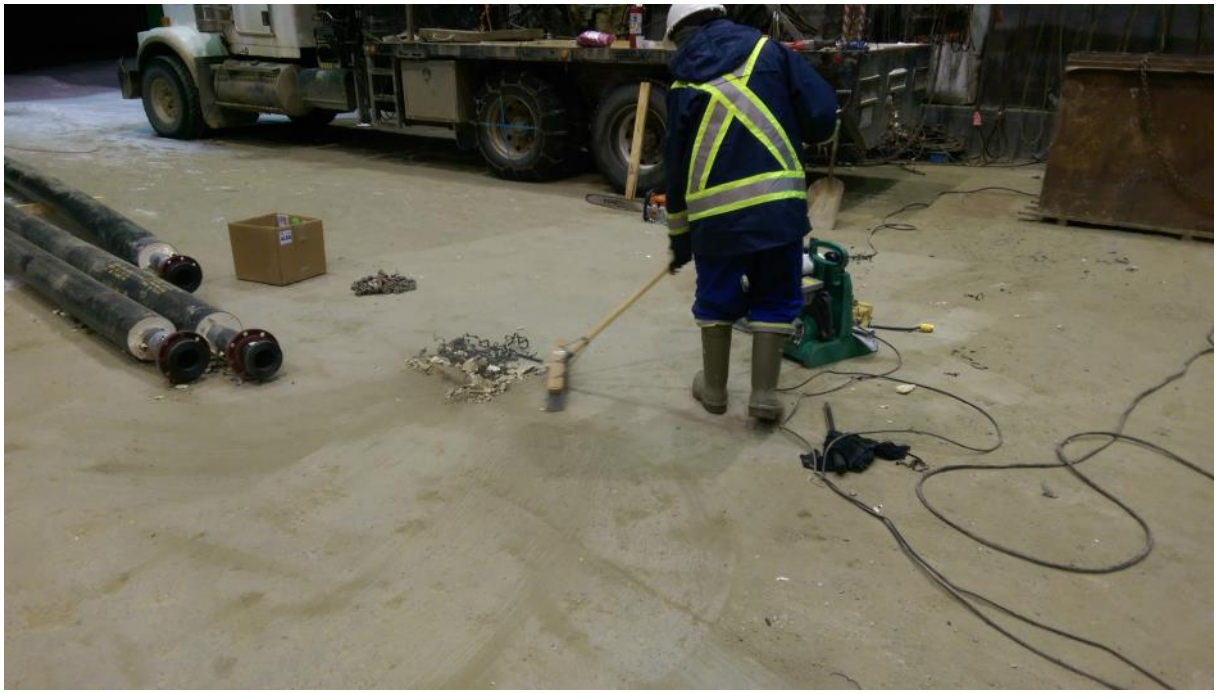

Photo 6: 20141204_NFRDSIS_Pipeline_P371_Contractor cleaning the working space at Bay 7

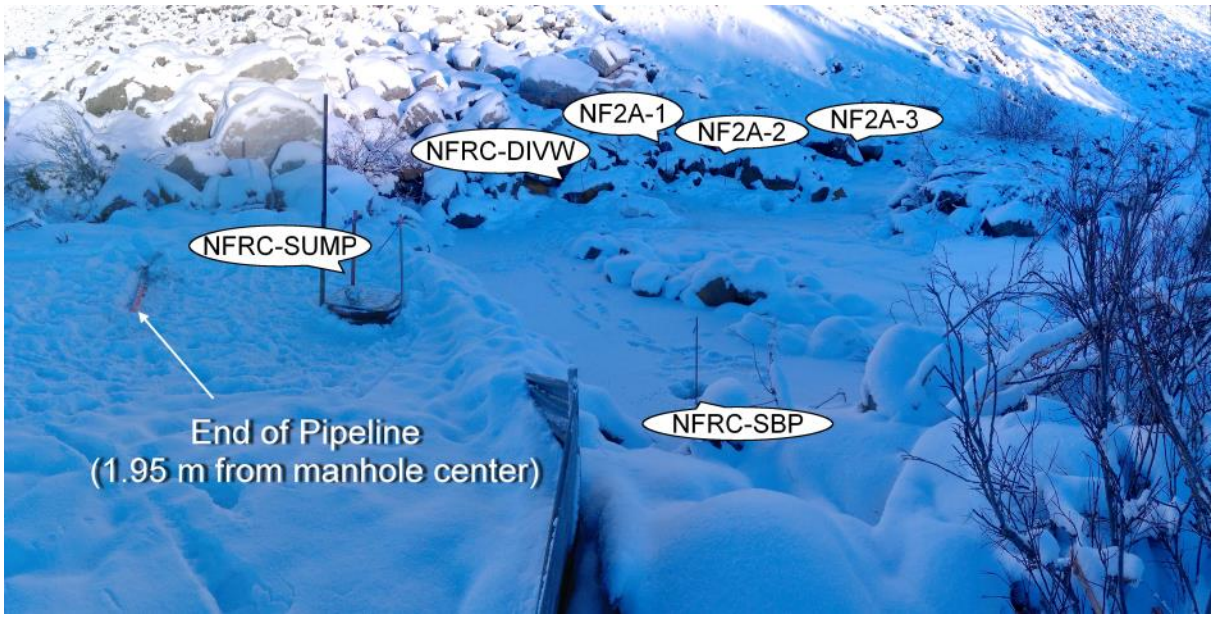

Photo 7: 20141204_NFRDSIS_Pipeline_P372_ Mark showing the end of pipeline at C-Can_Looking NE

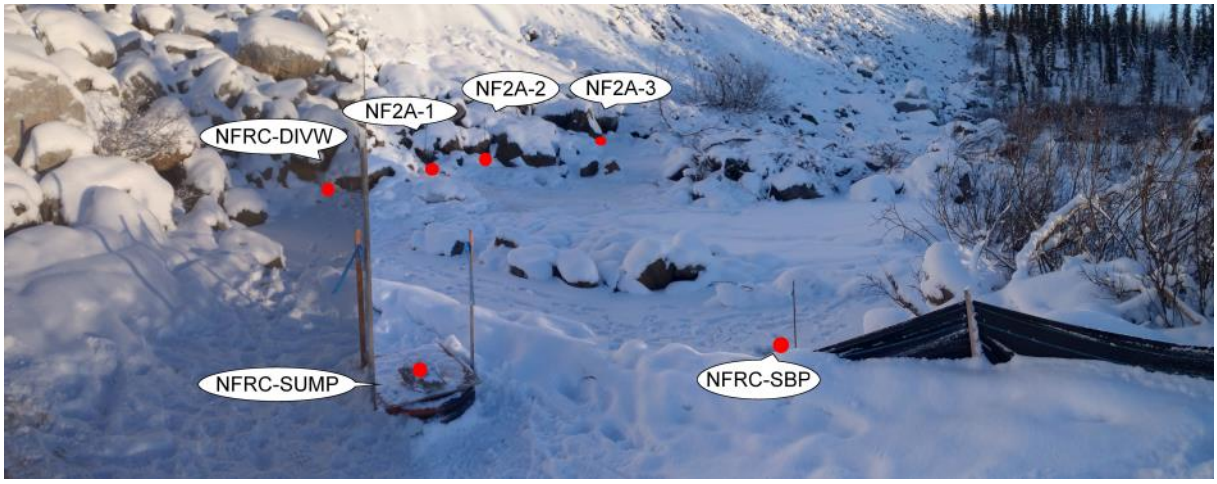

Photo 8: 20141204_NFRDSIS_DSSC_P373_DSSC covered with ice and snow_Looking E

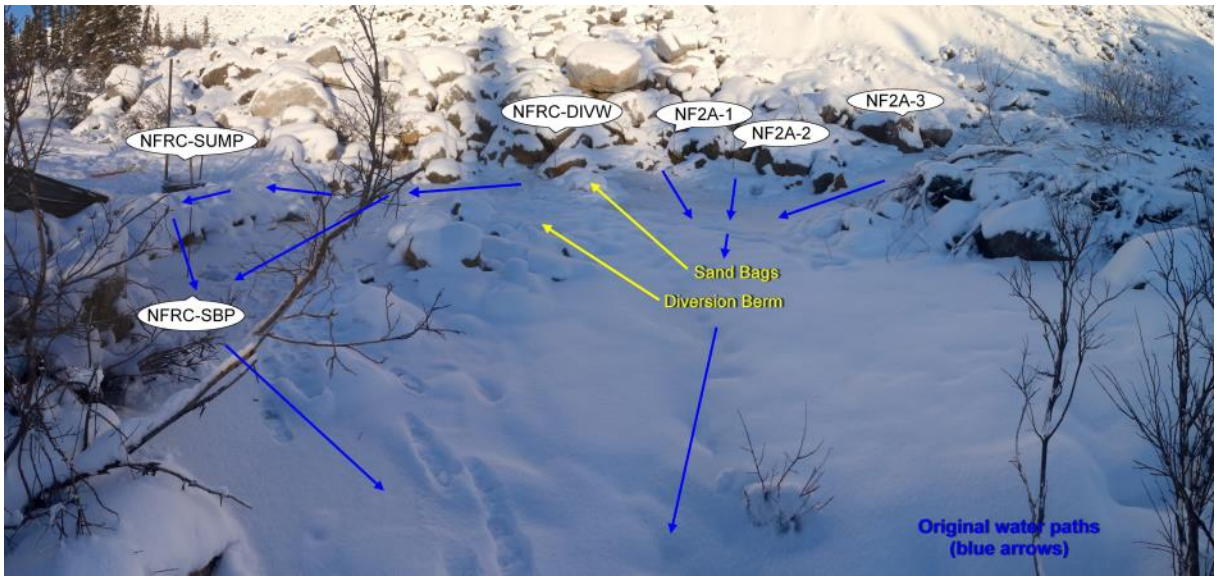

Photo 9: 20141204_NFRDSIS_DSSC_P374_DSSC area covered with ice and snow_ Looking N

Photo 10: 20141204_NFRDSIS_DSSC_P375_NFRC-DIVW point covered with ice_Looking NE

Photo 11: 20141204_NFRDSIS_DSSC_P376_Emerging points covered with ice_Looking NE

Photo 12: 20141204_NFRDSIS_DSSC_P377_NF2A-1 Sampling Point covered with ice_Looking NE

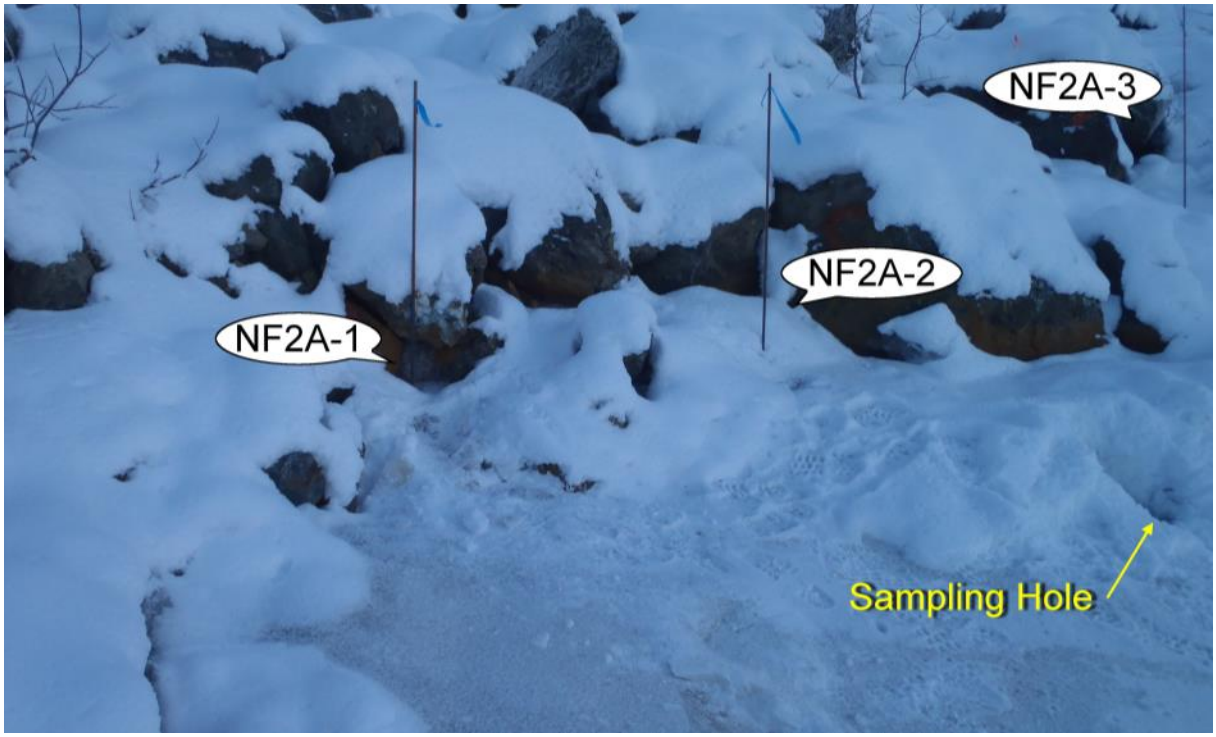

Photo 13: 20141204_NFRDSIS_DSSC_P378_NF2A-1 and NF2A-2 sampling point covered with ice_Looking NE

Photo 14: 20141204_NFRDSIS_DSSC_P379_NF2A-3 sampling point covered with ice_Looking NE

Photo 15: 20141204_NFRDSIS_DSSC_P380_NFRC-SBP sampling point covered with ice_Looking N

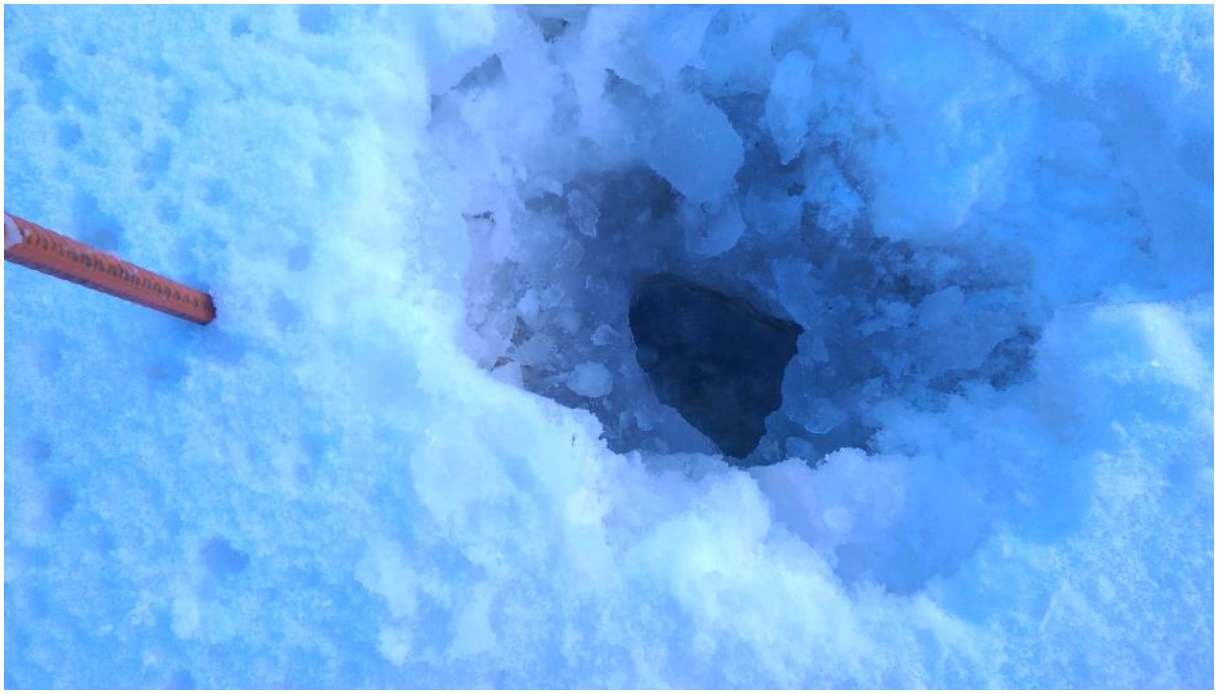

Photo 16: 20141204_NFRDSIS_DSSC_P381_Water observed under the ice at NFRC-SBP

Photo 17: 20141204_NFRDSIS_NF2_P382_Sampling points NF2 and NF2A_Looking NE

Photo 18: 20141204_NFRDSIS_NF2A_P383_View of the superficial layer ice layer browken_Looking E

Photo 19: 20141204_NFRDSIS_NF2_P384_View of the two layers of ice observed_Looking E

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Sunny	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141205	**Record #:**	*20141205_NFRDSIS_DSR_47*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -26.6 °C (Max = -24.6 °C; Min = -28.6 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141201_NFRDSIS_DSR_43_1 Pipeline parts delivered to site	A new 2 m long 1" XS ERW STL API-5L-B/A53- B pipe steel pipe has been purchased. It will be delivered next week. The delivery of the new parts is expected during the weekend. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop
Kyle Cresswell (Wildstone), Workshop
Jordan Charlie (Wildstone), Workshop
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, haul road, parked at Haul Road, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)

No activity.

Downstream Seepage Collection (DSSC)

The Engineer visited the DSSC area with an ice auger and a steel bar so as to perforate some exploration holes. As commented on the previous shift report (20141204_NFRDSIS_DSR_46), ice and snow covering the area was observed, including on top of the channels. Four (4) holes were executed through the ice to see if there was water flowing underneath. In addition, two of the existing wholes had to be reopened with the steel bar. The Engineer noted the following:

1. The sampling hole at NFRC-SBP was reopened with the steel bar. Water was observed under the ice but it was not moving.
2. A hole in the diversion channel, upstream to the manhole location, was executed with the steel bar (**Photo 10**). The hole was located approximately 2 m DS to NFRC-DIVW. Water was observed under the ice but it was not moving (**Photo 9**). A 0.4 m thick layer of ice was observed, underlain by 10 cm of water. There was a gap (6 cm) in between the water and the bottom of the ice.
3. There was an ice plug at NFRC-DIVW. Frozen water was observed at a higher elevation. This could indicate that water emerged at a higher point when the ice plug was formed ("overflow").
4. Thin layers of ice underlain with snow were observed on top of the thick crust of ice within the diversion channel (**Photo 10**). This could indicate that water was running on top of the ice crust at some stage. This water could be the one overflowing at NFRC-DIVW due to the formation of the ice plug. Note that similar thin layers of ice were observed in front of NF2A-1, NF2A-2 and NF2A-3 (**Photos 7** and **11**). A gap in between the layers of ice was also observed.
5. A hole in front of NF2A-1 was executed with the steel bar. It was located approximately 2 m DS to NF2A-1 (**Photo 7**). No water was observed under the ice (**Photo 8**). A 0.42 m thick layer of ice was observed. There was a gap (18 cm) in between the rocks and the bottom of the ice.
6. The sampling hole in front of NF2A-2 was opened with the steel bar. Water was flowing under the ice at this location. No measurement of the flow was possible during the visit. This hole was located at 1.6 m DS to NF2A-2 and 1.65 m from the hole executed in front of NF2A-1 (**Photo 7**).
7. A hole in front of NF2A-3 was executed with the steel bar. The hole was located approximately 2.5 m DS to NF2A-3. There point was frozen down to the bottom rock. No water was observed.
8. A hole was drilled with and ice auger within 1 m from NF2A collection point. Water flowing

under the thick layer of ice was observed (**Photo 6**). No measurement of the flow was performed. It is important to note that a gap in between ice layers was observed. Water trapped on the gap was also observed. The water trapped started to drain into the hole (very slow, no high flow). The engineer measured a 9 cm thick layer of ice underlain by a 21 cm thick layer of ice. In between the two ice layers, a 10 cm gap with static water was observed. The presence of this gap could be related to overflows caused by ice plugs at the emerging points (refer to bullet point 4 above).

The execution of a pumping test at the DSSC was postponed until the following day shift.

Pipeline (PL)

The Contractor completed the insulation of the joints along the 76 m long DR11 HDPE (DR11) pipeline length started on the previous shift. The thermocable was also installed along the pipeline section. Then, completed the fusing of four more DR11 pipeline lengths (76 m long each), including the associated stub ends, and backup rings (**Photo 1**). Thermocable was installed on three of the pipeline lengths. Insolation at joints was installed at one of the pipeline lengths. In addition, a stub end and ring were installed at a DR17 HDPE (D17) pipe (15.2 m long). At the end of the shift, the Contractor was starting a new DR11 length, by fusing three pipe sections (**Photo 2**).

The Contractor also tied the completed DR17 lengths in groups of 4 to facilitate its mobilization (**Photo 3**). A sacrificial pipe was installed under the group of pipes to prevent damage to the pipes during mobilization (**Photo 4**).

At the Haul Road crossing, the Contractor bolted the flume sections that will be installed downslope (**Photo 5**). The flume will be installed on top of the rock fill to protect the pipeline.

The Engineer noted that the Contractor increased the productivity during the shift. A total of 9 backup rings and stub ends (fused to a pipe end), 18 fuses at pipe joints, and the insulation at 8 pipe joints were installed by the Contractor. Note that thermocable was also installed at 3 DR11 pipeline lengths.

Tees spend 2 hrs mobilizing pipe sections to the workshop entrance. All the pipes were at the workshop area by the end of the shift. No more pipes are piled at the Haul Road.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	Dan, Joan. Delivery of pipeline parts.
	Discussion and Recommendations
	• The Contractor informed that a new 1" XS ERW STL API-5L-B/A53-B pipe was purchased. The new part will be delivered to site as soon as possible. • The Contractor informed that Northlands was still waiting for the supply of the backup rings. According to Northlands, the parts will arrive before the end of the day or during the following day. If so, they will be arriving to Whitehorse over weekend. The Contractor also, commented that no delay will be caused to the site activities as there are other activities that can be performed in the meantime

	Corrective Actions or Improvements	
	Contractor to update on the delivery of the new pipeline parts.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will continue fusing DR11 and DR17 pipes at the workshop (Bays 7 and 11). Also, they plan to install the flume on the slope from the top of the Haul Road to the S-Wells area. If possible, some completed pipeline sections will be mobilized to its definitive location. There should be reduced traffic as some Tees' personnel will not be on site.
- On the next shift, the Engineer and Contractor will execute a pump test with a 2" pump at the DSSC area.

Photos:

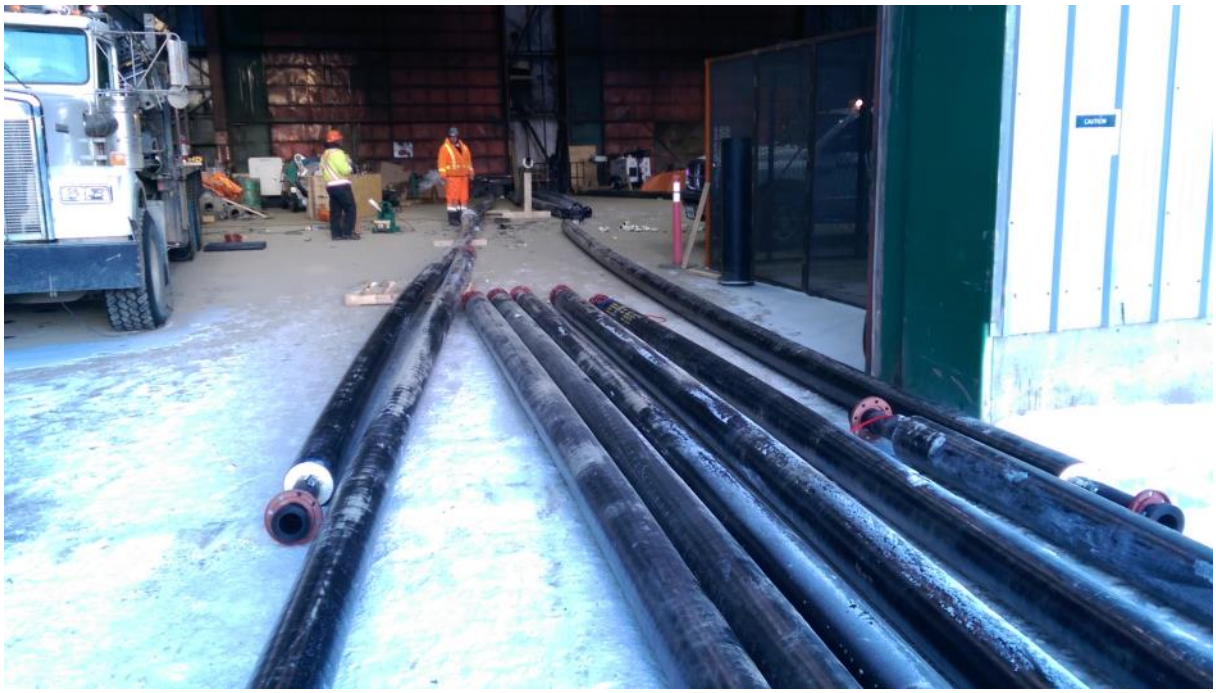

Photo 1: 20141205_NFRDSIS_Pipeline_P385_Completed DR17 and DR11 pipeline sections at Bay 7

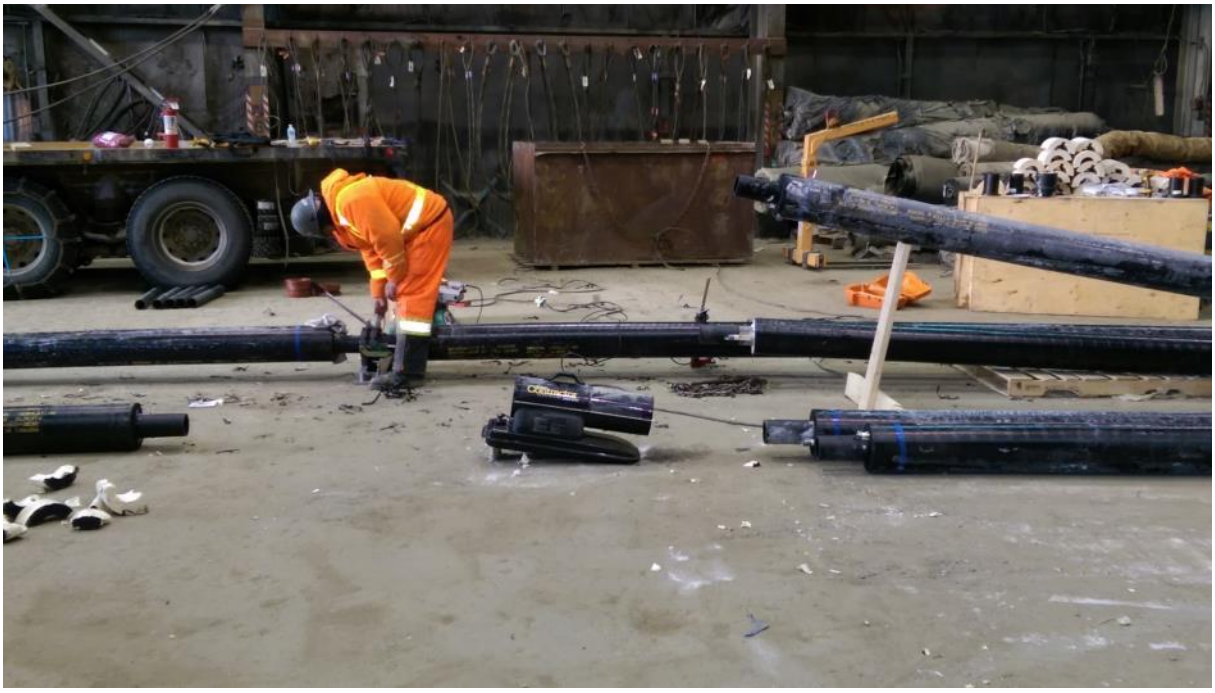

Photo 2: 20141205_NFRDSIS_Pipeline_P386_Contractor fusing DR11 HDPE pipes at Bay 7

Photo 3: 20141205_NFRDSIS_Pipeline_387_Pipeline sections tied together to facilitate mobilization

Photo 4: 20141205_NFRDSIS_Pipeline_P388_Sacrificial protection pipe placed under 4 pipe sections

Photo 5: 20141205_NFRDSIS_Pipeline_P389_Flume sections that will be installed downslope

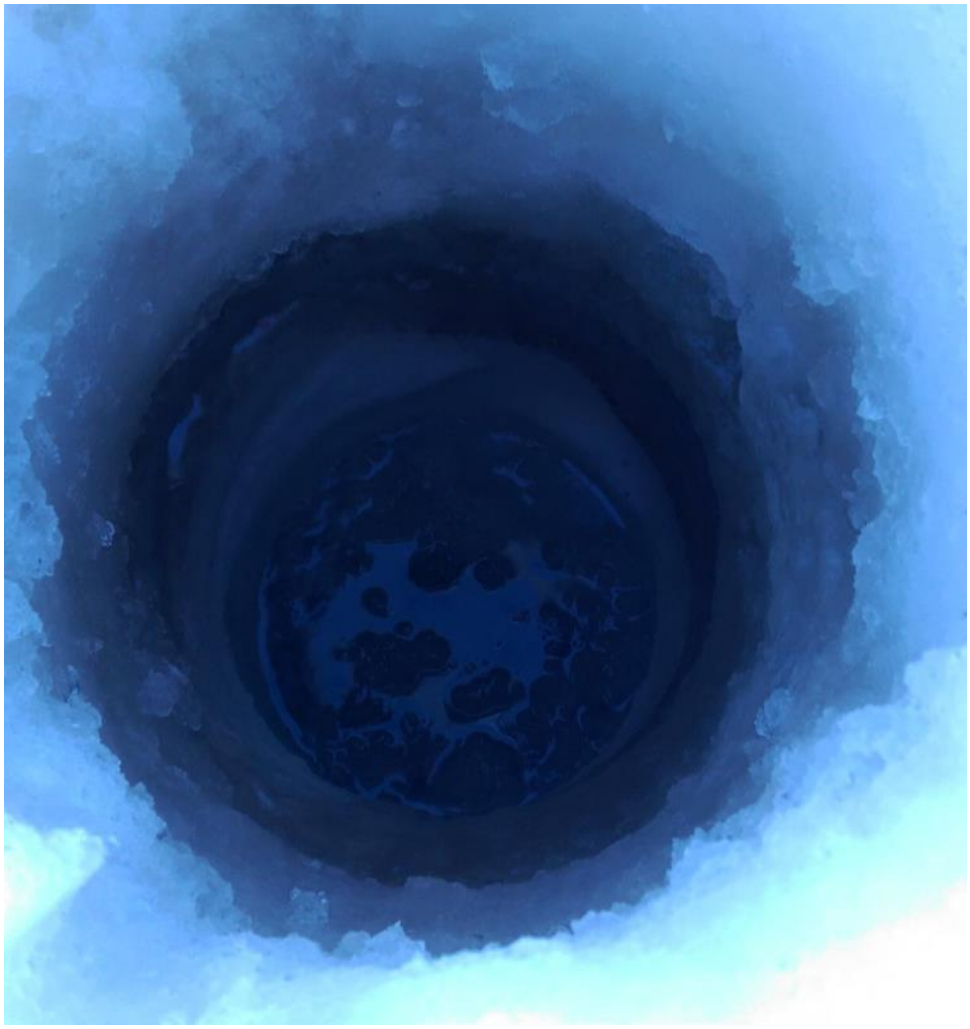

Photo 6: 20141205_NFRDSIS_NF2A_P390_Water observed under the ice. Hole drilled with ice auger

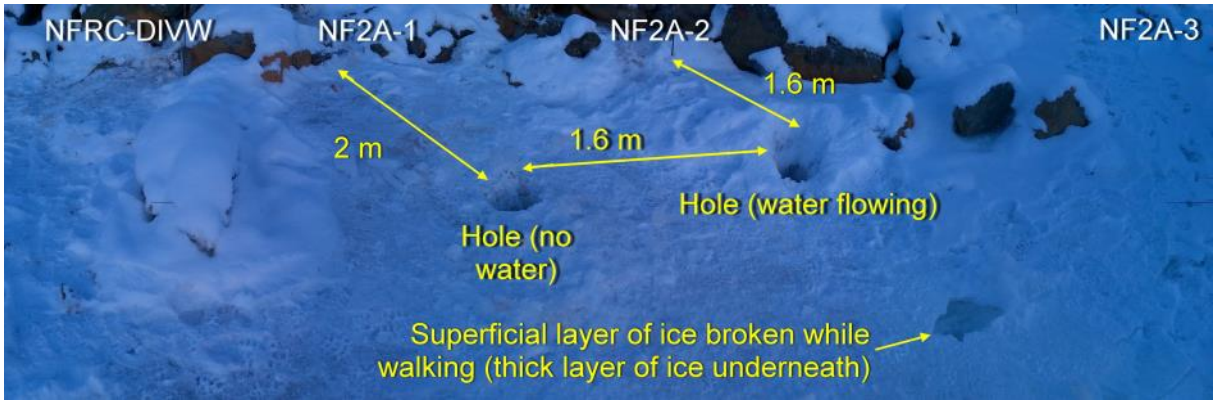

Photo 7: 20141205_NFRDSIS_DSSC_P391_Exploratory holes executed with a steel bar_Looking N

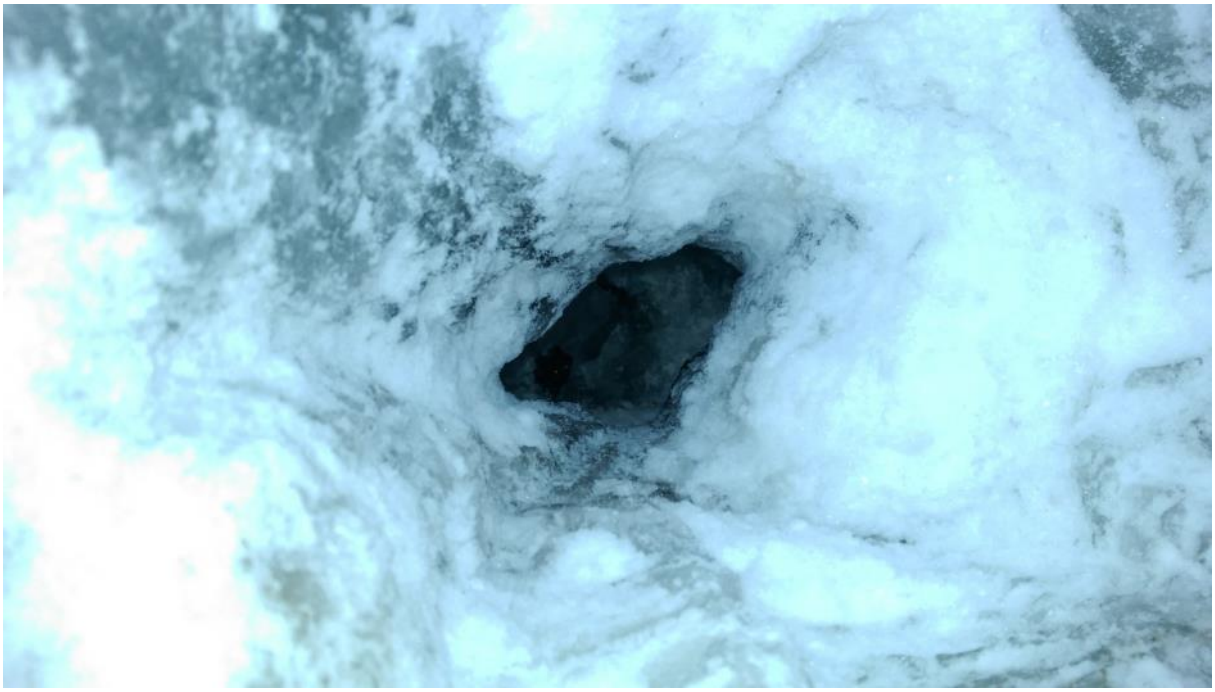

Photo 8: 20141205_NFRDSIS_DSSC_P392_No water observed under the ice at 2 m DS from NF2A-1

Photo 9: 20141205_NFRDSIS_DSSC_P393_Statc water observed under the ice at diversion channel

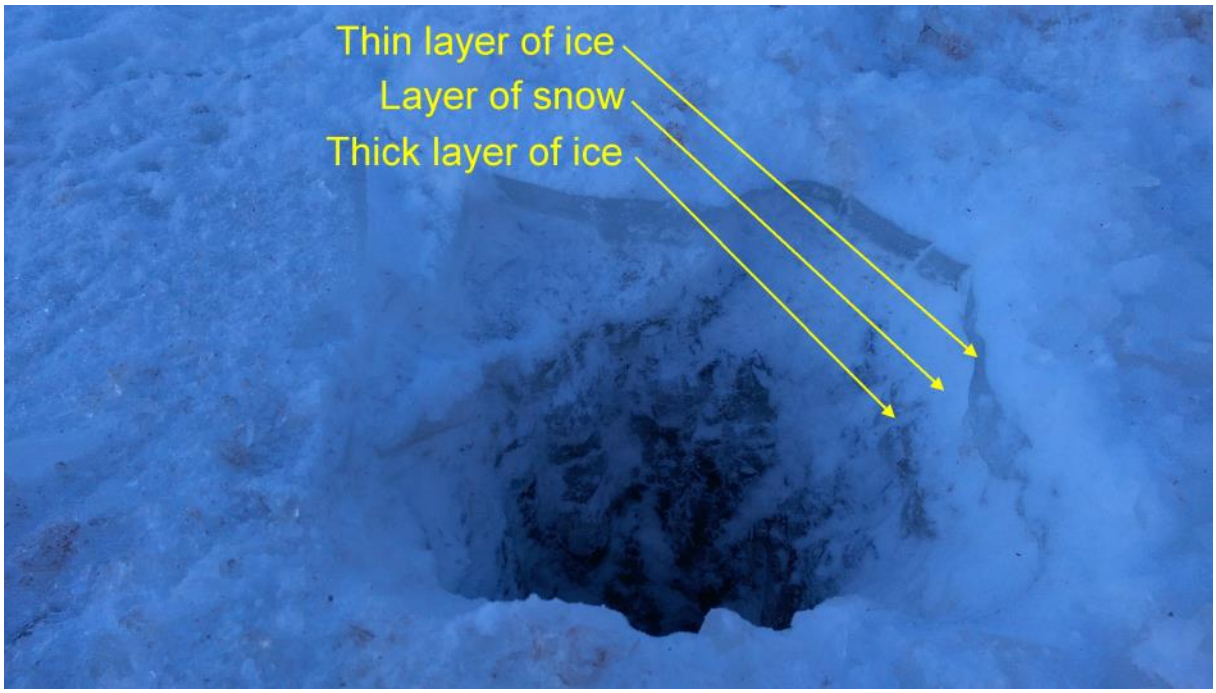

Photo 10: 20141205_NFRDSIS_DSSC_P394_Snow in between ice layers at the diversion channel

Photo 11: 20141205_NFRDSIS_DSSC_P395_Thin layers of ice on top of the thick ice crust in front of NF2A-2. Note the gap in between layers of ice.

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Cloudy. Light snow after 1:30 pm	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141206	**Record #:**	*20141206_NFRDSIS_DSR_48*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -19.5 °C (Max = -14.1 °C; Min = -24.8 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The risks associated to the installation of the flume on the slope were discussed. The flume was anchored to a front loader with a chain. In addition, the flume was secured to an excavator with a cable. All personnel involved on the installation of the flume were equipped with a radio to report problems (if any). No issues were recorded during installation.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141205_NFRDSIS_DSR_47_1 Pipeline parts delivered to site	No update. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop
Jordan Charlie (Wildstone), Workshop
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, pipeline)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)

Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, BA, loading equipment parts to a haul truck)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
The Contractor completed the insulation of the joints along the three 76 m long DR11 HDPE (DR11) pipeline lengths started on the previous shift. The thermocable was also installed along the pipeline sections. Then, completed the fusing of four 4" DR17 HDPE (DR17) pipeline lengths (76 m long each), including the associated stub ends, and backup rings. Thermocable was installed on one of the pipeline lengths. Insolation at joints was installed at some of the joints. The Engineer noted that the Contractor maintained similar productivity rates during the shift. A total of 8 backup rings and stub ends (fused to a pipe end), 16 fuses at pipe joints, and the insulation at 10 pipe joints were installed by the Contractor. Note that thermocable was also installed at 4 pipeline lengths. At the Haul Road crossing, the Contractor mobilized the flume to the edge of the slope to the S-Wells area. Then, started the installation of the flume at the right hand side of the existing pipeline. The flume was being installed on top of the rock fill. This activity could not be completed before the end of the shift. Tees mobilized an excavator and two operators to assist with the installation of the flume (a total of 3 hours).

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	Joan, John. Flume installation. Haul Road
	Discussion and Recommendations
	The Contractor informed that the flume will be installed from the top of Haul Road to S-Wells area. The Engineer and Contractor commented that the following: • The flume sections shall be secured to prevent them from sliding downhill. The Contractor will secure the flume to a front loader with a chain at the upstream end of the flume. Also, an excavator will be securing the flume right at the top of the slope. • The flume should be lifted very close to the edge of the slope with the excavator to prevent damage to the existing junction box (existing heat traced pipeline).

	• Radios will be distributed to all personnel to ensure they can communicate any issues. Contractor will not continue moving the flume if the word "STOP" is used on the radio. • Once installed, the flume will be anchored with steel cables to the two poles located on top of the slope.	
	Corrective Actions or Improvements	
	The installation of the flume was not completed before the end of the shift. The installation will be completed during the next shift.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
ID	**Summary *(time, personnel, work area and description)***	
2	Joan, Kim. Fusing of pipeline sections	
	Discussion and Recommendations	
	The Engineer observed that the Contractor was fusing pipe sections at Bay 7. The Engineer reminded to Contractor that some shorter lengths of DR17 HDPE pipeline were required. Therefore, not all the pipes should be fused to create 76 m long sections. Also, explained that the reason was the presence of valves along the pipeline.	
	Corrective Actions or Improvements	
	Contractor to create shorter lengths of pipeline to accommodate the valves to be installed.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will continue fusing DR17 pipes at the workshop (Bays 7 and 11). Also, they plan to drag some completed pipeline sections to the haul road. There should be reduced traffic as some Tees' personnel will not be on site.
- The Contractor commented that they will continue with the installation of the flume on the slope from the top of the Haul Road to the S-Wells area.
- On the next shift, the Engineer and Contractor will execute a pump test with a 2" pump at the DSSC area.
- Pelly demobilized some parts from site. A haul truck was loaded with tires, a front loader bucket, and a section of the CAT 365 excavator and its bucket.

Photos:

Photo 1: 20141206_NFRDSIS_Pipeline_P396_Flume and DR17 pipeline lengths mobilized to haul road

Photo 2: 20141206_NFRDSIS_Pipeline_P397_Detail of bolted connection of two flume lengths

Photo 3: 20141206_NFRDSIS_Pipeline_398_Excavator holding the flume to protect the existing junction box_Looking N

Photo 4: 20141206_NFRDSIS_Pipeline_399_Flume being installed at the right hand side of the existing pipeline_Looking S

Photo 5: 20141206_NFRDSIS_Pipeline_P400_Removal of imperfections at pipe ends before fusing

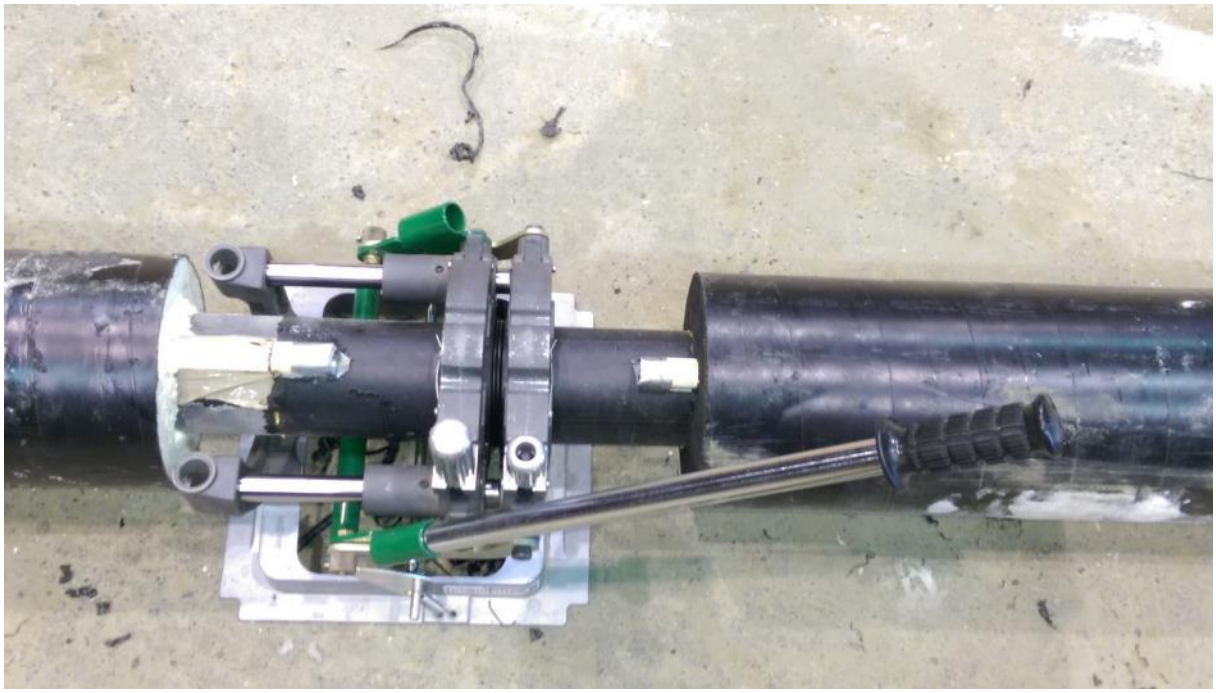

Photo 6: 20141206_NFRDSIS_Pipeline_P401_Fusing of two 4” DR17 HDPE pipes

Photo 7: 20141206_NFRDSIS_Pipeline_P402_Contractor installing insulation at a fused joint

Photo 8: 20141206_NFRDSIS_Pipeline_P403_Thermocable wrapped and protected at a pipe end

Photo 9: 20141206_NFRDSIS_Pipeline_P404_Pipeline lengths (76 m long) being completed

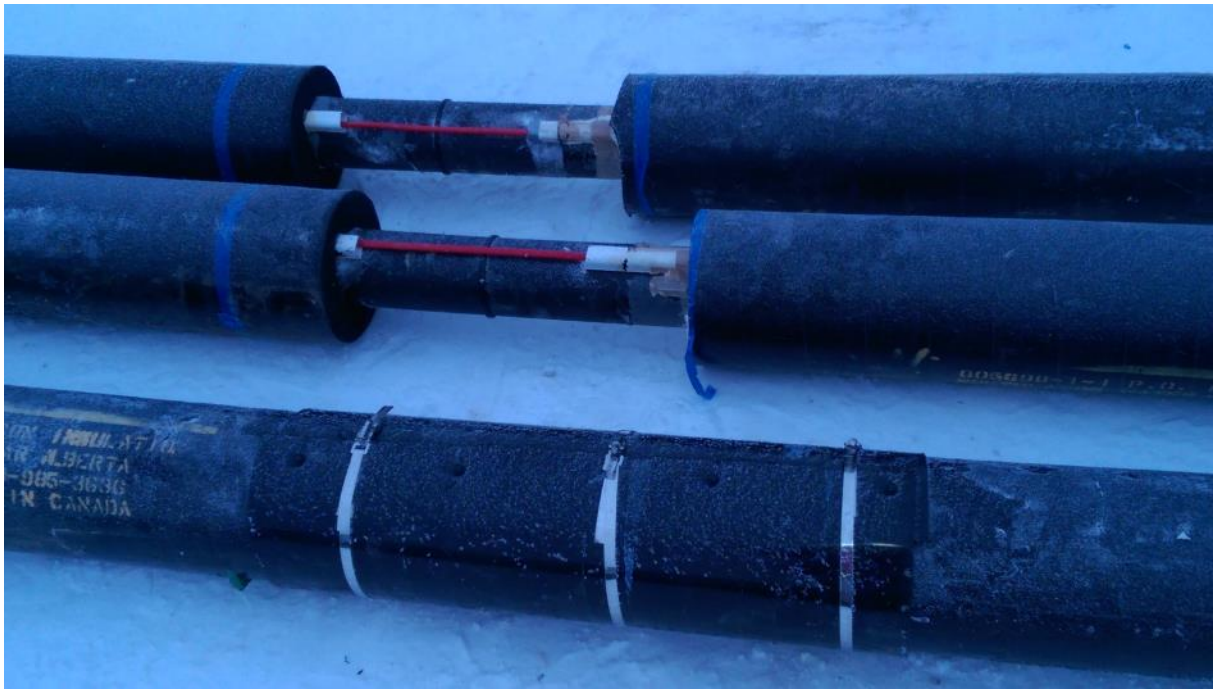

Photo 10: 20141206_NFRDSIS_Pipeline_P405_Pipe joints before and after the insulation is installed

Photo 11: 20141206_NFRDSIS_Miscellaneous_P406_Buckets being loaded to a haul truck_Looking S

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Cloudy. Light snow after 1:30 pm	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141207	**Record #:**	*20141207_NFRDSIS_DSR_49*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -11.5 °C (Max = -8.8 °C; Min = -14.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141205_NFRDSIS_DSR_47_1 Pipeline parts delivered to site	A new 2 m long 1" XS ERW STL API-5L-B/A53- B pipe was delivered to site. The supply of the new backup rings and associated bolts and nuts is still pending. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop
Kyle Cresswell (Wildstone), Workshop
Jordan Charlie (Wildstone), Workshop
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, pipeline)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Engineer and Contractor performed a pump test at the manhole.
Pipeline (PL)
The Contractor completed the installation of the flume on the slope (**Photos 1** and **4**). The flume was anchored to the two steel poles located on top of the slope with steel wires (**Photos 2** and **3**). Support from Tees personnel and an excavator was required to complete the installation (a total of 2 hours were recorded by the Engineer). At the downstream end, the Contractor did not complete the relocation of the flume (see Communication 3). The Contractor mobilized three 76 m long sections of fused DR11 HDPE pipes to the DSAR (**Photo 6**). Note that protections for the joints and backup rings were installed before the pipes were dragged with a pickup truck (**Photos 5** and **7**). The pipeline sections will be installed and jointed during the following shift along the DSAR, including the connection of the thermocables. The Contractor completed the insulation of the joints along one of the 76 m long DR11 HDPE (DR11) pipeline lengths started on the previous shift. The thermocable was also installed along the 5 pipeline sections started on the previous shift (**Photo 8**). Then, completed the fusing of five new 4" DR17 HDPE (DR17) pipeline lengths (76 m long each). No stub ends, backup rings, thermocable or insulation were installed on the new sections. The Engineer noted that the Contractor maintained similar productivity rates during the shift. A total of 20 fuses at pipe joints (**Photo 9**), and the insulation at 4 pipe joints were installed by the Contractor. Note that thermocable was also installed at 5 pipeline lengths.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	Joan, John. DSSC. Pump Test.
	Discussion and Recommendations
	A 2" pump was mobilized to the DSSC area to perform a pump test. The Engineer noted that there was water ponded under the ice at the diversion channel before the test. At the manhole, the ice cover was broken with a steel bar. The Engineer measured 1.10 m of water inside the manhole before the pump test. The suction hose was then inserted into the manhole and the water level was lowered to the bottom of the manhole. Then, the pumping

	was interrupted to allow some recovery time. Water flowing into the manhole was observed. The Engineer measured 1.02 m of water before continuing with the second pumping stage. The water level was lowered to bottom for the second time. Then, the pump was switched off to allow some time to recover. Very little water was entering the manhole at this second stage. The Engineer recorded 0.77 m of water inside the manhole. The Engineer noted the following: • Water entering the manhole was recorded after the first pumping stage. Less water income was observed after the second pumping stage. In addition, the water elevation after the first pumping stage was lower than the initial water elevation (-8 cm). The water elevation after the second pumping stage was even lower than the initial water elevation (-33 cm). This could indicate that the water level in the area around the manhole was being lowered every time that water was being pumped out of the system. • The inflow measured (water entering the manhole) was smaller than 1 L/s at all times. An inflow of at least 5 L/s is required to feed the pump that will be installed in the manhole. • There was no water under the ice at the diversion channel after the pumping test. This could indicate that the water paths from the diversion channel to the manhole were not plugged with ice. The pump test lowered the water elevation within the manhole area and the water from the diversion channel migrated into the manhole. No water on the diversion channel could confirm that there was not water flowing at NFRC-DIVW emerging point (refer to comments on the previous shift report, 20141207_NFRDSIS_DSR_48).
	Corrective Actions or Improvements
	Engineer to comment on an option to feed the manhole with water from the emerging points at the rock drain toe.
	Status at the end of the shift (Open, Closed or N/A) **OPEN**
ID	**Summary *(time, personnel, work area and description)***
2	Joan, John. Installation of DR11 HDPE pipes along the DSAR road
	Discussion and Recommendations
	• The Contractor recommended that the pipeline should be installed on a different location. According to the Contractor, there was a risk that a vehicle will damage the pipeline if the pipeline is installed along the access road. Also, that the removal of snow with a grader will be complicated (increasing the damage risk). The Contractor recommended that a new corridor should be executed in between the trees (uphill) so the pipeline could be installed separate from the access road. If so, an excavator to clear the trees along the new pathway would be required. Then, the pipeline will be placed on the natural ground. • The Engineer commented that the current design was reviewed and approved by both Tees and YG before construction. According to the information received from Tees, a free clearance of 3 m is required to remove the snow on the road with a grader. As recorded on previous shift reports, the access road was upgraded to a width of 6 m to allow traffic of Contractor's equipment (haul trucks, dozer and excavator). In addition, commented that

	truck access for installation and maintenance along the pipeline was required. Therefore, there should be enough room for the installation of the pipeline along the road. The Engineer commented that, based on the available information, there was no need for an alternative routing for the pipeline.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	Joan, John. Flume installation.	
	Discussion and Recommendations	
	The Engineer pointed out that the end of the flume was facing the forest and not the DSAR (**Photo 4**). Also, that there was a step that will cause some complications during the installation of the pipeline. The Engineer recommended that the Contractor should cut the flume as it was too long. If so, the flume could be relocated and the pipe could be placed closer to the S-Wells. The Engineer noted that there was a gentle slope covered with snow at the referred location. The Contractor informed that the plan is to move the flume towards the C-Can so the pipeline can be installed on the referred gentle slope covered with snow. Also, that no modification of the length was required.	
	Corrective Actions or Improvements	
	Contractor to move the flume so as to ensure that the pipeline is installed on a gentle slope.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will continue fusing DR17 pipes at the workshop (Bays 7 and 11). Also, they plan to drag some completed pipeline sections to the Haul Road. In addition, the Contractor will start the installation of pipeline sections along the DSAR and Haul Road.
- An electrician will be mobilized during the next shift to complete the connections of the thermocable along the pipeline.

Photos:

Photo 1: 20141207_NFRDSIS_Pipeline_P407_Flume being pushed downslope_Looking N

Photo 2: 20141207_NFRDSIS_Pipeline_408_Excavator holding the flume while anchor cables are installed_Looking NW

Photo 3: 20141207_NFRDSIS_Pipeline_409_Installation of anchor steel cables on the existing poles

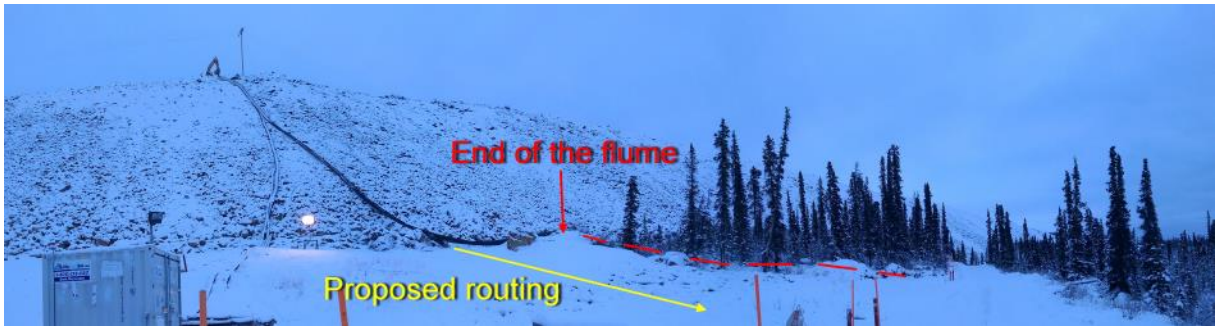

Photo 4: 20141207_NFRDSIS_Pipeline_P410_Proposed routing for the pipeline_Looking E

Photo 5: 20141207_NFRDSIS_Pipeline_P411_Protection of pipes at joints before they are mobilized

Photo 6: 20141207_NFRDSIS_Pipeline_P412_Pick up truck dragging pipes to the DSAR_Looking W

Photo 7: 20141207_NFRDSIS_Pipeline_P413_Contractor protecting the end of the pipeline sections and tying them together

Photo 8: 20141207_NFRDSIS_Pipeline_P414_Installation of thermocable on completed pipeline lengths (76 m long)

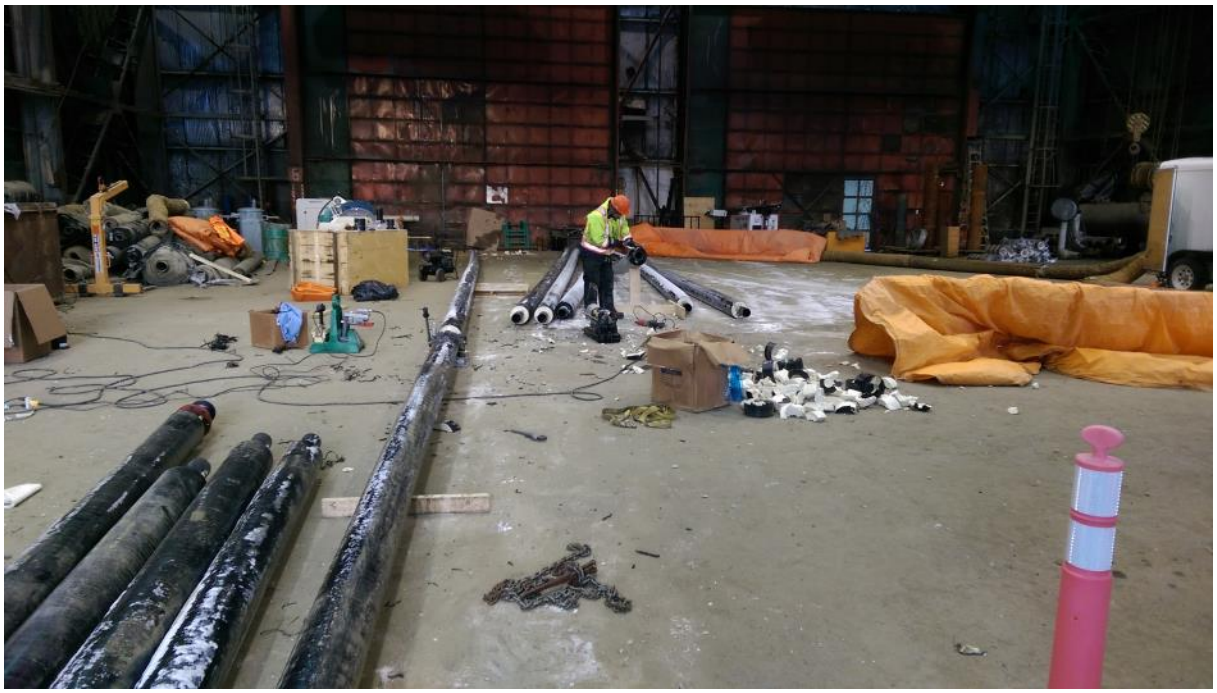

Photo 9: 20141207_NFRDSIS_Pipeline_P415_Contractor fusing two pipes at Bay 7

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Cloudy	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141208	**Record #:**	*20141208_NFRDSIS_DSR_50*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -6.6 °C (Max = -4.1 °C; Min = -9.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The Contractor installed a glow post to mark the end of the completed pipeline sections lying on the ground to increase their visibility (**Photo 8**).
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20141205_NFRDSIS_DSR_47_1 Pipeline parts delivered to site	All the required parts were delivered to the Faro Mine site and the pipeline installation could be completed (**Photos 7** and **9**). **CLOSED**	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Lloyd Barnhard (Nuline), Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, pipeline)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)

Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity (**Photo 1**).
Downstream Seepage Collection (DSSC)
No activity (**Photo 1**).
Pipeline (PL)
The Contractor completed the anchoring of the flume from the Haul Road to the S-Wells area (**Photo 2**). Also, the Contractor mobilized two 76 m long sections of fused DR11 HDPE pipes to the top of the slope from the Haul Road to the S-Wells area. At the end of the shift the Contractor started the installation of pipeline sections through the steel culverts at the first crossing. At the workshop bays 7 to 11, the Contractor completed the fusing of the required DR17 HDPE (DR17) pipeline lengths (76 m long each), including stub ends and backup rings (**Photos 6** and **9**). Note that 12 individual lengths of DR17 pipes were not welded at this stage. They will be fused to create shorter lengths to accommodate the installation of valves along the pipeline once its location is fixed on the field (refer to Communication 1). The insulation of the completed pipeline sections was not completed before the end of the shift. It is important to note that the Contractor did not reached the same productivity rates at the workshop as Wildstone was working on the installation of the flume and the mobilization of pipeline lengths to its final location. In addition, some wooden shelters for the protection of valves and other elements were mobilized to the Haul Road area (**Photo 5**). Nuline arrived to site and visited the construction areas. Also, visited the workshop area to observe the electrical parts delivered and check the quantities (refer to Communication 2).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	Joan, John, Kim. Pipeline Installation.
	Discussion and Recommendations
	The Engineer reminded that some DR17 pipes should not be fused as they will probably be required to accommodate the installation of valves along the pipeline. Shorter sections of pipe (shorter than 76 m) might be required to provide flexibility. The location for the different valves was commented to explain the need for shorter lengths of pipeline sections. The location of the valves will have to be adjusted based on the location of the flanged locations

	once they will be installed on the field.	
	Corrective Actions or Improvements	
	The Contractor did not fuse some pipeline sections.	
	Status at the end of the shift (Open, Closed or N/A)	**N /A**
ID	**Summary *(time, personnel, work area and description)***	
2	John, Joan, Lloyd. Electrical pipeline parts.	
	Discussion and Recommendations	
	The Engineer commented to Nuline that the electrical parts associated to the installation of the heat traced pipeline were stored at the workshop area. Also, suggested that Nuline should observe the elements delivered to site so as to ensure that no parts were missing.	
	Corrective Actions or Improvements	
	Nuline to observe the electrical parts delivered.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo

-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will continue fusing DR17 pipes at the workshop (Bays 7 and 11). Also, they plan to drag some completed pipeline sections to the Haul Road. In addition, the Contractor will continue with the installation of DR11 pipes through the culverts at the first crossing. Finally, the plan to assemble pipeline lengths along the DSAR, including the connection of thermocables.

Photos:

Photo 1: 20141208_NFRDSIS_DSSC_P415_View of the DSSC area and DSAR_Looking SW

Photo 2: 20141208_NFRDSIS_Pipeline_416_View of the flume anchored from the Haul Road to the S-Wells area_Looking SE

Photo 3: 20141208_NFRDSIS_Pipeline_417_DR11 HDPE pipe sections along the DSAR_Looking SW

Photo 4: 20141208_NFRDSIS_Pipeline_P418_DR17 HDPE pipe along the Haul Road_Looking NE

Photo 5: 20141208_NFRDSIS_Pipeline_P419_Wooden shelters for valves along the pipeline

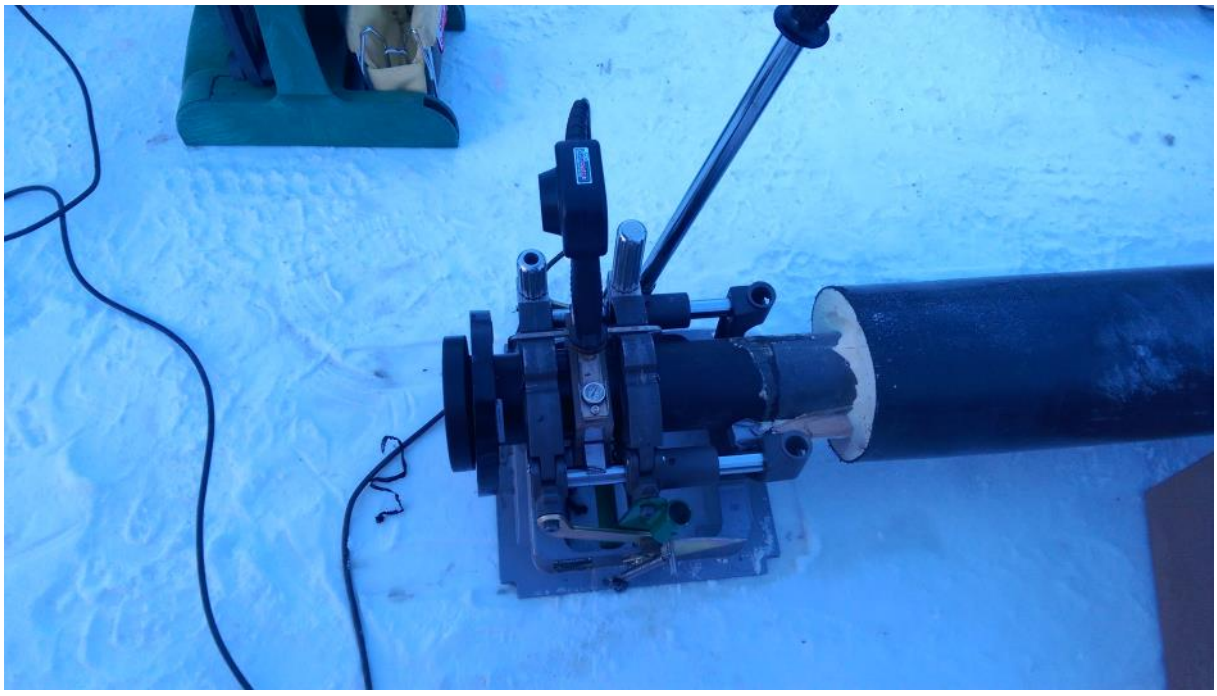

Photo 6: 20141208_NFRDSIS_Pipeline_P420_Stub end and pipe end being heated

Photo 7: 20141208_NFRDSIS_Pipeline_P421_Detail of some of the new stub ends delivered

Photo 8: 20141208_NFRDSIS_Pipeline_P422_Fist glow post installed to mark pipeline ends

Photo 9: 20141208_NFRDSIS_Pipeline_P423_New stub ends and backup rings installed at pipe end

BGC INTERNATIONAL
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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Cloudy, light snow	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141209	**Record #:**	*20141209_NFRDSIS_DSR_51*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -6.3 °C (Max = -3.8 °C; Min = -8.7 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The Contractor and Engineer identified a risk during the installation of the pipeline downslope (**Photo 4**). The pipeline lengths already installed could slide downslope due to its self-weight when they were not fixed to the front loader. Two redundant anchoring points were installed to secure the pipeline when it was not fixed to the front loader. Refer to Communication 2.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141208_NFRDSIS_DSR_50_2 Pipeline parts delivered to site (electrical)	Jerry visited the site to support Lloyd on the inspection of the available electrical elements. Nuline to provide comments on the electrical components, including type of element and quantities. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road, DSAR
Kim Field (Wildstone), Workshop, Haul Road, DSAR
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Jerry Boss (Nuline), Workshop, Haul Road, DSAR
Lloyd Barnhard (Nuline), Workshop, Haul Road, DSAR

Equipment ***(brand, model, reference #, colour, work area, and estimated working hours)***
Light Tower/Generator supplied by Wildstone (grey, workshop area, pipeline)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)
Articulated truck (Deere 400D, #7402, yellow, Haul Road, demobilized at the end of the shift)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity (**Photo 1**).
Downstream Seepage Collection (DSSC)
No activity (**Photo 1**).
Pipeline (PL)
The Contractor installed the pipeline sections at the DS area at its definitive location. The end of the DR11 pipeline was dragged to the location where it will be connected to the C-Can (**Photo 1**). Then, the flanged joints along the DSAR were bolted together and one thermocable connection was completed. In addition, the Contractor continued feeding pipeline sections through the steel culverts on the first crossing (**Photo 3**). The support from Tees was required to hold the pipes and push them through the steel culvert (**Photo 2**). Two hours of a front loader were recorded by the Engineer. At this location, two flanged connections (refer to Communication 1) and two thermocable connections were completed (**Photos 5, 6, 7, 8, 9, 10** and **11**). The location of the flanged connection were marked with spray on the pipeline so they can be identified once the insulation is installed (**Photo 6**). At the workshop, the Contractor fused shorter lengths of pipeline. A group of two pipe lengths (30 m long), a group of three pipe lengths (45 m long) and a group of four pipe lengths (60 m long) were fused. The installation of the thermocable or the insulation of joints was not completed.

5. Communications

ID	**Summary** ***(time, personnel, work area and description)***
1	Joan, John, Kim. Flanged connections.
	Discussion and Recommendations
	• The Engineer observed that the new gaskets supplied were slightly different that the ones already delivered to site. Wildstone explained that the difference was that ones were made in USA and the others in Canada (**Photo 5**). Also, commented that they are compatible so

	they could be installed at the same flanged connection without problems. • The Engineer observed that no gaskets were installed at the flanged connection being executed. Wildstone commented that no gaskets were available so their plan was to complete the flanged connections without gaskets. The Engineer noted that, as commented during the visit to observe the available pipeline components, gaskets were ordered and delivered to site. Therefore, gaskets were available to complete the installation of the pipeline as needed. • Wildstone informed that a flanged connection was already completed without a gasket. The referred connection was in the middle of the slope down to the S-Wells area. Wildstone commented that the stub ends supplied have a phonographic serrated surface. Therefore, no gasket was strictly required to prevent leakage if the parts are assembled (bolted) properly. The Engineer, noted that the some of the stub ends were slightly different (see bullet point above and **Photo 5**) so the serrated surface could not match perfectly. Therefore, commented that the use gaskets is recommended if they think there is a risk of leakage. In addition reminded that the Contractor is solely responsible for the execution and quality of the works.	
	Corrective Actions or Improvements	
	The Contractor collected the gaskets from workshop. A gasket was installed at the flanged connection and the flanged connection was completed (**Photo 6**). Regarding the flanged connection completed without a gasket, the Contractor informed that access was complicated as it was in the middle of the slope. The Contractor decided not to include the gasket on the flanged connection. The Engineer will note the location of this flanged connection on the As-Built documents.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
ID	**Summary *(time, personnel, work area and description)***	
2	John, Joan, Kim. Pipeline installation. H&S	
	Discussion and Recommendations	
	The Contractor and Engineer recommended to Wildstone that redundant anchoring systems should be installed to secure the pipeline sections already installed. The pipeline sections were fixed to the front loader but they had to be released as the loader had to be relocated. There was a risk that the pipeline sections will slide downhill due to its self-weight when they will not be secured to the front loader. In addition, the bolting of the flanged connection and the thermocable connections required the presence of personnel working on the pipeline. Therefore, extra assurance was recommended.	
	Corrective Actions or Improvements	
	Wildstone installed two anchors to secure the pipeline. The pipeline was secured to trucks.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

ID	Summary *(time, personnel, work area and description)*	
3	John, Lloyd, Kim, Joan. Thermocable	
	Discussion and Recommendations	
	The Contractor showed a section of thermocable presenting a small manufacture defect. This defect was observed as the internal cables were exposed during the splicing of thermocable. The Engineer observed that the white protection covering one of the two aluminum cables inside the thermocable was not complete for about 1 cm. This section was removed during the connection process (it was not installed as part of the pipeline). The Engineer and Contractor commented that the thermocable can be tested once some connections were completed to see if the conductivity was compromised. The Contractor commented that the plan was to test the cables with a megohmneter to verify that the installation was completed properly.	
	Corrective Actions or Improvements	
	Contractor to comment on the results from the testing of cables.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will continue connecting pipeline lengths by bolting flanged connections. Also, to execute the thermocable connections at the flanged connections and install the required insulation. Also, they plan to install a drain valve at the lowest point along the DSAR area. If possible, they will start installing pipeline along the Haul Road.
- The articulated Deere 400D truck was demobilized from site at the end of the shift (**Photo 12**).

Photos:

Photo 1: 20141209_NFRDSIS_Pipeline_P424_Pipeline extended to C-Can loaction_Looking SW

Photo 2: 20141209_NFRDSIS_Pipeline_425_Tees's front loader moving a pipe section so as to feed the steel culvert_Looking SE

Photo 3: 20141209_NFRDSIS_Pipeline_426_Contractor supervising the installation of pipes through the steel culvert at the first crossing_Looking SW

Photo 4: 20141209_NFRDSIS_Pipeline_P427Pipeline section being installed downslope_Looking S

Photo 5: 20141209_NFRDSIS_Pipeline_P428_Flanged connection before the installation of bolts, nuts and gasket. Note the difference between the stub end made in USA (left) and Canada (right)

Photo 6: 20141209_NFRDSIS_Pipeline_P429_Contractor bolting backup rings at flanged connection

Photo 7: 20141209_NFRDSIS_Pipeline_P430_Protection of internal cables installed. Note the ground mesh outside (still not connected).

Photo 8: 20141209_NFRDSIS_Pipeline_P431_Protection being installed on top of the ground mesh

Photo 9: 20141209_NFRDSIS_Pipeline_P432_Loops of thermocable being fixed with duct tape

Photo 10: 20141209_NFRDSIS_Pipeline_P433_Insulation parts being adjusted to the required length

Photo 11: 20141209_NFRDSIS_Pipeline_P434_Insulated being installed at flanged connection (DR11)

Photo 12: 20141209_NFRDSIS_Haul Road_P433_Deree truck being loaded on Pelly's haul truck

BGC INTERNATIONAL
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:15 pm
Project #:	0533-010-06	**Weather:**	Cloudy	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141210	**Record #:**	*20141210_NFRDSIS_DSR_52*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -7.0 °C (Max = -5.8 °C; Min = -8.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	A clamp was installed at the steel culvert outlet (first crossing) to anchor the pipeline (**Photo 3**).
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141208_NFRDSIS_DSR_50_2 Pipeline parts delivered to site (electrical)	The Contractor informed that some components were required to complete the installation of the pipeline (refer to Communication 1). Contractor to order the required parts. **OPEN**	Contractor
20141209_NFRDSIS_DSR_51_3 Thermocable conductivity test	Nuline performed a test with a megohmneter and no issues were identified. **CLOSED**	N/A

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road, DSAR
Kim Field (Wildstone), Workshop, Haul Road, DSAR
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Lloyd Barnhard (Nuline), Workshop, Haul Road, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, pipeline)

Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
The Contractor completed the installation of the DR11 HDPE (DR11) sections at its final installation location, including the installation of pipe sections through the steel culverts at the first crossing (**Photos 1**, **2**, **4**, and **8**). A clamp was installed at the DS side of the steel culverts to fix the pipeline (**Photo 3**). One hour of Tees's front loader was required to complete the pipeline installation. At a later stage, the DR 11 pipeline sections installed on downslope were connected to the ones installed along the road (**Photo 4**). The connection was performed close to the S-Wells area. A drain valve was installed at the connection point as it was the lowest point along the DSAR (refer to Communication 2 and **Photos 4** and **5**). In addition, the Contractor completed the required thermocable connections and installed the required insulation at pipeline joints. Finally, the Contractor tested the thermocable section installed downslope with a megohmneter to verify that the installation was completed properly (**Photo 6**). The Contractor reported that no issues/defects were identified during the test. At the workshop, the Contractor installed the insulation at some joints along the pipeline sections completed on previous shifts. Note that the insulation of all the joints was not completed before the end of the shift.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	Joan, John. Electrical components for pipeline installation.
	Discussion and Recommendations
	The need for some additional parts was identified by Northlands. The Contractor and Engineer reviewed the list produced by Northlands to define the actions to be undertaken. The following points were commented: a. Splice Kits: Nuline reported that 20 additional kits were required to complete the

	installation of the pipeline. The kits are used to connect thermocable sections. Urecon assumed that the thermocable will be installed on a continuous manner and not cutting it every 76 m (at flanges connections). Therefore, more connections are required with this construction approach. The Engineer and Contractor commented that these elements were required to complete the installation so they should be ordered as soon as possible to ensure that it will not have an impact on the construction schedule. b. End Termination Kits: Nuline reported that 8 kits were required as no kits were delivered. The Engineer contacted Urecon to understand why the End Termination Kits were not included on the procurement list. Urecon informed that 2 End Termination Kits should be included inside each of the PFK-1 Power Feed Kit boxes supplied. A total of 4 Power Feed Kits were supplied so the 8 End Termination Kits should be available on site (2 on each box). The Engineer and Contractor opened two of the Power Feed Kit boxes and 2 End Termination Kits were found to be included on each box. No elements are missing. c. PFK-1 Power Feed Kits and 2P30A UTC 2030 Ground Fault Controllers: Nuline recommended that 2 units of each element should be supplied in case there is a defect or malfunction. Urecon informed to the Engineer that problems with Power Feed Kits are very rare as they have no mechanical parts that can be damaged during transport. Regarding the Ground Fault Controllers, Urecon commented that the electronic parts (mainly the fuse) can be damaged during the transport by truck if not handled properly. Also, commented that problems with these controllers are not common. They don't usually supply spares unless it is a specific request from the client as they are off-the-shelve elements that are available 99% of the times. The Engineer commented to the Contractor that the parts on the field could be tested by Nuline to see if there was a problem. The need of additional units is not required by the Engineer unless an issue or malfunction is reported by Nuline or Precision. Note that two of the controllers were sent to Precision as they will be installed inside the C-Can.
	Corrective Actions or Improvements
	Contractor to order the required thermocable Splice Kits to complete the installation as per Nuline recommendations. Also, Nuline to comment on the working conditions of the Ground Fault Controllers supplied.
	Status at the end of the shift (Open, Closed or N/A) **OPEN**
ID	**Summary *(time, personnel, work area and description)***
2	John, Joan, Kim. Drain valve installation
	Discussion and Recommendations
	The Engineer commented to Contractor that the available drain valve should be installed at the lower point along the DSAR to allow drainage of the section in case of a problem on the pipeline. The lower point was located close to the S-Wells area, where the pipeline section installed downslope and the section installed along the DSAR had to be connected. The Engineer noted that this drain valve was the one required on the second crossing to drain

	the lower point located 3 m under the road invert. This drain was no longer required at the second crossing as shallow steel culverts were installed instead of a corrugated HDPE pipe on a deep trench. As a result, the pipeline will be installed with a constant gentle slope towards the Faro Pit and it will drain by gravity. The Engineer also noted that the drain was supposed to be installed on a DR17 pipeline section. It will now be installed on a DR11 section. The Contractor commented that the valve is made of steel and rubber components. Therefore, it is suitable for installation along DR11 pipelines. The higher pressures along this section should not cause problems on the valve.
	Corrective Actions or Improvements
	Wildstone installed the drain valve at the lower point along the DR11 HDPE pipeline section (**Photos 4** and **5**). The installation of the shelter was not completed before the end of the shift.
	Status at the end of the shift (Open, Closed or N/A) — **CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they plan to install the shelter for the drain valve at the DSAR area. Then, continue with the installation of the vacuum valve on top of the slope (beside the Haul Road, at the DS side of the first crossing). Afterwards, they plan to continue installing DR17 HDPE pipeline sections from the first crossing to the second crossing.

- Yukon Energy (YE) collected the 4 transformers previous delivered to site (1 x 75 kVA + 3 x 150 kVA). A document was signed by YE, the Contractor and the Engineer to record the activity. A copy of the document was handed over to Pelly, YE and Tees.

Photos:

Photo 1: 20141210_NFRDSIS_Pipeline_P434_DR11 HDPE pipeline installed downslope_Looking S

Photo 2: 20141210_NFRDSIS_Pipeline_435_DR11 HDPE pipeline inside the steel culvert (first crossing)_Looking N

Photo 3: 20141210_NFRDSIS_Pipeline_436_Clamp installed at the DS side of the steel culvert on the first crossing_Looking SE

Photo 4: 20141210_NFRDSIS_Pipeline_P437_DR11 HDPE pipeline section installed at its definitive location. Note the location for the drain valve installed_Looking NE

Photo 5: 20141210_NFRDSIS_Pipeline_P438_Drain valve installed at the lower point along the DSAR

Photo 6: 20141210_NFRDSIS_Pipeline_P439_Nuline testing thermocable sections installed with a megohmneter (end of section installed downslope)

Photo 7: 20141210_NFRDSIS_Pipeline_P440_Pipeline installed (at left side of the road) along DAR and truck parked. Note extra sections temporarily located at the right hand side_Looking E

Photo 8: 20141210_NFRDSIS_Pipeline_P441_Pipeline end at connection location (C-Can)_Looking W

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:10 pm
Project #:	0533-010-06	**Weather:**	Cloudy, light snow in the morning	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141211	**Record #:**	*20141211_NFRDSIS_DSR_53*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -8.1 °C (Max = -5.2 °C; Min = -10.9 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	The Engineer observed some sacrificial sections of insulation, short lengths of thermocable and a plastic bag piled beside the vacuum valve installed by Wildstone and Nuline (**Photo 1**). The Engineer reminded that all the garbage/debris should be collected as it could be covered by snow and then left behind. The Contractor collected the piles of garbage.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141210_NFRDSIS_DSR_50_2 Pipeline parts delivered to site (electrical)	The Contractor informed that the required splice kits were ordered. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road, DSAR
Kim Field (Wildstone), Workshop, Haul Road, DSAR
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Lloyd Barnhard (Nuline), Workshop, Haul Road, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, pipeline)

Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #318, yellow, it was loaded to a haul truck and demobilized)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
The Contractor dragged DR17 HDPE (DR17) sections and positioned them along the haul road. Then, installed the bolts nuts and gaskets to join the flanged connections (**Photo 4** and **5**). In addition, the Contractor completed the installation of two steel tees; one at the vacuum valve location (**Photos 7** and **8**) and one at the location of the first air release valve (refer to Communication 1). Then, completed the thermocable connections at the joints (**Photos 2** and **3**), including the installation of terminations at the end of heat traced circuits (**Photo 8**). At a second stage, the Engineer moved the assembled pipeline sections to its final location. A front loader had to be used as there was no space to drag the pipeline with a truck and there were some piles in the middle (1 hr of Tees's front loader). The installation of the first three valves (drain valve, air vacuum valve and air release valve) was not completed before the end of the shift. At the workshop, the Contractor welded some steel parts that will be used as part of the installation of valves.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	Kim, John, Joan. Location of air vacuum valve and air release valves.
	Discussion and Recommendations
	The location for the air vacuum valve and the air release valves was commented. The Contractor pointed out that the valves should be slightly moved upstream (US) or downstream (DS) to optimize the pipe lengths available. On the contrary, they will have to cut pipes to specific lengths to match the intended location for the different valves. The Contractor commented that this will slow down the construction process. The Engineer commented the following: a. <u>Air vacuum valve</u> – The intended location for this valve was Stn. 0+385. The closest flanged

	connection observed after the first crossing was found to be approximately 10 to 15 m DS to the intended location. The Engineer approved the installation of the air vacuum valve at the proposed location. b. Air release valve – The intended location for the first of the air release valves was Stn. 0+645. The closes flanged connection was found to be 20 to 25 m US to the intended location. The Engineer approved the installation of the air release valve at the proposed location. c. Air release/vacuum valve – The intended location for this valve was the highest point along the pipeline. According to Drawing FRNF-XD-02-15, the highest point should be close to Stn. 0+990. The Engineer pointed out that the valve shall be located at the highest point. The Contractor should use the 15.2 m long sections of pipe not fused to joint them in shorter lengths (shorter than 76 m if required). Contractor to fuse pipes to create a section matching the required length so as to install the valve at the highest point. d. Air release valve – The intended location for the second air release valve was at Stn. 1+350. The Engineer noted that no pipeline sections were present on that area so the discussion was postponed until the Contractor will be ready to install pipes close to that location.
	Corrective Actions or Improvements
	Contractor to install the air vacuum valve and the first air release valve as per the proposed locations. Then, fuse pipe sections to cover the required length so as to install the air release/vacuum valve at the highest point along the line. The Contractor started the installation of the steel tees (**Photos 7** and **8**), but the valves, wooden supports and shelters were not installed before the end of the shift.
	Status at the end of the shift (Open, Closed or N/A) — **OPEN**
ID	**Summary *(time, personnel, work area and description)***
2	John, Joan, Gordon. 2”x1” FLGD RED SCRD 150# FF STL A105 for valve connections.
	Discussion and Recommendations
	The Contractor informed that the steel flange (2”x1” FLGD RED SCRD 150# FF STL A150) supplied by Northlands was not threaded. As a result, it could not be connected to the 1” diameter CS Spool pipe (which was threaded). The connection of those two elements was required to connect the valve to the TEE RED 250 psi COATED Di FLGD installed along the pipeline (refer to Drawing FRNF-XD-02-17). The Engineer contacted Northlands (Gordon) to comment the issue observed on the field. Northlands commented that the 4 steel flanges delivered should be threaded. On the contrary, the parts should be returned to Northlands so they can supply the correct ones. If that was not an option due to time constraints, Northlands commented that the two steel elements could be welded. The Contractor commented that there was no time to return the 4 steel flanges so they will weld the steel flanges to the steel pipe sections. In addition, commented that this activity should not have an additional cost as the pieces could be welded on site.

	The contractor welded one of the steel flanges to a steel pipe section. The welded parts were observed by both the Contractor and the Engineer. The resultant piece was satisfactory so it was agreed that the remaining flanges (3 units) will also be welded.	
	Corrective Actions or Improvements	
	Contractor to weld the remaining steel flanges to the 1" steel pipes.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they plan to install the shelter for the drain valve at the DSAR area. Then, continue with the installation of the vacuum valve on top of the slope (beside the Haul Road, at the DS side of the first crossing). Afterwards, they plan to continue installing DR17 HDPE pipeline sections from the first crossing to the second crossing.

- The CAT 773B haul truck (#318) was demobilized from site (Photo 9).

Photos:

Photo 1: 20141211_NFRDSIS_Pipeline_P442_Garbage observed beside the pipeline

Photo 2: 20141211_NFRDSIS_Pipeline_443_Contractor connecting two thermocable lengths

Photo 3: 20141211_NFRDSIS_Pipeline_444_Completed flanged connection before the insulation is installed. Note the extra length of thermocable wrapped and fixed with tape

Photo 4: 20141211_NFRDSIS_Pipeline_P445_Contractor bolting a flanged connection along the pipeline. Note that the pipeline still has to be moved to its final position_Looking NE

Photo 5: 20141211_NFRDSIS_Pipeline_P446_Bolted flanged connection with gasket. Note that the thermocable is not connected.

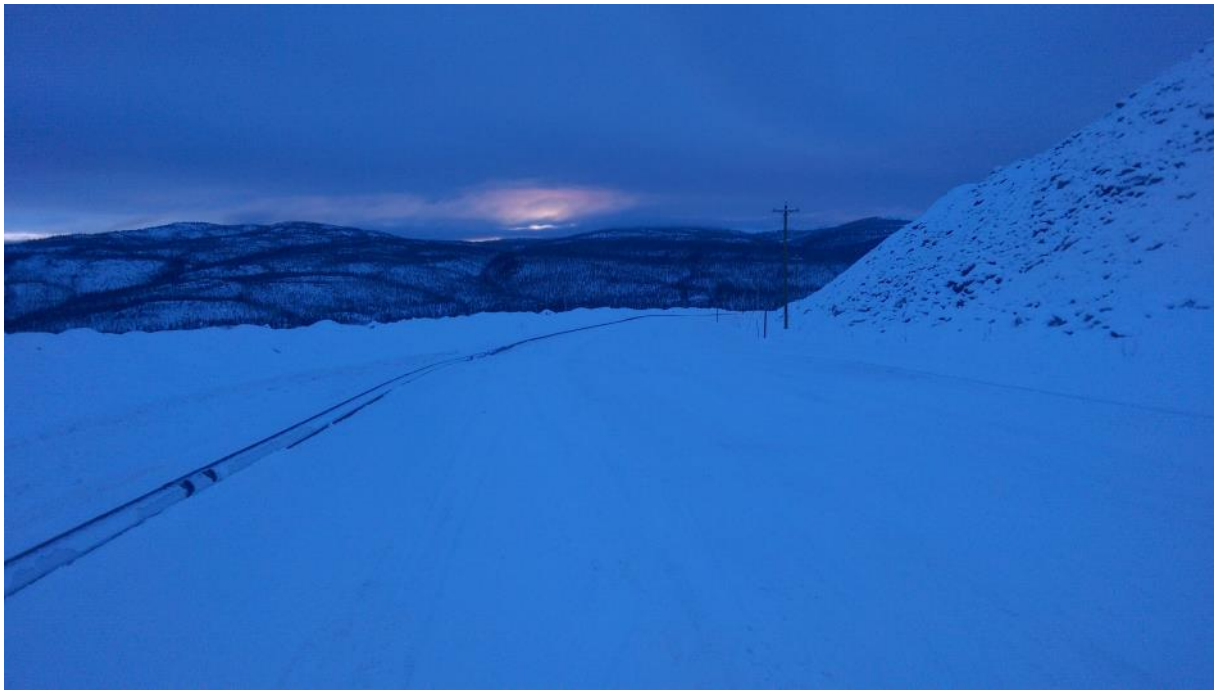

Photo 6: 20141211_NFRDSIS_Pipeline_P447_DR17 HDPE sections being positioned along the haul road_Looking SW

Photo 7: 20141211_NFRDSIS_Pipeline_P448_Location of the air vacuum valve at the DS side of the first crossing_Looking S

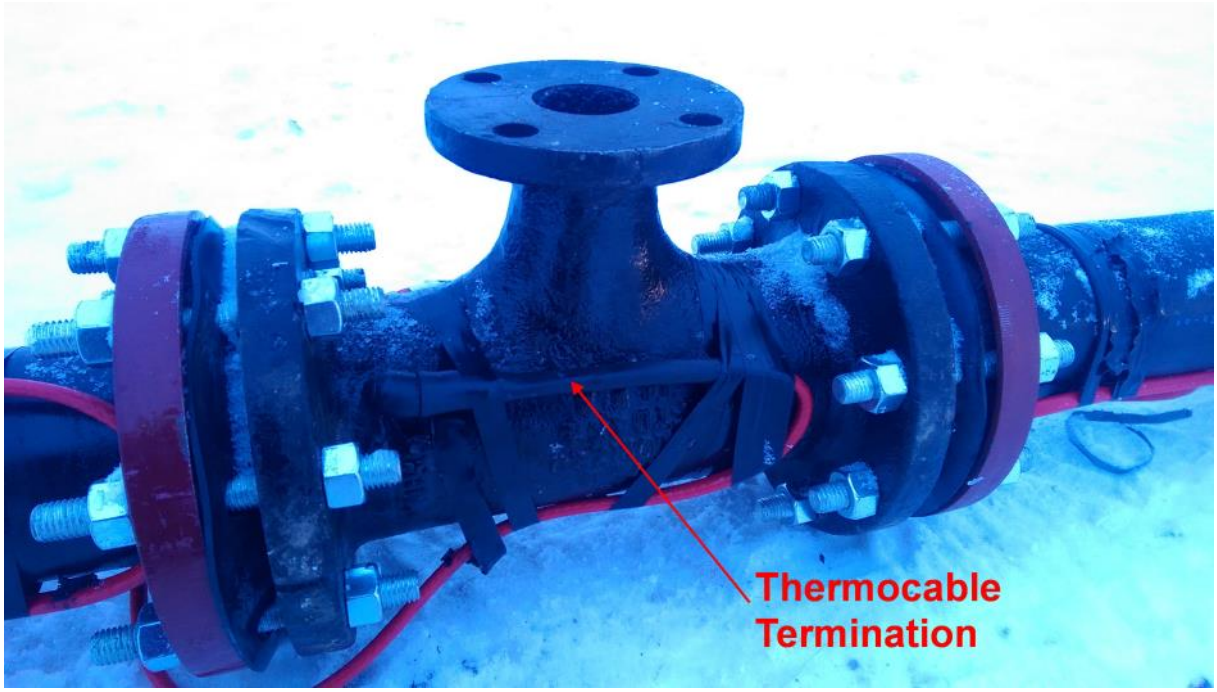

Photo 8: 20141211_NFRDSIS_Pipeline_P449_4” to 2” steel tee for the installation of the air vacuum valve. Note the termination at the end of a thermocable circuit

Photo 9: 20141211_NFRDSIS_Miscelaneous_P450_ CAT 773B haul truck (#318) demobilized from site

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:20 pm
Project #:	0533-010-06	**Weather:**	Light snow	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141212	**Record #:**	*20141212_NFRDSIS_DSR_54*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -11.6 °C (Max = -10.1 °C; Min = -13.0 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141210_NFRDSIS_DSR_50_2 Pipeline parts delivered to site (electrical)	No update. **OPEN**	Contractor
20141211_NFRDSIS_DSR_53_1 Installation of Valves	Contractor to fuse pipe sections to the required length to match the intended installation location for the valves. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, pipeline)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)

Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Engineer visited the DSAR area to record the distance from the first electronic controller to the C-Can. As informed by Nuline, the first electronic controlled will be installed beside the drain valve located close to the S-Wells area. The first electronic controlled was found to be located approximately at 180 m from the end of the pipeline (connection with the C-Can). Based on the maximum length that an electronic controller can control (225 m), there is an excess of about 45 m. This excess could be used to extend the thermocable past the C-Can (East) if required. The Engineer also measured the distance from the C-Can (manhole) to the NF2A sampling point. As shown on **Photo 5**, the measurement was performed following the channel (on top of the ice cover). The distance from the manhole to NF2A was found to be 18 m. It is important to note that the NF2A sampling point was located 2 m US to the investigative hole drilled with an ice auger (**Photo 6**). Also, that the hole drilled with an ice auger was located 3 m US to the deepest channel section found within NF2A (approximately 1.1 m deep). The location and characteristics of the deepest channel section was communicated by YG.
Pipeline (PL)
At the workshop, the Contractor completed the insulation of 16 fused joints completed on previous shifts. Then, assembled the different valve parts delivered to site. Some Teflon was installed at the different joints to prevent leakage (**Photo 2**). The assembly of the three air release valves and the vacuum valve was completed at the workshop (**Photos 3** and **4**). The assembled parts were not installed along the pipeline during the shift. At the Haul Road, the Contractor completed the installation of pipes at the second crossing (Stn. 1+250). Then, installed DR17 HDPE (DR17) sections at its definitive location. Support from Tees's high up was required to complete the installation of the pipes (a total of 4 hrs). In addition, dragged new DR17 sections to the Haul Road (**Photo 1**). The flanged connections were completed during the shift, including the installation of a gasket, bolts, nuts, and the connection of thermocable. Note that the installation of insulation at the flanged connections was not completed before the end of the shift.

5. Communications

ID	**Summary *(time, personnel, work area and description)***	
1	John, Joan. Pipeline installation progress.	
	Discussion and Recommendations	
	The Engineer and Contractor noted that, although Wildstone's observed productivity rates were lower than the ones observed the previous week, the installation of the pipeline as per design could be completed before Dec 19, 2014. Close monitoring of the production rates during the following two days (Dec 13 and Dec 14) will be required so as to provide a realistic estimate on the new completion date. Very little support from Tees is anticipated during the following week.	
	Corrective Actions or Improvements	
	Contractor and Engineer to provide an estimate for the new pipeline completion date.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
ID	**Summary *(time, personnel, work area and description)***	
2	Kim, John, Joan. Location for the second air release valves.	
	Discussion and Recommendations	
	The Engineer observed that the Contractor was mobilizing pipeline sections to be installed close to the highest point along the pipeline (**Photo 1**). The Engineer reminded that the second air release valve, which was intended to be installed at Stn. 0+990, should be installed at the highest point of the pipeline. The Engineer noted that the air will be accumulated at the highest point along the pipeline. Also, that the air release valve shall be installed at the referred point. The Contractor confirmed that they were organizing the available pipeline lengths so there will be a flanged connection at the highest point. Also, commented that timber pipe supports will be installed to support the valve. These timber supports could be adjusted to modify the elevation of the pipeline so the valve will be the highest point.	
	Corrective Actions or Improvements	
	Contractor to continue with the pipeline installation.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
ID	**Summary *(time, personnel, work area and description)***	
3	John, Joan. Assembly of vacuum valve	
	Discussion and Recommendations	
	The Contractor informed that there was a piece missing inside the box containing the air vacuum valve (small steel pipe to be assembled at the upper part of the valve). The Engineer contacted Northlands (Gordon). Northlands commented that the referred piece was included on a different box as there was no space inside the box for the valve. The Contractor opened all the boxes delivered to site and the required piece was found. The Contractor confirmed that the assembly of the valve could be completed.	

	Corrective Actions or Improvements	
	Contractor completed the assembly of the valve parts on the workshop.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they plan to install the valves at the intended location, and to complete the insulation of flanged connections along the pipeline. If possible, they will also start the installation of heated enclosures for valves.
- No support from Nuline will be available until Monday. Nuline was demobilized at the end of the shift as there will not be enough work during the weekend to justify the present of a person during the whole weekend. Nuline will be mobilized on Monday to complete the required activities. No delays will be caused to the installation of the pipeline due to this demobilization/mobilization.

Photos:

Photo 1: 20141212_NFRDSIS_Pipeline_P451_New pipeline section installed along the existing pipeline to Faro Pit. Note a new section ready to be located at its final location_Looking NE

Photo 2: 20141212_NFRDSIS_Pipeline_452_Contractor installing Teflon at connections for valves

Photo 3: 20141212_NFRDSIS_Pipeline_453_Air release valves and accessories assembled on the workshop. Note the steel flanges at the bottom welded to the 1" steel pipes

Photo 4: 20141212_NFRDSIS_Pipeline_P454_Detail of the top of an air release valve

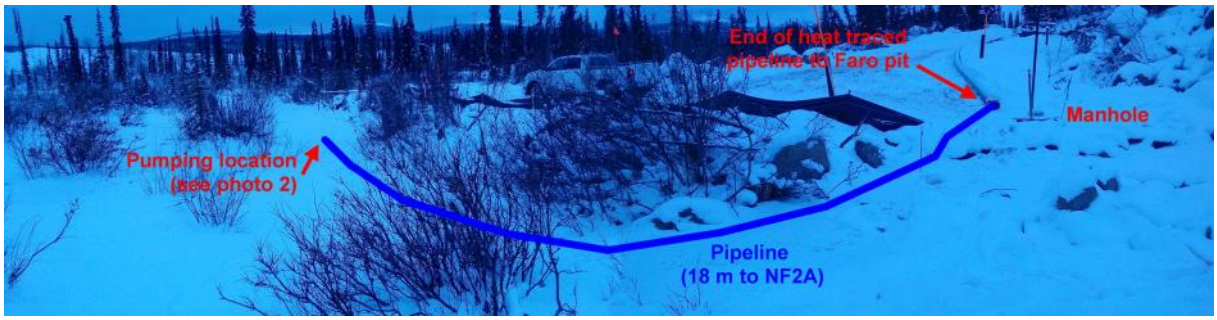

Photo 5: 20141212_NFRDSIS_DSSC_P453_Possible location for a pipeline from DSSC Manhole to pumping location. Note referring to photo 2 is for Photo 6 hereinafter_Looking SW

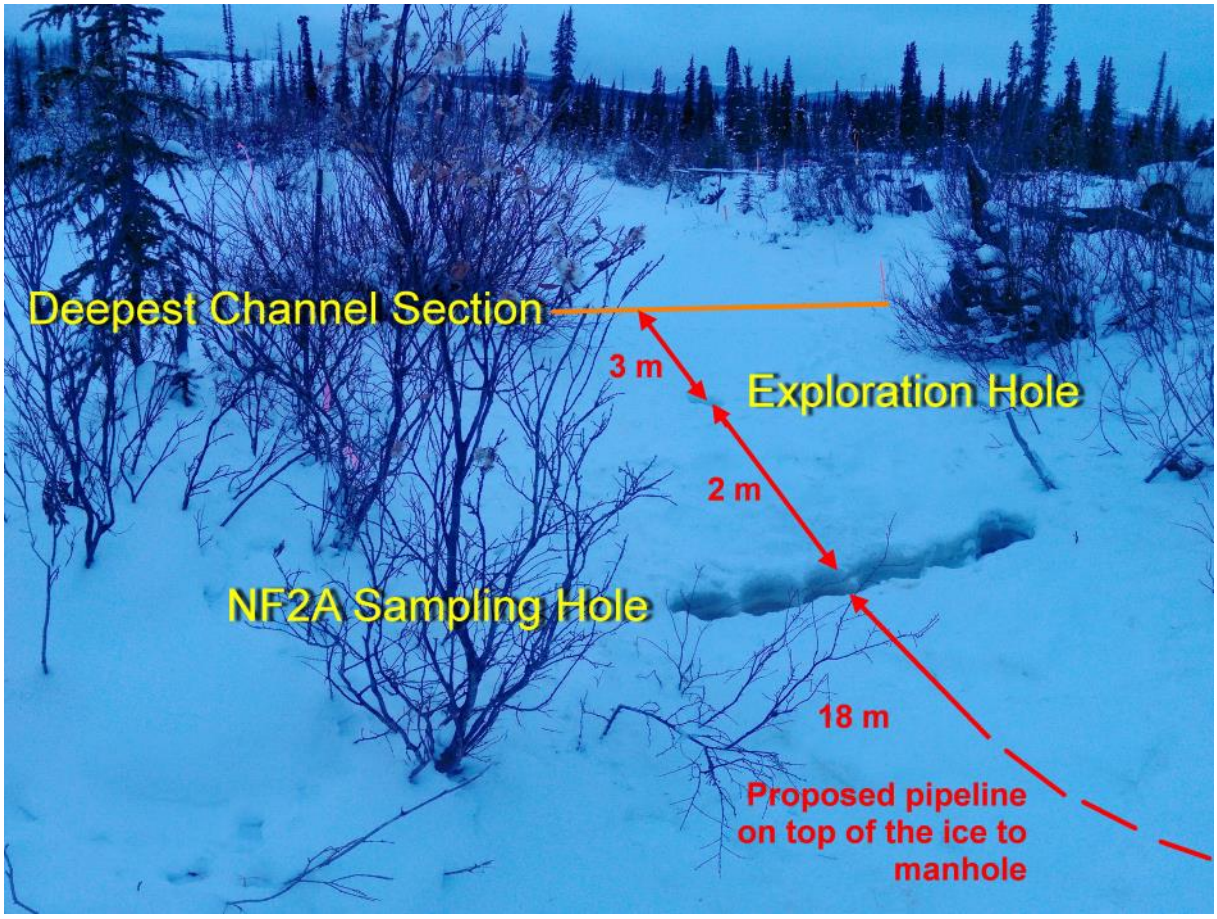

Photo 6: 20141212_NFRDSIS_DSSC_P454_Dimensions from DSSC Manhole to possible collection points at NF2A. Note that distances were measured on top of the ice (on the channel)_Looking SW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Partly cloudy	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141213	**Record #:**	*20141213_NFRDSIS_DSR_55*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -13.6 °C (Max = -9.8 °C; Min = -17.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141210_NFRDSIS_DSR_50_2 Pipeline parts delivered to site (electrical)	The delivery of the expected electrical components is expected for Dec 15, 2014 (next Monday). **OPEN**	Contractor
20141211_NFRDSIS_DSR_53_1 Installation of Valves	Contractor fused the required lengths of pipe so as to install the valves as commented on previous shifts. **CLOSED**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, pipeline)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)

Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
The Contractor completed the mobilization of pipes to its final location (**Photos 5, 6, 8** and **9**). Then, started levelling and moving the pipeline so it will be at the intended location (adjacent to the existing pipeline). As shown on **Photo 10**, some short sections of pipe presenting small bends or pipeline sections placed on top of snow piles were observed. This correction of these observations was not completed before the end of the shift. In addition, the Contractor installed the insulation at some joints along the pipeline. Note that the valves (**Photo 1**) and heated shelters for the valves were not installed before the end of the shift. At the workshop, the Contractor installed backup rings and stub ends (fused) to the HDPE tee (**Photo 2**). This HDPE tee will be used for the installation of an air release valve along the DR17 pipeline. Afterwards, the Contractor cleaned the workshop working area (**Photos 3** and **4**).

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Joan. Pipeline installation	
	Discussion and Recommendations	
	The Engineer observed some sections where the alignment of level of the pipeline should be slightly adjusted (**Photo 10**). Also, some metal straps that were damaged during the mobilization of pipes (**Photo 7**). The Engineer commented to the Contractor that some minor adjustments and repairs were required along the pipeline. In addition, commented that a site visit to observe the pipeline along the whole length was required to identify defects to be corrected.	
	Corrective Actions or Improvements	
	The Contractor did not complete the adjustment of level and position of the new pipeline before the end of the shift. This activity will continue during the next shift. A site visit to observe the pipeline is scheduled for Dec 14.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

2	Kim, John, Joan. HDPE Tee for the installation of valves	
	Discussion and Recommendations	
	The Contractor informed that 3 of the 4" x 2" tees ordered were made of steel (**Photo 9**). The other tee ordered, was made of HDPE DR17 (**Photo 2**). A steel tee was used for the installation of the drain valve along the DR11 HDPE pipeline section (valve installed close to the S-Wells area). The steel tee was used as the DR17 HDPE component was not suitable for the higher pressures expected along the DS section. It was agreed that the HDPE DR17 tee will be used for the installation of the last air valve (approximately at Stn. 1+350). Wildstone confirmed that there was no problem with the installation of the HDPE DR17 element for the air release valve along the HDPE DR17 pipes.	
	Corrective Actions or Improvements	
	Contractor installed the required stub ends and backing rings at the DR17 HDPE tee (**Photo 2**).	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
ID	**Summary *(time, personnel, work area and description)***	
3	John, Joan. Discharge of water into trench at downstream end of pipeline	
	Discussion and Recommendations	
	The Engineer noted that the last section of pipe was less than 20 m away from the trench were the water from the pipeline could be discharged. The Engineer commented that an additional section of pipeline should be added. If so, the end of the pipeline will be at the trench. The contractor commented that a section at the end will be installed so the water will be discharged on the trench.	
	Corrective Actions or Improvements	
	Contractor installed a section at the end of the pipe.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
4	John, Joan. Heated Shelters for valves	
	Discussion and Recommendations	
	The Contractor and Engineer visited the heated shelter on the existing pipeline. The presence of a thermostat to control the heater was noted. Also, a front door to provide easy access inside the shelter. Some of the details for the new heated shelters to be supplied and installed were commented. The Contractor informed that the details will be defined during the next day. The delivery of the shelters is expected at the beginning of next week.	
	Corrective Actions or Improvements	
	Contractor to complete the fabrication of the shelters and to install them in place.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they plan to complete the adjustments along the pipeline and complete the insulation of flanged connections. Also, to level the area around the valves so the heated shelters will be sitting on a flat and clean surface.

Photos:

Photo 1: 20141213_NFRDSIS_Pipeline_P455_Assembled air valves (3 units) and vacuum valve (1 unit)

Photo 2: 20141213_NFRDSIS_Pipeline_456_End stubs and backup rings being fused on the HDPE tee

Photo 3: 20141213_NFRDSIS_Pipeline_457_ Workspace at workshop bays 7 to 11

Photo 4: 20141213_NFRDSIS_Pipeline_P458_Some of the spare components at workshop bay 7

Photo 5: 20141213_NFRDSIS_Pipeline_P459_New pipeline along the existing pipeline_Looking N

Photo 6: 20141213_NFRDSIS_Pipeline_P460_Pipeline entering into the second crossing_Looking NW

Photo 7: 20141213_NFRDSIS_Pipeline_P461_Metal straps damaged during the mobilization of pipes

Photo 8: 20141213_NFRDSIS_Pipeline_P462_View of the pipeline bypassing the C-Can close to the second crossing_Looking N

Photo 9: 20141213_NFRDSIS_Pipeline_P463_Steel tee bolted to the pipeline for the installation of a valve. Note the existing pipeline at the right hand side_Looking N

Photo 10: 20141213_NFRDSIS_Pipeline_P464_Detail short bends along the pipeline_Looking SW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Partly cloudy	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141214	**Record #:**	*20141214_NFRDSIS_DSR_56*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -11.8 °C (Max = -5.5 °C; Min = -18.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20141210_NFRDSIS_DSR_50_2 Pipeline parts delivered to site (electrical)	No update. **OPEN**	Contractor
20141213_NFRDSIS_DSR_55_1 Pipeline adjustments	A visit was organized to observe the pipeline (refer to Communication 1). Contractor to correct the small issues observed during the visit. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)

Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, parked at Haul Road, dismantled, no activity)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
The Contractor and Engineer performed a site visit to observe the installed pipeline (refer to Communication 1). Wildstone corrected some of the issues observed during the visit, including the adjustment of the pipeline position to remove small bends and to ensure that it was not sitting on top of the existing pipeline. This activity was not completed before the end of the shift. In addition, the Contractor mobilized some sand and gravel to the all valve locations. The fill will be used to create a platform for the support of the valves and its shelters. Support from Tees was required to collect the sand from Borrow A, mobilize it to each valve location and place (**Photo 1**). Engineer estimated a total of 4 hrs to complete this activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	John, Joan. Pipeline visit. Correction of pipeline issues
	Discussion and Recommendations
	The Contractor and Engineer organized a site visit to observe the pipeline sections installed. The visit started at the upstream (US) end (connection to C-Can) and finalized at the downstream (DS) end (discharge to the trench). It is important to note that the section installed on slope was observed from the toe of the rockfill slope as it was unsafe to walk up and down. The rockfill slope was covered with snow. The section installed at the DS area (DSSC, DSAR and S-Wells area) was found to be properly installed. The main issues noted were the need of supports at the bottom of the rockfill slope to support the pipeline, the removal of the extra flume section, the anchoring of the pipeline and the installation of the shelter for the drain valve. More corrections were required along the US section, which goes from the top of the rockfill slope to the DS end of the pipeline. The alignment of the pipeline had to be corrected on various points to remove bends, ensure that it was properly levelled, and ensure that the pipeline was not sitting on top of the existing pipelines (**Photo 2**). The Engineer reminded that the Contractor shall avoid interferences with the existing pipeline. The adjustment of the

	thermocable channel position and the removal/replacement of broken steel traps were also required. At the crossings, the Engineer requested the Contractor to install a small piece of geotextile on the steel culvert not used to prevent the entrance of sediments. Finally, it was noted that the platform for the shelters to be installed were not completed. All the observations were communicated to Wildstone after the visit. In addition, the Engineer produced a list containing all the observations to record the issues commented. Wildstone commented that they will start correcting the issues immediately after the meeting.	
	Corrective Actions or Improvements	
	Wildstone started the correction of the issues observed by the Contractor and Engineer (**Photo 3**). The correction of all the issues was not completed before the end of the shift.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
2	John, Joan. Heated Shelters for valves	
	Discussion and Recommendations	
	The Contractor informed that the size of the heated shelter for the vacuum valve will be increased to provide easier access. As per the previous design, lifting the entire shelter was required for inspection of the valve. The new designed shelter will be bigger and a door will be provided for access. As commented during the previous shift, the installation of a thermostat to control the heater is recommended. The Contractor commented that this modification will not have an impact on schedule. The shelters will be constructed and installed at the beginning of next week (week starting on Dec 15). The Engineer commented that the size and characteristics of the shelters can be adjusted as required by the Contractor if Tees, as the final used of the system, was happy with the final shelter designed and installed.	
	Corrective Actions or Improvements	
	Contractor to comment on the characteristics of the shelters that will be installed.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
A	Sand and gravel	Front loader	Some sand and gravel was mobilized from BA to each and every valve location along the pipeline to create a platform for the valves and shelters.	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
Pipeline	Valves along pipeline	Front loader	Sand and gravel	BA	Wildstone placed four sand piles beside the pipeline. The piles were placed at each and every valve location. The sand will be used to create a levelled surface area prior to the installation of the valve timber supports and shelters.	1

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the next shift, the Contractor will continue correcting the issues observed during the site visit. In addition, they will continue connecting thermocable along the pipeline.

Photos:

Photo 1: 20141214_NFRDSIS_Pipeline_P465_Pile of sand and gravel beside an air release valve location. Note the existing pipeline at the right hand side of the new pipeline_Looking NW

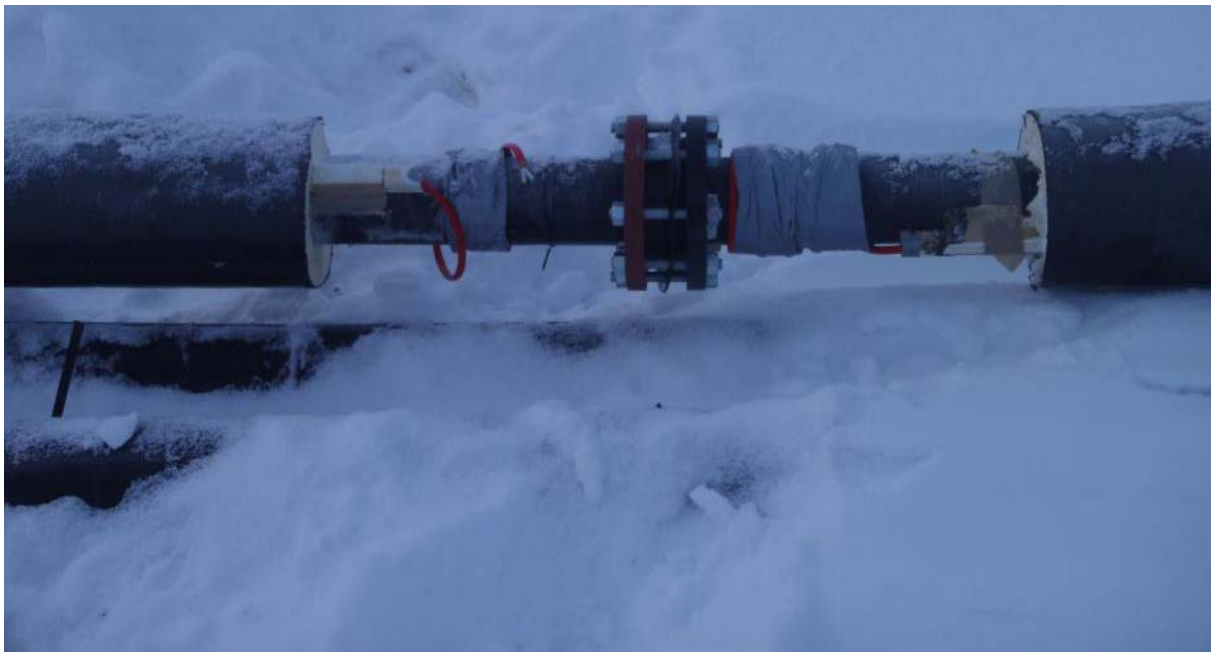

Photo 2: 20141214_NFRDSIS_Pipeline_466_New pipeline sitting on top of the existing pipeline

Photo 3: 20141214_NFRDSIS_Pipeline_467_Wildstone adjusting the location of the thermocable channel within the pipeline. Note the existing pipeline at the right hand side of the new pipeline_Looking NW

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Partly cloudy	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141215	**Record #:**	*20141215_NFRDSIS_DSR_57*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -6.0 °C (Max = -4.3 °C; Min = -7.7 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141210_NFRDSIS_DSR_50_2 Pipeline parts delivered to site (electrical)	The new splice kits were delivered to site. All the parts required to complete the installation are now on site. **CLOSED**	-
20141213_NFRDSIS_DSR_55_1 Pipeline adjustments	Contractor continued correcting the issues observed during the site visit. Not completed before the end of the shift. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road
Kyle Cresswell (Wildstone), Workshop, Haul Road
Jordan Charlie (Wildstone), Workshop, Haul Road
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator supplied by Wildstone (grey, workshop area, no activity)
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at BA, no activity)

Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #317, yellow, Haul Road, dismantled, demobilized)
Haul Truck (CAT 773B, #319, yellow, parked at Haul Road, dismantled, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity (**Photos 1** and **2**).
Downstream Seepage Collection (DSSC)
No activity (**Photos 1** and **2**).
Pipeline (PL)
Wildstone corrected some of the issues observed during the site visit on Dec 14. Some minor corrections could not be completed as the Contractor was focused on the fabrication and installation of shelters for the valves. As shown on **Photo 2**, the extra piece of flume was installed on top of the pipeline to provide additional protection in case of future earthworks in the vicinity of the first crossing. At the workshop bays 7 to 11, the Contractor fabricated the 5 shelters required for the protection of the valves installed along the line (**Photos 4**, **5**, **6** and **8**). As commented with Tees and YG (refer to Communication 1), two different kind of shelters will be constructed. Four (4) small shelters were constructed for the 3 air release valves and the drain valve. A bigger shelter was constructed for the vacuum valve installed after the first crossing (**Photo 9**). Contractor completed the fabrication of the wooden boxes and the boxes were mobilized to the final intended location (**Photo 10**). The installation of all the shelters, including insulation and the assembly of the valve, could not be completed before the end of the shift.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	John, Joan. Shelters for valves installed along the pipeline
	Discussion and Recommendations
	The Contractor informed that the design for the shelters was commented with Tees (Boyd). Tees validated both the dimensions and characteristics. As a second stage, the Contractor informed YG that smaller shelters will be installed at the air valves and the drain valve. Also, that a bigger heated shelter will be installed at the vacuum valve. The Engineer noted the comments. Also, requested some additional information regarding the big shelter for the vacuum valve. The Contractor explained that a front door will be provided for access, insulation material will be fixed on the wooden walls and a ceramic heater will be installed inside. Also, informed that the fabrication and installation will probably completed before the end of the following shift.

	Corrective Actions or Improvements	
	Contractor fabricated the 5 shelters at the workshop bays 7 to 11 (**Photo 9**). The shelters were constructed by cutting and assembling wooden boards. In parallel, timber supports for the pipes and valves were also fabricated at the workshop. Afterward, the Contractor mobilized the completed wooden shelters to the final installation location (**Photo 10**).	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
2	John, Joan. Electrical installation	
	Discussion and Recommendations	
	The Contractor informed that the electrical subcontractor will not arrive to the Faro Mine site before the end of the shift. Nuline informed that they will be on site on Tuesday (Dec 16). The Engineer and Contractor commented the activities to be completed by Nuline (**Photo 7**). Then, commented that the late mobilization will not cause any delay on Wildstone's schedule. Wildstone will be working on the shelters for the pipeline valves during the whole shift. The Contractor and Engineer commented that Nuline will probably complete the electrical works on Wednesday (Dec 17).	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the next shift, the Contractor will complete the installation of the shelters for the pipeline valves. If possible, they will complete the correction of all the remaining activities and demobilize.
- Nuline will be mobilized during the next shift to complete the connection of thermocable sections, install the control boxes, sensors and other required components (**Photos 7** and **8**).
- No support from Tees will expected for the remaining of the activities to be completed.
- CAT 773B Haul Truck #317 was demobilized during the afternoon.
- Wildstone's light tower was demobilized at the end of the shift.

Photos:

Photo 1: 20141215_NFRDSIS_DSSC_P468_General view of the DS area. Note the pipeline end at the C-Can location_Looking SW

Photo 2: 20141215_NFRDSIS_Pipeline_469_Extra section of flume installed on top of the pipeline to protect it from any future activity at the western side of the pipeline (earthworks)_Looking SW

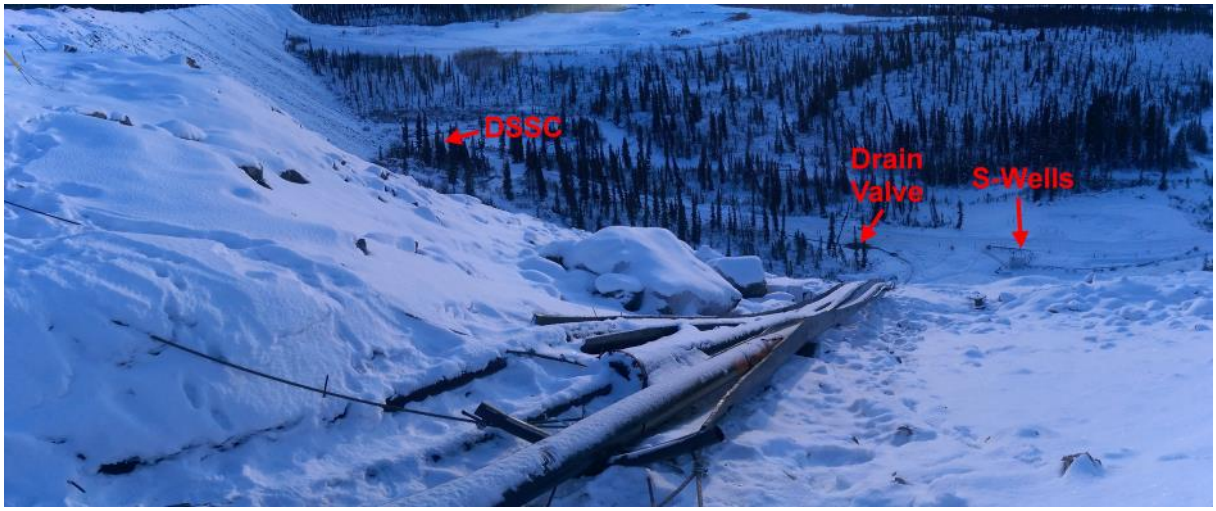

Photo 3: 20141215_NFRDSIS_Pipeline_470_View of the DR11 HDPE pipeline section from the top of the rockfill slope to the C-Can_Looking SE

Photo 4: 20141215_NFRDSIS_Pipeline_471_Sand and gravel platform for the heated shelter to be installed on top of the vacuum valve_Looking NE

Photo 5: 20141215_NFRDSIS_Pipeline_472_Sand and gravel platform for the shelter to be installed on top of the air release valve_Looking W

Photo 6: 20141215_NFRDSIS_Pipeline_473_Sand and gravel platform for the heated shelter to be installed on top of the air release valve at the highest point along the pipeline_Looking W

Photo 7: 20141215_NFRDSIS_Pipeline_474_Thermocable connection and insulation missing at flanged connection_Looking W

Photo 8: 20141215_NFRDSIS_Pipeline_475_Sand and gravel platform for the heated shelter to be installed on top of the last air release valve along the pipeline_Looking E

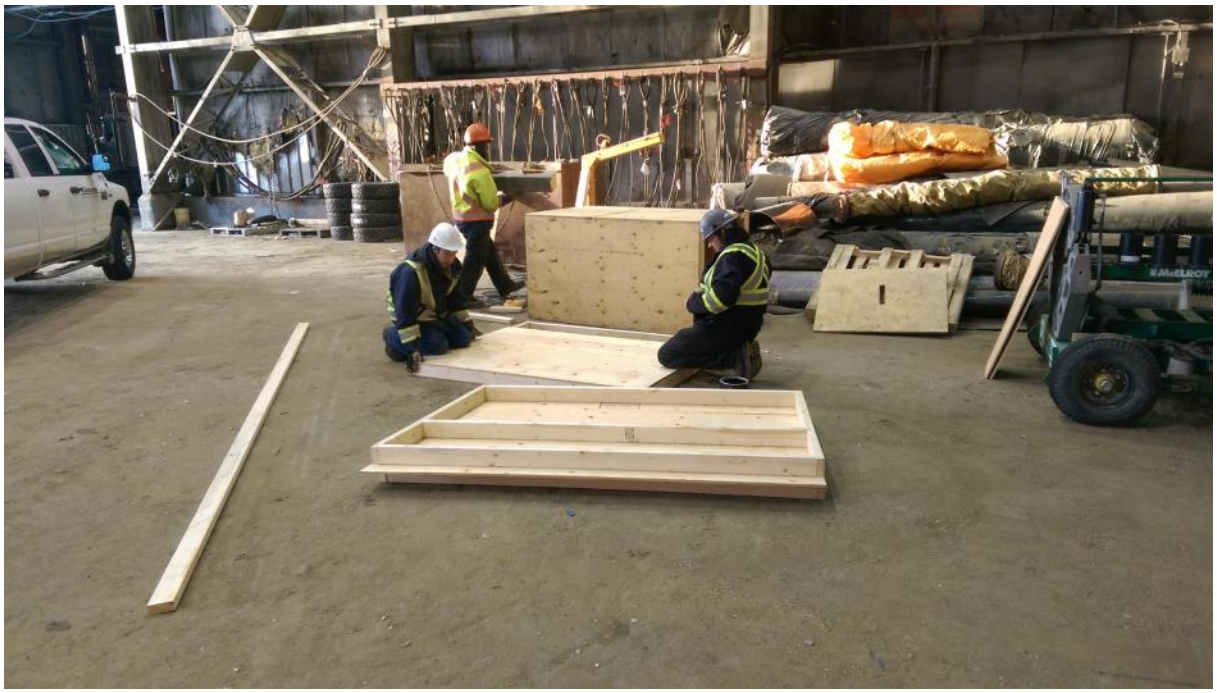

Photo 9: 20141215_NFRDSIS_Pipeline_476_Assembly of wooden panels for the shelter to be installed at the vacuum valve location_Workshop bay 7

Photo 10: 20141215_NFRDSIS_Pipeline_477_Wooden shelter installed at the air release valve location. Note that this is the highest point along the pipeline_Looking S

BGC ENGINEERING INC.
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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:15 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141216	**Record #:**	*20141216_NFRDSIS_DSR_58*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -8.7 °C (Max = -5.9 °C; Min = -11.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20141213_NFRDSIS_DSR_55_1 Pipeline adjustments	Contractor corrected the issues observed during the site visit. **CLOSED**	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Kim Field (Wildstone), Workshop, Haul Road, DSAR
Jerry Boss (Nuline), Workshop, Haul Road, DSAR. Mobilized before noon.
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at Haul Road, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)
Haul Truck (CAT 773B, #319, yellow, Haul Road, demobilized)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
Wildstone corrected the issues observed during the site visit on Dec 14. Then, continued with the remaining of the activities, including the insulation of flanged joints and the installation of shelters at valve locations (**Photo 4**). In parallel, Nuline continued connecting thermocable lengths at flanged joint connections (**Photo 5**). The Engineer noted that the ends of the spare culvert at the crossings were not covered by the Contractor. The Engineer recommended that the ends should be covered to prevent the access of sediment. At the workshop, the Contractor cleaned the work area and mobilized spare parts to the designated locations (**Photo 6**). Pipe sections and other big parts were stockpiled at the Haul Road (beside the corrugated 600 mm diameter HDPE pipes). The smaller parts, such as bolts, nuts, thermocable or backup rings, were placed inside the workshop.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	John, Joan, Boyd. Pipeline installation
	Discussion and Recommendations
	The Engineer and Contractor commented some aspects of the pipeline installation with Tees. The following points were discussed: • Both Tees and the Contractor recommended that no piles of fill should be placed on top of the pipeline to anchor it. The main reason was that the pipeline was installed on top of the snow so it will probably move when the snow will melt. They commented that piles will not allow the pipe to accommodate on the ground. The Engineer commented that the piles could be installed when the snow will melt. Tees commented that the piles should not be installed at any stage as they cause problems during the maintenance of the pipes. The Engineer commented that the installation of the piles was recommended by BGC. The Engineer noted that a discussion with BGC (designers) and YG was required before the decision on the piles could be taken. • Tees commented that the alignment of the installed pipeline was appropriate. Also, noted that the section along the S-Wells area was strange. The Engineer explained that it was installed separate to the S-Wells area so as to avoid interferences. The presence of the new pipeline could affect any works/maintenance to be performed on that area. • Tees commented that the discharge point (pipeline downstream end) at the trench beside the road to the Faro pit was appropriate. • Tees commented that the shelters installed along the pipeline to protect the valves were

	appropriate. The Engineer noted that the shelter for the vacuum valve was still incomplete (**Photos 1**, **2** and **3**).	
	Corrective Actions or Improvements	
	• Engineer to comment with BGC and YG the need of fill piles to anchor the pipeline. • Contractor to complete the installation of the shelters, including the installation of a heater inside the vacuum valve shelter.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
2	John, Joan. Wildstone demobilization	
	Discussion and Recommendations	
	The Contractor informed that Wildstone will demobilize at the end of the shift. The Engineer noted that there still were some activities to be completed, such as the insulation of some joints or the completion of the heated shelters. The Contractor informed that Pelly personnel will complete the remaining of the activities as they were minor and did not require a pipeline specialist. The Engineer commented that Pelly is the responsible for the delivery of the Pipeline in time (Dec 19) and according to Drawings and Specifications. As this work was contracted as a Lump Sum, the Engineer had no input on the mobilization or demobilization of subcontractors unless this could have an impact on the final completion date or the quality of the works delivered.	
	Corrective Actions or Improvements	
	Contractor to continue with pipeline construction.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	John, Joan. Control panels for thermocable	
	Discussion and Recommendations	
	The Contractor informed that the panels to control the thermocables could not be installed until the electrical panels and other electrical components will be supplied. Also, that the installation of sensors (grey and red) is not recommended until the control box is installed. The main reason is that the cables will be exposed and they can be damaged (moist, animals, etc.). In addition, there was no power to verify that the sensors were properly installed. The Engineer noted the comment from the Contractor. Also, commented that YG will be notified to see if this was in line with their expectations.	
	Corrective Actions or Improvements	
	Engineer to comment the installation of control boxes with YG	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
4	John, Joan. Redundant anchor for the pipeline	
	Discussion and Recommendations	
	The Contractor informed that a new clamp will be installed on top of the rockfill slope to anchor the pipeline. Steel cables will be installed to secure the clamp to the steel poles at the top of the slope. The Contractor noted that the pipeline was already anchored with a clamp	

	(located downstream to the steel culvert on the first crossing). This new clamp will be installed to provide a second anchor point in case of a failure. The Engineer noted the comment from the Contractor, and commented that it was a good measure to provide a redundant anchor point for the pipeline (extra safety).	
	Corrective Actions or Improvements	
	Contractor to install the new clamp	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
5	John, Joan. New pump to feed the manhole at the DSSC area	
	Discussion and Recommendations	
	The Engineer informed that YG has approved the installation of a short section of 4" HDPE heat traced pipe to feed the manhole with water. The new pipe will go from a new pumping location located 5 m downstream to the NF2A sampling point to the manhole at the DSSC area. The Engineer noted the following: a. A 23 m long section of 4" HDPE insulated pipe is required. It will be installed from the existing manhole to the new pumping location. The pipe will have a stub end and a backup ring at one of the ends. No flanged connection is required at the other end. b. The Engineer noted that Wildstone left a fused HDPE pipe (47 m long) with insulation at the DSAR area. Also, that a stub end and backup ring was already installed at one of the ends. This pipe section could be cut to the required length (23 m) and then dragged to the intended location. There was no need for the fusing of pipes or the installation of stub ends and backup rings as it was already available. c. The new pipe section shall be installed so the flanged end was at the new pumping location. The other end will be facing the manhole. The execution of a hole on the manhole wall will be required to insert the pipe and discharge water into the manhole. d. The installation of thermocable inside the new pipe section will be required. The new thermocable will be connected to the thermocable on the pipeline recently installed (at the C-Can end). Therefore, a new splice kit will be required. Then, an end termination for the thermocable should be installed at the pump end. e. The Engineer noted that there were spare connection kits available so there was no need to supply a new one. Also, that no additional end termination kit will be required as the termination that was supposed to be installed at the C-Can thermocable end will now be installed at the thermocable pump end (same activity but at a different location). f. A 1.3 horse power pump (230V, 5.6A) will be supplied by Tees (**Photo 10**). Power will be supplied from the C-Can. The addition of a plug or the connection into the electrical panel will be required. g. The pump will be connected to the new pipe with a flexi pipe. The flexi pipe will have a cam lock at one end for the connection with the pump (**Photo 9**). At the other end, the installation of a threaded needle (**Photo 7**) and a threaded backup ring (**Photo 8**) will be required. The flexi pipe and the new pipe will be connected with bolts and nuts.	

	h. The Engineer noted that the required flexi pipe, threaded needle, threaded ring, cam lock and other parts will be supplied by Tees to prevent any delays caused by the ordering and delivery process. The Engineer commented that the final installation will be a field fit as directed by the Engineer on site. Also, that it should be completed in the following shifts as this system has to be in place before the unloading of the C-Can.	
	Corrective Actions or Improvements	
	Contractor to install the new pipeline section and connection elements for the new pump.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the next shift, the Contractor will complete the installation of the valves, connect the remaining of the thermocable connections and anchor the pipeline with a clamp. If possible, the Contractor will install the new section of pipe and connect the thermocable.
- Wildstone was demobilized at the end of the shift (refer to Communication 2).
- CAT 773B Haul Truck #319 was demobilized during the afternoon.

Photos:

Photo 1: 20141216_NFRDSIS_DSSC_P478_Shelter at the vacuum valve location installed downstream to the first crossing_Looking NE

Photo 2: 20141216_NFRDSIS_Pipeline_479_Detail of the shelter at the vacuum valve location. Note the insulation attached to the wooden walls and door

Photo 3: 20141216_NFRDSIS_Pipeline_480_Steel tee for the assembly of the vacuum valve. Note the thermocable terminations at the tee.

Photo 4: 20141216_NFRDSIS_Pipeline_481_Insulation being installed at a flanged connection

Photo 5: 20141216_NFRDSIS_Pipeline_482_Thermocables being connected at a flanged connection

Photo 6: 20141216_NFRDSIS_Pipeline_483_Wildstone cleaned workshop bay 7

Photo 7: 20141215_NFRDSIS_Pipeline_484_Threaded needle available on site

Photo 8: 20141215_NFRDSIS_Pipeline_485_Threaded backup ring assembled on the needle

Photo 8: 20141215_NFRDSIS_Pipeline_486_Flexi pipe with cam lock available on site

Photo 10: 20141215_NFRDSIS_Pipeline_487_Pump available on site. Note the plug at the bottom right corner

BGC ENGINEERING INC.
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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141217	**Record #:**	*20141217_NFRDSIS_DSR_59*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

YG personnel on site and time present: D. Rainey, C. Brassard

Mean daily temperature at the Faro Airport: -14.2 °C (Max = -11.1 °C; Min = -17.2 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141216_NFRDSIS_DSR_58_1 Pipeline installation	As per conversations with YG, the installation of fill piles to anchor the pipeline can be postponed. Tees will decide if they need to install the piles at a later stage. BGC noted that the installation of the piles to anchor the pipes is recommended. **CLOSED**	Contractor
	Contractor to complete the installation of the shelters. **OPEN**	
20141216_NFRDSIS_DSR_58_3 Control boxes for thermocable	The Engineer commented with YG (refer to Communication 1). **CLOSED**	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road
Jerry Boss (Nuline), Workshop, Haul Road, DSAR. Demobilized at the end of the shift

Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at Haul Road, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity (**Photo 1**).
Downstream Seepage Collection (DSSC)
The Engineer visited the area with YG to observe the conditions within NF2A and to comment the details of the DSSC installed. In addition, the characteristics of the new pumping system to be installed to feed the manhole were also discussed (refer to Communication 3).
Pipeline (PL)
The Contractor installed the air release valves and the vacuum valve at the required locations (**Photos 5** and **6**). Also, completed the mobilization of spare parts to the workshop or Haul Road stockpile area. The steel anchor cables to anchor the new pipeline clamp were cut to the required length. The installation of the clamp will be completed on the following shift (**Photo 1**). Nuline completed the connection of thermocable sections, including the termination at each circuit end and the connections for the new section of thermocable at the DSSC area. Nuline demobilized at the end of the shift (refer to Communication 2). Tees collected and pre-assembled all the parts that will be required for the completion of the new pumping system at the DSSC area (**Photo 3**). The Contractor will complete the assembly of the required parts at the DSSC area during the following shift.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	Chad, Joan. Control panels for pipeline.
	Discussion and Recommendations
	The Engineer informed that the electrical panels were not on site as their supply was part of the following electrical installation stage. According to the available information, Nuline was currently building the electrical panels at their workshop in Whitehorse. The Engineer noted that Nuline recommended that the control boxes and sensors for thermocable circuits should be installed at a later stage. The main reason was that the electrical panels were not on site. Therefore, the control boxes will be sitting on the ground if installed. Also, Nuline commented that two first control boxes are not on site as they are installed inside the C-Can. As the C-Can was not on the field, the sensors and cables could not be connected and they will be exposed. There was a risk that the electronic components

	inside the boxes and exposed cables will be damaged (moist, animals, etc.). The Engineer informed that, based on Nuline's comments, the Contractor decided to postpone the installation of the sensors and the two available control boxes. The Contractor commented that they will install when the electrical panels will be on site.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
2	John, Joan. Nuline demobilization	
	Discussion and Recommendations	
	The Contractor informed that Nuline will demobilize at the end of the shift. The Engineer noted that some activities were not completed (refer to Communication 1). The Contractor informed that those parts will be completed when the electrical parts and definitive power will be available. Also, commented that those parts could be installed really fast (an hour?), so there will not be impact on the electrical installation schedule. For the avoidance of any doubt, the Engineer noted that the installation of the remaining components was part of this stage so they were included on the lump sum. Thus, no extension of budged will be accepted.	
	Corrective Actions or Improvements	
	Contractor to install the sensors, control boxes and associated parts.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	Joan, Chad. New pumping location. DSSC	
	Discussion and Recommendations	
	A visit to observe the conditions at within the NF2A and collection system was organized. Water flowing under the ice at NF2A-2, NF2A and NF2 sampling points was observed. The location for the new pump was discussed. Based on the information provided by Erik, the deepest section of the channel is located close to the end of the island (close to the orange topographic marks on **Photo 2**). The Engineer noted that, as discussed with Dustin on a previous site visit, there is a sand and gravel bank at the end of the island. The bank is extending DS to the island so there is area in between NF2A and NF2B that is shallower. There is a chance that this area immediately downstream to the island could be frozen to ground. As a result, the water from NF2A is probably merging to NF2B flow further downstream. Therefore, there was lower risk of backflow into the new pump if installed at the deepest section. The deepest section seems to be the best location for the new pump (5 m downstream to NF2A).	
	Corrective Actions or Improvements	
	Engineer to confirm pumping location to Contractor (5 m downstream to NF2A).	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

4	John, Joan. New pipeline section from the manhole to the new pump at the DSSC area.	
	Discussion and Recommendations	
	The Contractor informed that Nuline has mobilized the thermocable to the DSSC area. The new thermocable section was connected to the existing pipeline (C-Can pipeline end connection). Then, an end termination kit was used to terminate the thermocable end. The Contractor informed that the installation of the pipeline/pump parts will be completed during the following shift (Dec 18). The Engineer noted that Tees's personnel cleaned and tested the new pump. Tees informed that the pump was working properly. In addition, the Engineer commented that Tees prepared all the required parts at the workshop (**Photo 3**). A tripod was constructed by Tees so the pump could be suspended with a cable once the ice on the hole is drilled. The Contractor will only have to collect the parts and assemble them at the required position.	
	Corrective Actions or Improvements	
	Contractor to install the new pipeline section and connection elements for the new pump.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the next shift, the Contractor will complete the installation of the new clamp to anchor the pipeline and install the new section of pipe at the DSSC area.
- Nuline was demobilized at the end of the shift (refer to Communication 1).

Photos:

Photo 1: 20141217_NFRDSIS_Pipeline_P488_View of the pipeline along DSAR_Looking S

Photo 2: 20141217_NFRDSIS_DSSC_489_View of orange topographic at NF2A channel_Looking N

Photo 3: 20141217_NFRDSIS_DSSC_490_Parts required to complete the installation of the new pipeline section from the manhole to the new pump location_Workshop

Photo 4: 20141217_NFRDSIS_Pipeline_491_Shelter for the drain valve at the lower point along the DSAR (close to S-Wells area)_Looking NE

Photo 5: 20141217_NFRDSIS_Pipeline_492_Air release valve installed at the highest point along the pipeline. Note the timber supports for the pipeline_Looking W

Photo 6: 20141217_NFRDSIS_Pipeline_493_Vacuum valve installed inside the shelter_Looking SE

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	2:30 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	Pipeline	
Date:	20141218	**Record #:**	*20141218_NFRDSIS_DSR_60*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -15.2 °C (Max = -19.5 °C; Min = -23.7 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141216_NFRDSIS_DSR_58_1 Pipeline installation	Contractor to complete the installation and testing of control boxes, sensors, heater and other elements that could not be completed. The Contractor postponed these activities as no electrical panels or power were available. **OPEN**	Contractor
20141217_NFRDSIS_DSR_59_2		
20141217_NFRDSIS_DSR_59_3	Engineer confirmed that the pumping location will be at the deepest channel section within NF2A. This section is located 5 m downstream to NF2A sampling location, and 23 m away from the manhole location (measured along the stream). **CLOSED**	-

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road, DSSC

Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at BA, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at Haul Road, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at BA, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Contractor installed the new section of pipe at the DSSC area, from the manhole to the new pumping location. The installation of the new pipeline and pumping elements could not be completed before the end of the shift (Refer to Communication 1).
Pipeline (PL)
The Contractor installed a new clamp on the pipe to provide a redundant anchor point. The anchor was installed on the pipe, and then anchored to the steel piles at the top of the rockfill slope by means of steel cables.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. Installation of a section of pipe for the new pump. DSSC
	Discussion and Recommendations
	The Contractor started the installation of the new sort section of pipeline from the manhole to the intended pumping location. The Engineer noted the following observations: • The available insulated 4" DR11 HDPE pipe section was mobilized to the intended location. Then, the pipe was cut to the required length with a saw. • The installation of the thermocable spliced by Nuline on the previous shift could not be completed. The protection for the spliced connection installed by Nuline was too big so the Contractor could not insert the thermocable into the insulated pipe. In addition, Tees recommended that the Contractor should not leave spliced joints inside a covered (insulated) section of pipe. The main reason was that Tees will not be able to observe the splice in case of a malfunction. The Contractor postponed the installation of the thermocable until Nuline will be re-mobilized (Jan 2015). • A short section of flexible hose and clamps will likely be required for the final connection between the new pipe and the manhole. The insulated pipe was too rigid and the curve to avoid the C-Can skids was too tight. The Contractor commented that the required parts were available on site so the final installation could be completed really fast. The Engineer reminded that the installation of the different parts, including the pump, flexi

	pipes, tripod to support the pump, thermocable and connection to manhole, shall be completed before the arrival of the C-Can. The required elements as well as the activities to be performed were commented to ensure that the Contractor had a good understanding to effectively plan the works.	
	Corrective Actions or Improvements	
	Contractor to complete the installation of the new pump and pipe at the DSSC before the delivery of the C-Can.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
2	John, Joan. Demobilization.	
	Discussion and Recommendations	
	Based on the available information, there won't be work on site until the execution of the electrical installation, the upgrade of the existing overhead transmission line or the delivery of the C-Can. Both the Contractor and the Engineer demobilized from site at the end of the shift (2:30 pm). The Engineer reminded that the completion of the pending activities will have to be completed at the beginning of January 2015. The Contractor should contact YG to define the schedule of the works during January 2015.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor and the Engineer demobilized at the end of the shift.
- The Contractor did not complete the demobilization of all the equipment parked at the Haul Road. The Contractor will resume this activity in January 2015.

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	Overhead Power Line	
Date:	20150106	**Record #:**	*20150106_NFRDSIS_DSR_61*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -35.3 °C (Max = -32.6 °C; Min = -37.9 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	Construction activities were suspended at 12:30 pm as per conversations with YG. Construction resumed at 2:50 pm once YG informed that the required documentation was signed by both Pelly and YG.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141216_NFRDSIS_DSR_58_1	Installation of some pipeline parts to be completed. No update. **OPEN**	Contractor
20141217_NFRDSIS_DSR_59_2		
20141218_NFRDSIS_DSR_60_1	Contractor to complete the installation of the new pump and pipe at the DSSC before the delivery of the C-Can. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Workshop, Haul Road, DSSC
Danny Manuel (Nuline), Workshop, Haul Road, DSSC
Dustin Elliott (Nuline), Workshop, Haul Road, DSSC
Gary Drinnan (Nuline), Workshop, Haul Road, DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at Workshop bay 11, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at Workshop bay 11, no activity)

Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Engineer visited the area to observe the conditions within the NF2A channel and water collection system. No major changes were observed on the diversion channel (**Photo 5**), NF2A channel (**Photo 6**) or emerging points at the toe of the rock drain (**Photo 7**). The Engineer recorded that the flow rate observed through the sampling hole in front of NF2A-2 emerging point decreased since December 18, 2014. In addition, the Engineer observed that the Contractor modified the short length of pipe from the manhole to the new pumping location. A 90^{o} elbow was fused to create an "L shape" as the bending radius for the pipe was too wide and the Contractor could not complete the installation of the pipe at its intended location (**Photo 5**).
Pipeline (PL)
No activity.
Overhead Power Line (OPL)
Pelly, Nuline, Tees (Ray) and BGC visited the site to comment on the location for the new power poles to be installed (see Communication 1). Afterwards, Nuline mobilized the new poles to the intended location (**Photos 2** and **4**). Then, a Tees's excavator started digging a hole at the Haul Road crossing (brown shack area) for the installation of a pole. This activity could not be completed before the end of the shift as the ground was frozen (low excavation rate).

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	John, Danny, Dustin, Gary, Ray J. (Tees), Joan. Site Visit. Overhead Power Line
	Discussion and Recommendations
	A site visit was organized to comment on the activities to be performed by Nuline, including but not limited to the installation of new power poles. The schedule of the works was commented to identify the need for Tees's equipment and the timing for a power outage to upgrade de existing 69 kV overhead power line. During the visit, the Engineer noted that Nuline did not submit a design for the electric installation. Nuline informed that John Seeheaver will be on the field during the following shift so he will be able to provide details. It was noted that some activities could not be started until the design is submitted for approval. The location for the new poles was discussed as follows:

	• A new pole is required at the DS area (close to the C-Can location). A space adjacent to the pole is required for the new transformer to be installed. Nuline informed that a cement pad will be installed. The details (dimensions) for the pad were not available at the time of the visit. The most reasonable location seems to be the area immediately North to the DSAR road, adjacent to Borrow B1 (**Photo 1**). No support from Tees is expected as Nuline will drill a hole for the pole with an auger. • A pole at the Southeastern side of the Haul Road will be required. This pole will be aligned with the one installed at the DS area (as per the point above). Support from Tees will be required (excavator) to move material from the berm and dig a hole on the frozen ground. Nuline noted that the anchor lines for this pole will be on the Haul Road. The presence of a monitoring well very close to the intended location for the anchor lines was observed by the group. Tees commented that the well was already reducing the traffic width on that section so the installation of the new anchors should not be a problem. The Engineer noted that this observation was already commented during a site visit organized with Tees, Pelly and Nuline to comment on the installation of the poles and upgrade of the existing power line. • A pole close to the Haul Road crossing (brown shack) is required to cross the road. The location of the pole was discussed taking into account the existing poles and anchor lines, the existing heat traced pipelines and the available parts (**Photo 3**). The most suitable location was identified and marked on the ground. Support from Tees will be required (excavator) to dig a hole on the frozen ground. • A pole close to the second crossing will be required. Nuline could not present details of the design at that area so the decision on the suitable location for the new pole was postponed. Support from Tees (excavator) will likely be required to dig a hole on the frozen ground. According to the Contractor, the plan is to start with the mobilization and installation of poles. Then, install the new cables from the top of the Haul Road to the DS area. At a later stage, the existing 69 kV overhead line will be upgraded and the new cables installed. The installation of transformers and the remaining of the elements will be completed at a final stage.
	Corrective Actions or Improvements
	Contractor to complete the installation of poles at the first crossing and the Southeastern side of Haul Road. The approval of Nuline's designs is required before the location for the rest of the poles could be defined. Nuline to issue the overhead power line design for approval.
	Status at the end of the shift (Open, Closed or N/A) — **OPEN**
2	John, Joan. Pelly Supervision
	Discussion and Recommendations
	The Contractor informed that John will not be on the field during the following shift. No Pelly supervisor will be on the field as Pelly was not able to find a replacement for John in time. The Engineer noted the comment and requested Pelly to inform YG (Chad). Also, requested Pelly to comment with Nuline all the activities to be completed by Nuline during the following shift.

	Corrective Actions or Improvements	
	Contractor to inform YG and to comment with Nuline the activities to be completed during the following shift.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
Haul Road	First crossing (brown shack)	Excavator (Tees)	Contractor created an access to the intended location for the new power pole. Then, started digging a hole in the frozen ground.	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor will continue with the installation of power poles at the Haul Road. If possible, they will start with the upgrade of the existing power line.
- The Engineer observed the new 500 kVA transformed delivered to site on December 2014. No damage was observed on the transformer walls and top cover (**Photos 8** and **9**).

Photos:

Photo 1: 20150106_NFRDSIS_Power Line_494_Proposed location for transformer pad and power pole_Looking SW

Photo 2: 20150106_NFRDSIS_Power Line_495_Power pole mobilized to the DS area_Looking N

Photo 3: 20150106_NFRDSIS_Power Line_496_Visit to comment of the location of the pole to be installed at the first crossing (brown shack)_Looking NW

Photo 4: 20150106_NFRDSIS_Power Line_497_Nuline unloading a power pole at the first crossing (brown shack)_Looking NW

Photo 5: 20150106_NFRDSIS_DSSC_498_Detail of the 90^{o} elbow fused at the curve_Looking SW

Photo 6: 20150106_NFRDSIS_DSSC_499_View of NF2A sampling point and new pumping location_Looking NE

Photo 7: 20150106_NFRDSIS_DSSC_500_View of DSSC area_Looking E

Photo 8: 20150106_NFRDSIS_Power Line_501_Front panel of the 500 kVA transformer delivered

Photo 9: 20150106_NFRDSIS_Power Line_502_Back panel of the 500 kVA transformer delivered

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	Overhead Power Line	
Date:	20150107	**Record #:**	*20150107_NFRDSIS_DSR_62*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -32.5 °C (Max = -29.9 °C; Min = -35.0 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	• Nuline and Tees prepared a protocol for the power outage and the upgrade works on the existing 69 kV overhead power line. A copy of the protocol prepared has been attached at the end of this document (**Attachment 1**). • Nuline completed the upgrade of the existing 69 kV overhead power line by means of an elevating work platform. All personnel were equipped with the required PPE, including harnesses that were secured to the elevating work platform or wooden pole. In addition, equipotential grounding cables were installed prior to the execution of any work on the power lines.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141216_NFRDSIS_DSR_58_1	No update. **OPEN**	Contractor
20141217_NFRDSIS_DSR_59_2		
20141218_NFRDSIS_DSR_60_1	No update. **OPEN**	Contractor
20150106_NFRDSIS_DSR_61_1	Nuline to issue the overhead power line design for approval. **OPEN**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Danny Manuel (Nuline), Haul Road, DSAR

Dustin Elliott (Nuline), Haul Road, DSAR
Gary Drinnan (Nuline), Haul Road, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at Workshop bay 11, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at Workshop bay 11, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
No activity.
Overhead Power Line (OPL)
Tees and Nuline prepared a procedure for the power outage and upgrades on the existing 69 kV overhear transmission line (see Communication 1 and **Attachment 1**). Once the line was de-energized, Nuline completed the upgrade of the existing line by raising the two lower cables at each 69 kV pole location (**Photo 6**). In order to do it, a new arm with two plastic insulators was installed at each pole upgraded (**Photo 4**). As commented on Communication 2, the upgrade was completed on the first three poles from the Haul Road crossing (**Photos 3** and **5**). This activity was completed in 1 hour and 15 minutes (not including de-energizing and re-energizing of the 69 kV line). In addition, two new arms were installed on the existing 69 kV pole located at the Haul Road crossing (**Photo 1** and **3**). These arms will be used to support the new cables to be installed by Nuline. It is important to note that the 69 kV line was not re-energized by Tees before the end of the shift. Nuline (Tees's excavator) continued with the excavation for the new poles to be installed. The Contractor completed the excavation at the Haul Road crossing (brown shack) and installed the new pole (**Photos 3** and **7**). Note that the anchor lines were not installed before the end of the shift so the verticality of the pole could not be adjusted. At the Southwestern side of the Haul Road, the Contractor completed the excavation for the pole on top of the Haul Road (**Photos 5**, **8** and **9**). The location for this pole was selected by Nuline taking into account the location for the new pole at the DS area. Note that the pole on top of the Haul Road was not installed before the end of the shift. Finally, the Contractor installed a diagonal pole to support the second 69kV pole (**Photo 8**). This diagonal support pole was required at the Southwestern side of the pole to prevent the pole from tilting when the new cables will be installed.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	Dan, Joan. Upgrade of the existing 69 kV overhead transmission line.	
	Discussion and Recommendations	
	Nuline informed that a power outage was scheduled with Tees to complete the upgrade of the existing 69 kV overhead transmission line. The Engineer reminded to Pelly that John G. was not present on site and that no designs were submitted by Nuline for approval. Further, no HASP had been submitted to the Engineer. As per previous conversations with YG and Pelly, no critical activities should be performed until John G. will return to site. After conversations with YG, the Engineer commented to Pelly that this activity should be postponed until all documentation is available and a Pelly supervisor is on site. The Contractor noted the comments and recommendations made by the Engineer. In addition, commented that the HASP is available. According to the Contractor, a hard copy of the HASP will be delivered by John Seeheaver during the site visit. The Contractor informed that Pelly decided to continue with the execution as planned. As commented with YG, the Engineer notified to Pelly that they were continuing at his own risk.	
	Corrective Actions or Improvements	
	Contractor to submit HASP and designs for the execution of the overhead transmission line and the upgrade of the existing transmission line. In addition, the Contractor should prepare a protocol for the upgrade of the existing overhead transmission line to ensure that the power outage is satisfactorily completed before they start any activity on the line.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
2	Danny, Joan. Upgrade of the existing 69 kVA transmission line	
	Discussion and Recommendations	
	The Contractor informed that the upgrade of the existing transmission line will only take place on the first three 69 kV poles from the Haul Road crossing (**Photos 3** and **5**). As a result, three poles were only upgraded. According to Nuline, the upgrade of the fourth pole is not required as the new pole to be installed on top of the Haul Road (at the Southwestern side of the Haul Road) is aligned with the second 69 kV pole. The initial though was that the new pole will be close to the third 69 kV pole so the upgrade of the fourth pole will also be required. The Engineer noted the comment from Nuline.	
	Corrective Actions or Improvements	
	Nuline to comment this information with Pelly.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
Haul Road	First crossing (brown shack)	Excavator (Tees)	Contractor completed the excavation for the new pole and the pole was installed.	3
Haul Road	Existing 69 kV poles to be upgraded	Excavator (Tees)	Contractor removed the berm in front of the existing poles to provide access for the elevating work platform.	4, 5, 6
Haul Road	Southwestern side of Haul Road. Aligned with the C-Can and second 69 kV pole	Excavator (Tees)	Contractor excavated a hole in the berm in order to install a new pole. The excavation was completed but the pole was not installed.	5, 8, 9
Haul Road	Northeastern side of Haul Road. Aligned with the C-Can and second 69 kV pole	Excavator (Tees)	Contractor excavated a hole for the installation of a diagonal support pole for the existing 69 kV pole. The excavation was completed and the diagonal pole installed.	8

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor will continue with the installation of power poles at the Haul Road. If possible, they will start installing electrical cables on the poles.

Photos:

Photo 1: 20150107_NFRDSIS_Power Line_503_New arms (2) installed at the existing 69 kV pole located at the Haul Road crossing_Looking NW

Photo 2: 20150107_NFRDSIS_Power Line_504_Nuline's auger parked at Haul Road_Looking NE

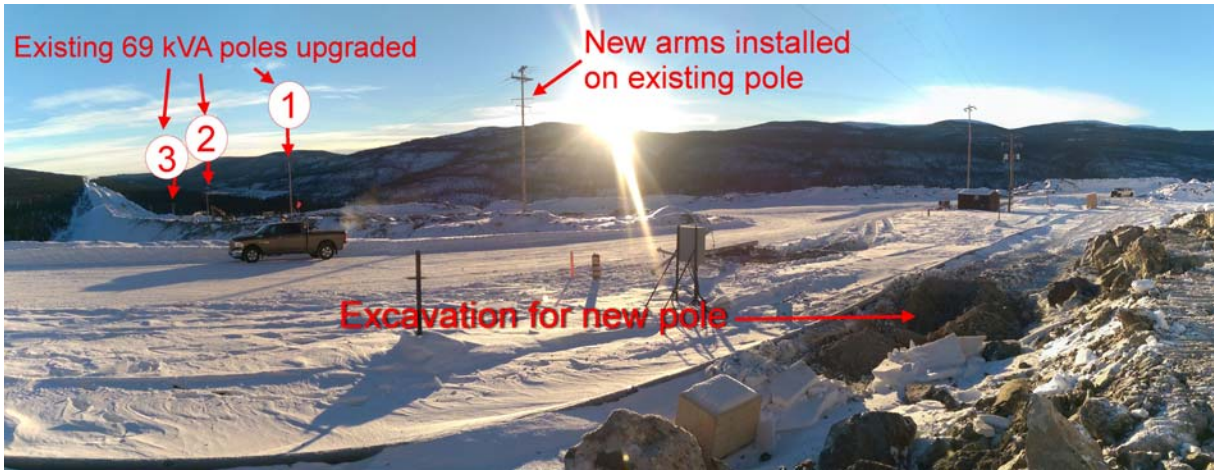

Photo 3: 20150107_NFRDSIS_Power Line_505_Excavation for the new pole at the Haul Road crossing completed_Looking S

Photo 4: 20150107_NFRDSIS_Power Line_506_Installation of a new arm on the first 69 kV pole_Looking E

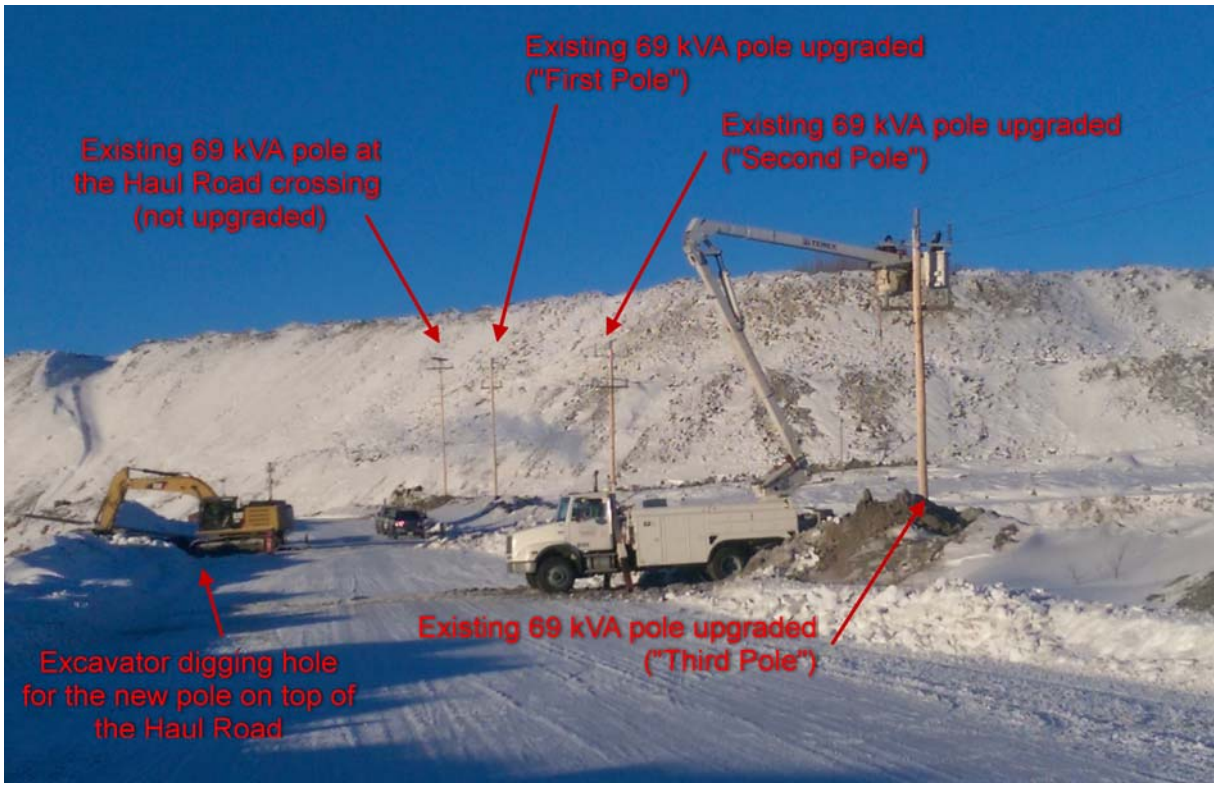

Photo 5: 20150107_NFRDSIS_Power Line_507_Nuline upgrading the third 69 kV pole. Note excavation for the new pole in line with the second 69 kV pole_Looking NW

Photo 6: 20150107_NFRDSIS_Power Line_508_First 69 kV pole upgraded by Nuline_Looking NW

Photo 7: 20150107_NFRDSIS_Power Line_509_New pole installed at the Haul Road crossing. Note that anchor lines still have to be installed_Looking N

Photo 8: 20150107_NFRDSIS_Power Line_510_Diagonal pole installed at the second 69 kV pole. Note that the new pole on top of the Haul Road is aligned with this 69 kV pole_Looking NW

Photo 9: 20150107_NFRDSIS_Power Line_511_Excavation for the new pole at the southwestern side of the haul road_Looking SW

Attachment 1: Protocol prepared by Tees and Nuline describing the power outage procedure

2015-01-07
NFRDSIS - Overhead Power Line Installation.
Protocol agreed by Nuline and Tees outlining the steps to be followed during upgrade of the existing 69 kVA line

SCOPE:

To raise cross arms on 3 to 4 69kv poles, the first 4 tangent poles after the 69kv line crosses the haul road to the north side.

People involved in switching, Ray Jones (Tees) Dan Manual (Nu-line)

The switching order is as follows.

1. Ray :When deemed safe to do so Ray will open pit breaker.
2. Ray: Will open 4160v air break feeding the Faro side 4160/ 69kv transformer.
3. Ray: Will apply his safety lock with tag
4. Dan: Will apply his safety lock with tag
5. Dan: Will apply ground chains to 69KV line.
6. Dan: Will then be able to proceed with work on 69kv structures.
7. Ray: Will reclose pit breaker to supply 4160v power to Zone 2 and S-wells.
8. Dan: after work is complete He will remove ground chains applied in step 5.
9. Dan: Will then inform Ray "All men and equipment are clear and it is safe to re-energize 69kv powerline".
10. Dan: Will remove his safety lock and tag.
11. Ray: will open Pit breaker.
12. Ray: Will remove his safety lock.
13. Ray: Will close air break opened in step 2
14. Ray :Will close Pit breaker and system will be returned to normal

Water treatment will be informed Prior to step 1 after step 7 and after step 14.

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	4:45 pm
Project #:	0533-010-06	**Weather:**	Clear	
Subject:	Day Shift Report	**Work Areas*:**	Overhead Power Line	
Date:	20150108	**Record #:**	*20150108_NFRDSIS_DSR_63*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -28.1 °C (Max = -23.3 °C; Min = -32.9 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	• Nuline installed new arms on power poles and installed new 4160 V electrical cables (**Photo 2**). An elevating work platform was used by Nuline (**Photo 3**). All Nuline personnel were equipped with the required PPE, including harnesses that were anchored to the elevating work platform. • The existing 69 kVA transmission line was not energized. Anyway, Nuline was applying all the health and safety measures as if the 69 kV was energized.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20141216_NFRDSIS_DSR_58_1	No update. **OPEN**	Contractor
20141217_NFRDSIS_DSR_59_2		
20141218_NFRDSIS_DSR_60_1	No update. **OPEN**	Contractor
20150106_NFRDSIS_DSR_61_1	Nuline to issue the overhead power line design for approval. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Haul Road
Danny Manuel (Nuline), Haul Road
Dustin Elliott (Nuline), Haul Road
Gary Drinnan (Nuline), Haul Road

Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at Workshop bay 11, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at Workshop bay 11, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
No activity.
Overhead Power Line (OPL)
Nuline completed the installation of the new power pole on top of the Haul Road (**Photo 1**). Note that this pole is aligned with the C-Can and the second 69 kV pole from the Haul Road crossing (brown shack). New anchor lines were installed as needed on the power poles. A grounding cable was installed at the second 69 kV pole from the Haul Road crossing (**Photos 7** and **8**). At the same time, Nuline also installed new arms on the existing 69 kV power poles (**Photos 2** and **7**). These arms were used to mount the new 4160 V electrical cables. It is important to note that the 69 kV transmission line was not energized. The shutdown was not related to Nuline's activity. Finally, Nuline installed 4160 V electrical cables from the new pole installed at the Haul Road crossing (brown shack) and existing 69 kV poles (**Photos 2, 3, 4, 5** and **6**). This activity was completed with support from an elevating work platform (Nuline's equipment). Equipotential grounding cables were installed before the beginning of the activities (**Photo 7**).

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. Delivery of C-Can.
	Discussion and Recommendations
	The Contractor informed that the delivery of the C-Can was scheduled for the following shift (January 9, 2015). The C-Can will be unloaded at the workshop bay 11 as it will not be mobilized and installed at the DSSC area until Precision will be on site. The unloading procedure was commented by Pelly and Tees, including stages, equipment and H&S measures to be implemented. Pelly and BGC will observe the unloading operations to record any damage that could occur.

	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor will continue with the installation of electrical cables during the following shift. If possible, Nuline will install the new pole at the DS area.
- Nuline electricians will be mobilized during the following shift, so activities related to the pipeline installation could probably be completed.
- The C-Can will be delivered and unloaded at workshop bay 11 during the following shift (refer to Communication 1).

Photos:

Photo 1: 20150108_NFRDSIS_Power Line_512_Installation of new 4160 V pole on top of the Haul Road. Note that it is aligned with the DSSC area and the second 69 kV pole_Looking SE

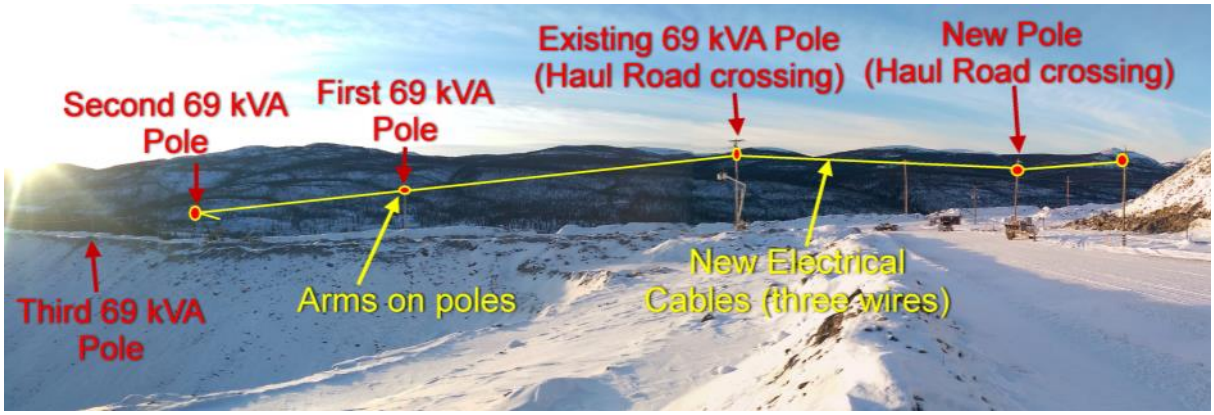

Photo 2: 20150108_NFRDSIS_Power Line_513_Overview showing the location for the new arms, poles and 4160 V cables installed. Pole on top of the Haul Road not labeled for clarity_Looking SW

Photo 3: 20150108_NFRDSIS_Power Line_514_Installation of 4160 V cables on the 69 kV pole at the Haul Road crossing_Looking E

Photo 4: 20150108_NFRDSIS_Power Line_515_New 4160 V cables being installed at the first 69 kV pole from the Haul Road crossing_Looking E

Photo 5: 20150108_NFRDSIS_Power Line_516_New 4160 V cables being installed at the second 69 kV pole from the Haul Road crossing_Looking SE

Photo 6: 20150108_NFRDSIS_Power Line_517_Overview of the new 4160 V cables installed at the Haul Road crossing_Looking NE

Photo 7: 20150108_NFRDSIS_Power Line_518_Detail of new arms installed at the second 69 kV pole. Note equipotential grounding cables. Also, a new grounding cable (red) on the pole_Looking NW

Photo 8: 20150108_NFRDSIS_Power Line_519_Grounding installed at the second 69 kV pole

Photo 9: 20150108_NFRDSIS_Power Line_520_Trailer with electrical cables being installed by Nuline

Photo 10: 20150108_NFRDSIS_Power Line_521_Drums with electrical cable being installed by Nuline

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:20 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	Overhead Power Line, Pipeline	
Date:	20150109	**Record #:**	*20150109_NFRDSIS_DSR_64*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -18.8 °C (Max = -13.8 °C; Min = -23.8 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	• Nuline delivered a hard copy of the H&S manual. • Before the electrical cables were installed across the Haul Road, Nuline informed by radio to all personnel that the Haul Road will be temporarily closed. The Engineer requested Nuline to install cones across the Haul Road in case someone missed the message on the radio. The cones were placed on the road and the cables installed (**Photo 9**).
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	No designs for the electrical installation have been submitted by Nuline (refer to Communication 1).

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20141217_NFRDSIS_DSR_59_2 Pipeline installation	The Contractor mobilized some control boxes to intended location. The installation of remaining parts will be completed during the next shifts. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	The Contractor removed some sand fill and a section of the straw log at the Eastern side of the manhole. Then, drilled a hole in the manhole wall and inserted the 4" pipeline from the new pumping location. **OPEN**	Contractor
20150106_NFRDSIS_DSR_61_1	Nuline to issue the overhead power line design for approval. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Haul Road, DSAR
John Seeheaver (Nuline), Haul Road, DSAR
Danny Manuel (Nuline), Haul Road, DSAR
Dustin Elliott (Nuline), Haul Road, DSAR
Gary Drinnan (Nuline), Haul Road, DSAR
Lloyd Burnhord (Nuline), Haul Road, DSAR
Troy Bruton (Nuline), Haul Road, DSAR
Jerry Boss (Nuline), Haul Road, DSAR
Scott Kovac (Nuline), Haul Road, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at Workshop bay 11, no activity)
Light Tower/Generator (Allmand ML8, yellow, parked at Workshop bay 11, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)
Front Loader (Deere TC54H, yellow, parked at Haul Road, demobilized)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The C-Can was delivered at the beginning of the shift (**Photo 1**). The C-Can was unloaded with a front loader (Tees) and placed inside the workshop bay 11 (**Photo 2**). Note that the C-Can will not be mobilized and installed at the DSSC area until Precision will arrive to the Faro Mine site. As shown on **Photos 3** to **6**, no damage was observed by the Contractor or the Engineer on the external walls of the C-Can. At the DSSC area, the Engineer noted that there was water on top of the ice within the main NF2A channel and diversion channel (**Photo 16**). Some water emerging at all emerging points was observed, although the flow was too small to measure it. The water flow was almost imperceptible in some cases (moist or melted snow was only observed). As shown on **Photo 17**, note that the water was emerging at a higher elevation at all emerging points (higher elevation than when the initial emerging points were observed). As a result, the water was flowing on top of the ice cover and ponding on depressions. The water observed on top of the ice at the diversion channel was coming from emerging point NF2A-DIVW (**Photo 17**). Water percolated through the exploration/sampling holes previously executed on the ice and filled the channel, rock drain and manhole area. The Engineer observed that the water level inside the manhole has also increased. At the main NF2A channel, water flowing under the ice was observed through the sampling hole in

front of NF2A-2 emerging point. Water flowing on top of the ice was observed on the main channel (**Photo 16**). The water was locally percolating through exploration/sampling holes in the area. At NF2A sampling location, water flowing under the ice was observed through a hole executed by the Engineer. Also, note that water was coming out from the whole executed in the ice at NF2A sampling location (upwards direction) and filled the trench previously executed on the ice by Tees (5 cm of ponded water was measured by the Engineer).
Pipeline (PL)
The Contractor removed some sand fill from the Eastern side of the manhole to create room for the proper location of the 4" pipe from the new pumping location. Then, contractor drilled a 4" hole on the manhole wall and inserted the 4" pipeline (**Photos 15** and **16**). A short section of straw log and some small rocks had to be removed to complete the installation of the pipe.
Overhead Power Line (OPL)
Nuline erected a new power pole at the DS area. The pole was installed on a 2.5 m deep hole excavated by Tees's excavator (**Photo 7**). New anchor lines were installed by Nuline on the new pole. The pole was located on the Northeastern side of the pipeline, immediately in front of Borrow B1. In addition, the excavator flattened an area for the installation of the new 500 kVA transformer. Then, Nuline completed the installation of electrical cables from the pole erected at the DS area to the pole erected at the top of the Haul Road (**Photo 8**). Then, installed cables across the Haul road, from the pole at the top of the Haul Road to the second 69 kV pole (**Photo 9**). A second Nuline team was unloading mounting steel plates at its intended location (**Photo 12**). Note that the steel plates were mounted on concrete pads by means of posts. Also, note that the thermocable control panels and switches were already mounted on the steel plates (**Photo 13**). Once the mounting steel plates were distributed, the Contractor started to lay electrical copper cable along the pipeline at the DS area (**Photo 14**). Also, through the steel culverts at the second crossing. In addition, the new 75 kVA transformer was delivered and unloaded at the second crossing. This transformer will be mounted on a new pole that will be erected by Nuline.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	John, Joan. Nuline electrical designs.
	Discussion and Recommendations
	The Engineer noted that construction activities were being executed by the Contractor and no approved electrical design was available. The Contractor informed that Nuline's electrical engineer will be mobilized during the weekend. The design drawings will be produced and delivered after the site visit. In the meantime, construction activities will continue so as to achieve the milestones. The Engineer noted the comment from the Contractor. Also, reminded that the works being executed by Nuline were performed at Contractor's risk. As commented with Dan (Pelly), work

	completed before the submittal and approval of designs which is found to be out of compliance will have to be rectified at Contractor's expense.	
	Corrective Actions or Improvements	
	Nuline to deliver a set of electrical designs for approval.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
ID	**Summary *(time, personnel, work area and description)***	
2	John, Joan. Protection and signaling of anchor cables.	
	Discussion and Recommendations	
	The Engineer observed that the anchor cables installed on new/existing electrical poles were not protected nor marked. The Engineer noted that all the existing anchor cables on site had a yellow or orange plastic cover for Health and Safety reasons. The Contractor commented that the installation the referred protections is common practice. Also, that they will install them shortly.	
	Corrective Actions or Improvements	
	Contractor to install protections on the anchor lines installed.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
DSAR	Northeastern side of the DSAR and Pipeline. STN 0+160 (field estimate)	Excavator (Tees)	Contractor executed a 2.5 m deep excavation for the installation of a new electrical pole.	7

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor will continue with the installation of overhead electrical cables from the new pole at the Haul Road crossing (brown shack) to the second crossing. In parallel, the electricians will continue installing electrical cable along the pipeline. If possible, they will start connecting the cables and installing sensors on the pipeline. Also,
- The Contractor demobilized the Deere TC54H front loader.
- The Contractor will require support from Tees to mobilize the new 500 kVA transformer, install the new pole close to the second crossing, and to mobilize/install the C-Can at the DSSC area. No more support from Tees is foreseen at this time.

Photos:

Photo 1: 20150109_NFRDSIS_DSSC_522_C-Can on top of the haul truck

Photo 2: 20150109_NFRDSIS_DSSC_523_Front loader unloading the C-Can in front of the workshop

Photo 3: 20150109_NFRDSIS_DSSC_524_C-Can at workshop bay 11. Right side wall

Photo 4: 20150109_NFRDSIS_DSSC_525_C-Can at workshop bay 11. Back side wall

Photo 5: 20150109_NFRDSIS_DSSC_526_C-Can at workshop bay 11. Left side wall

Photo 6: 20150109_NFRDSIS_Power Line_527_C-Can at workshop bay 11. Front side wall

Photo 7: 20150109_NFRDSIS_Power Line_528_Excavator (Tees) digging a 2.5 m deep hole for the new pole at the DS area_Looking SW

Photo 8: 20150109_NFRDSIS_Power Line_529_Installation of 4160 V electrical cables from the new pole erected at the top of the Haul Road to the new pole erected at the DS area_Looking SE

Photo 9: 20150109_NFRDSIS_Power Line_530_Installation of new 4160 V cables across the Haul Road_Looking SE

Photo 10: 20150109_NFRDSIS_Power Line_531_New arms and 4160 V cables installed at the existing 69 kV pole at the haul road crossing_Looking SE

Photo 11: 20150109_NFRDSIS_Power Line_532_New 4160 V cables installed on new pole at Haul Road crossing_Looking NE

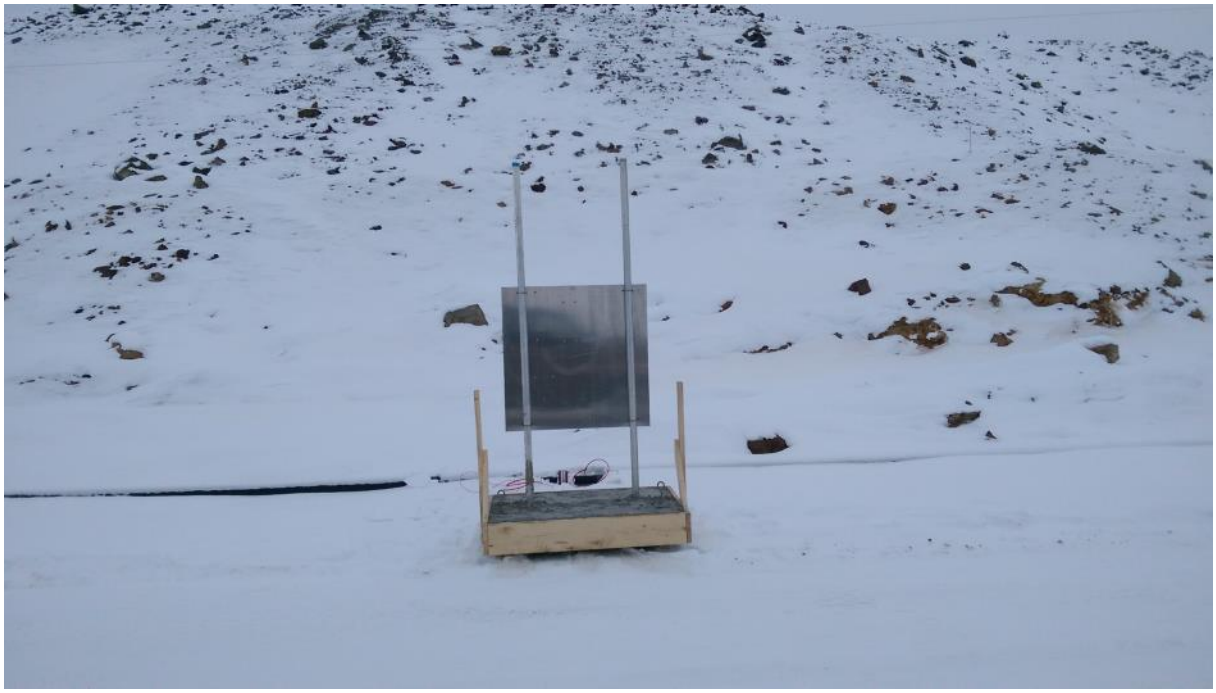

Photo 12: 20150109_NFRDSIS_Power Line_533_Mounting steel plate installed along the pipeline. Note the concrete pad and poles_Looking NW

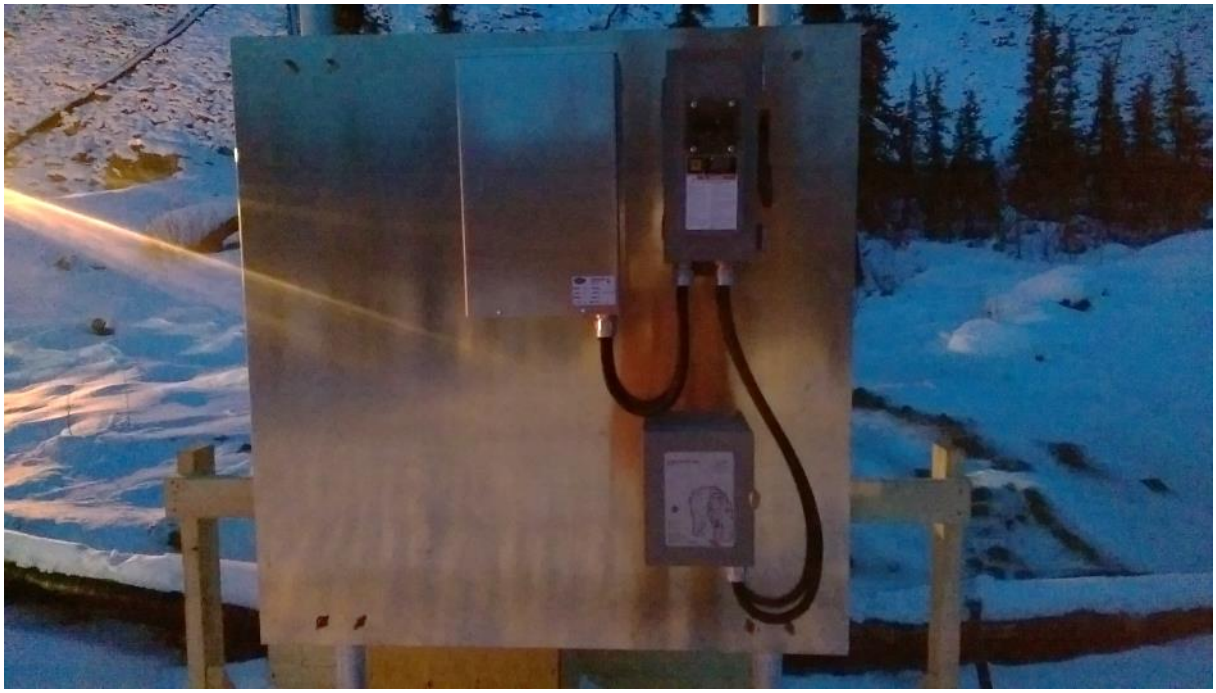

Photo 13: 20150109_NFRDSIS_Power Line_534_Electronic controller, switch and connection box mounted on steel plate_DSAR area, Looking N

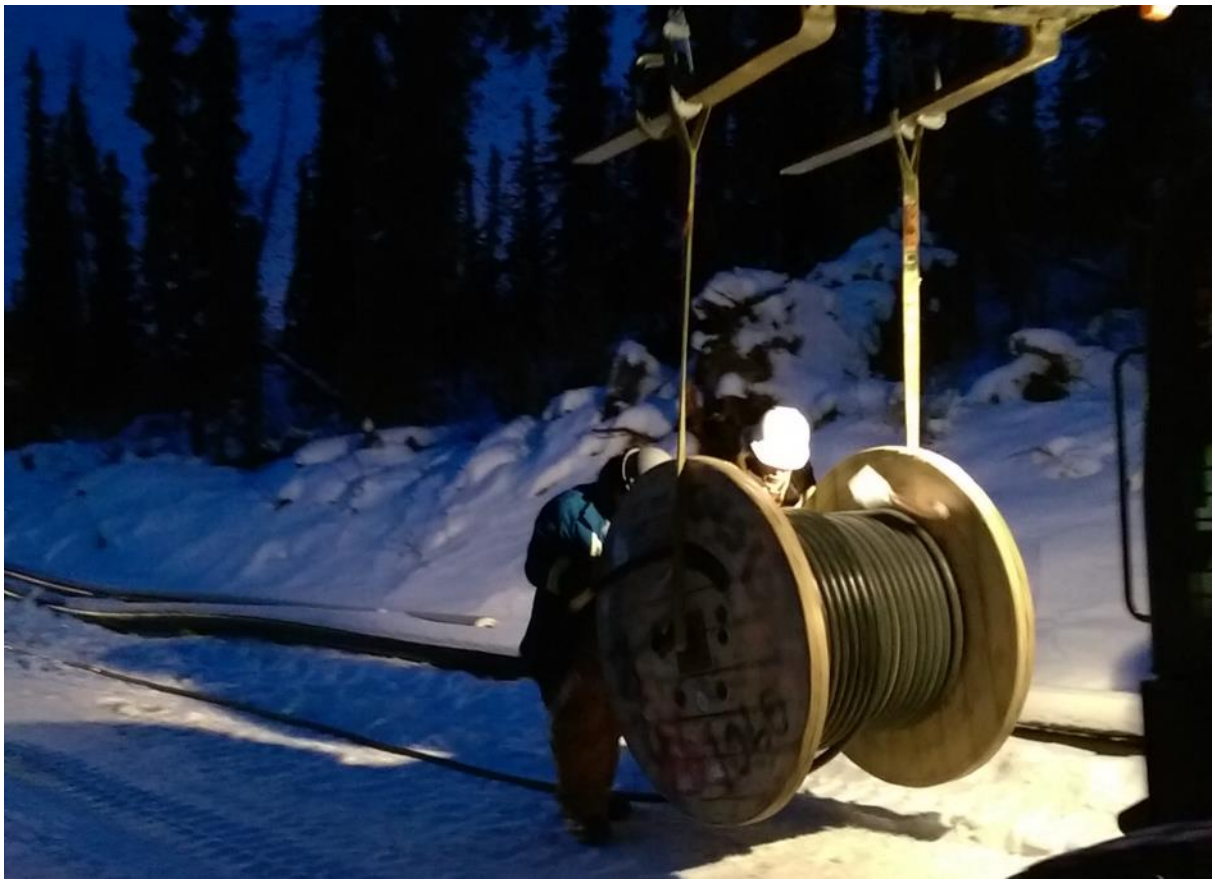

Photo 14: 20150109_NFRDSIS_Power Line_535_Electrical cable being installed along the pipeline at the DSAR area_Looking NW

Photo 15: 20150109_NFRDSIS_DSSC_536_New 4” pipe connected to the manhole_Looking NE

Photo 16: 20150109_NFRDSIS_DSSC_537_View of water on top of the ice at diversion channel and main NF2A channel. Note brownish water_Looking N

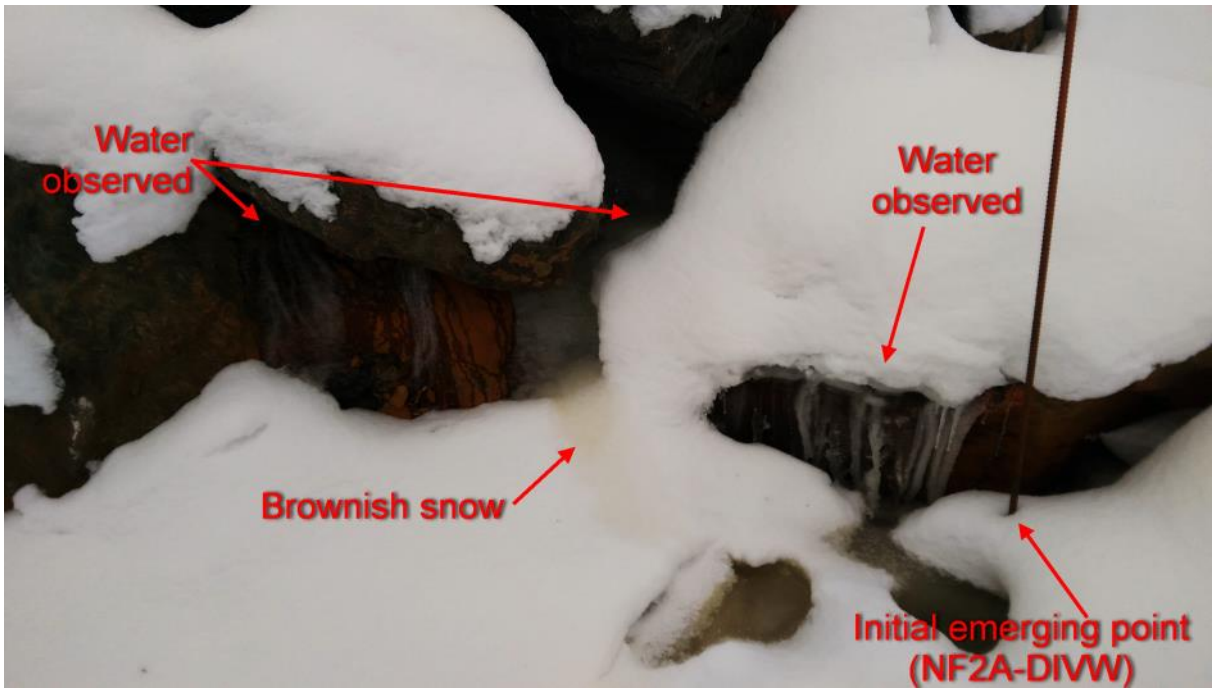

Photo 17: 20150109_NFRDSIS_DSSC_538_Detail of water emerging at a higher elevation than original emerging point. Note brownish snow/water_Looking N

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:15 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	Electrical Installation	
Date:	20150110	**Record #:**	*20150110_NFRDSIS_DSR_65*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -12.0 °C (Max = -9.7 °C; Min = -14.2 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	At the second Haul Road crossing, new 4160 V cables were installed from the new utility pole erected to the existing utility pole. The power at the existing 4160 V overhead line was de-energized by Tees before the new 4160 V cables were installed and connected to the existing line. The protocol created for the 69 kV line power outage was followed again. In addition, all operations were communicated by radio.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141217_NFRDSIS_DSR_59_2 Pipeline installation	The Contractor continued with the installation of thermocable sensors and electronic control boxes (**Photos 1** and **2**). Not completed before the end of the shift. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	The thermocable still have to be installed on the pipe and connected. In addition, the new pump and the A-frame have to be installed at the intended pumping location and connected to the system. **OPEN**	Contractor

20150109_NFRDSIS_DSR_64_1 Nuline's electrical designs	Nuline's electrical engineer visited the site. The Contractor informed that the designs will be available at the beginning of next week. **OPEN**	Contractor
20150109_NFRDSIS_DSR_64_2 Reflectors/protections at anchor cables	Contractor to install protectors/reflectors at the new anchor lines installed at utility poles. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Haul Road, DSAR
John Seeheaver (Nuline), Haul Road, DSAR
Danny Manuel (Nuline), Haul Road, DSAR
Yesh Sarna (Nuline), Haul Road, DSAR
Dustin Elliott (Nuline), Haul Road, DSAR
Gary Drinnan (Nuline), Haul Road, DSAR
Lloyd Burnhord (Nuline), Haul Road, DSAR
Troy Bruton (Nuline), Haul Road, DSAR
Jerry Boss (Nuline), Haul Road, DSAR
Scott Kovac (Nuline), Haul Road, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at Workshop bay 11, no activity)
Light Tower/Generator (Allmand ML8, yellow, Haul Road, providing support to Nuline)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Engineer visited the DSSC area. The following observations were recorded during the visit: • At both the NF2A, NF2B and NF2 channels there was more water ponded on top of the ice than during the previous shift (**Photos 9**, **10** and **11**). Water ponded within NF2A channel was brownish, while no areas with brownish water was observed at NF2B and NF2 areas. • At NF2A-DIVW, the emerging point was frozen (**Photos 12** and **13**). An ice plug was formed so water was no longer emerging (dripping) at this point. • At the vicinity of NF2A-1, water was emerging at various points at a higher elevation than the original emerging point (**Photos 12** and **14**). The amount of water emerging had increased since

the last shift. This could probably indicate that water migrated from NF2A-DIVW to NF2A-1 due to the formation of an ice plug at NF2A-DIVW.

- Water emerging at higher elevation (above the ice cover) at both NF2A-2 and NF2A-3 was more evident than during the previous shift (**Photos 12** and **15**).
- Some of the water ponded on top of the ice at the NF2A channel was locally percolating through the exploration/sampling holes. The rest, was either ponding on top of the ice or flowing into the trench at NF2A sampling point (**Photo 16**). Note that this trench on the ice was executed by Tees to allow sampling.
- Some water from NF2 was backing into the NF2A channel (on top of the ice) and falling into the NF2A sampling trench (**Photo 16**).

Pipeline (PL)

The Contractor installed the thermocable sensors for two of the four heat trace circuits (**Photo 2**). Afterwards, connected them to the electronic control boxes. Note that the electronic control boxes were mounted on the steel mounting plate. Then, connected the thermocables to the electronic control boxes. Finally, connected the electronic control boxes to the switches and the electrical cable installed along the pipeline (**Photo 1**). The installation of the remaining elements (two last heat traces circuits) was not completed by the end of the shift.

Overhead Power Line (OPL)

Nuline erected a new 4160 V pole at the second crossing (refer to Communication 1). The pole was located at the Northwestern side of the road, close to the existing 4160 V poles (**Photos 5** and **6**). The pole was installed on a 2.5 m deep hole excavated by Tees's excavator (**Photo 3**). New anchor lines were installed by Nuline on the new pole. Then, Nuline installed new 4160 V cables from the new pole to the existing pole and connected them to the existing 4160 V overhead line.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	John, Joan. New utility pole (4160 V) installed at the second crossing.
	Discussion and Recommendations
	The Contractor informed that the new utility pole required to mount the 75 kVA transformer and to connect the system to the existing 4160 V overhead line will be located at the second crossing (approx. pipeline STN. 1+230). The Engineer noted that, according to the CH2M Hill design (Drawing FRNF-XD-02-18_Rev 0), the new pole should be installed close to the highest point along the pipeline (approx. pipeline STN 1+040). Then, new cables should be installed to connect the system to the existing overhead 4160 V overhead wires. From that location, two runs of TECK90 cables (30 m and 400 m respectively) should be installed along the pipeline to feed the thermocable electronic control boxes. The Engineer reminded that Nuline did not present a new design for approval. Therefore, the Contractor should follow the CH2M Hill design unless there was a major problem/concern.

	The CH2M Hill design showed a pole at the Northeastern side of the road (not at the same side than the pipeline) so a road crossing will be required for the cables (overhead crossing for the 4160 V wires and underground crossing for the TECK90 cables). To solve this, the pole had to be installed at the Northwestern side of the road (same side as the pipeline). At this side of the road there was limited space for the execution of the required excavation for a new pole. In addition, access for the excavator was also complicated due to the presence of the pipelines, connection boxes, valves, and the existing overhead power line. The Contractor informed that the new pole will be installed at the second crossing as it was easier and faster. Also, noted that the new location was commented with Tees's personnel and they were happy with the change. Finally, commented that the CH2M Hill design concept will not be unchanged. The only modification is the location where the connection to the existing 4160 V is performed. According to the Contractor, minor variations on the TECK90 cable lengths will be required. The Engineer reminded that this change was not previously approved by CH2M electrical engineer as no design from Nuline was available. As commented on previous shifts, if the Contractor decides to continue as per the new intended location, the work will be performed at Contractor's risk. Any future change or modification required by CH2M Hill (after the review of Nuline's design) will have to be performed at Contractors expense. Also, commented that no modification/variation of the lump sum rate listed on the Contract will be allowed.
	Corrective Actions or Improvements
	Contractor continued construction as per the new proposed location and acknowledged that they moving forward at their risk. The Engineer reminded that this modification had to be included on Nuline's electrical design so the CH2M Hill electrical engineer could review it.
	Status at the end of the shift (Open, Closed or N/A) **OPEN**
ID	**Summary *(time, personnel, work area and description)***
2	John, Joan. Thermocable electronic controllers inside the C-Can.
	Discussion and Recommendations
	The Contractor informed that two electronic control boxes were installed inside the C-Can. According to the CH2M Hill design, these electronic control boxes have to be installed along the pipeline as they can feed/control a maximum of 225 m of thermocable. If mounted inside the C-Can, the distances from the electronic control boxes to the end of the thermocable circuits will be far bigger than 225 m. The Contractor contacted Precision (by means of satellite phone) to inform them that Nuline will enter the C-Can to remove the electronic control boxes. In addition, two switches with fuses will be mounted were the electronic control boxes were previously located (inside the C-Can. Afterwards, the C-Can will be locked again to prevent disturbance of the elements inside. Precision approved the activity.
	Corrective Actions or Improvements
	The Contractor opened the C-Can and the two electronic control boxes were removed by

	Nuline. Then, two switches with fuses were mounted on the panel inside the C-Can. Finally, the C-Can was locked by the Contractor. The two electronic control boxes will be installed at the intended located by Nuline during the following shift.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
Overhead Transmission Line	Second crossing, close to existing utility poles located behind the C-Can. Approx. pipeline STN 1+230	Excavator (Tees)	Contractor executed a 2.5 m deep excavation for the installation of a new 4160 V electrical pole. Note that the ground was frozen.	3, 4

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will continue with the connection of 4160 V wires and the installation of the two new transformers (500 kVA and 75 kVA respectively). A second team will complete the installation of electronic control boxes, thermocables, heat trace line sensors, and electrical cables along the pipeline.
- The Contractor will require support from Tees to install the 500 kVA transformer at the DS area. At a later stage (probably on Wednesday, Jan. 14, 2015), the Contractor will need support to mobilize/install the C-Can at the DSSC area. No more support from Tees is foreseen at this time.

Photos:

Photo 1: 20150110_NFRDSIS_Pipeline_539_Connection box, switch and electronic control box mounted on a steel plate at the DSAR area. Note electrical cables already connected_Looking N

Photo 2: 20150110_NFRDSIS_Pipeline_540_Detail of thermocable sensors (grey and red) to be installed on the heat traced pipeline

Photo 3: 20150110_NFRDSIS_Power Line_541_Excavation for the installation of the new 4160 V pole at the second crossing. Note the copper grounding cable installed by Nuline.

Photo 4: 20150110_NFRDSIS_Power Line_542_Detail of an aggregate of frozen soil from the excavation for the new 4160 V pole at the second crossing

Photo 5: 20150110_NFRDSIS_Power Line_543_Location of the new 4160 V pole installed at the second crossing_Looking SW

Photo 6: 20150110_NFRDSIS_Power Line_544_Excavator (Tees) backfilling the excavation for the new 4160 V pole_Looking SW

Photo 7: 20150110_NFRDSIS_Electrical Installation_545_Removal of debris at the inlet of the second crossing_Looking NE

Photo 8: 20150110_NFRDSIS_Electrical Installation_546_Detail of cable being installed along the pipeline at the second crossing.

Photo 9: 20150110_NFRDSIS_DSSC_547_Water ponded on top of the ice at NF2_Looking NE

Photo 10: 20150110_NFRDSIS_DSSC_548_Water ponded on top of the ice at NF2B_Looking NE

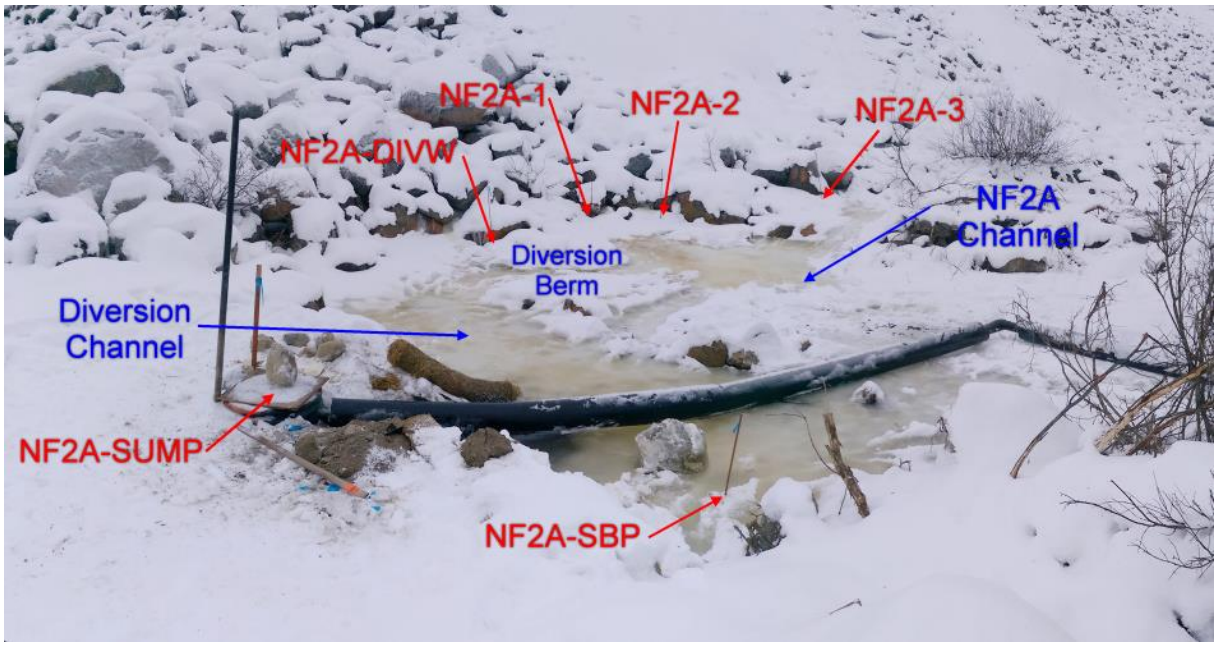

Photo 11: 20150110_NFRDSIS_DSSC_549_Brownish water on top of the ice at NF2A_Looking NE

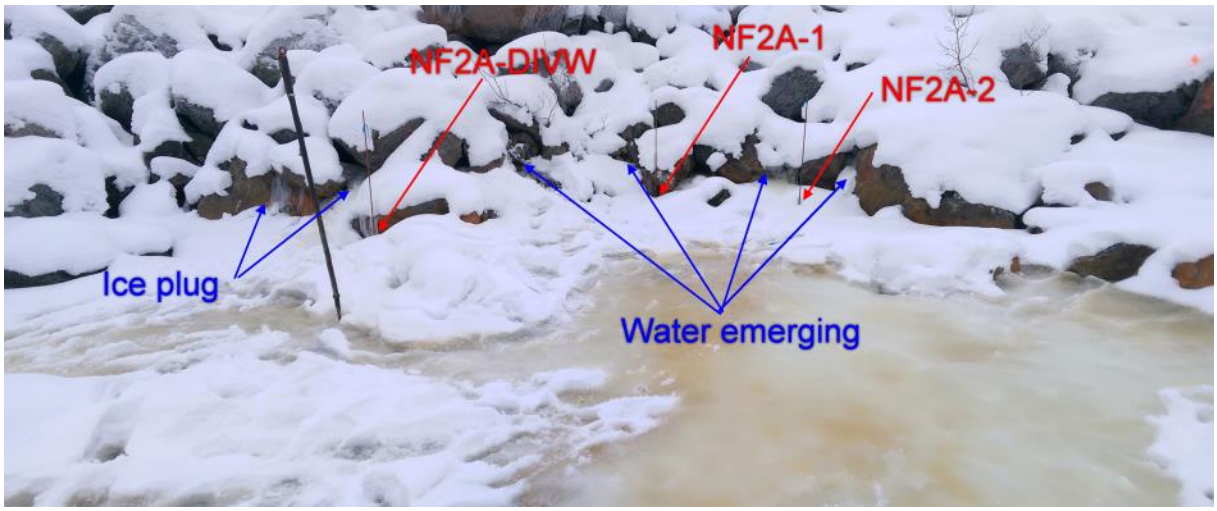

Photo 12: 20150110_NFRDSIS_DSSC_550_Overview of the initial emerging points and the emerging points observed at a higher elevation. Note brownish water ponded on top of the ice_Looking N

Photo 13: 20150110_NFRDSIS_DSSC_551_View of the frozen emerging points above NF2A-DIVW forming an ice plug_Looking N

Photo 14: 20150110_NFRDSIS_DSSC_552_Water emerging at various points close to NF2A-1 (at a higher elevations)_Looking N

Photo 15: 20150110_NFRDSIS_DSSC_553_Water emerging above NF2A-2_Looking N

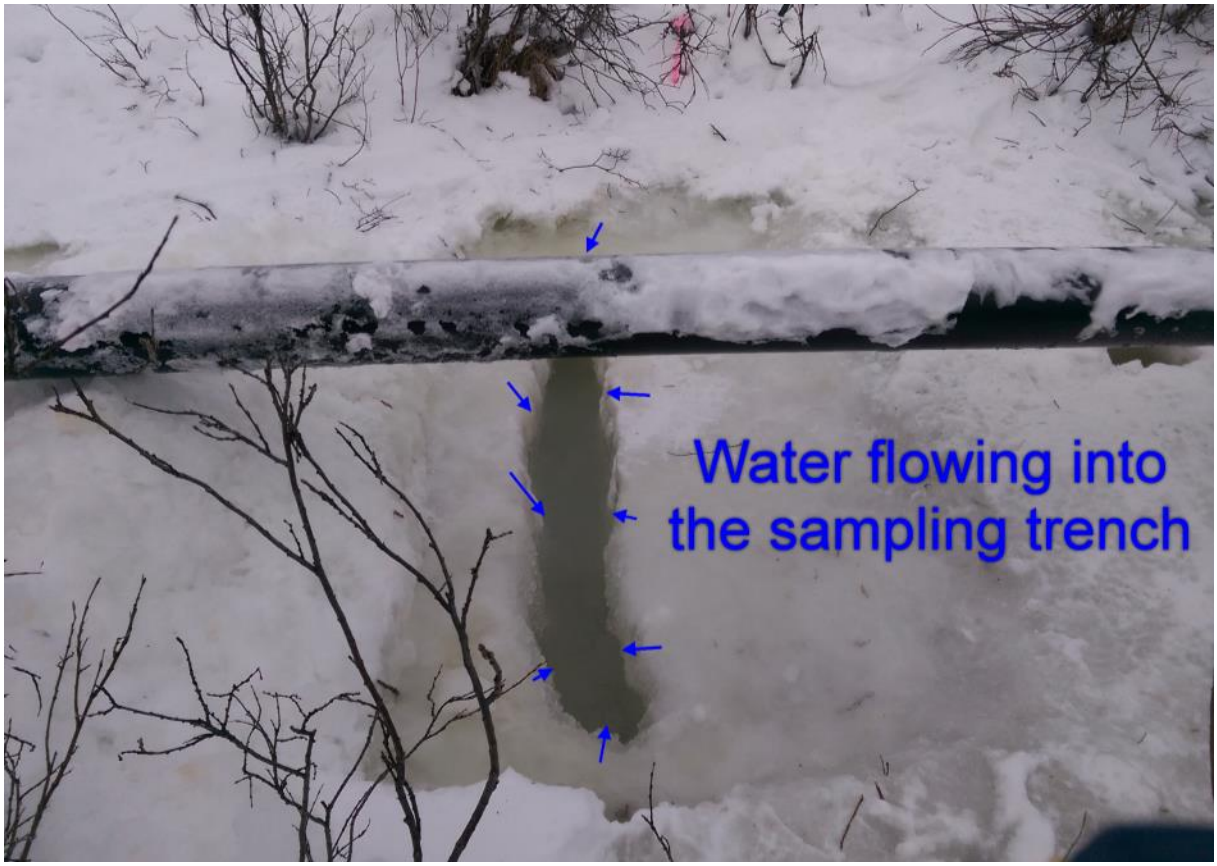

Photo 16: 20150110_NFRDSIS_DSSC_554_NF2A sampling point. Note water flowing into sampling trench_Looking E

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:20 pm
Project #:	0533-010-06	**Weather:**	Snowing until noon, then overcast	
Subject:	Day Shift Report	**Work Areas*:**	Electrical Installation	
Date:	20150111	**Record #:**	*20150111_NFRDSIS_DSR_66*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -8.8 °C (Max = -7.5 °C; Min = -10.0 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	The Engineer recommended that the Contractor should collect the leftovers and debris from working areas before it will be covered with snow (see communication 2).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141217_NFRDSIS_DSR_59_2 Pipeline installation	Nuline continued with the installation of the required elements (**Photo 4**). The Contractor did not complete the installation of all the elements before the end of the shift. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	No update. **OPEN**	Contractor
20150109_NFRDSIS_DSR_64_2 Reflectors at anchor cables	No update. **OPEN**	Contractor
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	No update. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Haul Road, DSAR
Danny Manuel (Nuline), Haul Road, DSAR

Dustin Elliott (Nuline), Haul Road, DSAR
Gary Drinnan (Nuline), Haul Road, DSAR
Lloyd Burnhord (Nuline), Haul Road, DSAR
Troy Bruton (Nuline), Haul Road, DSAR
Jerry Boss (Nuline), Haul Road, DSAR
Scott Kovac (Nuline), Haul Road, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at Workshop bay 11, no activity)
Light Tower/Generator (Allmand ML8, yellow, Haul Road, providing support to Nuline)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Engineer visited the DSSC area. The following observations were recorded during the visit: • The water that was pounded on top of the ice at NF2A, NF2B and NF2 channels during the previous shift was all frozen (**Photo 13**). As noted the day before, the frozen ice at NF2A channel was brownish, while no areas with brownish ice was observed at NF2B, NF2 or DS to NF2A sampling point. Note that the sampling trench across the channel at NF2A location was intercepting the water flowing on top of the ice. The water ponded on top of the ice DS to the sampling trench was backing up from NF2 area. • The new emerging points observed during the previous two shifts at NF2A-DIVW, NF2A-1, NF2A-2 and NF2A-3 were frozen (**Photos 11** and **12**). No sign of water emerging from the rock drain was observed along the whole rock fill face. • No water flowing under the ice was observed through the hole in front of NF2A-2, although the Engineer could hear water flowing under the ice. At the time of the visit, it was unclear how much water and where the water was flowing under the ice within the NF2A channel. • Water flowing under the ice was observed at NF2A sampling point. • Water flowing under the ice was observed at NF2.
Pipeline (PL)
The Contractor installed the thermocable sensors for the third heat trace circuit (**Photos 4** and **5**). Afterwards, connected them to the electronic control box. The installation of the required elements at the fourth circuit and the insulation of the pipeline at those locations were not completed before the end of the shift (it will be completed early during the following shift). In addition, a cable to guide the electrical cable down the rockfill slope (at the first crossing area, along the pipeline) was installed.
Overhead Power Line (OPL)

The Contractor installed the new 75 kVA transformer on the new utility pole installed at the second crossing (**Photos 1** and **2**). Then, the transformer was connected to the 4160 V overhead wires installed during the previous shift. In addition, a TECK90 electrical cable was installed from the bottom of the pole up to the 75 kVA transformer, and then connected to the transformer (**Photos 2** and **3**).

At the DS area, an excavator (Tees) executed a small excavation for the installation of a 1925 kg precast concrete block beside the new 4160 V utility pole at the DSAR area (**Photos 7** and **8**). This block will be used to support the 500 kVA transformer. Also, it will allow the entrance of the electrical cables from the bottom of the transformer. The concrete block was installed before the end of the shift (**Photo 9**). Note that the installation of the transformer was postponed until the next shift. A short trench from the utility pole to the transformer location was also executed by the excavator (refer to Communication 1). This trench will be used to bury the electrical cables to feed the transformer (note the roll of orange cable at the right hand side of **Photo 9**).

Nuline also corrected the installation of the 4160 V wires at the new utility pole erected at top of the Haul Road (**Photo 6**). According to Nuline's electrical engineer, the angle between the "horizontal" wires installed to cross the Haul Road and the wires going down the slope to the utility pole at the DS area was too small. New anchors where installed on the arm at the top of the utility pole at the Haul Road and the wires were reinstalled by fixing them to the new anchors.

5. Communications

ID	**Summary *(time, personnel, work area and description)***
1	John, Joan. Installation of the new 500kVA transformer
	Discussion and Recommendations
	The Contractor informed that the new transformer will be installed on top of a 1925 kg precast concrete block. The block will be buried on the ground with support from an excavator. The excavator will also dig a trench from the utility pole at the DS area to the transformer location. The trench will be used to install the electrical cables underground, as they will enter the transformer from the bottom. The Engineer noted that the area was initially identified as a potential borrow for Till, so the ground was really soft and wet when not frozen. There was a chance that the transformer will settle (move) during warmer weather. Also, recommended that a culvert/pipe should be installed to protect the underground cables that will be laid on the trench. Finally, commented that warning tape should be installed on top of the buried electrical cable. This will mark the location of the cable if a future excavation is required on the area. Also, that a sign should be installed above ground (on the post) to mark the presence an underground line. The Contractor commented that sand and gravel will be used to level the bottom of excavation. No other measures will be considered to mitigate possible settlements caused by the presence of soft ground. Regarding the underground cable, the Contractor commented that the cable was rated for underground installation so a protection was not needed. Also,

	commented that they will install tape and signs to warn about the presence of the line.	
	Corrective Actions or Improvements	
	The Contractor completed the required excavation for both the concrete block and electrical cable (**Photos 7** and **8**). Then, installed the concrete block (**Photo 9**). The installation of the transformer and electrical cables was postponed for the next shift. The warning tape and sign will be installed when the trench will be backfilled.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
ID	**Summary *(time, personnel, work area and description)***	
2	John, Joan. Removal of leftovers and debris from the work area.	
	Discussion and Recommendations	
	The Engineer suggested that the short sections of cables, wooden boards, plastic bags and other debris should be removed. As shown on Photo 4, the Contractor was leaving some parts around the working areas. There was a risk that the referred elements will hidden by the snow and they will be left behind. The Contractor commented that they will clean the work area as they move from one work area to the next one. The Engineer commented that they also had to go back to the previous working areas and collect all the debris, if any.	
	Corrective Actions or Improvements	
	Contractor to clean all work areas.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
DSAR	Beside the new utility pole, at the northeastern side of the pipeline. DSAR STN 0+165 (field estimate)	Excavator (Tees)	Contractor executed a 1.5 m deep excavation for the installation of the precast concrete block that will be used to install the 500 kVA transformer. Also, executed a trench for the electrical cables.	7, 8

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor commented that during the next shift they will install the new 500 kVA transformer at the DS area and connect it to the system. A second team will complete the installation of electronic control boxes, thermocables, heat trace line sensors, and electrical cables along the pipeline.
- The Contractor will require support from Tees to backfill the trench from the new 500 kVA transformer to the utility pole (DS area). At a later stage (probably on Wednesday, Jan. 14, 2015), the Contractor will need support to mobilize/install the C-Can at the DSSC area. No more support from Tees is foreseen at this time.

Photos:

Photo 1: 20150111_NFRDSIS_Power Line_555_75 kVA transformer mounted at the new utility pole (right) and 4160 V wires installed for the connection to the existing overhead line (left)_Looking NW

Photo 2: 20150111_NFRDSIS_Power Line_556_Detail of 75 kVA transformer installed on the new utility pole. Note the TECK90 cable installed on the utility pole up to the 75 kVA transformer

Photo 3: 20150111_NFRDSIS_Electrical Installation_557_Detail of the TECK90 cable installed on the utility pole, from the 75 kVA transformer to the ground

Photo 4: 20150111_NFRDSIS_Electrical Installation_558_Mounting panel for the third heat traced circuit located beside the piepline_Looking W

Photo 5: 20150111_NFRDSIS_Pipeline_559_Detail of grey and red sensors to be installed on the heat traced line and connected to the electronic thermostat controller.

Photo 6: 20150111_NFRDSIS_Power Line_560_Nuline modifying the installation of 4160 V cables at the new utility pole at the top of Haul Road as per Nuline's engineer comments_Looking W

Photo 7: 20150111_NFRDSIS_Electrical Installation_561_Excavation for the installation of the 500 kVA transformer and cable trench beside the new utility pole_Looking SW

Photo 8: 20150111_NFRDSIS_Electrical Installation_562_Excavation for the concrete block and cable trench beside the new utility pole_Looking SE

Photo 9: 20150111_NFRDSIS_Electrical Installation_563_Excavator moving the precast concrete block to the intended location_Looking NW

Photo 10: 20150111_NFRDSIS_DSSC_564_NF2A channels covered with snow_Looking NW

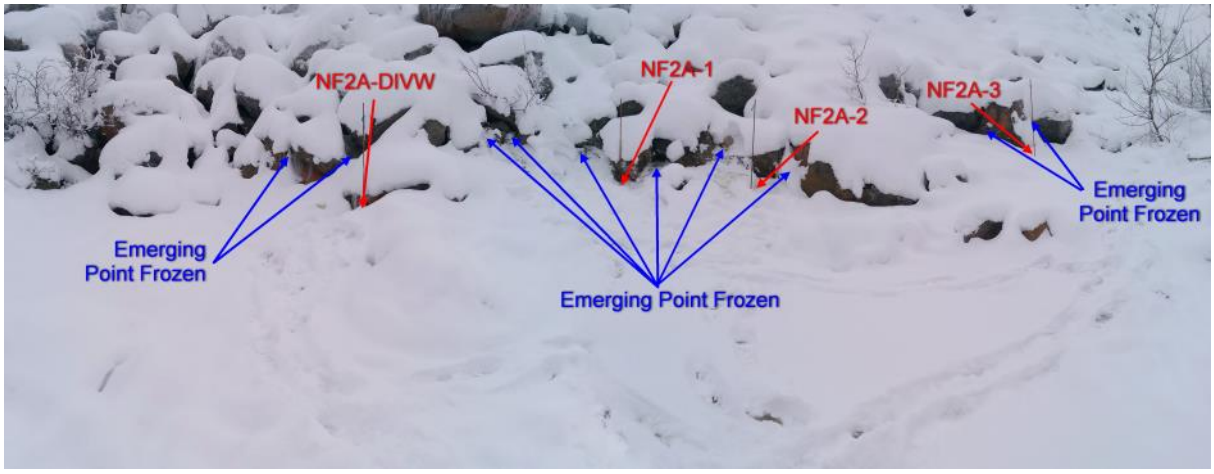

Photo 11: 20150111_NFRDSIS_DSSC_565_Frozen emerging points at NF2A area_Looking NE

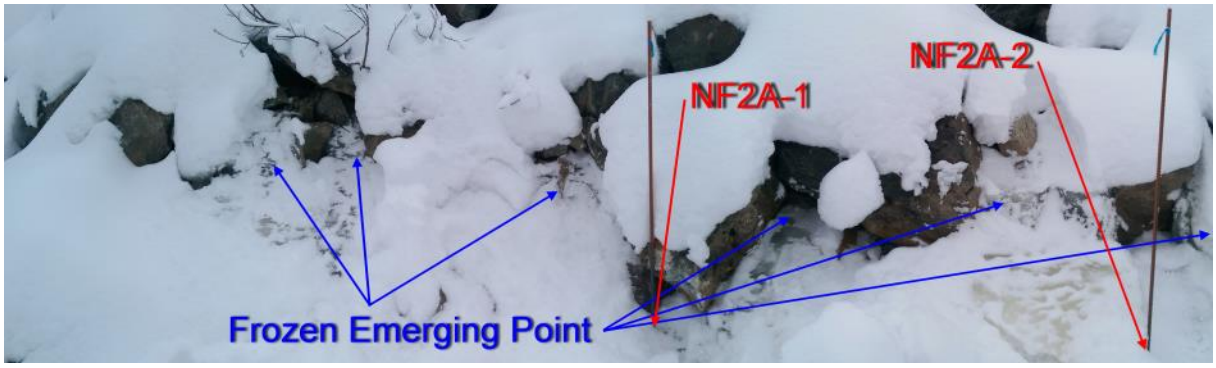

Photo 12: 20150111_NFRDSIS_DSSC_566_Detail of the frozen emerging points above the sampling points at the toe of the rock drain_Looking NE

Photo 13: 20150111_NFRDSIS_DSSC_567_Frozen water downstream to the NF2A sampling trench_Looking NE

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:10 pm
Project #:	0533-010-06	**Weather:**	Overcast, intermittent light snow	
Subject:	Day Shift Report	**Work Areas*:**	Electrical Installation	
Date:	20150112	**Record #:**	*20150112_NFRDSIS_DSR_67*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -8.4 °C (Max = -7.4 °C; Min = -9.3 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141217_NFRDSIS_DSR_59_2 Pipeline installation	The installation of sensors and electronic control boxes was completed (**Photos 1 and 3**). The boxes were also connected to the electrical cables that will feed them. The remaining activities, such as the insulation of the pipeline joints where the sensors were installed, were not completed before the end of the shift (**Photo 2**). **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	No update. **OPEN**	Contractor
20150109_NFRDSIS_DSR_64_2 Reflectors at anchor cables	Reflectors were installed on all the new anchor lines except two as the Contractor was short on reflectors (**Photo 4**). The two reflectors missing will be delivered and installed during the following shift. **OPEN**	Contractor
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	No update. **OPEN**	Contractor

20150111_NFRDSIS_DSR_66_1 Underground power line	Contractor to mark the presence of an underground power line. **OPEN**	Contractor
20150111_NFRDSIS_DSR_66_2 Removal of debris	Contractor to remove debris from work areas. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Haul Road, DSAR
Danny Manuel (Nuline), Haul Road, DSAR
Dustin Elliott (Nuline), Haul Road, DSAR
Gary Drinnan (Nuline), Haul Road, DSAR
Lloyd Burnhord (Nuline), Haul Road, DSAR
Troy Bruton (Nuline), Haul Road, DSAR
Jerry Boss (Nuline), Haul Road, DSAR
Scott Kovac (Nuline), Haul Road, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, parked at Workshop bay 11, no activity)
Light Tower/Generator (Allmand ML8, yellow, Haul Road, providing support to Nuline)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
No activity.
Pipeline (PL)
The Contractor completed the installation of thermocable sensors (**Photos 1** and **2**). Also, completed the connections for the electronic control boxes and installed electrical cables along the pipeline, including the cable from the first crossing down to the S-Wells area (**Photo 3**).
Overhead Power Line (OPL)
The Contractor installed protectors/reflectors on some anchor lines (**Photo 4**). The delivery of the remaining of protectors is expected for the next shift. At the same time, a second team was installing the 500 kVA transformer at the DS area (**Photo 5**). The cables from the pole to the transformer and from the transformer to the C-Can were laid on the ground, but not connected to the transformer.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Ray J. (Tees), Dan D. (Tees), Joan.	
	Discussion and Recommendations	
	A visit was organized by the Contractor to observe some of the elements installed by Nuline, including the 4160 V overhead power line, mounting panels and transformers. The following is a summary of the relevant comments noted during the visit: • Tees commented that the overhead crossings were low. The Contractor informed that the lowest point, at the crossing from the new pole at the top of the Haul Road to the second existing 69 kVA pole, the lower wire was at 8.6 m from road invert. The wires at the brown shack crossing were more than 13 m above. Also, commented that the wires at both crossings were higher than the requirements on the codes, providing almost 4 m more clearance than required by the codes at the lowest point. The Engineer commented that no specific requirements were listed on the design for the height of the poles and required clearance so the crossings will be accepted if they comply with the codes. • No protections/reflectors were installed on anchor lines. The Contractor will complete the installation of the protectors on the anchor lines during the following shifts. • No case grounding installed on the 75 kVA transformer. The Contractor commented that the part required to complete the grounding will be delivered during the following shift. • The TECK90 cable installed downslope (from the brown shack to the S-Wells area) was not laid beside the pipeline. Instead, the cable was laid on top of the rock fill about 3 to 4 m away from the pipeline. There was a risk that the cable will be damaged by rocks rolling downslope. The Contractor commented that Nuline was already informed that the electrical cable should be laid inside the pipeline flume to add some protection to the cable. The activity will be completed during the current shift. No more deficiencies were observed on the overhead power line (up to the connection with the transformers). A new meeting will be organized to comment on the pipeline and electrical components starting at the transformers. This second visit will be organized when the pipeline and electrical installation will be completed. Note that the observation of the heat traced pipeline elements was postponed as there was no power to verify the different components. Also, because some pipeline parts, such as the insulation of some joints, were still not installed at the time of the visit (**Photo 2**).	
	Corrective Actions or Improvements	
	Contractor to complete the following actions: • Complete the installation of protections at anchor lines (**Photo 4**) • Install grounding for the 75 kVA pole mounted transformer • Relocate the TECK90 cable installed downslope as per the comments provided	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor will complete the connections of the electrical components during the following shift, including the backfilling of the cable trench to feed the 500 kVA transformer.

- The Contractor will continue with the installation of the remaining pipeline parts.
- The Contractor will require support from Tees (back hoe) to backfill the trench from the new 500 kVA transformer to the utility pole (DS area). In addition, the Contractor will need support to mobilize/install the C-Can at the DSSC on Wednesday, Jan. 14, 2015. No more support from Tees is foreseen at this time.

Photos:

Photo 1: 20150112_NFRDSIS_Electrical Installation_568_Detail of red sensor installed in the thermocable channel and grey sensor installed in the insulation (outside)

Photo 2: 20150112_NFRDSIS_Electrical Installation_569_Detail of the thermocable connection and installation of sensors. Note that the insulation is missing.

Photo 3: 20150112_NFRDSIS_Electrical Installation_570_Thermocables and sensors connected to the electronic control box (third circuit). Note that the insulation on the pipe is missing_Looking SW

Photo 4: 20150112_NFRDSIS_Electrical Installation_571_Reflector/protector installed at an anchor line_Looking W

Photo 5: 20150112_NFRDSIS_Electrical Installation_572_500 kVA transformer on top of the concrete block. Note the black electrical cable (to C-Can) and orange electrical cable (to pole)_Looking N.

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:15 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	Electrical Installation	
Date:	20150114	**Record #:**	*20150114_NFRDSIS_DSR_68*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -3.6 °C (Max = 2.4 °C; Min = -9.6 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20141217_NFRDSIS_DSR_59_2 Pipeline installation	No update. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	The Contractor installed the thermocable inside the heat trace line and the ice inside the manhole was removed. The rest of the elements, pump and a frame will be installed and connected during the following shifts. **OPEN**	Contractor
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	No update. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Haul Road, DSAR, Workshop
Jerry Boss (Nuline), Haul Road, DSAR
Lloyd Burnhord (Nuline), Haul Road, DSAR

Troy Bruton (Nuline), Haul Road, DSAR
Scott Kovac (Nuline), Haul Road, DSAR
Todd Carter (Precision), Workshop, DSAR
Ron Nelson (Precision), Workshop, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, DSAR, illuminating the work area)
Light Tower/Generator (Allmand ML8, yellow, Haul Road, illuminating the work area)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Engineer visited the area to observe the conditions within the NF2A channel (**Photo 5**). The sampling point in front of NF2A-2 location was reopened by means of a steel bar. The ice cover at this location was found to be thicker than on previous visit (0.62 cm). Underneath, water flowing was observed (**Photo 6**). Then, the sampling point in front of NF2A-1 location was reopened. The ice cover was thicker too (0.61 cm). No water was observed at this point under the ice (the rocks at the bottom were observed through the hole in the ice). No water emerging above the ice cover elevation was observed along the rock fill face. No water ponded on top of the ice was observed within NF2A channels. At NF2A sampling point, water flowing under the ice was observed.
Pipeline (PL)
The Contractor mobilized the required insulation kits to insulate the exposed sections of pipe, but the insulation was not installed (**Photos 3** and **4**).
Overhead Power Line (OPL)
The Contractor installed protectors/reflectors on the remaining of the anchor cables. At the DS area, a second team installed a grounding mesh around the 500 kVA transformer and along the power cable installed. Then, spread a layer of sand at the bottom of the trench for the cable feeding the 500 kVA transformer. Support from a small back hoe was required (Tees). Afterwards, the cable was relocated and the trench backfilled with sand and gravel (around the cable) and common excavated material. Note that warning tape to mark the location of the underground cable was installed at 0.3 m of the cable (**Photo 1**). Also, a sign on the utility pole was installed to inform about the presence of an underground line. The trench and transformer excavation was not completely backfilled before the end of the shift.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	John, Joan. C-Can installation	
	Discussion and Recommendations	
	The Engineer noted that the weather was changing fast. Strong wind was observed during the afternoon. The Contractor commented that they will consider the use of guide lines during installation of the C-Can at the DS area if the wind is found to be strong.	
	Corrective Actions or Improvements	
	Contractor will observe weather conditions before the mobilization of the C-Can to the DS area and to plan/modify the unloading procedure accordingly.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Joan. Nuline demobilization.	
	Discussion and Recommendations	
	The Contractor informed that the first Nuline team that was mobilized (high voltage personnel) will be demobilized at the end of the shift. The second team (electricians) will stay on site to complete the installation of the C-Can and connection to the 500 kVA transformer. Then, they will complete the testing and commissioning of the system with Precision.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	John, Joan. Heated shelters	
	Discussion and Recommendations	
	The Contractor informed that the shelters for the three air valves and the drain valve installed along the pipeline (#1, #3, #4 & #5) will be upgraded. A bigger shelter with a heater will be installed to ensure that the valves are warm and operational during winter.	
	Corrective Actions or Improvements	
	Contractor to complete installation of the shelters before the commissioning of the system.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
4	John, Boyd, Joan. Handover procedure. Training	
	Discussion and Recommendations	
	The need for training of Tees's personnel was commented. Tees's key personnel have to visit the C-Can with Precision to observe the system installed and receive training. Training shall include but will not be limited to operation of the system, the elements installed, the maintenance required, and the recommended spare parts. Tees commented that the best day for the training is Thursday, as there was a cross-shift and the key personnel will be on site at the same time. If training is postponed, a new date could be agreed between Pelly and Tees. In addition, the Engineer reminded that testing and commissioning of the system by Precision and Nuline will be required. The presence of Pelly, BGC and Tees during the key stages of the	

	testing and commissioning is recommended to ensure that all parts are confident with the system before the hand over to YG/Tees. Tees commented that the system should be maintained for a minimum of 24 hrs to verify that can run overnight without supervision (Tees has no personnel during the night). The Engineer commented that 48 hrs seems a reasonable period but it will have to be confirmed with Precision. Finally, the Engineer explained that all documents produced by Nuline and Precision, such as test certificates, will have to be compiled and attached to the handover document (by Pelly) as a support to show that the system is operational and tested according to the design intent. Tees commented that it is unclear how the transition of the system from Pelly to YG and then to Tees will be performed. The Engineer will comment with YG.	
	Corrective Actions or Improvements	
	• Contractor and Tees to agree on the date for the training of Tees's personnel (likely Thursday January 15, 2015). • Engineer to comment with YG the handover procedure (Pelly to YG and YG to Tees?). • Precision/Nuline to comment on the schedule for the testing and commissioning so Pelly, Tees, and BGC could observe the key parts. • BGC to comment with Pelly and Precision on the timeframe for commissioning.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
5	John, Joan. Supervision of Tees's earthworks.	
	Discussion and Recommendations	
	The Engineer noted that the back hoe was moving some material close to the 500 kVA transformer without supervision by Nuline. The Engineer reminded that Nuline or Pelly should be present at all times during the execution of activities with Tees's support. The Contractor is the responsible for the works so they should supervise the entire process. The Contractor commented that the activities were suspended due to the end of the shift. The Tees's back hoe remained on the area a few minutes more to remove some material from the road to allow traffic (work no related to Nuline's execution). Also, confirmed that no work will be performed with Tees unless supervised by Pelly or Nuline's personnel. The Engineer noted the comment from the Contractor, work related to the NFRDSIS installation was performed with supervision of Nuline's personnel.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	N/A

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
DSAR	Beside the new utility pole, at the Northeastern side of the pipeline. DSAR STN 0+165 (field estimate)	Back Hoe (Tees)	Sand and gravel + common excavation material	BA (sand and gravel)	The back hoe was backfilling the cable trench and the transformer excavation. Sand and gravel was used around the pipe. Then, common excavation material. Note that a warning tape was installed by Nuline above the cable to indicate the presence of an underground line.	1, 2

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor will complete the backfill of the cable trench and transformer excavations during the following shift. Then, will complete the connection of the cables into the 500 kVA transformer.
- Precision will be mobilized at the beginning of the shift. After the required orientation and a brief meeting with Pelly and BGC, Precision will start assembling components. If possible, the installation of the C-Can at the DSSC area will be completed during the following shift. Then, Nuline's electricians will start connecting the C-Can with the heat trace line and 500 kVA transformer.
- The Contractor will continue with the installation of the remaining pipeline parts during the next shift.
- During the following shift, the Contractor will require support from Tees (back hoe) to backfill the cable trench and transformer excavation. Also, a hiab to mobilize/install the C-Can at the DSSC. No more support from Tees is foreseen at this time.

Photos:

Photo 1: 20150113_NFRDSIS_Electrical Installation_573_Installation of a warning tape on top of the first layer of sand and gravel placed on top of the cable_Looking NW

Photo 2: 20150113_NFRDSIS_Electrical Installation_574_Back Hoe (Tees) backfilling the transformer excavation and cable trench_Looking NW.

Photo 3: 20150113_NFRDSIS_Electrical Installation_575_Detail of completed mounting panel with all the elements and connections Note insulation on the pipeline still missing_LookingW

Photo 4: 20150113_NFRDSIS_Pipeline_576_Insulation kits mobilized to required locations along the pipeline_Looking W

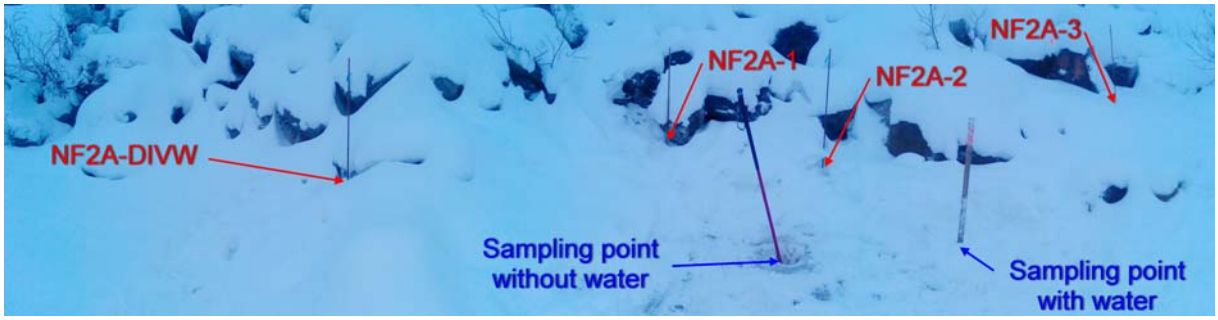

Photo 5: 20150113_NFRDSIS_DSSC_577_Location for the sampling points re-opened to observe conditions under the ice_Looking N

Photo 6: 20150113_NFRDSIS_DSSC_578_Water observed under the ice in front of NF2A-2

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:15 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	Electrical Installation, DSSC	
Date:	20150114	**Record #:**	*20150114_NFRDSIS_DSR_69*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -3.1 °C (Max = 3.0 °C; Min = -9.1 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The installation of the C-Can at the DSSC area will take place on the following shift. A meeting to comment on the unloading procedure, C-Can weight, and measures to be implemented was organized (Precision, Pelly and Tees). A specific tool box meeting will be organized before the activity will take place and a Job Hazard Analysis (JHZ) will be produced and signed.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20150113_NFRDSIS_DSR_68_3 Pipeline installation	No update. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	The parts will be installed during the following shift so Precision will be able to start testing the C-Can (likely during the afternoon). **OPEN**	Contractor
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	No update. **OPEN**	Contractor
20150114_NFRDSIS_DSR_4 Tees training (C-Can)	Contractor to schedule training for Tees. Ideally, Paul and Dan (Tees) should both attend the training. **OPEN**	Contractor (Pelly/Precision) and Tees

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), Haul Road, DSAR, Workshop
Jerry Boss (Nuline), Haul Road, DSAR
Lloyd Burnhord (Nuline), Haul Road, DSAR
Troy Bruton (Nuline), Haul Road, DSAR
Scott Kovac (Nuline), Haul Road, DSAR
Todd Carter (Precision), Workshop, DSAR
Ron Nelson (Precision), Workshop, DSAR
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, DSAR, illuminating the work area)
Light Tower/Generator (Allmand ML8, yellow, Haul Road, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
At the DSSC area, the Contractor removed the ice plug from the manhole with support from a steam truck (Tees). The water level inside the manhole was found to be at 1 m from the top of the manhole (**Photo 2**). In addition, the Contractor installed the thermocable inside the short section of pipeline from manhole to the new pumping location. The thermocable connection was not completed before the end of the shift. Afterwards, the Contractor removed the snow from the area around the manhole to provide a safe access to the manhole. Also, to allow the proper installation of the C-Can. Some sand and gravel from the C-Can pad was removed during this process. Pelly prepared some wooden logs in case Precision needs them to level the C-Can. At the workshop (bay 11), Precision started to mount and assemble C-Can components (**Photo 1**). The rest of the elements, such as the external lights, will not be mounted until the C-Can will be installed on top of the manhole. Those elements were removed from the C-Can so they will not be damaged during the mobilization and installation of the C-Can. The installation of the C-Can was postponed until the following shift.
Pipeline (PL)
No activity.
Electrical Installation (EI)
Nuline installed a mounting steel panel at the bottom of the utility post erected at the second crossing. Then, mounted and connected the required connection boxes, switches and breakers for the 75 kVA transformer mounted on the utility pole (**Photo 6**). At the DS area, Nuline connected the 500 kVA transformer to the electrical cable (4160 V) from the

utility pole (**Photo 5**). Then, installed a mounting steel panel beside the 500 kVA transformer (**Photo 3**). This panel will be used to mount the required connection boxes, switches and breakers for the 500 kVA transformer (**Photo 4**). The installation and connection of these elements was not completed before the end of the shift. The installation of the remaining elements is expected by the following shift, so the C-Can and heat traced system can be energized and tested. The required training of Tees personnel is also scheduled for the following shift.
Overhead Power Line (OPL)
No activity.

5. Communications

ID	Summary *(time, personnel, work area and description)*	
1	Joan, John. DSSC collection system	
	Discussion and Recommendations	
	The Engineer commented that water flowing under the ice was observed at NF2A-2 location. Therefore, there was water reaching the new pumping location. No changes on the pumping intended location are expected so the pump could be installed. As commented on previous shifts, the pump will be installed 5 m downstream to the NF2A sampling trench. The Contractor commented that the new pump will be installed at the intended location as soon as the C-Can will be ready to be tested. There was a risk that the hole and the pump will freeze (blockage) if it is installed and not in operation.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	Joan, John. Heated Shelters. Power for heaters	
	Discussion and Recommendations	
	The Contractor requested information regarding the required power for the heated shelters. The Engineer reminded that the power required, according to the heater supplied, could be obtained from the heat traced line system, as communicated by email on November 17, 2014.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	Joan, John. Drainage for 500 kVA precast concrete block.	
	Discussion and Recommendations	
	The Engineer noted that water could accumulate inside the precast concrete block located under the 500 kVA transformer (precast concrete block). The Contractor commented that the cables were rated for underground installation so the presence of water should not cause problems on the system. Also, noted that, if water will accumulate at that point, water will drain on the contact between the transformer and concrete block. In addition, the Contractor commented that some work will have to be performed by Tees	

	when the snow and ice will melt. They will have to grade the area and then place some sand and gravel to regularize the area.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- Nuline will complete the installation and connection of switches, breakers and connection boxes for the 500 kVA transformer. Then, once the C-Can will be installed, they will connect the C-Can, 500 kVA transformer and the heat trace line components.
- Precision will mobilize and install the C-Can at the DSSC area (manhole) with support of a hiab (Tees). Afterwards, they will complete the installation of the C-Can elements. If possible, they will start testing C-Can components.
- During the following shift, the Contractor will require support from Tees to mobilize/install the C-Can at the DSSC. No more support from Tees is foreseen at this time.

Photos:

Photo 1: 20150114_NFRDSIS_DSSC_579_Air intake installed on the C-Can_Workshop Bay 11

Photo 2: 20150114_NFRDSIS_DSSC_580_The Ice plug inside the manhole was removed with a steam truck. Water was at 1 m from the top of manhole. Note that 4" pipe on the manhole wall.

Photo 3: 20150114_NFRDSIS_Electrical Installation_581_New mounting panel beside the 500 kVA transformer at the DS area_Looking NW

Photo 4: 20150114_NFRDSIS_Electrical Installation_582_New breaker for the 500 kVA transformer

Photo 5: 20150114_NFRDSIS_Electrical Installation_583_Intake inside the 500 kVA transformer

Photo 6: 20150114_NFRDSIS_Electrical Installation_584_Nuline installing switch for the 75 kVA transformer at the bottom of the pole_Looking NW

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:25 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	OPL, EI, DSSC	
Date:	20150115	**Record #:**	*20150115_NFRDSIS_DSR_70*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -0.9 °C (Max = +1.3 °C; Min = -3.0 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	• A specific tool box meeting was organized for the mobilization and unloading of the C-Can at the DSSC area. Pelly, Precision, Tees and BGC attended the meeting. The Job Hazard Analysis (JHZ) was signed by all parts. • Nuline closed the road from the brown shack to Zone 2 during the works on the overhead power line. Cones across the road were installed to block traffic.
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20150113_NFRDSIS_DSR_68_3 Pipeline installation	No update. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	A hole in the ice was executed and the pipe components connected with support from Tees. The pump was not installed and tested as there was no power at the C-Can to feed the pump. The insulation of the 90° elbow and the connection of the heat trace line were not completed at the end of the shift. **OPEN**	Contractor
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	No update (see Communication 1). **OPEN**	Contractor

20150114_NFRDSIS_DSR_4 Tees training (C-Can)	The training was postponed as both Precision and Nuline were still assembling and mounting components. **OPEN**	Contractor (Pelly/Precision) and Tees

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (YC/CH2M), Haul Road, DSAR, DSSC, Pipeline
John Garvis (Pelly), Haul Road, DSAR, Workshop
Danny Manuel (Nuline), Haul Road
Dustin Elliott (Nuline), Haul Road
Gary Drinnan (Nuline), Haul Road
Jerry Boss (Nuline), DSAR, DSSC
Lloyd Burnhord (Nuline), DSAR, DSSC
Troy Bruton (Nuline), DSAR, DSSC
Scott Kovac (Nuline), DSAR, DSSC
Todd Carter (Precision), DSAR, DSSC
Ron Nelson (Precision), DSAR, DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, DSAR, illuminating the work area)
Light Tower/Generator (Allmand ML8, yellow, workshop bay 11, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
At the new pumping location (5 m downstream to NF2A sampling location), Tees installed a butterfly valve and a discharge hose to regulate the flow sent to the manhole (**Photo 6**). The butterfly valve could be opened if there was a risk of overflow at the manhole. Afterwards, Tees executed a hole in the ice with a power saw and steel bars (**Photo 6**). Then, installed the steel A-frame that will support the pump and a chain. The pump was not finally installed as the C-Can tests were postponed until the next shift. At the manhole, the C-Can was mobilized and installed by Pelly, Precision and Tees (**Photos 1** and **2**). Some wooden logs were used to level the C-Can on top of the manhole. Once the C-Can was installed, Precision started assembling components inside the C-Can, including the pump and other piping components (**Photos 3** and **7**). Precision did not complete the installation of all the C-Can elements before the end of the shift.

The Engineer and YG visited the DSSC area. Water flowing under the ice in front of NF2A-2 location was observed. At NF2A sampling trench, water flowing under the ice was also observed. At the new pumping location (5 m downstream to NF2A sampling trench), the Engineer measured a water depth of 0.97 m.
Pipeline (PL)
Pelly started the insulation of the two locations were the thermocable connections and the installation of sensors was completed. The activity was not completed before the end of the shift. According to the Contractor, the new valve shelters were completed by Pelly personnel in Whitehorse. The shelters will be mobilized to Faro and installed during the following shift.
Electrical Installation (EI)
Nuline continued with the installation of the switches and breakers for the 500 kVA transformer, 4160 V line and the C-Can (**Photo 8**). These elements were mounted at the steel mounting panel located beside the transformer. Also, laid electrical cable from the mounting steel panel beside the 500 kVA to the C-Can. Then, started connecting the C-Can (**Photo 7**). These activities were not completed before the end of the shift so the C-Can could not be energized. The completion of electrical connections is expected by the beginning of next shift. The electrical cable required to connect the third heat trace circuit to the 75 kVA transformer was not delivered to site before the end of the shift. The delivery and installation of the cable, as well as the required connections, will be completed during the next shift.
Overhead Power Line (OPL)
Nuline mobilized a new pole to the first Haul Road crossing (refer to Communication 1). Then, new steel arms were installed on the utility pole. Also, the 4160 V wires previously installed on the existing 69 kV utility pole located at the crossing were removed (**Photo 9**). An excavator (Tees) was mobilized to the crossing to execute small excavations for the installation of the pole and the required anchors. The installation of the new pole was not completed before the end of the shift.

5. Communications

ID	Summary *(time, personnel, work area and description)*
1	John, Chad, Joan. Installation of a new pole at the Haul Road crossing.
	Discussion and Recommendations
	The Contractor informed that a new pole will be installed at the Haul Road crossing (brown shack). This pole is required to reduce the load (tension) from the existing 69 kVA pole, where the new 4160 V wires were installed by Nuline. The new pole will be installed and the 4260 V wires relocated. This decision was taken by Nuline as the calculations performed by their engineer showed a safety factor lower than the required by the applicable codes. Both the Engineer and YG noted the information supplied by the Contractor. Also, commented that this change shall be reflected on the designs that will be supplied by Nuline. Finally, remembered that, once the designs are delivered, they will have to be reviewed. Any changes arisen from the review of Nuline's design will have to be executed at Contractor's expense. No

	update on the delivery date for the designs was available at the time of the communication.	
	Corrective Actions or Improvements	
	Nuline to include the new pole and 4160 V cable configuration on the electrical. Also, to submit the design for review and approval.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
2	John, Chad, Joan. Supply of electrical cables.	
	Discussion and Recommendations	
	The Engineer and YG noted that the third heat traced circuit was not connected to the 75 kVA transformer. The Contractor explained that the required electrical cable will be delivered and installed by Nuline during the shift. It was unclear if the installation and connection of the components could be completed before the end of the shift, as the Contractor was focusing all personnel on the connection of the 500 kVA transformer and the C-Can. YG noted that, according to the milestones listed on the Contract, the complete electrical wiring for the heat trace pipe and the complete electrical supply for the two downstream heat trace circuits shall be completed by January 16, 2015 (next shift). Also, commented that Pelly should send a notification to YG if the referred milestones are not achieved.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	John, Chad, Joan. Sand bags around the C-Can.	
	Discussion and Recommendations	
	The Contractor informed that no sand bags will be placed around the manhole. According to Precision's design, sand bags had to be placed around the manhole to block the circulation of cold air. As commented with Precision, sand bags will be placed at the perimeter of the C-Can to insulate the whole area under the C-Can. The Engineer noted the comment from the Contractor.	
	Corrective Actions or Improvements	
	Contractor to install the sand bags.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
4	John, Chad, Joan. C-Can testing and commissioning schedule.	
	Discussion and Recommendations	
	The Contractor informed that the C-Can will not have power until the following shift. Nuline was not able to complete the electrical connections between the new 500 kVA transformer and the C-Can before the end of the shift. The testing of the C-Can and the training of Tees's personnel was postponed until the next shift. It was noted that Tees will not have all personnel on site, so the person trained by Precision will have to receive addition information so as to be able to train other Tees personnel.	

	If the delivery of power to the C-Can is delayed, Precision may look for other works not related to the NFRDSIS project. YG noted that a second mobilization for Precision was considered in case there was a waiting time. The group commented that, if possible, Precision should stay and complete the testing and commissioning without an extra mobilization.	
	Corrective Actions or Improvements	
	Nuline to complete the electrical installation so Precision can continue with the C-Can testing and the training of Tees's operators.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
5	John, Chad, Joan. Heated shelters for valves.	
	Discussion and Recommendations	
	The Contractor informed that the new shelters will be delivered and installed during the following shift. Nuline will comment on options to provide power to the heaters as soon as they finish the connections at both 500 kVA transformer, C-Can and 75 kVA transformer.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
OPL	First Haul Road crossing (brown shack)	Excavator (Tees)	Contractor started the excavation for a new utility pole and anchor lines. Not completed before the end of the shift.	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Nuline will complete the installation and connection of the C-Can and 500 kVA transformer so as to supply power to the C-Can. Then, Nuline will install a new electrical cable along the pipeline to feed the third heat trace circuit. At the haul road crossing, Nuline will complete the installation of the new utility pole and the relocation of the 4160 V wires. Precision will complete the installation of components inside/outside the C-Can. If power is available, Precision will start testing C-Can components and the training of Tees's personnel.
- During the following shift, the Contractor will require support from Tees to mobilize/install the new wooden shelters at each valve location. No more support from Tees is foreseen at this time.

Photos:

Photo 1: 20150115_NFRDSIS_DSSC_585_Installation of the C-Can on top of the manhole_Looking E

Photo 2: 20150115_NFRDSIS_DSSC_586_Overview of the DSSC showing the location of the 500 kVA transformer, utility pole, mounting steel panel and C-Can_Looking SW

Photo 3: 20150115_NFRDSIS_DSSC_587_Precision installing components at the C-Can_Looking E

Photo 4: 20150115_NFRDSIS_DSSC_588_C-Can clear opening matching the manhole location.

Photo 5: 20150115_NFRDSIS_DSSC_589_View of the manhole through the C-Can clear opening. Note the 4" pipe outlet that will be used to feed the manhole.

Photo 6: 20150115_NFRDSIS_DSSC_590_Tees executing a hole in the ice to install the new pump. Note the butterfly valve already installed_Looking NE

Photo 7: 20150115_NFRDSIS_Electrical Installation_591_Nuline connecting electrical cables at the C-Can end_Looking NE

Photo 8: 20150115_NFRDSIS_Electrical Installation_592_Nuline mounting components at the steel mounting panel beside the 500 kVA transformer_Looking N

Photo 9: 20150115_NFRDSIS_Overhead Powerline_593_Nuline removing the 4160 V wires preciously installed at the existing 69 kV utility pole_Looking NE

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:20 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	OPL, EI, DSSC	
Date:	20150116	**Record #:**	*20150116_NFRDSIS_DSR_71*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -2.8 °C (Max = +3.3 °C; Min = -8.8 °C)

1. General

#	Description	Comments
1.1	Health and Safety	• The Engineer recommended extreme caution when working on the overhead power line as intense wind was blowing intermittently (see Communication 2). • The Haul Road section from the first crossing (brown shack) to the second crossing (Zone 2) was closed to traffic with cones during the relocation of 4160 V wires. • The Engineer reminded that the work areas shall be clean at all times. Also, that cables should be tied together as they could cause accident (tripping hazard).
1.2	Environmental	
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	Nuline informed that the electrical design will be available during the following shift.

2. Issue Tracking

Issue ID [1]	Status/ Observations	Action Required By
20150113_NFRDSIS_DSR_68_3 Pipeline installation	The Contractor completed the insulation of the two flanged connections. The new shelters were delivered and installed. Some elements are still pending. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	The pump was installed. Also, a temporary hose was installed from the C-Can to NF2 location. The required insulations and the heat trace line connection will be completed during the next shift. **OPEN**	Contractor

20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	Nuline informed that the designs will be delivered during the following shift. **OPEN**	Contractor
20150114_NFRDSIS_DSR_4 Tees training (C-Can)	The training was postponed as Precision did not complete the setup of the C-Can components. **OPEN**	Contractor (Pelly/Precision) and Tees

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
Chad Brassard (YC/CH2M), Haul Road, DSAR, DSSC, Pipeline
John Garvis (Pelly), Haul Road, DSAR, DSSC, Pipeline, Workshop
Dean Serelo (Pelly), Haul Road, DSAR, DSSC, Pipeline, Workshop
Dylan Lowery (Pelly), Pipeline, Haul Road, Workshop
John Seehaver (Nuline), Haul Road, DSAR, Pipeline
Danny Manuel (Nuline), Haul Road
Dustin Elliott (Nuline), Haul Road
Gary Drinnan (Nuline), Haul Road
Jerry Boss (Nuline), Pipeline, DSAR, DSSC
Lloyd Burnhord (Nuline), Pipeline, DSAR, DSSC
Troy Bruton (Nuline), Pipeline, DSAR, DSSC
Scott Kovac (Nuline), Pipeline, DSAR, DSSC
Todd Carter (Precision), DSAR, DSSC
Ron Nelson (Precision), DSAR, DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, DSAR, illuminating the work area)
Light Tower/Generator (Allmand ML8, yellow, workshop bay 11, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
At the C-Can, Precision installed C-Can components (**Photo 3**). Then, started the setup of the pumping system. No pumping was performed as Precision did not complete the setup for the C-Can components before the end of the shift. At the new pumping location (5 m downstream to NF2A sampling location), Tees installed the pump into the hole executed during the previous shift (**Photos 7**, **8** and **9**). Then, installed a temporary discharge hose from the C-Can to NF2 location (**Photos 7**, **11** and **12**). This temporary

discharge hose will be used to discharge the water pumped at the C-Can pump. No water will be pumped to the Faro pit until Precision confirms that the C-Can is working properly (see Communication 3). The hose installed at the outlet of the butterfly valve was also located so it will discharge at NF2 location (**Photos 7, 10** and **11**). The Engineer and YG visited the DSSC area. Water flowing under the ice was observed at NF2A sampling trench, NF2 sampling point (**Photo 12**) and the new pumping location (**Photo 9**). The Engineer measured a water depth of 0.97 m at the new pumping location (same reading as the previous shift). At NF2A sampling location, the Engineer recorded a water depth of 0.72 m.
Pipeline (PL)
Pelly completed the insulation of the two flanged connections that were still pending. Then, removed the shelters previously installed by Wildstone. The new shelters were delivered and positioned at the intended locations before the end of the shift (**Photo 2**). The complete installation of the shelters and the associated components was not completed before the end of the shift. Some tasks, such as the insulation of the connection with the C-Can (Communication 4) or the relocation of the pipeline at the S-Wells area (Communication 5), were not completed before the end of the shift.
Electrical Installation (EI)
Nuline completed the connections between the 500 kVA transformer and the C-Can (**Photos 4** and **5**). Then, energized the 500 kVA transformer and supplied power to the C-Can (**Photo 16**). Afterwards, mobilized all personnel to install the new electrical cable delivered and connected the third heat traced circuit to the 75 kVA transformer (**Photos 13** and **15**). At the end of the shift, all electrical connections were completed, including the ones for the third and fourth heat traced circuits (**Photo 14**). Nuline did not test the 75 kVA transformer before the end of the shift so the Engineer could not verify that power was available and the heat trace circuits were working properly. The first two heat trace circuits were not tested either. Some tasks, such as the connection of heaters, the cleaning of working areas, or the relocation of the electrical cable at the S-Wells area (Communication 5), were not completed before the end of the shift.
Overhead Power Line (OPL)
Nuline completed the erection of the new pole at the first Haul Road crossing. Then, the 4160 V wires were relocated (**Photo 1**). Finally, two new anchors and protectors/reflectors were installed.

5. Communications

ID	Summary *(time, key personnel, work area and description)*
1	John, Jerry, Todd, Chad, Joan. Coordination Meeting.
	Discussion and Recommendations
	A meeting was organized to coordinate the testing and commissioning of the pumping system. The following is a summary of the relevant comments performed during the meeting:

- Nuline will complete the connection of the C-Can to the 500 kVA transformer. At the same time, the new pole will be erected at the Haul Road crossing and the 4160 V cables relocated. Then, power will be supplied to the C-Can (probably after 12 pm).
- Precision will complete the installation of the C-Can components and then will wait for Nuline to provide power to the C-Can. In the meantime, Precision could do some work not related to the NFRDSIS.
- As soon as there is power available:
  - Nuline will mobilize all personnel to the 75 kVA transformer to complete the electrical connections. The delivery of a new cable is expected by noon (John S.). Nuline is confident that they will be able to install the new cable and execute the required connections before the end of the shift. This is required to achieve one of the milestones on the Contract.
  - Precision will start the setup of components inside the C-Can, and then test the pumping system. At the same time, Pelly and Tees will complete the installation of the new pump to feed the manhole.
- The training of Tees's personnel will likely be performed during the afternoon. Additional information will have to be provided to ensure that Tees's representatives will be able to train other personnel. A signed document to record the training session will have to be produced and attached to the handover document.
- The commissioning of the system will start when the testing of components (pipeline, heat trace and C-Can) are completed. The sub-contractors shall show that the elements are working properly before the commissioning. The Engineer noted that separate signed certificates for the tests and the commissioning will be required. Pelly requested Nuline and Precision to prepare the certificates before they leave site. The system has to be running for a complete night to show that it can work without supervision (at least 24 hours). Therefore, the recommended commissioning duration is 48 hours.
- Pelly will deliver and install new shelters for the valves. Nuline will postpone the connection of heaters until all urgent activities are completed. Nuline commented that they were only aware of the presence of 1 heater, not 5, so more work will be required. Pelly commented that, based on previous conversations with Tees, 1 single heater was going to be installed. Pelly decided to install new walk-in shelters with heaters for all valves so as to deliver a better product. The Engineer and YG commented that the heated shelters are a Contractor's design. It is up to the Contractor to decide how to heat them (if they meet the design intent). Anyway, commented that the all installed elements will be subject to a defects notification period so any deficiencies will have to be solved.
- Precision will have to provide field data for the completion of the Operations and Maintenance manual. Pelly requested that all the documentation is produced on the field to speed up the process. The Engineer noted that the manual shall include a troubleshooting section explaining the steps to be followed in case of malfunction of the

	system. The meeting concluded and all personnel started working on their respective areas.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	John, Chad, Joan. H&S. Overhead power line activities at the Haul Road crossing.	
	Discussion and Recommendations	
	The Engineer and YG noted that works on the overhead power line could be impacted by the intermittent wind blowing at the Haul Road area. No wind speed readings were available at the Faro Mine so the Engineer recommended to Contractor that the conditions should be revaluated. If strong winds are observed, activities should be suspended and risks evaluated. Mitigation measures should be implemented before activities could resume. The Contractor commented that Nuline personnel were trained to work under the effect wind blowing up to 100 km/h. Also, that the Nuline informed that the works could be completed on a safely manner. According to the records from the Faro Airport, the wind speed was approximately 30 km/h.	
	Corrective Actions or Improvements	
	Contractor observed the weather conditions during the erection and installation of 4160 V wires. The implementation of remedial measures was not required. The activity was completed and no incidents were recorded.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
3	John, Chad, Joan. DSSC. C-Can local pump test.	
	Discussion and Recommendations	
	The Contractor informed that no water will be pumped into the pipeline until Precision will confirm that the pumping system within the C-Can is working properly. The Contractor noted that the heat trace line was not tested. There was a risk that the pumping will be interrupted and the water will remain inside the unheated pipeline. The Contractor commented that it was safer to wait until Nuline confirm that the heat trace line is working. In the meantime, a temporary hose will be installed at the C-Can outlet and the water will be locally discharged at NF2 location. This will allow Precision to start testing the pumping system. The Engineer noted the comment from the Contractor. Also, commented that testing of the complete system (C-Can + pipeline) will be required at a later stage to confirm that the complete system is working. This first local test will be performed within the DSSC area so the system will not be under high water pressures. At a later stage, bigger pressure will be required to pump water to the top of the Haul Road so recalibration will likely be required.	
	Corrective Actions or Improvements	
	The Contractor installed a temporary hose from the C-Can outlet to the NF2 location (**Photos 7**, **11** and **12**). The testing was not completed as Precision did not complete the setup of components inside the C-Can. Local testing (within the DSSC area) is expected during the	

	following shift.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
4	John, Chad, Joan. Insulation of the connection between the C-Can and pipeline.	
	Discussion and Recommendations	
	YG noted that the last section of pipeline was not insulated (connection to the C-Can). The Engineer noted that the dog house delivered by Precision to insulate the 90º connection elbow was too small. According to Precision's drawings, the dog house shall cover the 90º elbow and the flanged connection. The Contractor informed that the insulation will be installed when the pipeline will be connected to the C-Can. Also, that they will try to install the supplied dog house on a horizontal direction. If so, the house will then cover the 90º elbow, the flanged connection and the last section of pipeline. If the dog house could not cover all the elements, a new wooden shelter will be constructed and installed to protect the elements.	
	Corrective Actions or Improvements	
	Contractor to insulate the 90º elbow, flanged connection and last pipeline section.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
5	John, Joan. Relocation of pipeline and electrical cable inside the flume.	
	Discussion and Recommendations	
	The Engineer noted that the pipeline and electrical cable was no longer located inside the flume (close to the S-Wells area). Also, recommended that both the pipeline and the flume should be relocated inside the flume to provide extra protection.	
	Corrective Actions or Improvements	
	Contractor to relocate the pipeline and the electrical cable inside the flume.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
6	John, Joan. Milestone on Contract and remaining activities. Electrical Installation.	
	Discussion and Recommendations	
	The Contractor informed that the electrical wiring for the heat trace pipe was completed. Also, that the electrical supply for the two downstream heat trace circuits was completed. The Engineer noted that the first milestone was achieved, although the wiring was completed but not tested. Regarding the second milestone, the Engineer noted that no test was performed to confirm that the electrical supply was really available. The 75 kVA transformer should be energized and the system verified before the Engineer could conclude that the milestone is achieved. The Engineer also reminded that, as requested by YG, Pelly should give a status of the work to YG at the end of the shift. In addition, the Engineer noted that Nuline still had to complete some activities, including but not limited to: • Group cables together so they can be easily identified by Tees's personnel and they could not be damaged by traffic, water or personnel. For example, the cables behind	

	the C-Can were hanging on top of the ice. The Engineer noted that they can also cause accidents (tripping hazard). • Testing of all heat trace components and transformers. • Power supply for heaters inside heated shelters for valves. • Connection of the heat trace section from the C-Can to the new pump. • Clean work areas. The Contractor commented that the activities will be completed on the following shifts.	
	Corrective Actions or Improvements	
	Contractor to complete the remaining activities.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Nuline will energize the 75 kVA transformer and test the heat trace circuits. Then, they will continue with the remaining of activities. Precision will complete the setup of C-Can elements and then start with pumping tests. If the heat trace line is ready and the C-Can pumping system is working properly, the Contractor may start testing the complete system.
- Nuline demobilized the team working on the overhead power line as soon as they finished with the erection of the new pole and the relocation of 4160 V cables. John S. also demobilized at the end of the shift. Pelly demobilized Dylan L. at the end of the shift.
- No more support from Tees is foreseen at this time.

Photos:

Photo 1: 20150116_NFRDSIS_Overhead Powerline_594_Installation of 4160 V wires on the new pole erected at the first Haul Road crossing (brown shack)_Looking N

Photo 2: 20150116_NFRDSIS_Pipeline_595_New valve shelters delivered to site

Photo 3: 20150116_NFRDSIS_DSSC_596_Precision installing components at the C-Can_Looking E

Photo 4: 20150116_NFRDSIS_Electrical Installation_597_Cables connected at splitter boxes mounted on the C-Can wall_Looking N

Photo 5: 20150116_NFRDSIS_Electrical Installation_598_Nuline connecting cables at the mounting steel board beside the 500 kVA transformer_Looking NW

Photo 6: 20150116_NFRDSIS_DSSC_599_View of C-Can installed on top of the manhole_Looking N

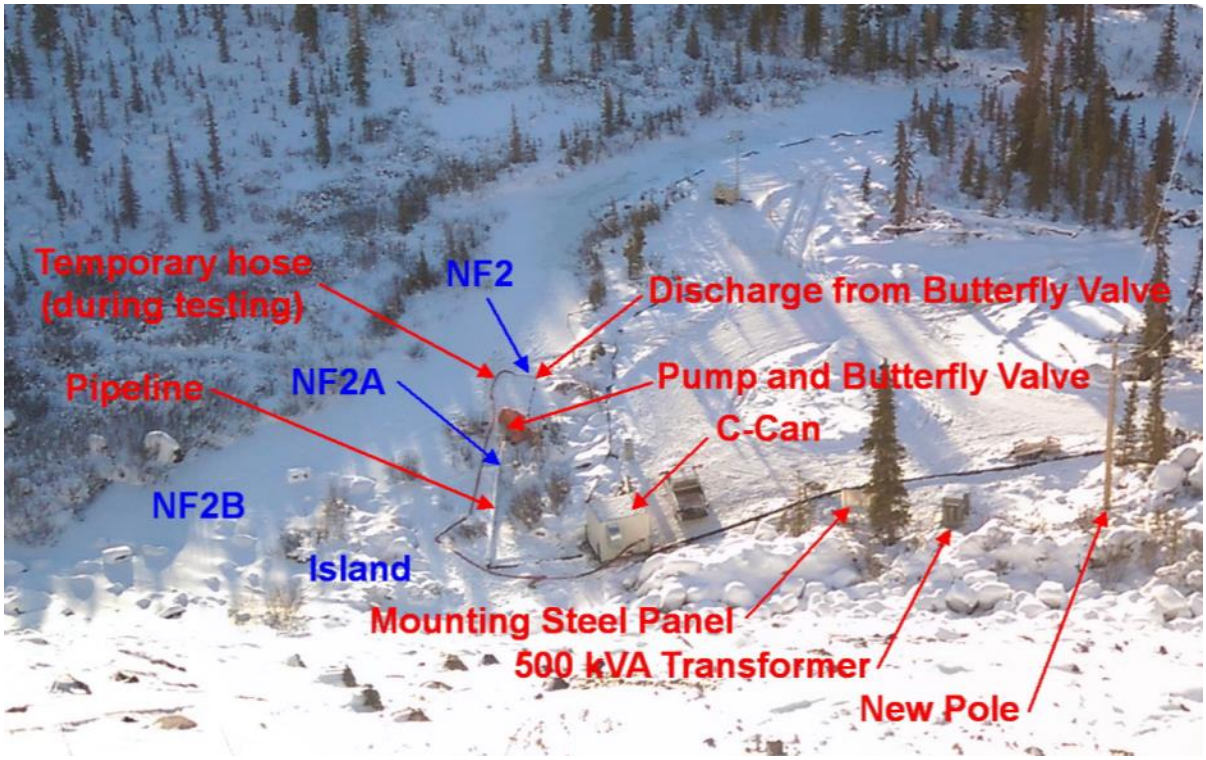

Photo 7: 20150116_NFRDSIS_DSSC_600_Configuration of pipes and hoses to perform the local test. Note temporary discharge hose from the C-Can to NF2 location_Looking SW

Photo 8: 20150116_NFRDSIS_DSSC_601_Pump suspended by means of a chain and A-frame. Note that the elevation of the pump can be adjusted_Looking SW

Photo 9: 20150116_NFRDSIS_DSSC_602_Pump being lowered into the hole executed in the ice. Note the presence of water

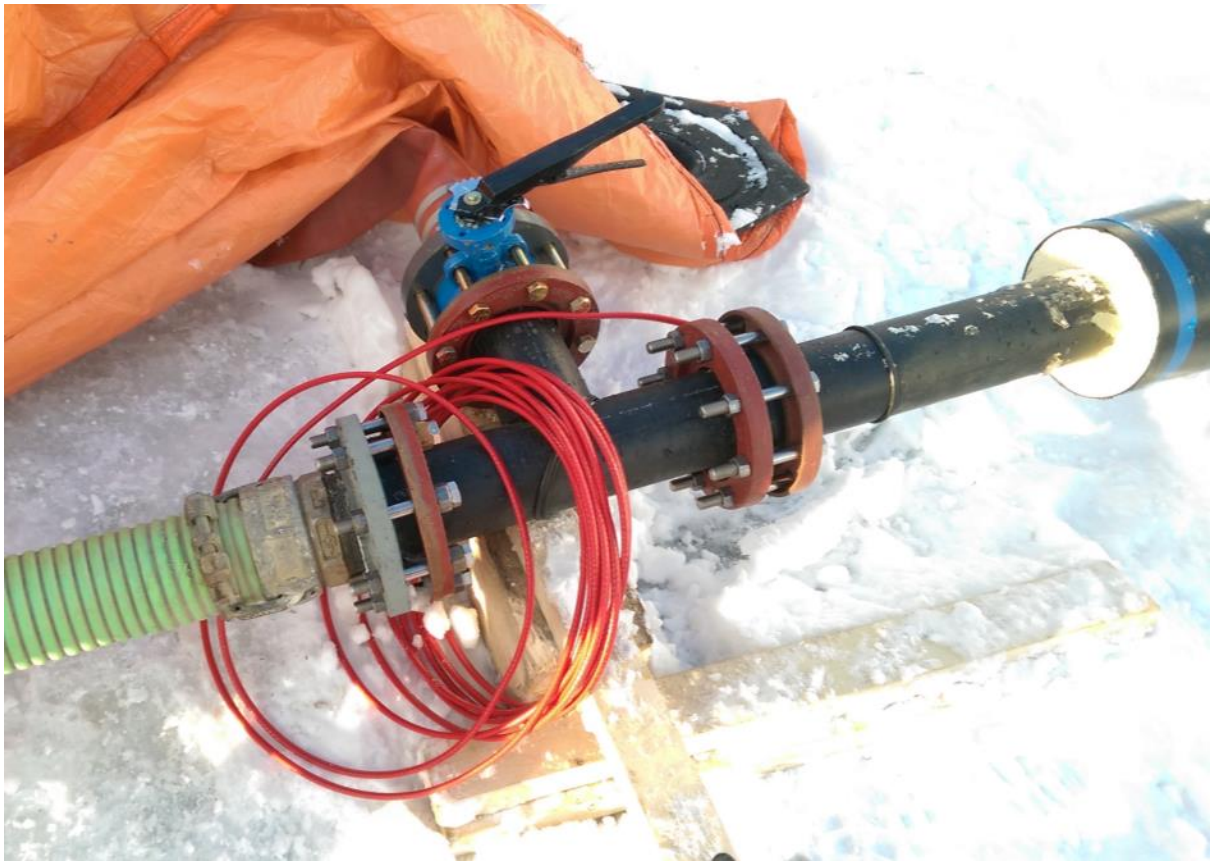

Photo 10: 20150116_NFRDSIS_DSSC_603_4" HDPE tee and butterfly valve installed to regulate the flow sent to the manhole (C-Can). Note that the insulation is still not completed

Photo 11: 20150116_NFRDSIS_DSSC_604_View of NF2 sampling location with temporary discharge hose (right) and discharge from the butterfly valve at pump outlet)_Looking N

Photo 12: 20150116_NFRDSIS_DSSC_605_Temporary discharge hose at NF2 sampling location. Note water flowing under the ice

Photo 13: 20150116_NFRDSIS_Electrical Installation_606_Nuline connecting elements at the mounting panel installed at the bottom of the 75 kVA transformer_Looking N

Photo 14: 20150116_NFRDSIS_Electrical Installation_607_All connections completed at the panel under the 75 kVA transformer_Looking W

Photo 15: 20150116_NFRDSIS_Electrical Installation_608_Connections at the third circuit completed_Looking W

Photo 16: 20150116_NFRDSIS_Electrical Installation_609_Completed connections at C-Can. Note that power is available and the external light is working_Looking NE

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:20 pm
Project #:	0533-010-06	**Weather:**	Overcast, intermittent light snow	
Subject:	Day Shift Report	**Work Areas*:**	EI, PL, DSSC	
Date:	20150117	**Record #:**	*20150117_NFRDSIS_DSR_72*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -3.5 °C (Max = -0.1 °C; Min = -7.0 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	Nuline submitted a stamped version of the electrical design drawings. Nuline's field personnel spotted some errors on the design. Pelly informed that the drawings will be corrected and a new revision delivered.

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20150113_NFRDSIS_DSR_68_3 Pipeline installation	The Contractor is still working on the heated shelters. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	The contractor installed the required parts and the pump was energized. Some tests were performed by the Contractor and the pump was working properly. The connection of the heat trace line is still pending. **OPEN**	Contractor
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	Nuline delivered design drawings. A new revision of the drawings will be prepared and delivered. **OPEN**	Contractor
20150114_NFRDSIS_DSR_4 Tees training (C-Can)	The training was postponed as Precision did not complete the testing of the C-Can components. **OPEN**	Contractor (Pelly/Precision) and Tees

20150116_NFRDSIS_DSR_4 Insulation of C-Can connection	No update. **OPEN**	Contractor
20150116_NFRDSIS_DSR_5 Relocation of pipeline (S-Wells)	No update. **OPEN**	Contractor
20150116_NFRDSIS_DSR_6 Remaining electrical tasks	Nuline was testing the thermocable sections. No other activity was completed before the end of the shift. **OPEN**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), DSAR, DSSC, Pipeline, Workshop
Dean Serelo (Pelly), DSAR, DSSC, Pipeline, Workshop
Jerry Boss (Nuline), Pipeline, DSAR, DSSC
Lloyd Burnhord (Nuline), Pipeline, DSAR, DSSC
Troy Bruton (Nuline), Pipeline, DSAR, DSSC
Scott Kovac (Nuline), Pipeline, DSAR, DSSC
Ron Nelson (Precision), DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, DSAR, no activity)
Light Tower/Generator (Allmand ML8, yellow, workshop bay 11, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
Precision completed the setup of the C-Can components. Then, the new pump located 5 m downstream to NF2A sampling location was energized (**Photo 1**). As soon as the new pump was feeding the manhole, Precision started pumping water at the C-Can to test the pumping system (**Photos 7**, **8**, **9 10**, **11** and **12**). It is important to note that the C-Can was not connected to the pipeline. As commented during the previous shift, no water will be pumped to the Faro pit until Precision confirms that the C-Can is working properly. Until then, water will be pumped to NF2 (**Photos 3**, **4** and **6**). The tests included different pumping rates (up to 8 L/s) and different income flows from the new pump installed at the creek. The flow pumped to the C-Can was regulated by means of the butterfly valve installed at the pump outlet (**Photos 2**, **3** and **4**). It is important to note that Precision did not complete the pumping tests before the end of the shift. Also, that the Contractor decided to leave the system running all night to see if it will be able to work

continuously. The Engineer visited the DSSC area to observe the pumping tests. Water flowing under the ice was observed at NF2A sampling trench (**Photo 5**), NF2 sampling point and the new pumping location. The Engineer measured water elevations before and during the pumping tests. It is important to note that the variations were imperceptible at both NF2A sampling trench and the pumping hole. This could indicate that there was a considerable water flow under the ice. At the time of the visit, no water samples were collected.
Pipeline (PL)
The Contractor continued with the installation of the new heated shelters. Not completed before the end of the shift.
Electrical Installation (EI)
Nuline started the testing stage for the thermocable circuits. The heat trace line was energized and the Contractor measured the electrical resistance with a megohmmeter. Some problems were identified along the pipeline. Nuline located the problems and corrected them. Note that the testing of the complete thermocable circuit was not completed before the end of the shift. In addition, the existing thermocable at the dual vacuum breaker and air release valve, which is located at the highest point along the pipeline, was cut (**Photo 15**). The existing thermocable was found to be short so no sufficient wrapping of the valve was provided. A new section will be fused in order to provide extra wrapping around the connection tee and valve. The new wrapping around the valve and the connection of the thermocable was not completed before the end of the shift.
Overhead Power Line (OPL)
No activity.

5. Communications

ID	Summary *(time, key personnel, work area and description)*
1	John, Barry (Tees), Jerry, Ron, Joan. Progress update.
	Discussion and Recommendations
	A meeting was organized to provide an update on the testing for the different components. The following is a summary of the comments performed during the meeting: • Nuline informed that the heat trace line will be energized to test the thermocable. Pelly reminded that all tests shall be recorded. They will be included on the certificates to be produced by Nuline. • Precision commented that they will start with the pumping tests during the morning. If all systems are working properly, the C-Can could be connected to the pipeline and test the complete system. As commented before, Pelly requested Precision to record all test data. • Tees commented that training of key personnel could be postponed if required. Support from Tees's personnel was not required during the testing of C-Can components. Ray H. (Tees) will visit the site during the morning so training could be completed if Precision is ready. If not, training to Ray will have to be postponed until Monday, January 19, 2015.

	• The commissioning of the complete system will not start until both the pipeline and pumping system are working properly and calibrated.	
	Corrective Actions or Improvements	
	N/A	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**
2	John, Joan. C-Can instruments. Transducer to measure water level inside the manhole.	
	Discussion and Recommendations	
	The Engineer noted that the digital screen showing the water level inside the manhole (**Photo 8**) was showing more than 3 m of water. The Engineer commented that the manhole was 2.8 m deep and no water overflowing was observed. In addition, noted that water falling into the manhole from the outlet of the 4" pipeline could be heard from the back of the C-Can. Therefore, the information shown on the screen was not correct, possible due to problems with the pressure transducer. The Engineer commented that Precision will have to provide information to show that the readings shown on the digital screen are correct. The Contractor commented that a hole on the C-Can floor could be executed to allow the observation of the manhole. A plug or cover could be fabricated on site to seal the hole.	
	Corrective Actions or Improvements	
	Contractor to calibrate the sensors inside the C-Can and to provide documentation showing that all elements are working properly.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**OPEN**
3	John, Joan. Power supply for the heaters. Heated shelters at valve locations.	
	Discussion and Recommendations	
	The Contractor informed that the best option to feed the heaters is to connect them to existing elements on the field. Also, commented that this activity could not be completed without authorization from Tees's electrical personnel. Therefore, the activity will be completed at the beginning of the next week (starting on Monday, January 19, 2015). The Engineer noted the comment from the Contractor.	
	Corrective Actions or Improvements	
	Contractor to complete the installation and power supply for heaters on shelters as per the new Contractor's shelter design.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**OPEN**
4	John, Dean, Jerry, Joan. Design drawings delivered by Nuline.	
	Discussion and Recommendations	
	A set of electrical design drawings was delivered during the morning. A meeting was organized to comment the new design drawings delivered by Nuline. The Engineer noted that the design was not matching the electrical installation executed by Nuline. For example, a splitter was shown for the connection of the fourth thermocable circuit and the splitter was not installed. Also, the design was showing underground installation for	

	the electrical cables from the 500 kVA transformer to the C-Can (the cables were installed at ground surface). In addition, the Engineer noted that some information was missing, including but not limited to the required clearances, upgrade of the 69 kVA lines or details for the mounting panels and utility pole installation. Finally, the Engineer commented that all differences between the electrical design delivered and the electrical installation on the field will have to be treated as variances (changes). Therefore, documentation for all the changes will have to be produced by the Contractor for the approval of the Engineer. The Contractor commented that that the preferred solution was to mark the errors on the design drawings. Then, modify the drawings so they match the executed works. Nuline commented that they will markup the drawings and send them back to John S (Nuline). The Engineer requested Pelly to inform YG about the problems observed on the design drawings and the process/steps that the Contractor will follow. Also, reminded that Nuline's design drawings will have to be reviewed by an electrical engineer and any problems identified will have to be discussed and addressed.	
	Corrective Actions or Improvements	
	Contractor to inform YG. Also, to explain how Pelly and Nuline will proceed.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
5	John, Jerry, Joan. Future supply to S-Wells area.	
	Discussion and Recommendations	
	The Engineer noted that the new electrical design from Nuline show a 10 m long cable for the future supply to the S-Wells area (100 A). The CH2M Hill electrical design shows a note saying "Future feed to S-Wells area". The Engineer commented that Nuline should clarify the purposed for this cable. Was the addition of the cable a requirement from YG?	
	Corrective Actions or Improvements	
	Contractor to clarify the addition of cable for the future feed to S-Wells area.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Nuline will continue testing the heat trace line. If problems are found, they will locate the problems and correct them. Precision will continue with the testing and calibration of the C-Can pumping system. The Contractor will complete the installation of the heated shelters for valves.
- The Contractor will not test the complete system (C-Can + heat traced pipeline) until all the problems identified along the pipeline (thermocable circuits) are addressed and the C-Can pumping system is working properly.
- Nuline demobilized some personnel at the end of the shift. Two electricians will remain on site to complete the installation and testing of all components.
- No more support from Tees is foreseen at this time. The training for the Tees's personnel will take place as soon as the C-Can is working properly.

Photos:

Photo 1: 20150117_NFRDSIS_DSSC_610_Water being pumped at the new pumping location. Note the water level inside the hole_Looking SW

Photo 2: 20150117_NFRDSIS_DSSC_611_Detail of the insulation of the tee for the butterfly valve_Looking W

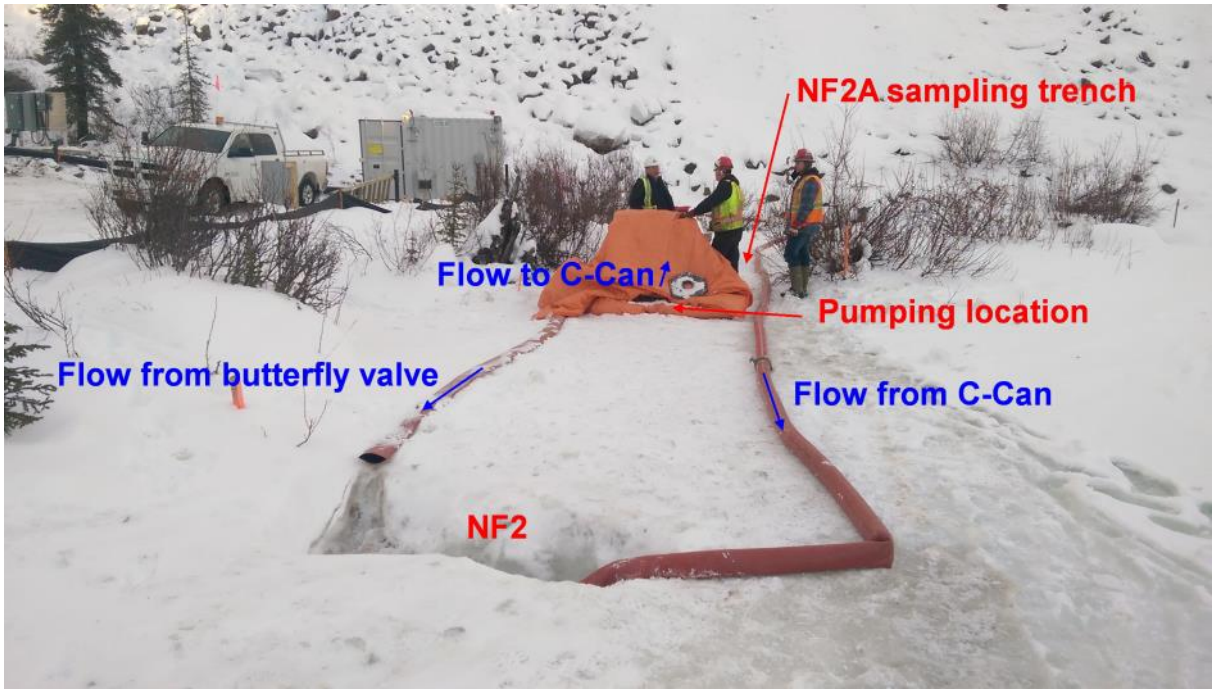

Photo 3: 20150117_NFRDSIS_DSSC_612_Configuration during the preliminary pump tests_Looking N

Photo 4: 20150117_NFRDSIS_DSSC_613_Water being discharged at NF2 location_Looking W

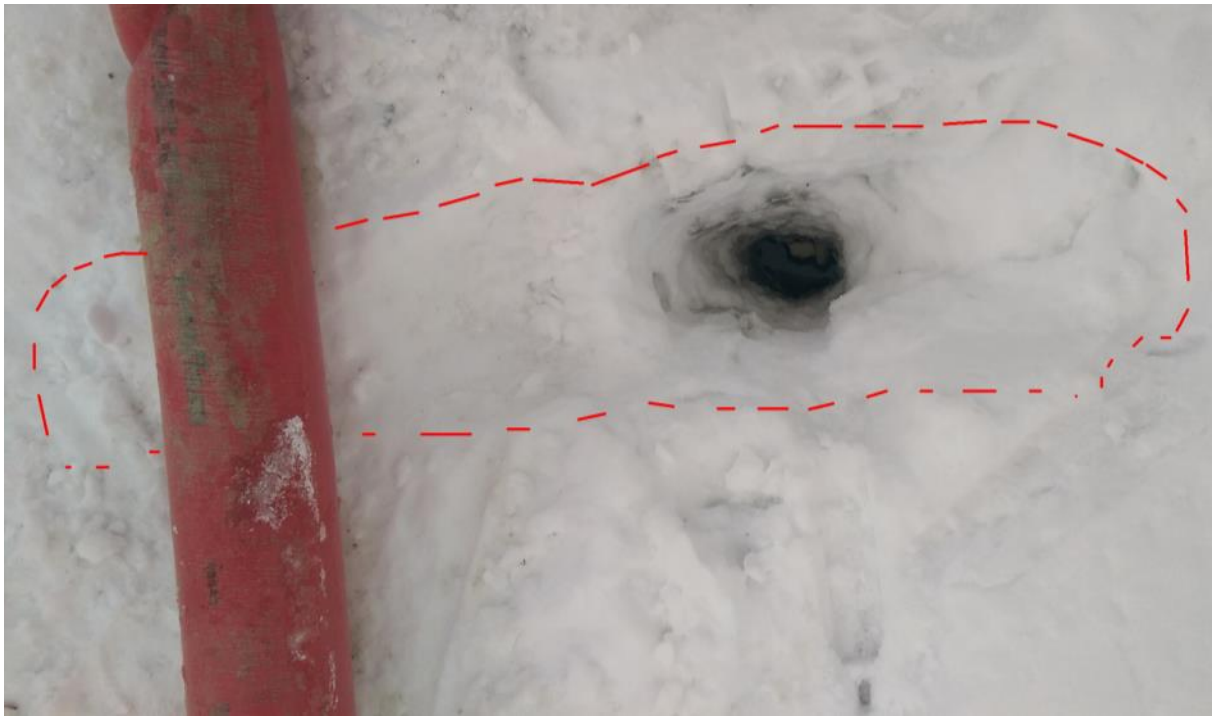

Photo 5: 20150117_NFRDSIS_DSSC_614_Water observed under the ice at NF2A sampling trench. Note that the trench is covered with snow_North up

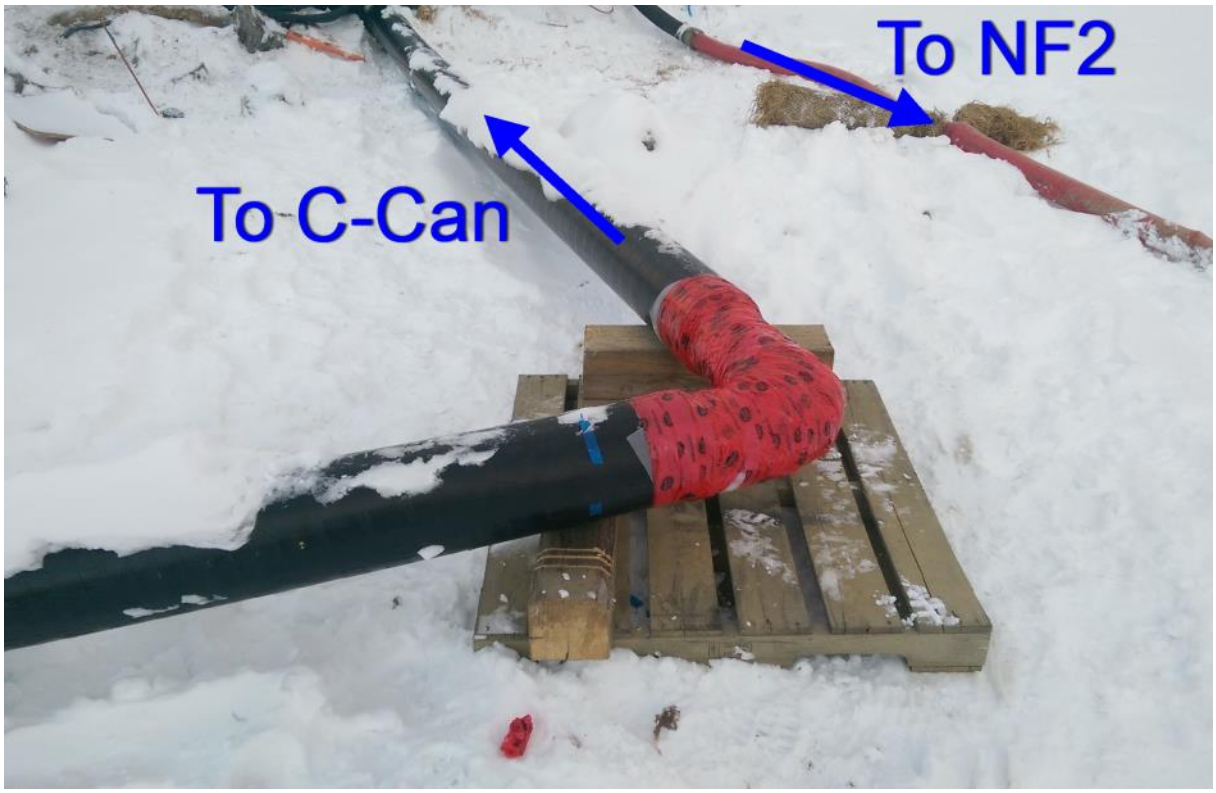

Photo 6: 20150117_NFRDSIS_DSSC_615_Insulation at the 90^{o} elbow _Looking NW

Photo 7: 20150117_NFRDSIS_DSSC_616_Control panel mounted at the C-Can wall

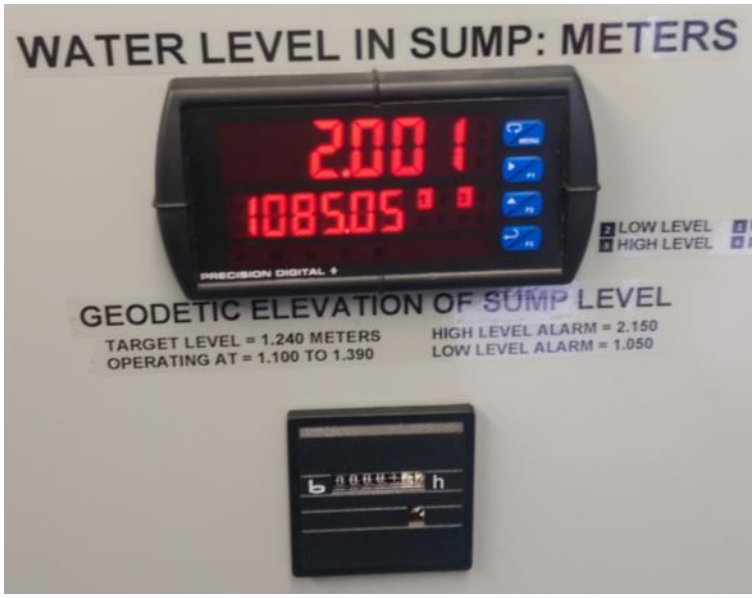

Photo 8: 20150117_NFRDSIS_DSSC_617_Digital displays at the C-Can control panel

Photo 9: 20150117_NFRDSIS_DSSC_618_Air release valve installed inside the C-Can

Photo 10: 20150117_NFRDSIS_DSSC_619_Pressure meter and flow meter installed at the C-Can

Photo 11: 20150117_NFRDSIS_DSSC_620_Detail of the flow meter (C-Can)

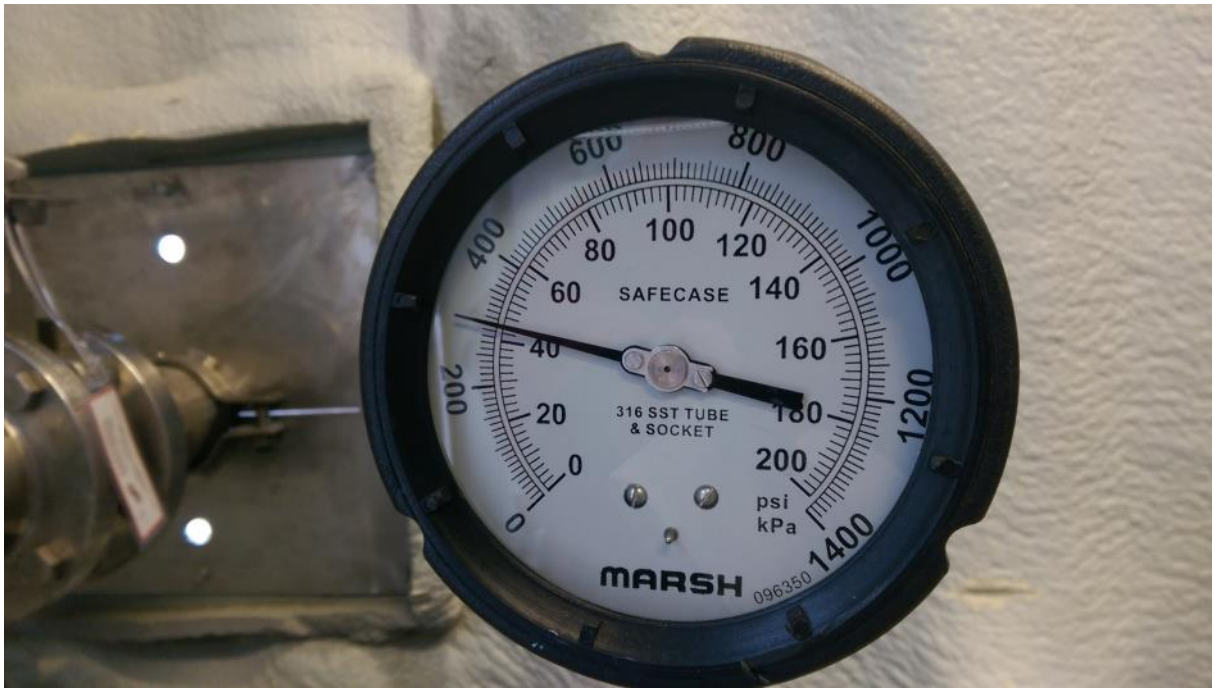

Photo 12: 20150117_NFRDSIS_DSSC_621_Detail of the pressure meter (C-Can)

Photo 13: 20150117_NFRDSIS_Electrical Installation_622_Fuses (20 A and 100 A) inside the C-Can

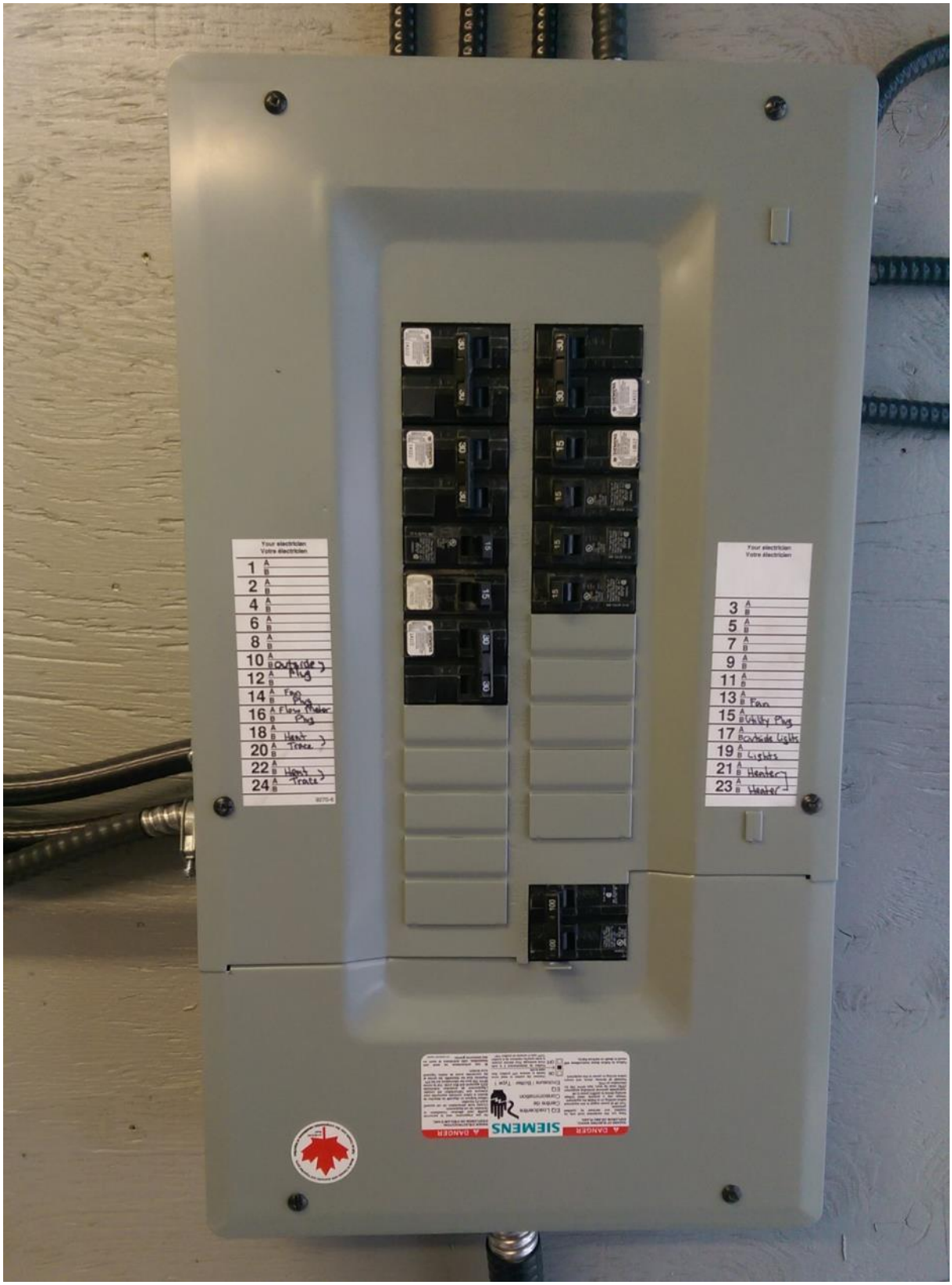

Photo 14: 20150117_NFRDSIS_Electrical Installation_623_Distribution panel inside the C-Can

Photo 15: 20150117_NFRDSIS_Electrical Installation_624_Thermocable ends disconnected to splice a new length of thermocable. Note that the tee for the dual air release and vacuum breaker valve is not wrapped with thermocable.

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:10 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	EI, PL, DSSC	
Date:	20150118	**Record #:**	*20150118_NFRDSIS_DSR_73*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -10.4 °C (Max = -3.6 °C; Min = -17.2 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20150113_NFRDSIS_DSR_68_3 Pipeline installation	Some activities were performed but the shelters were not completed. **OPEN**	Contractor
20141218_NFRDSIS_DSR_60_1 Pump to feed the manhole	The Contractor completed the connection of the thermocable section. Also, installed wooden supports for the pipeline to ensure Tees will be able to drain it if required (**Photo 9**). **CLOSED**	Contractor
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	Nuline will modify the drawings and a new version will be delivered. **OPEN**	Contractor
20150114_NFRDSIS_DSR_4 Tees training (C-Can)	Precision completed the training to one Tees field supervisor. The training for the rest of the personnel will be completed during the following shift. **OPEN**	Contractor (Pelly/Precision) and Tees
20150116_NFRDSIS_DSR_4 Insulation of C-Can connection	The Contractor connected the pipeline and completed the insulation. **CLOSED**	Contractor
20150116_NFRDSIS_DSR_5 Relocation of pipeline (S-Wells)	No update. **OPEN**	Contractor

20150116_NFRDSIS_DSR_6 Remaining electrical tasks	Nuline was testing the thermocable sections and installed some heaters. **OPEN**	Contractor
20150117_NFRDSIS_DSR_2 Calibration of pressure transducer	The Engineer pointed out again that the transducer was not working properly. Precision reinstalled the transducer and modified the label under the digital screen. **CLOSED**	Contractor
20150117_NFRDSIS_DSR_3 Power for heaters	The Contractor still has to check with Tees how to connect the heaters to existing structures. **OPEN**	Contractor
20150117_NFRDSIS_DSR_5 Future supply to S-Wells	The Engineer confirmed that the only requirement is for Nuline to confirm that there will be space and power capacity for the future supply. **CLOSED**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), DSAR, DSSC, Pipeline, Workshop
Dean Serelo (Pelly), DSAR, DSSC, Pipeline, Workshop
Jerry Boss (Nuline), Pipeline, DSAR, DSSC
Lloyd Burnhord (Nuline), Pipeline, DSAR, DSSC
Ron Nelson (Precision), DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, DSAR, no activity)
Light Tower/Generator (Allmand ML8, yellow, workshop bay 11, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The temporary discharge hose from the C-Can to NF2 location was disconnected and removed by Tees. The Contractor installed wooden supports for the pipeline section from the C-Can to the new pumping location to ensure it will be levelled (**Photo 9**). Then, the Contractor installed wooden supports for the pipeline to raise it and align it with the C-Can elbow (**Photo 1**). Afterwards, the pipeline was connected to the C-Can. Finally, the Contractor insulated the flanged connection by means of insulation material and a wooden dog house (**Photo 8**).

Precision started pumping water into the pipeline at 12:50 pm. Water was being pumped at 6.6 L/s at the maximum pump speed (60 Hz). After 7 minutes the pressure raised up to 115 PSI. At 1:20 pm, Precision turned the system off as water pressures were raising fast and no water was going through (no water observed at the pipeline discharge). The emergency pressure release was working to release pressure from the system and water was being returned to the manhole. Precision commented that there was a chance that the valves were closed or there was an obstruction along the pipeline. The Contractor checked all valves. Then, Precision started pumping again and the water was finally pumped to the Faro pit. Precision started the calibration of the pumping system. Once Precision informed that the system was stabilized, the water level inside the manhole was constant at 2.14 m, the pump working at 5.6 L/s and a pressure of 135 PSI (according to the instruments). The Engineer performed a test with a 18.9 L bucket at the outlet and measured a flow of 5.1 L/s. No variations of the water level at NF2A or pump hole were observed. Afterwards, Precision recalibrated the system once the errors on the pressure transducer were solved (see Communication 1). At 4:35 pm, Precision informed that the testing/calibration stage had been completed so the commissioning stage could begin. The instruments showed 1.3 m of water inside the manhole with the pump working at 58 Hz, 5.6 L/s, and a pressure of 135 PSI. The Contractor decided to leave the pumping system working all night (see Communication 2).
Pipeline (PL)
The Contractor placed sand around the perimeter of the shelters to seal any gaps between the shelter and the ground (**Photos 3** and **4**). Also, installed insulation at the floor (**Photo 5**) and mounted wooden panels on the wall to support the heaters (**Photo 6**).
Electrical Installation (EI)
Nuline completed the thermocable connections, including the heat trace section at the new pipeline from the C-Can to the pump location and the thermocable at the dual vacuum breaker/air release valve. Then, continued testing the thermocable circuits. Nuline commented that all circuits were working properly. Finally, Nuline installed 3 of the 5 required heaters (1500 watt each). The power connection for the installed heaters was not completed before the end of the shift.
Overhead Power Line (OPL)
No activity.

5. Communications

ID	Summary *(time, key personnel, work area and description)*
1	Joan, John, Ron. C-Can instruments. Transducer to measure water level inside the manhole.
	Discussion and Recommendations
	The Engineer noted again that the there was a problem with the digital screen showing the water level inside the manhole (**Photo 2**). The Engineer requested Precision to verify the sensor and to correct the installation accordingly. Precision commented that the sensor was working properly with an error of 1 cm. The Engineer commented that, if the information was

	correct, the manhole should be overflowing. The manhole was not overflowing. The Engineer requested Precision to prove that the sensor was working properly. The sensor was recovered from the manhole and tested. The information on the digital screen was proof to be incorrect (+0.37 m error). The Engineer requested Precision to correct the error and to recalibrate the pumping system. Note that the sensor was providing the water elevation inside the manhole and the pump speed was automatically adjusted accordingly.	
	Corrective Actions or Improvements	
	Precision reinstalled the sensor inside the manhole, corrected the error and a new sticker was installed on the control panel. The complete pumping system was recalibrated based on the new information.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
2	Joan, John, Ron. Overnight test.	
	Discussion and Recommendations	
	The Contractor informed that the pumping system was found to be working properly so they will keep the system running all night. The Engineer noted the comment from the Contractor. Then, reminded that the shelters were not heated so there was a risk that the system will not work properly if the temperature will drop. The Contractor commented that, according to the meteorological prediction, the risk was low. The Contractor decided to keep the system pumping all night.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	Joan, Jerry, John. Electrical cables.	
	Discussion and Recommendations	
	The Engineer requested Nuline to group the cables together (tripping hazard). The cables were grouped at one of the control panels (**Photo 7**). Also, recommended that the cables could be located beside the pipeline at the new wooden supports installed beside the C-Can (**Photo 1**).	
	Corrective Actions or Improvements	
	Contractor to group the cables together and to relocate them close to the pipeline.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
BA	Sand	Small back hoe	Some sand was mobilized to the shelters locations. The sand was placed around the perimeter of the shelters to ensure that no air will enter under the walls.	4

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Nuline will continue testing the heat trace line and installing heaters on shelters. Precision will continue with the commissioning of the complete C-Can pumping system.
- No more support from Tees is foreseen at this time. The training for the Tees's personnel will be completed during the following shift (Monday 19, 2015).

Photos:

Photo 1: 20150118_NFRDSIS_Pipeline_625_New wooden supports to raise the pipeline. Note the electrical cables on the ground_Looking NW

Photo 2: 20150118_NFRDSIS_DSSC_626_Digital screen showing 2.9 m of water in the sump (C-Can)

Photo 3: 20150118_NFRDSIS_Pipeline_627_Shelter installed to protect a valve. Note sand around the perimeter of the shelter_Looking NW

Photo 4: 20150118_NFRDSIS_Pipeline_628_Detail of the sand to seal the gaps at the bottom of the wooden walls_Looking N

Photo 5: 20150118_NFRDSIS_Pipeline_629_Detail of insulation installed under a valve

Photo 6: 20150118_NFRDSIS_Pipeline_630_Detail of insulation on walls. Note wooden panel to mount the heaters on the wall

Photo 7: 20150118_NFRDSIS_Electrical Installation_631_Cables grouped in front of a control panel

Photo 8: 20150118_NFRDSIS_DSSC_632_Insulation being installed at C-Can connection_Looking E

Photo 9: 20150118_NFRDSIS_DSSC_633_Wooden supports installed to level the pipeline from the pumping location to the C-Can_Looking SW

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:25 pm
Project #:	0533-010-06	**Weather:**	Clear with some clouds	
Subject:	Day Shift Report	**Work Areas*:**	EI, PL, DSSC	
Date:	20150119	**Record #:**	*20150119_NFRDSIS_DSR_74*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -15.0 °C (Max = -15.0 °C; Min = -17.9 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	The need for a spillage containment system to be installed at the 500 kVA transformer is being discussed. The transformer is installed close to the creek so a special collection system may be required in case of oil spillage.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20150113_NFRDSIS_DSR_68_3 Pipeline installation	The Contractor completed the installation of heaters and insulation on shelters. The repair of the flanged connection not properly wrapped was pending at the end of the shift (**Photo 9**). **OPEN**	Contractor
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	No update. **OPEN**	Contractor
20150114_NFRDSIS_DSR_4 Tees training (C-Can)	Precision completed the training to two Tees's personnel. An attendance list was signed by the attendees. Pelly to give the list to Tees so the other supervisor, which completed the training the day before, can also sign the sheet. **OPEN**	-

20150116_NFRDSIS_DSR_5 Relocation of pipeline (S-Wells)	The Contractor could not move the pipeline. Support from Tees's equipment is required to move the pipe. Contractor to comment with Tees the need of equipment to complete this activity. **OPEN**	Contractor
20150116_NFRDSIS_DSR_6 Remaining electrical tasks	Nuline completed electrical installation except the power supply for heaters on shelters. **CLOSED** (the supply of the required power for heaters is included on 20150117_NFRDSIS_DSR_3 below)	Contractor
20150117_NFRDSIS_DSR_3 Power for heaters	No power for heaters available. See Communications 2 and 3. **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), DSAR, DSSC, Pipeline, Workshop
Dean Serelo (Pelly), DSAR, DSSC, Pipeline, Workshop
Jerry Boss (Nuline), Pipeline, DSAR, DSSC
Lloyd Burnhord (Nuline), Pipeline, DSAR, DSSC
Ron Nelson (Precision), DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, DSAR, no activity)
Light Tower/Generator (Allmand ML8, yellow, workshop bay 11, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
At the beginning of the shift, the alarm beacon at the C-Can was flashing. Precision observed that the manhole was overflowing and the excess of water was flowing on top of the ice (**Photo 2**). The discharge hose from the butterfly valve was found to be frozen. As a result, all the water pumped at the creek was being discharged into the manhole. The C-Can pump was working at the maximum speed trying to lower the level of water on the manhole and the alarm was activated. The Engineer observed a flow of 5.9 L/s according to the flowmeter at the C-Can. At the discharge end of the pipeline (**Photo 4**), the Engineer measured an approximate flow of 5.4 L/s (bucket test). Tees removed the blocked (frozen) hose and installed a new one. The new flexi hose was shorter

so water was being discharged into the pumping hole instead of NF2 point (**Photo 7**). The thermocable was then fixed to the new hose by means of tape and a fraction of the water pumped was discharged into the pumping hole. The C-Can pump was then able to reduce the water level into the manhole. Precision informed that the pumping system was working properly during the rest of the shift. Precision demobilized at the end of the shift. Ron will provide the required information to complete the OM Manual and the handover document from his office.
Pipeline (PL)
The Contractor completed the installation of shelters. As commented on Communication 2, the Engineer observed a flanged joint connection that was not properly wrapped (**Photo 9**). The Contractor did not fix the insulation of the flanged connection before the end of the shift.
Electrical Installation (EI)
The Engineer delivered a list of the pending tasks to the Contractor (Communication 2). A visit was organized to observe the issues and pending tasks on the field with Nuline. Nuline corrected some of the deficiencies before the end of the shift, including the relocation of the electrical cable along the pipeline (**Photo 6**), the installation of the missing heaters (**Photo 5**) and the cleaning of working areas. The works related to the supply of power to the heaters was not completed before the end of the shift (Communications 2 and 3). Then, Nuline demobilized from site. One hour before the end of the shift, the second thermocable circuit was found to be disconnected and a red light was visible at the control box. According to the legend on the control boxes, there was a grounding fault (**Photo 8**). The Contractor called Nuline and they remobilized to solve the issue. At the end of the shift, Nuline reconnected the heat trace system but did not complete the tests to confirm that the system was working properly. Nuline will continue with the tests during the following shift.
Overhead Power Line (OPL)
No activity.

5. Communications

ID	Summary *(time, key personnel, work area and description)*
1	Joan, John, Ron. C-Can alarm beacon activated.
	Discussion and Recommendations
	The Engineer noted that the alarm beacon was active. Precision commented that the beacon was active because the water level was too high inside the manhole. Too much water was being pumped into the manhole from the creek and the C-Can pump was not able to reduce the water level. The manhole was overflowing and the excess water migrating under the C-Can. Water flowing on top of the ice within the NF2A channel was observed (**Photo 2**). At the new pumping location, the Engineer observed that the discharge hose at the butterfly valve was frozen and no water was being diverted to NF2 sampling location. As a result, all water was being pumped to the manhole. Precision commented that Tees will install a shorter discharge hose to reduce the risk of

	freezing. Then, a fraction of the pumped water will be diverted and the C-Can will return to the normal working conditions.	
	Corrective Actions or Improvements	
	Tees installed a shorter discharge hose at the butterfly valve (less risk of freezing) and the excess water was being discharge into the pumping hole. In addition, the extra length of thermocable was fixed to the hose to keep the water warm (**Photo 7**). The C-Can pump was then able to stabilize the water level inside the manhole.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
2	Joan, John, Jerry, Ron. Pending tasks and observed issues.	
	Discussion and Recommendations	
	The Engineer performed a site visit to observe the Works and to collect GPS coordinates of the main components. After the visit, the Engineer produced a list to compile the observations performed and distributed the list to the Contractor. A meeting and site visit was organized to comment on the status of the pending tasks and issues. The following is a summary of the items discussed during the meeting: • John/Dean will install sand bags around the C-Can. Also, they will complete the relocation of sediment control elements at the back of the C-Can. • Tees supplied an oxygen sensor and Precision installed it at the C-Can. Precision will deliver a new sensor for Tees. Precision to send an email to record this process. • Precision presented a field sketch showing the final installation of the C-Can. The formal drawing produced by Precision will be included on the OM Manual. • Precision created a signing sheet to record the training performed to Tees's personnel. The document will be collected by Pelly and attached to the handover documentation. • Sub-Contractors are still working on the documentation to be presented before the handover (as per Chad's email), including but not limited to the electrical design, testing certificates and the OM Manual. The Contractor will also submit emails to document changes introduced during construction are required. • Pelly to supply information of the shelters installed (dimensions and characteristics). Nuline commented that the power supply for heaters was not on Nuline's contract so that was an extra. The Engineer commented that YG retained Pelly as the Contractor (no Nuline) so the completion of the shelters was on their Contract. Nuline commented that they could not connect the heaters as the required components were not available (cables, switches, etc.). Contractor to comment with Tees is power could be supplied from the existing elements on site. • The Contractor will clean work areas and spare parts relocated either to the workshop or the Haul Road area. • The Engineer explained that the installation of containment for the 500 kVA transformer was being discussed. If required, the installation of a containment or collection system will be necessary.	

	• Relocation of the pipeline inside the flume at the S-Wells area. Pelly will comment with Tees, as support from Tees's equipment will be required. • Nuline commented that they could not provide a better wrapping of the flanged connection with the available tools (Photo 9). Pelly will amend the deficiencies observed.	
	Corrective Actions or Improvements	
	Contractor and Engineer will comment the status of the items during the following shift.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	Joan, John, Ray (Tees). Power supply for heaters.	
	Discussion and Recommendations	
	Tees commented that the supply of power to the heaters on shelters from the existing elements on site was not recommended. There were risks associated to the existing systems failing and not being able to provide power to the NFRD SIS heaters (cross-connection of systems). Also, noted health and safety risks associated to having isolated cables lying on the ground (tripping hazard). The Engineer commented to the Contractor that the activities were not completed so Nuline should not demobilize. The Contractor informed that Nuline decided to demobilize as they commented that they completed all elements under their contract.	
	Corrective Actions or Improvements	
	Contractor to comment with Nuline options to provide power to the heaters. The Engineer will communicate to YG the conversations with the Contractor and Tees	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, Nuline will continue testing for the heat trace circuit that failed. Pelly will provide an update on the power supply for heaters as per communications with Nuline (John Seeheaver).
- Precision demobilized at the end of the shift. The pumping system will continue pumping water during the night.

Photos:

Photo 1: 20150119_NFRDSIS_DSSC_634_Overview of the DS area_Looking NE

Photo 2: 20150119_NFRDSIS_DSSC_635_Water from manhole flowing on top of the ice. Note the red alarm beacon activated on the left back corner of the C-Can_Looking SW

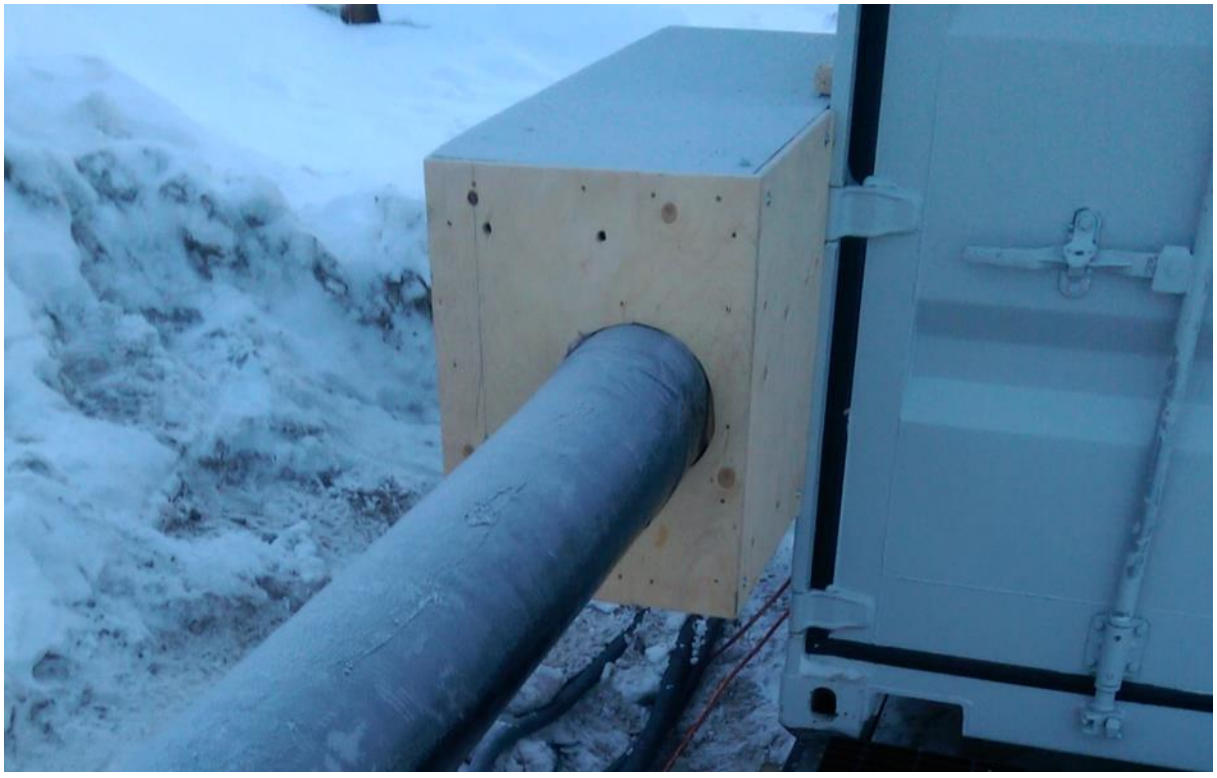

Photo 3: 20150119_NFRDSIS_Pipeline_636_Detail of the completed insulation of the pipeline connection at the C-Can end_Looking E

Photo 4: 20150119_NFRDSIS_Pipeline_637_Detail of water discharged at the trench to Faro Pit

Photo 5: 20150119_NFRDSIS_Pipeline_638_Detail of 1500 w heater installed at one of the shelters

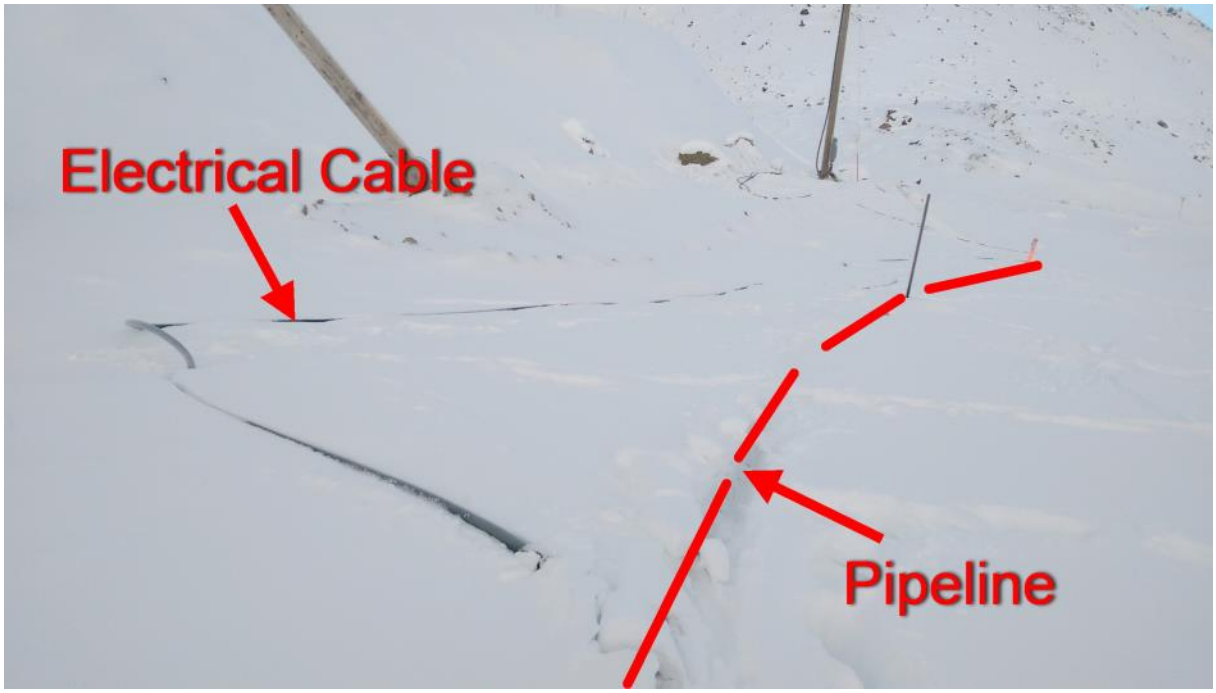

Photo 6: 20150119_NFRDSIS_Electrical Installation_639_Electrical cable not following the pipeline route. Note the utility pole for the 75 kVA transformer at background_Looking N

Photo 7: 20150119_NFRDSIS_DSSC_640_New flexi hose installed for the discharge of the butterfly valve. Note black tape to fix the thermocable under the flexi hose_Looking E

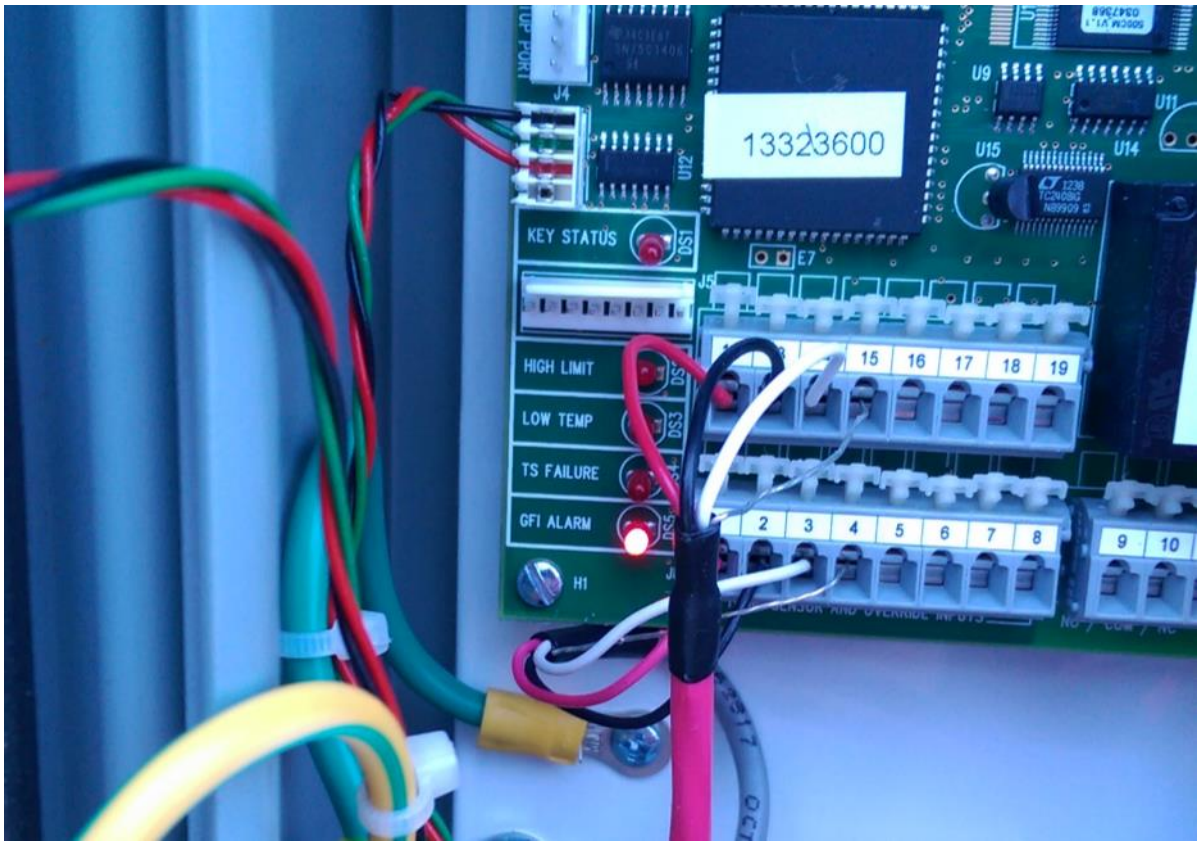

Photo 8: 20150119_NFRDSIS_Electrical Installation_641_Ground fault alarm on control box

Photo 9: 20150119_NFRDSIS_Pipeline_642_Pipeline insulation not properly wrapped by Nuline

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	EI, PL, DSSC	
Date:	20150120	**Record #:**	*20150120_NFRDSIS_DSR_75*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -7.6 °C (Max = -2.8 °C; Min = -12.4 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	The power cable from the C-Can to the new pump at the creek was covered with sand bags to mitigate the tripping hazard identified by the Engineer (**Photos 1** and **2**).
1.2	Environmental	The need for a containment system to be installed at the 500 kVA transformer was still being discussed. The transformer is installed close to the creek so a special collection system may be required in case of oil spillage.
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID [1]	*Status/ Observations*	*Action Required By*
20150113_NFRDSIS_DSR_68_3 Pipeline installation	The Contractor repaired the wrapping for the insulation of a flanged connection that was opened by Nuline. **CLOSED** (the required power supply for heaters is included on 20150117_NFRDSIS_DSR_3 below).	-
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	No update. **OPEN**	Contractor
20150114_NFRDSIS_DSR_4 Tees training (C-Can)	The attendance list was signed by all Tees's personnel and distributed to Tees's management and YG (Karen). **CLOSED**	-

20150116_NFRDSIS_DSR_5 Relocation of pipeline (S-Wells)	Tees recommended that the pipeline is moved when the snow will melt. The Engineer commented with YG. Tees will mobilize the pipeline during the spring (refer to Communications 1 and 5). **CLOSED**	Contractor
20150117_NFRDSIS_DSR_3 Power for heaters	YG will comment possible options with Tees. Pelly will comment possible options with Nuline (refer to Communication 3). **OPEN**	Contractor

[1]*All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), DSAR, DSSC, Pipeline, Workshop
Dean Serelo (Pelly), DSAR, DSSC, Pipeline, Workshop
Jerry Boss (Nuline), Pipeline, DSAR, DSSC
Lloyd Burnhord (Nuline), Pipeline, DSAR, DSSC
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, workshop, no activity)
Light Tower/Generator (Allmand ML8, yellow, workshop, no activity)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Contractor completed the installation of sand bags around the perimeter of the C-Can (**Photos 1** and **2**). Also, covered the power feeder cable for the new pump installed at the creek with sand bags (see Section 1). Then, reinstalled the sediment and control elements at the back of the C-Can (**Photo 2**). Finally, the Contractor cleaned the working areas. The pumping system was found to be working properly and no variations within the NF2A channel or the pump on the creek could be observed (**Photo 3**).
Pipeline (PL)
The Contractor added additional wrapping around the pipeline flanged connection that was opened by Nuline on a previous shift. Then, installed extra insulation sheets (**Photo 4**) on top of the drain valve and wrapped extra insulation around the rest of the valves. Pelly installed the extra insulation to provide extra protection to the valves until the power supply for the heaters will be

available. The Engineer measured the water temperature at the pipeline discharge end (+1.1 °C).
Electrical Installation (EI)
The Contractor continued monitoring the second thermocable circuit, which presented a grounding fault at the end of the previous shift. Once all the testing was completed, Nuline concluded that the system was working properly (refer to Communication 4). Then, Nuline demobilized from site. Note that no power for the heaters on shelters was available before the end of the shift. As per communications with YG, Pelly requested Nuline to present options for the power supply to the heaters (Communication 3). No feedback from Nuline was received before the end of the shift.
Overhead Power Line (OPL)
No activity.

5. Communications

ID	Summary *(time, key personnel, work area and description)*	
1	Joan, John, Len (Tees), Ray A. (Tees). Relocation of pipeline inside the flume.	
	Discussion and Recommendations	
	The Contractor and Tees commented that the mobilization of equipment to relocate the pipeline inside the flume was not recommended. The area was covered with snow and there were hazards associated to equipment moving on top of "hidden" soft areas or the existing S-Wells infrastructure. Therefore, the relocation of the pipeline at this stage will have to be done by hand. Tees commented that no resources were available to move the pipe at this stage (too heavy so too many personnel required). Also, that there were risks associated to slippery conditions, heavy lifting and more. The Contractor informed that the installation of the flume was not a requirement included on the construction Drawings. The flume was introduced by Pelly to prevent damage to the pipeline when sliding it downhill. It was not required for the permanent situation. Therefore, having a short section of pipeline sitting on top of the rockfill slope was not a concern. Tees added that the S-Wells pipeline was also sitting on top of the rockfill slope at the toe of the slope (close to the S-Wells). Both Tees and the Contractor recommended that, if the pipeline has to be relocated, it can be done when the snow will melt and heavy equipment will be able to access the area safely. The Engineer noted the comments. Also, commented that it will be discussed with YG.	
	Corrective Actions or Improvements	
	Engineer to comment the relocation of the pipeline with YG.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED (see Communication 4)**

2	Joan, John. Pending tasks and observed issues.	
	Discussion and Recommendations	
	The Engineer and Contractor commented the status of the tasks listed on the list created during previous shifts. The following is a summary of the tasks that were pending: • Precision to include on the OM Manual a formal drawing showing the final installation of the C-Can elements. • Sub-Contractors are still working on the documentation to be presented before the handover (as per Chad's email), including but not limited to the electrical design, testing certificates and the OM Manual. • Pelly to comment with Nuline on possible options to feed the heaters on shelters (refer to Communication 3). • The installation of containment for the 500 kVA transformer was still being discussed. If required, the installation of a containment or collection system will be necessary. • The Contractor and Tees recommended that the relocation of the pipeline inside the flume at the S-Wells area is postponed (refer to Communications 1 and 5).	
	Corrective Actions or Improvements	
	Contractor and Engineer will comment the status of the items during the following shift.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	Joan, John. Power supply for heaters.	
	Discussion and Recommendations	
	The Engineer commented to the Contractor that YG will contact Tees to see if power for the installed heaters could be supplied from the existing infrastructure on site. At the same time, Pelly should check with Nuline possible options to feed the installed heaters from the NFRD SIS system. Also, Nuline should evaluate options considering the reduction of the size of heaters supplied (less consumption).	
	Corrective Actions or Improvements	
	Contractor to comment with Nuline options to provide power to the heaters.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
4	John, Dean, Jerry, Joan. Fault ground of the second thermocable circuit.	
	Discussion and Recommendations	
	Nuline explained that they reset the control box and then started monitoring it. They monitored the system during some hours before the end of the previous shift and then during the following morning. Several tests were performed and all the readings were found to be normal (the amperage readings were the same as before the failure). Also, commented that the system was working properly. The Contractor pointed out that Nuline did not do anything to solve the system other than reset the control box and monitoring the circuit. Nuline commented that there were no more things they could do. The Contractor noted that they will have to mobilize to site again if the system is found to be deficient.	

	The Engineer and Contractor requested Nuline to issue a document explaining what happened to the heat trace circuit and the activities they performed once the failure was detected. Also, to comment on the working condition of the system.	
	Corrective Actions or Improvements	
	Nuline issued an email summarizing the problem observed and the actions taken. Also, commented that, based on the information compiled, the system was working properly.	
	Status at the end of the shift (Open, Closed or N/A)	**CLOSED**
5	Joan, Chad (YG). Relocation of pipeline inside the flume.	
	Discussion and Recommendations	
	The Engineer explained the recommendations performed by the Contractor and Tees (see Communication 1). The Engineer noted that the relocation of the pipeline will have to be performed by Tees with independency on when it is performed. The reason was that Pelly had not equipment to complete this activity. In addition, noted that the pipeline was currently sitting on top of snow. Therefore, the relocation of the pipeline could be postponed. YG added that the pipeline will probably expand so small movements are expected at a later stage. The relocation of the pipeline will be recorded on the as-built document as a pending activity that will be completed by Tees as a later stage.	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
BA	Sand	Hand tools	The Contractor filled some sand bags with sand from Borrow area A. The sand bags were located around the C-Can to prevent the circulation of air/water under the C-Can.	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- During the following shift, the Contractor will complete the mobilization of spare parts to the workshop or Haul Road. In addition, the Contractor and Tees will monitor the pumping system.
- Nuline demobilized in the middle of the shift.
- The pumping system will continue pumping water.

Photos:

Photo 1: 20150120_NFRDSIS_DSSC_643_Overview of the C-Can. Note the sand bags installed around the C-Can perimeter and on top of the electrical cable to the new pump (right hand side)_Looking NE

Photo 2: 20150120_NFRDSIS_DSSC_644_Sand bags and sediment control elements installed at the back of the C-Can. Note the pipeline entering underneath the C-Can_Looking NW

Photo 3: 20150120_NFRDSIS_DSSC_645_Overview of NF2A channel_Looking SW

Photo 4: 20150120_NFRDSIS_Pipeline_646_Extra layers of insulation placed by the Contractor on top of the drain valve (close to S-Wells area)

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	PL	
Date:	20150121	**Record #:**	*20150121_NFRDSIS_DSR_76*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -5.4 °C (Max = -2.2 °C; Min = -8.5 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	The need for a containment system to be installed at the 500 kVA transformer was still being discussed (Communication 3).
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	-

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	No update. **OPEN**	Contractor
20150120_NFRDSIS_DSR_3 Power for heaters	Possible solutions are being discussed by different parties. The installation can't be completed until a solution is agreed (refer to Communication 2). **OPEN**	Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), DSAR, DSSC, Pipeline, Workshop
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, workshop, no activity)
Light Tower/Generator (Allmand ML8, yellow, workshop, demobilized)
Dozer (CAT D6R, #1604, yellow, parked at Haul Road, dismantled, demobilized)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity (**Photo 6**).
Downstream Seepage Collection (DSSC)
The Contractor and Engineer monitored the performance of the pumping system. The C-Can components were found to be operating normally (**Photos 4** and **5**).
Pipeline (PL)
The Contractor and Engineer monitored the performance of the pipeline. All the heat trace circuits were active, water was being discharged at the Faro Pit end and the valves were working properly. The Contractor installed additional sheets of insulation on the shacks.
Electrical Installation (EI)
No activity.
Overhead Power Line (OPL)
No activity.

5. Communications

ID	**Summary *(time, key personnel, work area and description)***	
1	Joan, John. Pending tasks and observed issues.	
	Discussion and Recommendations	
	The Engineer and Contractor commented the status of the tasks listed on the list created during previous shifts. The following is a summary of the tasks that were pending: • Precision to include on the OM Manual a formal drawing showing the final installation of the C-Can elements. • Sub-Contractors are still working on the documentation to be presented before the handover of the complete system (as per Chad's email), including but not limited to the electrical design, testing certificates and the OM Manual. • The heated shelters could not be completed (power for heaters missing). • The installation of containment for the 500 kVA transformer was still being discussed. If required, the installation of a containment or collection system will be necessary.	
	Corrective Actions or Improvements	
	The pending activities were tasks to be completed off-site (at the office), except for the heated shelters and containment for the 500 kVA transformer. These two activities were being discussed between YG-BGC-Pelly at the time of preparing this report.	
	<u>Status at the end of the shift</u> (Open, Closed or N/A)	**N/A**
2	Joan, John. Power supply for heaters.	
	Discussion and Recommendations	
	The Contractor informed that, according to Nuline, there was no power available within the heat traced system to feed the heaters installed (1500 watts). The installation of a new electrical cable from the panels at the new transformers and the supply/installation of new	

	switches are required for all the shacks. Also, commented that the reduction of the heaters delivered will not solve the problem as the switches installed (30 A) and/or the cable sizes are limiting the power that can be supplied. No conclusive information was received from Tees to confirm if the heaters could be fed from the existing structures (brown shack, s-wells and existing shack at the higher point along the pipeline). The Engineer informed that YG was trying to obtain more information from Tees. Also, that a meeting/call between Nuline and the CH2M electrical engineer will be organized to comment on alternative solutions to feed the heaters. Then, YG-Pelly-BGC-CH2M will have a meeting/call to comment on the possible options. The solution to be implemented will be defined based on all the boundary conditions. According to the weather forecast, the temperatures will drop at the beginning of next week. The Engineer and Contractor commented that a solution should be in place before the weather will change. The Contractor informed that they will install extra sheets of insulation to protect the valves.	
	Corrective Actions or Improvements	
	No activity will be performed on site until a solution is agreed and Nuline will remobilize to complete installation. The Contractor will install extra sheets of insulation.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**
3	Joan, John. Containment for the 500 kVA transformer.	
	Discussion and Recommendations	
	The need for containment at the 500 kVA transformer was still being discussed. Possible options were commented, such as the installation of berms around the transformer, the use of the vault under the transformer for containment, the installation of a plastic containment at the back of the transformer and more. Confirmation from YG (environment) on the need of containment is expected during the following days.	
	Corrective Actions or Improvements	
	Engineer to check with YG on the status of the conversations about the need of containment.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- No activity will be performed on site until a solution for the heated enclosures at valves is agreed and Nuline will remobilize to complete the installation.
- All the spare parts were mobilized to either the work shop or Haul Road (**Photo 1**).
- The Contractor demobilized the D6 dozer and the Allmand ML8 light tower.
- The pumping system will be operating all night. During the following shift, the Contractor and Tees will monitor the pumping system.

Photos:

Photo 1: 20150121_NFRDSIS_Miscelaneous_647_Parts not used during construction stored at the workshop bay 5

Photo 2: 20150121_NFRDSIS_DSSC_648_Warning sign mounted at the C-Can door (outside wall)

Photo 3: 20150121_NFRDSIS_DSSC_649_Plate mounted at the C-Can door (outside wall)

Photo 4: 20150121_NFRDSIS_DSSC_650_Pressuremeter showing a pressure of 140 psi

Photo 5: 20150121_NFRDSIS_DSSC_651_C-Can control panel. Note digital display showing 1.338 m of water inside the manhole (1.010 m of water above the pump)

Photo 6: 20150121_NFRDSIS_DSAR_652_Overview of the DSAR and DSSC from the Haul Road_Looking SW

Photo 7: 20150121_NFRDSIS_DSSC_653_Overview of C-Can, pipeline, 500 kVA transformer and control panel_Looking N

Photo 8: 20150121_NFRDSIS_DSSC_654_Overview of C-Can and NF2A area. Note the orange tarp covering the A-frame and pump at the creek_Looking E

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Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:00 pm
Project #:	0533-010-06	**Weather:**	Overcast	
Subject:	Day Shift Report	**Work Areas*:**	-	
Date:	20150122	**Record #:**	*20150122_NFRDSIS_DSR_77*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -7.1 °C (Max = -6.0 °C; Min = -8.2 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	Pelly submitted Rev 1 of the electrical design (3 drawings).

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	Pelly submitted a revision of Nuline's electrical design. The Engineer noted that the design did not match the electrical installation on site. The Contractor commented that Nuline will prepare a new revision. No review of this version was performed by CH2M Hill. **OPEN**	Contractor (Nuline)
20150121_NFRDSIS_DSR_76_1 Pending documentation	No update. The Contractor (and sub-contractors) are still working on the preparation of the documents to be delivered as part of the handover of the system (as per Chad's email), including but not limited to the electrical design, testing certificates and the OM Manual. **OPEN**	YG, BGC & Contractor

20150121_NFRDSIS_DSR_76_2 Power for heaters	A call between Nuline and CH2M electrical engineer was organized to comment on possible options to provide power to the heaters. The installation of a small transformer and associated switches at the brown shack was discussed as a possible option. The Engineer submitted two photos to CH2M showing the configuration of elements inside the brown shack (**Photos 2** and **3**). **OPEN**	Contractor
20150121_NFRDSIS_DSR_76_3 Containment for 500 kVA transformer	No update. The need for containment was still being discussed. **OPEN**	YG, BGC & Contractor

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvis (Pelly), DSAR, DSSC, Pipeline, Workshop
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
Light Tower/Generator (Ingersoll Rand, light brown, workshop, no activity)
Grader (CAT 14H, #1407, yellow, parked at Haul Road, no activity)

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Contractor and Engineer monitored the performance of the pumping system. The C-Can components were found to be operating normally. At the NF2A channel, the Engineer could not observe any change on the emerging points at the toe of the NFRD. Also, no changes on the water elevations at NF2A sampling point or the new pumping location could be measured.
Pipeline (PL)
The Contractor and Engineer monitored the performance of the pipeline. All the heat trace circuits were active, water was being discharged at the Faro Pit end and the valves were working properly (**Photo 1**).
Electrical Installation (EI)
No activity.
Overhead Power Line (OPL)
No activity.

5. Communications

ID	Summary *(time, key personnel, work area and description)*	
1	Joan, John, Paul (Tees). Procedure to drain the line	
	Discussion and Recommendations	
	The Contractor explained that their plan was to keep the pumping system continuously working unless YG decides to shut it down. The Engineer commented that YG expressed their interest on keeping the system working unless the system was compromised due to the issues with the power for heaters. The Contractor commented that light towers and small heaters can be temporarily provided to keep the most important valves on working conditions. The Engineer noted that a plan to drain the pipeline is required in case that the system has to be disconnected sooner or later. The Contractor explained that the drain at the C-Can will be used to drain the pipeline section close to the C-Can. The water will be returned to the manhole and the excess water will overflow and reach the NF2A channel. The pipeline section from the highest point along the DSAR to the highest point along the pipeline will be drained by means of the drain at the S-Wells area. In order to do so, the shelter door will have to be opened. The installation of a discharge hose is recommended to discharge the water at the other side of the road. If not, the water will be directly discharged on top of the road running surface and local erosion of the sand and gravel can occur. The last section of pipeline, from the highest point to the pipeline outlet (Faro Pit), will freely drain through the pipeline end. One the line is all drained, the heat traced circuits can be disconnected. The Engineer noted that the vacuum valves along the pipeline will have to be open before draining the pipe to ensure that the pipe does not collapse. Tees commented that the use of a compressor will not likely be required as the suction will help to drain the line. His view was that minor volumes of water ponded at pipeline depressions will not be a problem unless they are occupying the whole pipeline section. Also, noted that, if required, a compressor was available on site. Finally, that they also have equipment to melt ice on the drain valves if required.	
	Corrective Actions or Improvements	
	The need of a temporary system to keep the valves on working conditions during cold days has to be discussed.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- No activity will be performed on site until a solution for the heated shelters is agreed and Nuline will remobilize to complete the installation. No more day shift reports will be produced until Nuline will remobilize to complete the heated shelters.
- The Contractor informed that the last two pieces of equipment (grader and light tower) will be demobilized during the following shifts (Saturday, January 24?).

- Tees will continue monitoring the pipeline and pumping system if the C-Can and heat trace circuits are in operation.

Photos:

Photo 1: 20150122_NFRDSIS_Pipeline_655_Vacuum valve (valve 2) wrapped with insulation

Photo 2: 20150122_NFRDSIS_EI_656_View of the brown shack showing the existing components

Photo 3: 20150122_NFRDSIS_EI_657_Detail of the low voltage panel inside the brown shack

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AN APPLIED EARTH SCIENCES COMPANY

Day Shift Report

Project Name:	North Fork Rock Drain SIS	**Start/End Time:**	7:30 am	5:30 pm
Project #:	0533-010-06	**Weather:**	Light snow and partly cloudy	
Subject:	Day Shift Report	**Work Areas*:**	EI, Pipeline	
Date:	20150130	**Record #:**	*20150130_NFRDSIS_DSR_78*	
Prepared By:	J. Roca			

**Refer to the sections below for a definition of the acronyms*

BGC personnel on site and time present: J. Roca

Mean daily temperature at the Faro Airport: -25.1 °C (Max = -23.4 °C; Min = -26.8 °C)

1. General

#	*Description*	*Comments*
1.1	Health and Safety	-
1.2	Environmental	-
1.3	Ongoing/ New RFIs	-
1.4	New Inspection Instruction	-
1.5	New Field Memorandum	-
1.6	Ongoing/ New NCRs	-
1.7	Others (Drawings)	On January 26, 2015, Pelly submitted Rev 2 of the electrical design (3 drawings).

2. Issue Tracking

Issue ID[1]	*Status/ Observations*	*Action Required By*
20150110_NFRDSIS_DSR_65_1 Nuline's electrical designs	Pelly submitted a new revision of Nuline's electrical design on January 26, 2015. YG submitted the comments from the CH2M's electrical engineer to Pelly on January 29, 2015. Contractor to answer CH2M's comments and questions. **OPEN**	Contractor (Nuline)
20150121_NFRDSIS_DSR_76_1 Pending documentation	The Contractor has been working on the OM Manual and the compilation of the documents to be delivered as part of the handover of the system (as per Chad's email), including but not limited to the electrical design, testing certificates and the OM Manual. A new version of the OM Manual has been submitted by the Contractor. Engineer and YG to review and to provide comments. **OPEN**	YG, BGC & Contractor

20150121_NFRDSIS_DSR_76_2 Power for heaters	The Contractor remobilized to wrap thermocable and insulation around the valves on shelters 1, 2, 3 and 5, as agreed during the meetings between YG, Pelly, Nuline, BGC and CH2M. The electrical installation at shelter 4 could not be completed before the end of the shift as some components were not delivered to the Fare Mine site. The remaining tasks will be completed at a later stage (Communication 1). **CLOSED**	Contractor
20150121_NFRDSIS_DSR_76_3 Containment for 500 kVA transformer	Containment for the 500 kVA transformer is required as the transformer is located close to the Creek. YG to comment on the schedule and requirements for the containment. **OPEN**	YG

[1] *All communications that remained open at the end of the shift are identified as issues (Issue ID = Shift Report #_Communication #)*

3. Summary of Pelly/Subcontractors Personnel and Equipment:

List of relevant personnel *(name, company, and work area)*
John Garvice (Pelly), DSAR, DSSC, Pipeline
Lloyd Burnhord (Nuline), Pipeline
Scott Kovac (Nuline), Pipeline
Equipment *(brand, model, reference #, colour, work area, and estimated working hours)*
All equipment was demobilized from site.

4. Summary of activities:

Downstream Access Road (DSAR)
No activity.
Downstream Seepage Collection (DSSC)
The Contractor and Engineer monitored the performance of the pumping system. The C-Can components were found to be operating normally (**Photos 1**, **2**, **3** and **4**). At the NF2A channel, the Engineer could not observe any change on the emerging points at the toe of the NFRD. Also, no changes on the water elevations at NF2A sampling point or the new pumping location could be measured.
Pipeline (PL)
The Contractor and Engineer visited the components along the pipeline. The heat trace circuits were active, water was being discharged at the Faro Pit end and the valves were working properly. The Engineer measured the temperature of shelters and valve components at the beginning of the

shift. Note that no activity had been completed by Nuline or Pelly so the shelters were heated by means of temporary heaters only (**Photos 5** and **6**). The temperature of the external shelter walls was between -17 ^{o}C and -20 ^{o}C approximately. The temperature of the valve components was between +28 ^{o}C and +34.6 ^{o}C, except on shelter number 5 where the heater was not working properly. On shelter number 5, the valve was at -9.8 ^{o}C and the air release mechanism was still working properly. Then, the Contractor installed Roxul Comfortbatt insulation around the valves, pipeline and flanged connections at shelters 1, 2, 3 and 5 (**Photos 9**, **8**, **10** and **15**). It is important to note that all valves were working properly even with the insulation covering the upper side of the valves. Afterwards, the Contractor removed the temporary light towers and heaters (except for shelter 4). At the end of the shift, the Engineer repeated the temperature readings on the valve components. At this stage, there were no temporary heaters heating shelters 1, 2, 3 and 5. The temperature of the valve components was between -0.8 ^{o}C and +21.4 ^{o}C. The Engineer noted that some valves/shelters were still warm hours after the removal of the heaters so the readings were not showing the real effect of the new thermocable and insulation installed by Nuline and Pelly. At the end of the shift, all valves were found to be working properly.
Electrical Installation (EI)
Nuline wrapped thermocable along the valve and connection elements. Note that three splice kits were used to splice additional length of thermocable on shelters 2, 3 and 5 (**Photo 14**). No additional thermocable was spliced on shelter number 1 as there was sufficient length to wrap the valve. The thermocable was fixed to the valve components with tape (**Photos 7**, **9** and **10**). Afterwards, Nuline tested the heat trace circuits and recorded the test values. Nuline confirmed that all circuits were working properly (Communication 3). At shelter number 4, Nuline installed a new switch disconnect for the future operation of the heater. Also, a cable was installed from shelter number 4 to the existing shelter along the S-Wells pipeline. The cable was not terminated at the existing shelter (S-Wells) end as no disconnect was supplied. As commented on Communication 1, some components were not delivered to site so the installation could not be completed.
Overhead Power Line (OPL)
No activity.

5. Communications

ID	Summary *(time, key personnel, work area and description)*
1	Joan, John, Lloyd. Completion of electrical installation on shelter 4.
	Discussion and Recommendations
	The Engineer observed that Nuline installed a new length of #10 electrical cable from the existing shelter (S-Wells pipeline) to shelter number 4 (dual air release and vacuum breaker valve). As shown on **Photo 13**, The cable was introduced under the shelter wooden wall. Inside shelter number 4, Nuline also installed a switch disconnect and a short section of #10

	cable for the connection of the new heater (**Photo 12**). Nuline explained that the installation could not be completed as the rest of the required components were not delivered, including: • Two (2) heaters • Two (2) switches • One (1) splitter box • Short sections of cable to complete the installation of heaters As commented with YG, these elements will have to be installed at a later stage. The Engineer requested the Contractor to inform YG about the elements missing, as well as the estimated delivery times for each components.	
	Corrective Actions or Improvements	
	Contractor to inform YG about the elements missing on shelter number 4 and to provide an estimate on the delivery times for each component. This subject will be discussed with YG during the following weeks.	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
2	Joan, John, Paul (Tees). Water at the outlet of air release valve (shelter 3).	
	Discussion and Recommendations	
	The Engineer observed that there was some water accumulated at the outlet on top of the air release valve (**Photo 11**). Tees commented that it was normal and the operation of the valve was not compromised. That being said, the water could be an issue if it freezes (it can block the outlet). The valve will be wrapped with thermocable and then insulated so it will prevent the water from freezing. Tees commented that they will monitor this valve as part of the daily inspections (no additional action required).	
	Corrective Actions or Improvements	
	N/A	
	Status at the end of the shift (Open, Closed or N/A)	**N/A**
3	Joan, John, Lloyd. Testing of heat trace circuits.	
	Discussion and Recommendations	
	Nuline commented that all heat trace circuits were tested. Also, that the results recorded showed that all circuits were working properly. The Engineer noted Nuline's comment. Then, reminded that the field test records shall be compiled on a formal document (test certificate). The test certificate provided by Nuline will be attached to the handover documentation to record that the system was working properly.	
	Corrective Actions or Improvements	
	Nuline to issue formal testing certificate.	
	Status at the end of the shift (Open, Closed or N/A)	**OPEN**

6. Borrow Activity

Borrow	Material	Equipment	Description	Photo
-	-	-	-	-

7. Environmental Protection and Monitoring

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

8. Clearing and Grubbing

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

9. Fills

Work Area	Approx. Location	Equipment	Material	Borrow Area	Description	Photo
-	-	-	-	-	-	-

10. Sub-Excavation

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

11. Geotextiles

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

12. Rock Breaking

Work Area	Approx. Location	Equipment	Description	Photo
-	-	-	-	-

13. BGC Sampling

Work Area	Approx. Location	Material	Reason Sampled	Photo
-	-	-	-	-

14. BGC Audits

Work Area	Approx. Location	BGC Rep.	Description and Status (Completed/Ongoing)	Photo
-	-	-	-	-

General notes:

- The Contractor demobilized at the end of the shift. The shelter at the highest point of the pipeline (shelter 4) was temporarily heated by means of a light tower (Tees) and a small

heater. As per communications with YG, the remaining activities will be completed at a later stage when the components will be delivered.

- The Contractor completed the demobilization of equipment from the Faro Mine.
- Tees will assume the operation of the NFRD SIS, including the monitoring of C-Can pumping components, pumping system at the Creek and the pipeline.

Photos:

Photo 1: 20150130_NFRDSIS_DSSC_658_Overview of C-Can_Looking E

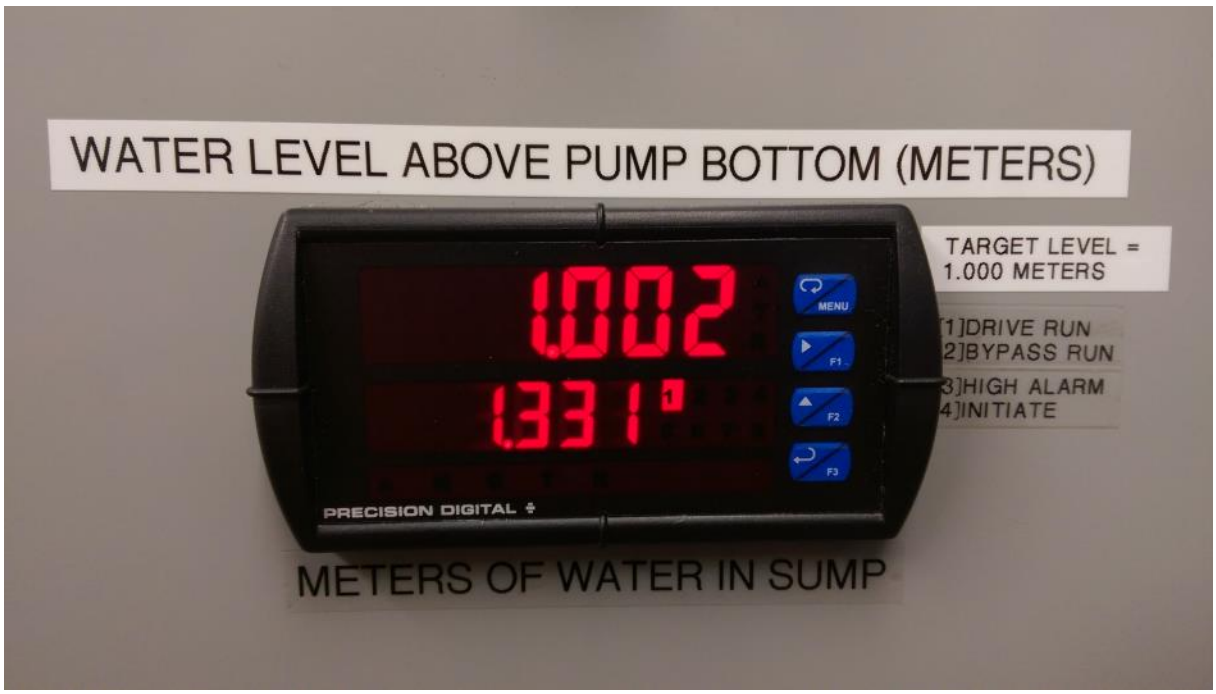

Photo 2: 20150130_NFRDSIS_DSSC_659_Digital display showing water elevation in the sump (C-Can)

Photo 3: 20150130_NFRDSIS_DSSC_660_Flowmeter showing a flow of 5.6 L/s

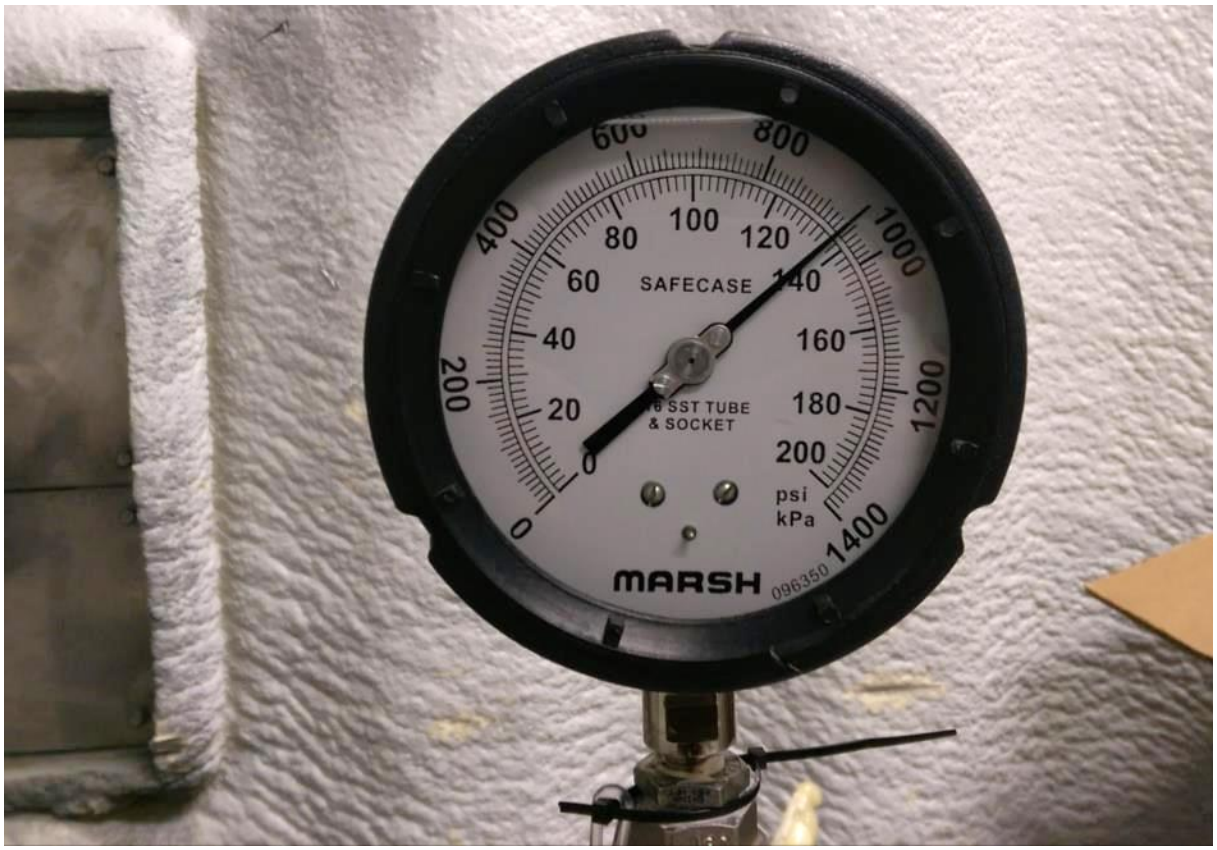

Photo 4: 20150130_NFRDSIS_DSSC_661_Pressuremeter showing a pressure of 137 psi

Photo 5: 20150130_NFRDSIS_Pipeline_662_Light tower feeding the temporary heater inside shelter number 2_Looking E

Photo 6: 20150130_NFRDSIS_Pipeline_663_Small heater (1500 w) inside shelter number 2

Photo 7: 20150130_NFRDSIS_EI_664_Thermocable being wrapped around the drain valve (shelter 1)

Photo 8: 20150130_NFRDSIS_Pipeline_665_Sheets of insulation installed to protect the drain valve (shelter 1)

Photo 9: 20150130_NFRDSIS_Pipeline_666_Thermocable and insulation installed around the vacuum valve on shelter 2. Note the insulation under the pipeline components

Photo 10: 20150130_NFRDSIS_Pipeline_667_Thermocable and insulation installed to wrap the air release valve (Shack 3)

Photo 11: 20150130_NFRDSIS_Pipeline_665_Water accumulated at the air release valve outlet

Photo 12: 20150130_NFRDSIS_EI_665_Disconect installed at shelter 4 by Nuline

Photo 13: 20150130_NFRDSIS_EI_665_Electrical cable (#10) entering under shelter 4

Photo 14: 20150130_NFRDSIS_EI_665_Nuline splicing thermocable at shelter 5

Photo 15: 20150130_NFRDSIS_Pipeline_665_Insulation installed around air release valve (shelter 5)

Photo 16: 20150130_NFRDSIS_Pipeline_665_Spare parts stored at workshop bay 5

APPENDIX C
BGC FIELD MEMORANDUMS

LIST OF FIELD MEMORANDUM

Reference	Title	Date
20150205_NFRDSIS_FM3	Pipeline Operation, Inspection and Troubleshooting.	February 5, 2015
20150217_NFRDSIS_FM4	Outstanding Activities and Recommendations	February 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Field Memorandum

Project Name:	NFRD Drain SIS	**To:**	Chad Brassard
Project #:	0533-010-06	**Copied:**	Jim Cassie
Company:	BGC Engineering Inc.	**From:**	Joan Roca
Date:	20150205	**Record #:**	*20150205_NFRDSIS_FM3_ Pipeline Operation, inspection and troubleshooting*

Subject: North Fork Rock Drain SIS Construction. Pipeline Operation, Inspection and Troubleshooting.

1.0. Introduction:

As part of the NFRD SIS project, an above ground pipeline (pipeline) of approximately 1.6 km length was installed by Pelly Construction Ltd. (PCL). The pipeline will deliver pumped seepage water from the downstream pumping system control house (C-Can) to the Faro Pit.

The pipeline consists of 100 mm diameter (4") HDPE DR 11/17 pre-insulated pipes, a heat trace system and the required valves (air release, vacuum and drain valves). All valves alongside the pipeline layout have been protected by insulated shelters to prevent freezing during operations during winter. In addition, extra length of thermocable has been wrapped around the valves and additional insulation has been installed to keep the valves warm. At the dual vacuum breaker/air release valve, a heater will also be installed inside the shelter to provide additional protection against freezing.

This document summarizes the recommended operation, maintenance and inspection procedures for the installed pipeline. Recommendations for the rest of the elements comprising the pumping system (pump, control house and power) are not included on this document and are assumed to be provided by others.

2.0. Operation:

The pipeline will deliver the pumped water from the pump station (C-Can) to the Faro Pit. In normal operation of the pipeline, all air release and vacuum breaker valves have to be opened and in working conditions. The drain gate valve has to be closed. The use of the heat trace system is recommended when air temperature is found to be below 0ºC to prevent freezing.

The air release and vacuum valves can be opened/closed by means of the ball valve installed under each valve. The heat trace system can be operated from the disconnect switch mounted beside the electronic thermostat controller for each circuit.

3.0. Drainage:

If required, the pipeline can be manually drained. The pipeline drain is managed through three locations:

- The pipeline between Stn. 0+000 and the highest point along the downstream access road (approx. Stn. 0+070) will be drained towards the C-Can and discharged into the pump sump and creek.
- The pipeline between Stn.'s 0+070 and the highest point along the pipeline (approx. Stn. 0+975) will be drained towards the gate valve installed at the lowest point along the pipeline (close to the S-Wells C-Can) with following discharge to the downstream access road and gradually to the creek.
- The pipeline between the highest point along the pipeline (approx. Stn. 0+975) and the pipeline outlet (approx. Stn. 1+600) will be drained into the common ditch with following discharge into the Faro Pit.

It is important to mention that the pumping system has to be disconnected before the pipeline can be drained. Also, all valves shall be opened to prevent damage to the different pipeline elements. If the air temperature is below 0ºC, the heat trace system should be connected until all water is drained.

All valves shall be closed and the heat trace systems disconnected once the pipeline is drained. All valves (except the drain gate valve) shall be reopened before seepage water is pumped into the system. If the air temperature is below 0ºC, the heat trace system should also be reconnected. On the contrary, damage to the pumping system or pipeline elements could occur.

4.0. Inspection and Maintenance:

No scheduled lubrication or maintenance is required for the pipeline sections, air release valves, vacuum breaker valves, drain valve or electronic thermostat.

Daily inspection of the valves, the heat trace electronic thermostat controllers and the pipeline outlet is recommended to confirm proper operation of the system. The problems observed during inspection, such as water leakage on valves or pipe connections (flanged/welded), shall be reported and repaired by skilled mechanic with proper tools.

If air temperatures below 0ºC are recorded, additional regular monitoring of the heat trace components and valves is recommended (at least once per week), including:

- Testing of heat trace circuits with a multimeter to validate that is energized along the whole thermocable length;
- Temperature checks for the valve components inside the insulated shelters to verify that they are not frozen; and
- Monitoring of inlet (C-Can) and outlet (discharge to common ditch) water temperatures.

When moving insulation covering pipeline components during inspection, monitoring or maintenance, very important that insulation be replaced properly to cover the pipeline elements.

After each winter, inspect the earth anchors installed on pipeline and repair them to ensure they are installed as per the design drawings (refer to drawing FRNF-XD-02-17_Rev 0).

5.0. Troubleshooting:

The following is a summary of problems and solutions for the pipeline installation:

- Leakage or malfunction on valves: Inspect the valve components to locate the leakage and follow the troubleshooting recommendations from the manufacturer. If disassembly or replacement is required, close the ball shut-off valve and follow the instructions from the manufacturer.
- Heat trace circuit failure (below 0ºC): Follow the recommendations of the manufacturer. If the affected heat trace circuits cannot be repaired within the same day, the risks for the pipeline shall be evaluated by the Yukon Government (YG) and the Care and Maintenance Operator. The temperature for the water discharged at the Faro Pit outlet and the pipeline components shall be monitored. If required, the pumping system can be disconnected and the pipeline drained.
- Heater failure (below 0ºC): Repair/replace the heater inside the shelter. If the heater can't be repaired/replaced within the same day, the risks for the pipeline shall be evaluated by the Yukon Government (YG) and the Care and Maintenance Operator. The temperature for the pipeline components inside the shelter shall be monitored. If required, the pumping system can be disconnected and the pipeline drained.
- No water discharged at Faro Pit end: Inspect the pipeline and valve components. Follow recommendations listed above if problems are identified along the pipeline. On the contrary, inspect the pumping system (pump, C-Can and electrical installation) and follow instructions listed on the independent Operations and Maintenance Manual from PCL. If required, the pumping system can be disconnected and the pipeline drained.
- Pipeline blockage (including freezing): Disconnect the pumping system and, if required, drain the pipeline. Locate and remove the obstruction. The inspection of the pipeline before pumping will resume is recommended to identify possible problems that the increased water pressures could have caused, including but not limited to leakage on pipe connections or malfunctioning of valves.

Specific problems and solutions for the air release valves, vacuum breaker valves and heat trace components can be found on the specific sections of Operation and Maintenance Manuals attached at the end of this document.

6.0. Closure:

BGC prepared this document for the account of YG. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation.

We trust the above satisfies your requirements at this time. Should you have any questions or comments, please do not hesitate to contact us.

7.0. Attachments:

The following documents can be found attached to this field memorandum:

- Attachment 1: Air Release Valve. Operation, Maintenance and Installation Manual (6 pages).
- Attachment 2: Vacuum Breaker Valve. Operation, Maintenance and Installation Manual (5 pages).
- Attachment 3: Heat Trace Circuit – Installation instruction for components (25 pages).

BGC Representatives:	Joan Roca	**Date:**	20150205
Reviewed by:	Jim Cassie	**Date:**	20150206

Attachment 1: Air Release Valve. Operation, Maintenance and Installation Manual (6 pages).

Manual No.
ARSL-OM1-2

Air Release Valve

(Simple Lever Type)
Models 15A, 22, 25
Operation, Maintenance and Installation Manual

INTRODUCTION 1
RECEIVING AND STORAGE..... 1
DESCRIPTION OF OPERATION 1
INSTALLATION..... 2
VALVE CONSTRUCTION 2
MAINTENANCE 3
TROUBLESHOOTING 3
DISASSEMBLY 3
REASSEMBLY 3
PARTS & SERVICE 4
WARRANTY 5

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VAL-MATIC'S AIR RELEASE VALVE
(Simple Lever Type)
OPERATION, MAINTENANCE AND INSTALLATION

INTRODUCTION

This manual will provide you with the information to properly install and maintain the valve to ensure a long service life. The Air Release Valve has been designed with stainless steel trim to give years of trouble-free operation. The Air Release Valve is typically mounted at the high points in a piping system to automatically remove pockets of air as they accumulate. The valve can also be used to slowly release air in tanks and pump casings.

Note: This valve is not intended for fluids containing suspended solids such as wastewater. For waste-water and other high turbidity applications, use Val-Matic Series 48A & 49A Sewage Air Release Valves.

CAUTION
This valve is not intended for fuel service or fluids containing suspended solids.

The valve is a float-operated, resilient-seated valve designed to handle clean fluids. The Maximum Working Pressure and Model No. are stamped on the nameplate for reference.

RECEIVING AND STORAGE

Inspect valves upon receipt for damage in shipment. Handle all valves carefully without dropping. Valves should remain boxed, clean and dry until installed to prevent weather related damage. For long term storage greater than six months, the valve must remain in the box and stored indoors. Do not expose valve to sunlight or ozone for any extended period.

DESCRIPTION OF OPERATION

The Air Release Valve is designed to automatically remove air pockets at the high points in a piping system. The valve, as shipped, is a normally open valve and will slowly vent air through the top orifice. As fluid enters the valve, the float will rise, closing the orifice. As air accumulates in the piping system and enters the valve, the float drops allowing the venting orifice to open.

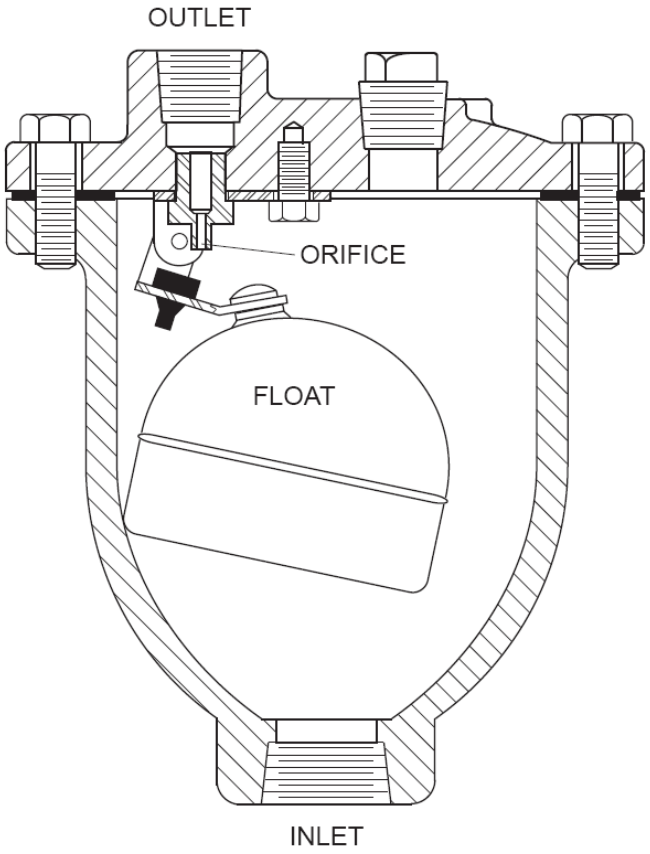

FIGURE 1. Simple Lever AIR RELEASE VALVE

The lever mechanism provides mechanical advantage for the float. During system operation, the pipeline pressure exerts a strong upward force on the sealing component, the orifice button. The lever mechanism magnifies the weight of the float so that the orifice will open under high pipeline pressures. Additional ports are provided for flushing, testing and draining purposes.

INSTALLATION

The installation of the valve is important for its proper operation. Valves must be installed at the system high points in the vertical position with the inlet down. For pipeline service, a vault with freeze protection, adequate screened venting, and drainage should be provided. During closure, some fluid discharge will occur so vent lines should extend to an open drain area in plant service. A shut-off valve should be installed below the valve in the event servicing is required.

CAUTION

Install valve with "INLET" port down or leakage will occur.

VALVE CONSTRUCTION

The standard Air Release Valve body and cover are cast iron. See the specific Materials List submitted for the order if other than standard cast iron construction. All internal components are stainless steel with the exception of the orifice button which is resilient. The general details of construction are illustrated in Figure 2. The body (1) is threaded for connection to the pipeline. The seat (4) is threaded into the cast cover (2).

ITEM	DESCRIPTION	MATERIAL
1	Body	Cast Iron
2	Cover	Cast Iron
3	Lever Frame*	Stainless Steel
4	Seat*	Stainless Steel
5	Float*	Stainless Steel
6	Gasket*	Non-Asbestos
7	Cover Bolt	Alloy Steel
10	Float Arm*	Stainless Steel
11	Orifice Button*	Buna-N
12	Pivot Pin*	Stainless Steel
13	Pin Retainer*	Stainless Steel
14	Pipe Plug	Iron
17	Float Retainer*	Stainless Steel
21	Locator*	Stainless Steel
34	Lock Washer*	Stainless Steel

*Recommended Repair Part Kit

TABLE 1. VALVE COMPONENTS

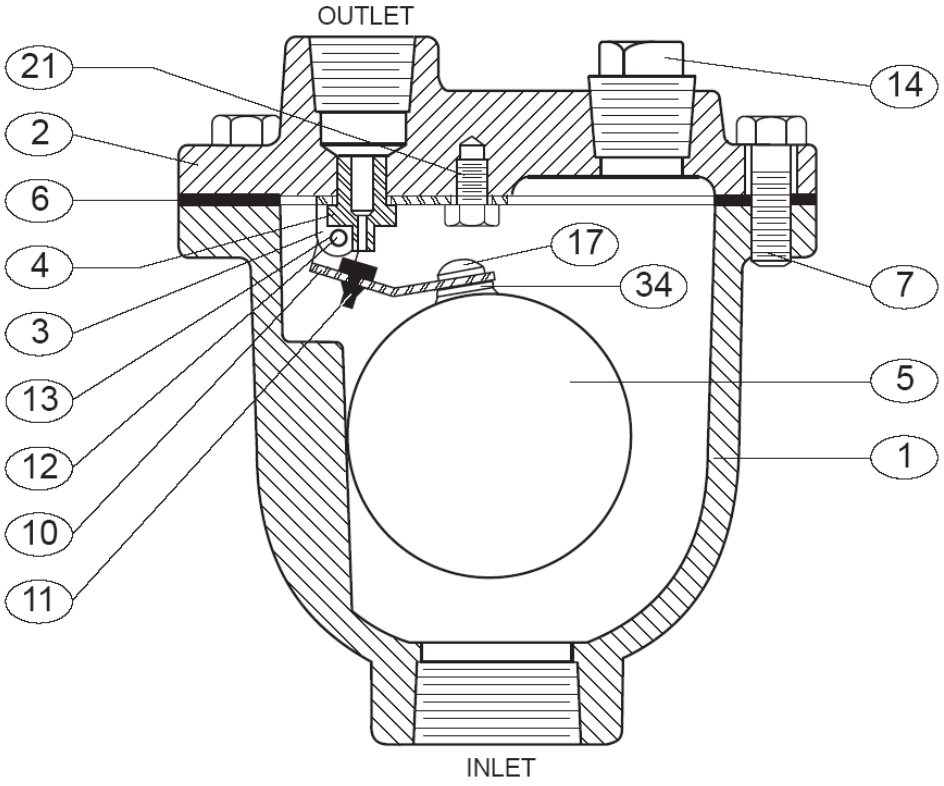

FIGURE 2. Simple Lever AIR RELEASE VALVE

MAINTENANCE

The Air Release Valve requires no scheduled lubrication or maintenance.

INSPECTION: Check outlet for water leakage. If continuous water leakage occurs, valve inspection and repair is needed.

Table 2. Valve Cover Bolt Torques

Size	Torque (Ft-lbs)
5/16"	20
3/8"	35

TROUBLESHOOTING

Several problems and solutions are presented below to assist you in troubleshooting the valve assembly in an efficient manner.

- Leakage at Bottom Connection: Tighten valve threaded connection. If leak persists, remove valve and seal threads with thread sealant.
- Leakage at Cover: Tighten bolts per Table 2, replace gasket.
- Valve Leaks when Closed: Flush valve to remove debris. Disassemble and inspect seat, orifice button, and float. NOTE: Many floats contain sand for weight but if water is detected, replace float.
- Valve not Venting Air: Check that operating pressure does not exceed Working Pressure on nameplate.

DISASSEMBLY

The valve can be disassembled without removing it from the pipeline. Or for convenience, the valve can be removed from the line. All work on the valve should be performed by a skilled mechanic with proper tools. No special tools are required. Refer to Figure 2.

1. Close inlet shut-off valve. Loosen the cover bolts (7) slowly on the top cover to release any trapped pressure.
2. Remove cover bolts (7) and lift cover off valve body.
3. Remove the 2 retainer rings (13) and pivot pin (12) that pass through the lever frame (3). The float (5) and float arm (10) will be free from the cover. Disconnect float from float arm (10).
4. To remove lever frame (3), remove hex-head locator (21). Rotate seat (4) counter-clockwise to remove.
5. Remove orifice button (11) from float arm (10).
6. Clean and inspect parts. Note: some floats contain sand for extra weight; if water is detected, replace float. Replace worn parts as necessary.

REASSEMBLY

All parts must be cleaned and gasket surfaces should be cleaned with a stiff wire brush in the direction of the serrations or machine marks. Worn parts, gaskets and seals should be replaced during reassembly. Refer to Figure 2 on page 2.

1. Assemble lever frame (3) to cover. Secure with bolt (21) and washers (30).
2. Apply Loctite PST No. 565 thread sealant to seat (4) and assemble to cover with maximum torque of 10 ft-lbs; DO NOT OVER-TORQUE.
3. Install new orifice button (11) flush to arm (10).
4. Connect arm (10) to float (5) with retainer bolt (17) and lockwasher (34). Install pivot pin (12) and retaining rings (13); rings should snap over pins.
5. Float should move freely pressing the orifice button (11) against the seat (4) when pushed upward. Verify that all retainer rings (13) are properly secured.
6. Lay new cover gasket over body (1) and install cover (2) over bolt holes in body (1).
7. Insert lubricated bolts (7) and tighten to 20 ft-lbs.
8. Place valve back in service. Refer to the Installation instructions on page 2. Slowly open inlet isolation valve.

PARTS AND SERVICE

Parts and service are available from your local representative or the factory. Make note of the valve Model No and Working Pressure located on the valve nameplate and contact:

Val-Matic Valve and Mfg. Corp.
905 Riverside Drive
Elmhurst, IL 60126
Phone: (630) 941-7600
Fax: (630) 941-8042

A sales representative will quote prices for parts or arrange for service as needed.

LIMITED WARRANTY

All products are warranted to be free of defects in material and workmanship for a period of one year from the date of shipment, subject to the limitations below.

If the purchaser believes a product is defective, the purchaser shall: (a) Notify the manufacturer, state the alleged defect and request permission to return the product; (b) if permission is given, return the product with transportation prepaid. If the product is accepted for return and found to be defective, the manufacturer will, at his discretion, either repair or replace the product, f.o.b. factory, within 60 days of receipt, or refund the purchase price. Other than to repair, replace or refund as described above, purchaser agrees that manufacturer shall not be liable for any loss, costs, expenses or damages of any kind arising out of the product, its use, installation or replacement, labeling, instructions, information or technical data of any kind, description of product use, sample or model, warnings or lack of any of the foregoing. NO OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, ARE MADE OR AUTHORIZED. NO AFFIRMATION OF FACT, PROMISE, DESCRIPTION OF PRODUCT OF USE OR SAMPLE OR MODEL SHALL CREATE ANY WARRANTY FROM MANUFACTURER, UNLESS SIGNED BY THE PRESIDENT OF THE MANUFACTURER. These products are not manufactured, sold or intended for personal, family or household purposes.

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VAL-MATIC® VALVE AND MANUFACTURING CORP.

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Phone (630) 941-7600 ● Fax (630) 941-8042
www.valmatic.com

Attachment 2: Vacuum Breaker Valve. Operation, Maintenance and Installation Manual (5 pages).

Manual No.
VB-OM2-0

1/2"-3" Threaded Vacuum Breaker

Models 100VB to 103VB

Operation, Maintenance and Installation Manual

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VAL-MATIC'S 1/2"-3" VACUUM BREAKER
I OPERATION, MAINTENANCE AND INSTALLATION

NTRODUCTION
The Vacuum Breaker has been designed with stainless steel trim to give years of trouble-free operation. This manual will provide you with the information to properly install and maintain the valve to ensure a long service life. The Vacuum Breaker is designed to open fully and allow air to enter the piping system during critical vacuum conditions caused by power failure or rapid draining of the system.

NOTE: The vacuum breaker will not allow air to escape from the pipeline. An optional air release valve piped near the vacuum breaker would be needed to release accumulated air during system operation.

Also, this valve is not intended for fluids containing suspended solids such as wastewater.

CAUTION:	**This valve is not intended for fuel service or fluids containing suspended solids.**

The valve is a float-operated, resilient-seated valve designed to handle clean fluids. The Size, Maximum Working Pressure, and Series No. are stamped on the nameplate for reference.

RECEIVING AND STORAGE
Inspect valves upon receipt for damage in shipment. Unload all valves carefully to the ground without dropping.

Valves should remain boxed, clean and dry until installed to prevent weather related damage. For long term storage greater than six months, the rubber surfaces of the seat should be coated with a thin film of FDA approved grease such as Lubriko #CW-606. Do not expose seat to sunlight or ozone for any extended period.

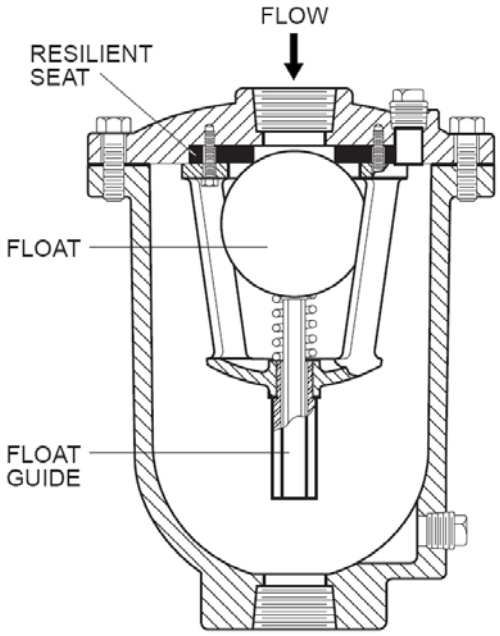

FIGURE 1. 1/2"-3" VACUUM BREAKER

DESCRIPTION OF OPERATION
The Vacuum Breaker is designed to prevent vacuum conditions from occurring in pipes or tanks. After a power failure or rapid draining of the system, a vacuum condition often occurs in a pipe or tank. The pressure difference between the inside vacuum and outside air will cause a downward force on the float. At vacuum pressures greater than –0.25 psig, the float will compress the spring and move downward allowing free flow of outside air into the pipe or tank to eliminate the vacuum.

When positive pressure is restored in the pipe or tank, the vacuum breaker will automatically close and seal tightly against the resilient seat. Optional valves can be piped to the vacuum breaker to vent trapped air in the pipeline if needed.

The valve may be supplied with an optional threaded hood for insertion into the top of the valve. The only moving parts in the valve are the float and the spring. The float guide controls the movement of the float and assures that the float contacts the seat evenly.

INSTALLATION
The installation of the Vacuum Breaker is important for its proper operation. The seat end must be oriented upward. The device should be installed on top of horizontal lines or tanks and equipped with a full-ported isolation valve. If installed in a vault, adequate ventilation is needed to supply air to the vacuum breaker.

It leakage occurs at the pipe connection, torque valve tighter or reapply pipe dope to threaded joint.

VALVE CONSTRUCTION
The Vacuum Breaker body and cover are cast iron. All internal components are stainless steel with the exception of the valve seat which is resilient. The float (5) and float guide shaft (20) are the only moving parts assuring long life with minimal maintenance. The general details of construction are illustrated in Figure 2. The body (1) is threaded for connection to the pipeline. The seat (4) is retained in the cast cover (2). The seat (4) is retained by a baffle (3).

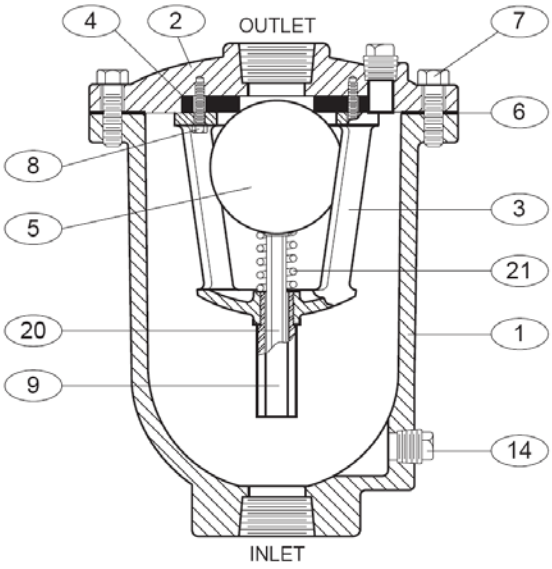

FIGURE 2. 1/2"-3" VACUUM BREAKER

ITEM	DESCRIPTION	MATERIAL
1	Body	Cast Iron
2	Cover	Cast Iron
3	Baffle	Ductile Iron
4	Seat*	Buna-N
5	Float*	Stainless Steel
6	Gasket*	Non-Asbestos
7	Cover Bolt	Alloy Steel
8	Retaining Screw*	Stainless Steel
9	Guide Bushing*	Stainless Steel
14	Pipe Plug	Iron
20	Guide Shaft*	Stainless Steel
21	Spring*	Stainless Steel

*RECOMMENDED SPARE PART

TABLE 1. 1/2"-3" Vacuum Breaker Parts List

MAINTENANCE
The Vacuum Breaker requires no scheduled lubrication or maintenance.

TROUBLESHOOTING
Several problems and solutions are presented below to assist you in troubleshooting the vacuum breaker assembly in an efficient manner.

•Leakage at Bottom Connection: Tighten threaded connection. If leak persists, remove device and seal threads with Teflon sealant.

•Leakage at Cover: Tighten bolts, replace gasket.

•Device Leaks when Closed: Inspect seat for damage and replace.

DISASSEMBLY
The device can be disassembled without removing it from the pipeline. Or for convenience, the device can be removed from the line. All work on the valve should be performed by a skilled mechanic with proper tools.

WARNING: **The line must be drained before removing the cover or pressure may be released causing bodily harm.**

DISASSEMBLY (continued)

1. Close inlet shut-off valve. Open drain valve or remove drain plug. Remove the cover bolts (7) on the top cover.

2. Pry cover (2) loose and lift off body (1).

3. Remove retainer bolts (8) and inspect seat for cracks in rubber or wear in sealing surface.

4. Turn guide bushing (9) to remove it from the cast baffle (3).

5. Clean and inspect parts. Replace worn parts as necessary.

RE-ASSEMBLY

All parts must be cleaned and gasket surfaces should be cleaned with a stiff wire brush in the direction of the serrations or machine marks. Worn parts, gaskets and seals should be replaced during reassembly.

1. Apply Loctite to guide bushing threads (9) and thread bushing into baffle (3). Insert float shaft into float (5).

2. Lay seat (4) over inverted cover with flat surface directed toward cover.

3. Install float assembly and spring (21) and baffle over seat and secure with retaining bolts (8) at 10 ft-lbs.

4. Lay cover gasket (6) and cover (2) over bolt holes in body (1).

5. Insert lubricated bolts (7) and tighten to the torques listed in Table 2.

SIZE	TORQUE (FT-LBS)
5/16"	10
3/8"	24
1/2"	59
5/8"	117

TABLE 2. VALVE COVER BOLT TORQUES

PARTS AND SERVICE

Parts and service are available from your local representative or the factory. Make note of the valve Size, Series No, and Serial No. located on the valve nameplate and contact:

Val-Matic Valve and Mfg. Corp.
905 Riverside Drive
Elmhurst, IL 60126
PH: 630/941-7600
FAX: 630/941-8042

A sales representative will quote prices for parts or arrange for service as needed.

LIMITED WARRANTY

All products are warranted to be free of defects in material and workmanship for a period of one year from the date of shipment, subject to the limitations below.

If the purchaser believes a product is defective, the purchaser shall: (a) Notify the manufacturer, state the alleged defect and request permission to return the product; (b) if permission is given, return the product with transportation prepaid. If the product is accepted for return and found to be defective, the manufacturer will, at his discretion, either repair or replace the product, f.o.b. factory, within 60 days of receipt, or refund the purchase price. Other than to repair, replace or refund as described above, purchaser agrees that manufacturer shall not be liable for any loss, costs, expenses or damages of any kind arising out of the product, its use, installation or replacement, labeling, instructions, information or technical data of any kind, description of product use, sample or model, warnings or lack of any of the foregoing. NO OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, ARE MADE OR AUTHORIZED. NO AFFIRMATION OF FACT, PROMISE, DESCRIPTION OF PRODUCT OF USE OR SAMPLE OR MODEL SHALL CREATE ANY WARRANTY FROM MANUFACTURER, UNLESS SIGNED BY THE PRESIDENT OF THE MANUFACTURER. These products are not manufactured, sold or intended for personal, family or household purposes.

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Attachment 3: Heat Trace Circuit – Installation instruction for components (25 pages).

URECON
PRE-INSULATED PIPE SYSTEM

St-Lazare, Quebec Tel.: (450) 455-0961
Calmar, Alberta Tel.: (780) 985-3636
Rockledge, Florida Tel.: (321) 638-2364

INSTALLATION INSTRUCTION #1E

THERMOCABLE® FLUOROPOLYMER INSULATED PARALLEL HEATING CABLE

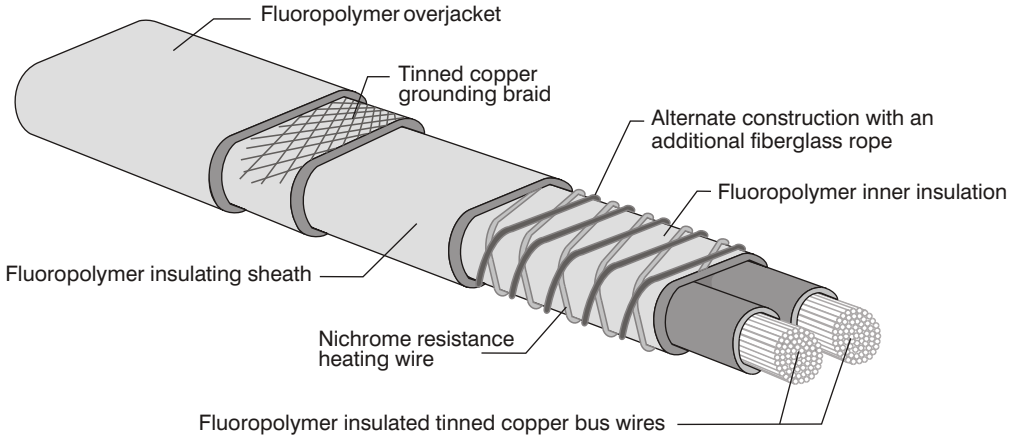
TERMINATION KIT # A1333-COJ

SPLICE KIT # S1334-COJ

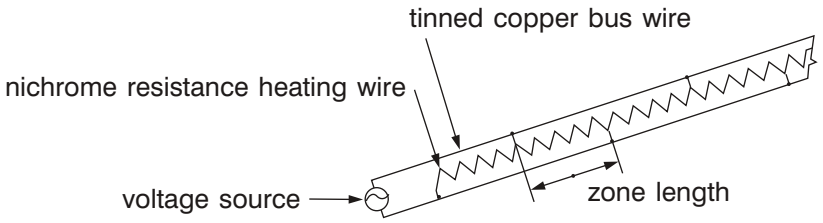
END TERMINATION KIT # E1336-COJ

POWER SPLICE KIT # PS1337-12-COJ

THERMOCABLE® parallel heating strip is used to prevent Urecon pre-insulated pipes from freezing.



THERMOCABLE® fluoropolymer constant watt cut - to - length heat tracing cable is a parallel resistance type heating strip which uses a thermally stable nichrome heating wire, with a series of heating zones. These heating zones produce constant, predictable wattage per meter output. THERMOCABLE® is ideally suited for pulling into trace conduits on Urecon pre-insulated pipe systems.



PROPER HEATING CABLE SELECTION :

Urecon can assist you determining the required heating cable for you application. We have computer design programs to calculate the power requirement of a given pipe/insulation arrangement. The following heat loss charts can also enable you to determine the proper heating cable power output required for your application. These charts are for urethane insulation.

Select the heat loss chart with a temperature differential (ΔT) similar or greater than of the proposed installation. The temperature differential (ΔT) is the temperature difference between the minimum ambient and the desired maintain temperature of the pipe.

Based on the pipe size and insulation thickness you will find a corresponding heat loss value on the chart. This value expressed in watts / meter *(watts / foot)* of pipe will indicate the minimum power required.

Nominal pipe size		Pipe heat loss @ 10 °C *(18 °F)* ΔT					
		Urethane insulation thickness					
mm	*in*	25 mm *(1 in)*		50 mm *(2 in)*		75 mm *(3 in)*	
		w/m	*w/ft*	*w/m*	*w/ft*	*w/m*	*w/ft*
13	½	1.5	*0.5*	1.0	*0.3*	0.9	*0.3*
19	¾	1.7	*0.5*	1.2	*0.4*	0.9	*0.3*
25	*1*	2.0	*0.6*	1.3	*0.4*	1.1	*0.3*
32	*1¼*	2.3	*0.7*	1.5	*0.5*	1.2	*0.4*
40	*1½*	2.5	*0.8*	1.6	*0.5*	1.3	*0.4*
50	*2*	3.0	*0.9*	1.8	*0.5*	1.4	*0.4*
64	*2½*	3.4	*1.0*	2.1	*0.6*	1.6	*0.5*
75	*3*	4.0	*1.2*	2.4	*0.7*	1.8	*0.5*
100	*4*	4.9	*1.5*	2.8	*0.9*	2.1	*0.6*
150	*6*	6.8	*2.1*	3.8	*1.2*	2.8	*0.9*
200	*8*	8.6	*2.6*	4.7	*1.4*	3.4	*1.0*
250	*10*			5.7	*1.7*	4.1	*1.2*
300	*12*			6.6	*2.0*	4.7	*1.4*
350	*14*			7.2	*2.2*	5.1	*1.6*
400	*16*			8.1	*2.5*	5.7	*1.7*
450	*18*			9.0	*2.7*	6.3	*1.9*
500	*20*			9.9	*3.0*	6.9	*2.1*
550	*22*			10.8	*3.3*	7.5	*2.3*
600	*24*			11.7	*3.6*	8.1	*2.5*

Nominal pipe size		Pipe heat loss @ 20 °C *(36 °F)* ΔT					
		Urethane insulation thickness					
mm	*in*	25 mm *(1 in)*		50 mm *(2 in)*		75 mm *(3 in)*	
		w/m	*w/ft*	*w/m*	*w/ft*	*w/m*	*w/ft*
13	½	3.0	*0.9*	2.1	*0.6*	1.7	*0.5*
19	¾	3.4	*1.0*	2.3	*0.7*	1.9	*0.6*
25	*1*	3.9	*1.2*	2.6	*0.8*	2.1	*0.6*
32	*1¼*	4.6	*1.4*	2.9	*0.9*	2.4	*0.7*
40	*1½*	5.0	*1.5*	3.2	*1.0*	2.5	*0.8*
50	*2*	5.9	*1.8*	3.7	*1.1*	2.9	*0.9*
64	*2½*	6.8	*2.1*	4.1	*1.2*	3.2	*1.0*
75	*3*	8.0	*2.4*	4.7	*1.4*	3.6	*1.1*
100	*4*	9.8	*3.0*	5.7	*1.7*	4.3	*1.3*
150	*6*	13.7	*4.2*	7.6	*2.3*	5.6	*1.7*
200	*8*	17.3	*5.3*	9.5	*2.9*	6.8	*2.1*
250	*10*			11.4	*3.5*	8.1	*2.5*
300	*12*			13.2	*4.0*	9.4	*2.9*
350	*14*			14.4	*4.4*	10.1	*3.1*
400	*16*			16.2	*4.9*	11.3	*3.4*
450	*18*			18.0	*5.5*	12.6	*3.8*
500	*20*			19.8	*6.0*	13.8	*4.2*
550	*22*			21.6	*6.6*	15.0	*4.6*
600	*24*			23.4	*7.1*	16.2	*4.9*

Nominal pipe size		Pipe heat loss @ 30 °C *(54 °F)* ΔT					
		Urethane insulation thickness					
mm	*in*	25 mm *(1 in)*		50 mm *(2 in)*		75 mm *(3 in)*	
		w/m	*w/ft*	*w/m*	*w/ft*	*w/m*	*w/ft*
13	½	4.4	*1.3*	3.1	*0.9*	2.6	*0.8*
19	¾	5.1	*1.6*	3.5	*1.1*	2.8	*0.9*
25	*1*	5.9	*1.8*	3.9	*1.2*	3.2	*1.0*
32	*1¼*	6.8	*2.1*	4.4	*1.3*	3.5	*1.1*
40	*1½*	7.5	*2.3*	4.8	*1.5*	3.8	*1.2*
50	*2*	8.9	*2.7*	5.5	*1.7*	4.3	*1.3*
64	*2½*	10.2	*3.1*	6.2	*1.9*	4.8	*1.5*
75	*3*	12.0	*3.7*	7.1	*2.2*	5.4	*1.6*
100	*4*	14.7	*4.5*	8.5	*2.6*	6.4	*2.0*
150	*6*	20.5	*6.2*	11.5	*3.5*	8.4	*2.6*
200	*8*	25.9	*7.9*	14.2	*4.3*	10.3	*3.1*
250	*10*			17.1	*5.2*	12.2	*3.7*
300	*12*			19.8	*6.0*	14.1	*4.3*
350	*14*			21.6	*6.6*	15.2	*4.6*
400	*16*			24.3	*7.4*	17.0	*5.2*
450	*18*			27.0	*8.2*	18.8	*5.7*
500	*20*			29.7	*9.1*	20.7	*6.3*
550	*22*			32.4	*9.9*	22.5	*6.9*
600	*24*			35.1	*10.7*	24.3	*7.4*

Nominal pipe size		Pipe heat loss @ 40 °C *(72 °F)* ΔT					
		Urethane insulation thickness					
mm	*in*	25 mm *(1 in)*		50 mm *(2 in)*		75 mm *(3 in)*	
		w/m	*w/ft*	*w/m*	*w/ft*	*w/m*	*w/ft*
13	½	5.9	*1.8*	4.1	*1.2*	3.4	*1.0*
19	¾	6.8	*2.1*	4.6	*1.4*	3.8	*1.2*
25	*1*	7.8	*2.4*	5.2	*1.6*	4.2	*1.3*
32	*1¼*	9.1	*2.8*	5.9	*1.8*	4.7	*1.4*
40	*1½*	10.0	*3.0*	6.4	*2.0*	5.1	*1.6*
50	*2*	11.8	*3.6*	7.3	*2.2*	5.7	*1.7*
64	*2½*	13.7	*4.2*	8.3	*2.5*	6.4	*2.0*
75	*3*	16.0	*4.9*	9.5	*2.9*	7.2	*2.2*
100	*4*	19.6	*6.0*	11.4	*3.5*	8.5	*2.6*
150	*6*	27.3	*8.3*	15.3	*4.7*	11.2	*3.4*
200	*8*	34.6	*10.5*	19.0	*5.8*	13.7	*4.2*
250	*10*			22.8	*6.9*	16.3	*5.0*
300	*12*			26.5	*8.1*	18.7	*5.7*
350	*14*			28.7	*8.7*	20.3	*6.2*
400	*16*			32.4	*9.9*	22.7	*6.9*
450	*18*			36.0	*11.0*	25.1	*7.7*
500	*20*			39.6	*12.1*	27.5	*8.4*
550	*22*			43.2	*13.2*	30.0	*9.1*
600	*24*			46.8	*14.3*	32.9	*10.0*

Nominal pipe size		Pipe heat loss @ 50 °C *(90 °F)* ΔT					
		Urethane insulation thickness					
mm	*in*	25 mm *(1 in)*		50 mm *(2 in)*		75 mm *(3 in)*	
		w/m	*w/ft*	*w/m*	*w/ft*	*w/m*	*w/ft*
13	½	7.4	*2.3*	5.2	*1.6*	4.3	*1.3*
19	¾	8.5	*2.6*	5.8	*1.8*	4.7	*1.4*
25	*1*	9.8	*3.0*	6.5	*2.0*	5.3	*1.6*
32	*1¼*	11.4	*3.5*	7.4	*2.3*	5.9	*1.8*
40	*1½*	12.5	*3.8*	8.0	*2.4*	6.3	*1.9*
50	*2*	14.8	*4.5*	9.1	*2.8*	7.2	*2.2*
64	*2½*	17.1	*5.2*	10.4	*3.2*	8.0	*2.4*
75	*3*	20.0	*6.1*	11.8	*3.6*	9.0	*2.7*
100	*4*	24.5	*7.5*	14.2	*4.3*	10.7	*3.3*
150	*6*	34.2	*10.4*	19.1	*5.8*	14.0	*4.3*
200	*8*	43.2	*13.2*	23.7	*7.2*	17.1	*5.2*
250	*10*			28.5	*8.7*	20.4	*6.2*
300	*12*			33.1	*10.1*	23.4	*7.1*
350	*14*			35.9	*10.9*	25.3	*7.7*
400	*16*			40.5	*12.3*	28.4	*8.7*
450	*18*			45.0	*13.7*	31.4	*9.6*
500	*20*			49.5	*15.1*	34.4	*10.5*
550	*22*			54.0	*16.5*	37.4	*11.4*
600	*24*			58.6	*17.9*	40.5	*12.3*

Nominal pipe size		Pipe heat loss @ 60 °C *(108 °F)* ΔT					
		Urethane insulation thickness					
mm	*in*	25 mm *(1 in)*		50 mm *(2 in)*		75 mm *(3 in)*	
		w/m	*w/ft*	*w/m*	*w/ft*	*w/m*	*w/ft*
13	½	8.9	*2.7*	6.2	*1.9*	5.2	*1.6*
19	¾	10.2	*3.1*	6.9	*2.1*	5.7	*1.7*
25	*1*	11.7	*3.6*	7.8	*2.4*	6.3	*1.9*
32	*1¼*	13.7	*4.2*	8.8	*2.7*	7.1	*2.2*
40	*1½*	15.1	*4.6*	9.6	*2.9*	7.6	*2.3*
50	*2*	17.7	*5.4*	11.0	*3.4*	8.6	*2.6*
64	*2½*	20.5	*6.2*	12.4	*3.8*	9.6	*2.9*
75	*3*	23.9	*7.3*	14.2	*4.3*	10.9	*3.3*
100	*4*	29.4	*9.0*	17.0	*5.2*	12.8	*3.9*
150	*6*	41.0	*12.5*	22.9	*7.0*	16.8	*5.1*
200	*8*	51.9	*15.8*	28.4	*8.7*	20.5	*6.2*
250	*10*			34.2	*10.4*	24.4	*7.4*
300	*12*			39.7	*12.1*	28.1	*8.6*
350	*14*			43.1	*13.1*	30.4	*9.3*
400	*16*			48.5	*14.8*	34.0	*10.4*
450	*18*			54.0	*16.5*	37.7	*11.5*
500	*20*			59.4	*18.1*	41.3	*12.6*
550	*22*			64.8	*19.8*	44.9	*13.7*
600	*24*			70.3	*21.4*	48.6	*14.8*

Insulation type	Insulation "K" factor	Correction factor
Urethane foam	0.17	1.00
Polyisocyanurate	0.18	1.06
Fiberglass	0.25	1.47
Mineral wool	0.30	1.76
Calcium silicate	0.37	2.18
Cellular glass	0.40	2.35

If the insulation used is not urethane foam, this pipe heat loss value has to be adjusted accordingly. Other types of insulation are not as efficient and require more power to achieve the same results. Refer to the above table to determine the correction factor corresponding to the insulation used. Multiply the heat loss obtained initially by that correction factor. Select a heating cable power output with at least that much power.

Caution : On plastic pipe, the heating cable power output is limited to 13 watts/meter *(4 watts/foot)* when using the standard 65 °C *(149 °F)* high limit cutout setting on the thermostat. If the power requirement of your piping system is greater than this limit of 13 watts/meter *(4 watts/foot)*, multiple runs of lower wattage heating cables totaling the power requirement must be used.

In certain cases, a 16 watts/meter (5 watts/foot) cable can be used if the high limit cutout setting on the thermostat is raised. Please contact a Urecon office for details.

THERMOCABLE® is provided with a metallic grounding braid conforming to the latest electrical codes, a fluoropolymer over jacket is also provided for the ease of pulling into conduits.

This heating cable can be used on any type of metal or plastic pipe. It is available in several watt densities and voltages as indicated in the following table (page 4).

All cables except C8-120-COJ have # 12 AWG bus wires, C8-120-COJ is intended for short runs (house services) and has #16 AWG bus wires. Be sure that you are using the proper termination or splice kit before commencing installation.

THERMOCABLE® and accessories are CSA approved for wet locations.

URECON THERMOCABLE® CONSTANT WATT TRACE CABLE FOR PRE-INSULATED PIPES

Part number	Color	Watts		Volts	Bus wire AWG	Maximum circuit length		Approximate zone length	
		per meter	per foot			meters	feet	cm	inches
120 VOLT THERMOCABLE®									
C7-120-COJ	Blue	7	2	120	12	140	450	92	36
C8-120-COJ	Red	8	2.4	120	16	80	275	92	36
C13-120-COJ	Yellow	13	4	120	12	125	400	61	24
240 VOLT THERMOCABLE®									
C10-240-COJ	Green	10	3	240	12	245	800	152	60
C13-240-COJ	Red	13	4	240	12	245	800	127	50
C16-240-COJ	Brown	16	5	240	12	215	700	107	42
C20-240-COJ	Orange	20	6	240	12	200	650	107	42
C26-240-COJ	White	26	8	240	12	175	570	92	36
575 VOLT THERMOCABLE®									
C13-575-COJ	Clear	13	4	575	12	425	1400	183	72
C20-575-COJ	Violet	20	6	575	12	365	1200	183	72

NOTE:

Alternate voltages: should THERMOCABLE® be connected to less (or more) than its rated voltage, the actual thermal output will be reduced or increased. Calculate the actual thermal output as follows:

$$\text{ACTUAL THERMAL OUTPUT} = \frac{\text{CONNECTED VOLTS}^2}{\text{RATED VOLTS}^2} \times \text{THERMOCABLE® RATED THERMAL OUTPUT}$$

ACCESSORIES FOR THERMOCABLE®:

A1333-COJ	Power and end termination kit for THERMOCABLE®.
S1334-COJ	In-line splice kit for THERMOCABLE®.
E1336-COJ	Three-pack end termination kit for all THERMOCABLE®.
PS1337-12-COJ	Splice kit for #12 AWG bus wires THERMOCABLE® to power leads.
A-300	Aluminum tape roll 5 cm *(2 in)* wide x 45 m *(150 ft)* long.

Note: Only Urecon electrical accessories such as power terminations, end terminations and splices are certified for use with THERMOCABLE ®.

INSTALLATION OF THERMOCABLE® IN A TRACE CONDUIT ON URECON PRE-INSULATED PIPE TO PREVENT FREEZING:

When the pre-insulated pipe has been joined, the urethane block should be removed (bell and spigot systems) or the cutback area at each connection should be left exposed to assist in the installation of the heat tracing cable.

If the pipe is to be buried and the trench is dry, the pipe can be laid in the trench. The joint area should be accessible from underneath to permit the later installation of the heat shrink wrap. If the trench is wet then the pipe should be left in a dry area, on the side of the trench until the cable has been installed (polyethylene pipe with butt fused joints only).

Before inserting the cable the following items should be considered:

Read the Thermocable® as well as the Power Feed Kit (if applicable) installation instructions thoroughly before commencing the installation.

The positions of the power points should be located and marked along the route. It is usually most convenient to position power points at pipe connections. This will eliminate the need to penetrate the insulation somewhere between pipe joints.

The proper voltage and correct thermostat(s) should be available for each power point. It is useful to provide a numbering system for the power points and to assign these numbers to the appropriate electrical components. Follow the engineer's tracing layout drawing if one exists. The correct heat tracing cable must be selected for each pipe and power point. Extra care must be taken to ensure that the heating cables are installed correctly, and that the correct wattage and voltage cable has been selected for installation. Caution, verify the identifying print on the cable before installing it into the conduit. Never connect the wrong voltage to the cable.

Ensure that the final position of the conduit after the pipe has been installed, is clearly identified. Usually the conduit is positioned on the top of the pipe if it will normally be full of liquid. If the pipe is normally only partially full, the conduit should be installed in the lower quadrant. If the pipe is to be moved after installation of the cable and after covering the joint areas, it will be necessary to mark the position of the conduit on the insulation jacket. When the pipe is in its final position this mark should be in the correct position, either on top, or in the lower quadrant depending on the pipe service.

The conduit should be inspected to ensure that it is free of debris, obstructions and standing water.

The following steps describe the preferred method for inserting the heat tracing cable, at least two workers are required.

1. Pull a few feet of cable from the reel and install a heat shrink end cap (for moisture sealing as per the instructions on page 7). Note: On small heat trace channel, the heat shrink tube has to be installed after the cable has been pulled (step 5).

2. Push the end cap into the conduit at the power point position and continue pushing the cable until it emerges at the first cutback area. Pay off the cable from the reel so that it does not twist or kink. This can be simplified by mounting the cable reel on a pair of wooden "horses". While the cable is paying off the reel examine it for cuts, "bruises" or any other defects. Defects should be removed and the cables spliced using a THERMOCABLE® splice kit. If the cable is difficult to push, retract it, cup some powder lubricant (talc) in one hand and apply it to the cable while pushing. If this does not solve the problem insert a "fish tape" through the conduit from the opposite end and attach it to the cable. Use a combined push and pull to insert the cable. If this is not successful it will be necessary to cut open the pipe insulation and remove the obstruction.

3. As the end of the cable emerges at the first cut-back area, the second worker gently pulls the cable forward.

4. Insert the end cap into the conduit on the next length of pipe and continue the insertion method. In this manner the cable can be "threaded" from one length to the next until the heating circuit has been completely installed.

5. Verify that the end cap has not been damaged during the threading operation, if it has, cut it off and install a new one. Be sure that the bus wires are NOT TOUCHING. If the end cap is in good condition, it is now time to install the heat shrink tube if this was not done in step 1.

6. It is more convenient to terminate the heat tracing cable circuit at a pipe connection. It allows for easier access in the event that maintenance is required. The section of cable between the last indentation and the end cap is non-heating. The "cold" end on the next cable circuit can be over-lapped at this position to ensure continuous heating. If the cable circuit is to be terminated within a pipe length between two connections ensure that the "cold end" on the cable is as short as possible. The position of the end of each circuit should be noted on the "as-built" drawings and with a solid stake driven into the ground beside the pipe.

7. The next cable circuit in the same direction down the pipeline should be installed from the next power point position in the same manner as previously described. When it is inserted into the final length of pipe its length should be adjusted by moving up more "slack" and by cutting the cable and repositioning the end cap.

8. After the pipe and cable have been subjected to the specified acceptance tests and recorded in the commissioning log, the insulation at the pipe connections can be completed and heat shrink sleeves installed. Power feed kits must be installed at this time according to their specific installation instructions.

9. The commissioning log should become part of the "as built" records after witnessing by the owner.

10. Install the standard insulation half shells tightly over the cutback area, line up the groove in the halfshell over the conduit ends and cable (or insert the urethane block on bell and spigot systems).

11. Wrap the heat shrink sleeve around the half shells (or urethane block) and shrink into place. If the pipe is metal jacketed, cover the halfshell with the pre-rolled metal cover supplied, caulking all seams against water ingress.

PREVENT OVERHEATING AND POSSIBLE PLASTIC PIPE DAMAGE BY:

- Installing the correct wattage cable on the proper pipe (cables are color coded for easy identification).
- Connecting the correct voltage to the cable to produce the desired wattage.
- Having no heating cable installed closer than 13 mm *(½ in)* of any exposed combustible surface.
- Always use a thermostat to control the cable.
- Always use a dual sensing electronic thermostat with high temperature cutout on plastic pipes (high temperature cutout setting should be verified with Urecon).
- Installing the thermostat as per the installation instructions taking special care to ensure that the high temperature sensor is securely attached to an **ACTIVE** zone of the heating cable, and the controlling sensor is securely attached to the pipe 180° away from the cable **UNDER THE INSULATION.**
- Not energizing before the installation is complete.
- Installing so the heating cable is not crossed, grouped or touching itself.
- The heating cable is not applied to various diameters of pipe (or a network) and controlled from one controller (because of varying heat loss, each pipe diameter normally requires a separately controlled tracer).
- Ensuring that the heating cable is not trapped by insulation, especially where half shells are applied at pipe joints or at fittings, particular caution must be exercised when Portafoam® field sprayed foam is applied.
- Never connect power while the heating cable is on the reel, or in the shipping container.

AVOID DAMAGE TO HEATING CABLE AND PREVENT POSSIBLE FREEZING BY:

- Handling with normal care, when pulling in long circuits avoid walking or driving over cable during and after installation.
- Never use a mechanical pulling device (winch, etc.).
- Not bending to a diameter of less than 50 mm *(2 in)*.
- Not installing when the ambient temperature is below -40 °C *(-40 °F)*.
- If connected to generated power, avoid high voltage spikes (especially on 575 V circuits).
- Never use THERMOCABLE® for internal tracing (inside the pipe).
- Not exceeding the maximum circuit length as indicated in the following table.

BEFORE YOU START:

Parallel heating sets are field assembled. Be sure you have the proper termination, splice or power feed kits required for the installation. Be sure you have the following tools required and some aluminum foil tape to hold the sensors in place:

- Sharp knife or wire stripping tool.
- Side cutters.
- 25mm *(1 in)* adjustable wrench.
- Propane torch such as Thomas and Betts SIT-1 or equivalent heat source.
- Thomas and Betts crimping tool.

INSTALLING THE HEATING CABLE:

It is important to understand how the cable works and to locate the indents (nodes) where the nichrome heating element alternately makes contact with the bus wires. If not cut at the correct location, a 'dead zone' may occur causing small diameter pipes to freeze, or for the controller high temperature limit sensor to be installed on a 'dead zone' possibly causing damage to the pipe, if plastic. Follow the 'cutting' instructions carefully.

INSTALLATION OF A1333-COJ TERMINATION KIT.

Power and end termination kit contains the following components:

- One strain relief connector including two form fitting bushings of different sizes.
- One 13 mm *(½ in)* locknut.
- One 90 cm *(36 in)* roll of Teflon® tape.
- One blue insulated butt splice connector for #14-16 AWG wires.
- 30 cm *(12 in)* of #14 AWG green grounding wire.
- One yellow insulated butt splice connector for #12 AWG wire.
- 30 cm *(12 in)* of #12 AWG green grounding wire.
- One heat shrink end cap.
- One heat shrink tube.

INSTALLATION OF END TERMINATION KIT # E1336-COJ (INCLUDED IN TERMINATION KIT # A1333-COJ).

Remote end termination kit contains the following components:

- Three heat shrink end caps.
- Three heat shrink tubes.
- One 90 cm *(36 in)* roll of Teflon® tape.

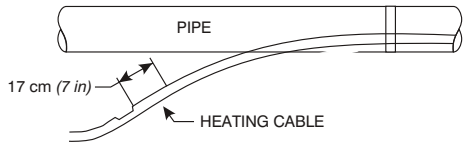
TERMINATING THE THERMOCABLE®

IMPORTANT

THERMOCABLE® IS A PARALLEL HEAT TRACING SYSTEM – DO NOT CONNECT OR TIE COPPER BUS WIRES TOGETHER

POWER TERMINATION

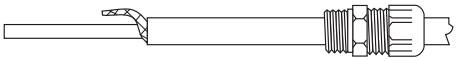
1. At the supply end allow sufficient cable to reach the junction box, plus approximately 20 cm *(8 in)* for connection tails. Cut approximately 17 cm *(7 in)* from indentation.



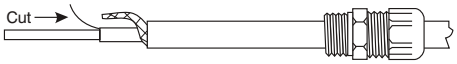
2. Choose the appropriate form fitting bushing to suit the THERMOCABLE® size. Use the bushing with the small opening for C8-120-COJ and the one with the larger opening for all the other THERMOCABLE®. Insert the bushing into the connector body, put the compression ring over the bushing and screw on the nut.

3. Slide the strain relief connector over the cable.

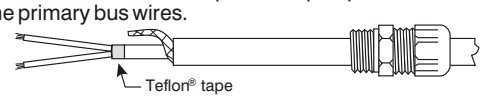
4. Remove 20 cm *(8 in)* of overjacket by scoring around and down the middle of the jacket. Unravel the braid and twist into a pigtail. Caution, do not cut into the braid and insulating sheath.



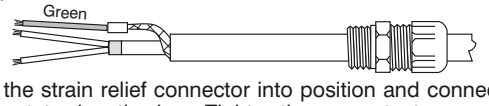
5. Remove the insulating sheath for approximately 15 cm *(6 in)*. On cables with a fiberglass rope, remove the rope by unwinding it all the way against the insulation and cut. Remove the exposed nichrome heating wire back to the center layer of insulation and cut. Take care not to cut through the insulation on the bus wires. Apply Teflon® tape over no more than 10 mm *(3/8 in)* on each of the insulating sheath and inner insulation to insulate the bare nichrome element wire end.



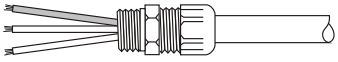
6. Remove the inner insulation jacket by sliding the knife blade between the two bus wires up to the taped position. Do not nick or cut the primary bus wires.



7. On C8-120-COJ THERMOCABLE®, using the blue butt splice, connect the #14 AWG green wire supplied to the pigtail. On the other THERMOCABLE®, use the yellow butt splice to connect the #12 AWG green wire supplied to the pigtail. Remove 7 mm *(¼ in)* of insulation from each wire end. Use an approved tool to crimp the butt splice connector.

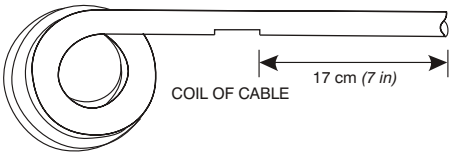


8. Slide the strain relief connector into position and connect into a thermostat or junction box. Tighten the connector to compress the bushing.

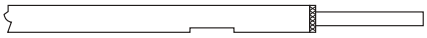


END TERMINATION

1. Cut cable approximately 17 cm *(7 in)* from indentation, as shown.

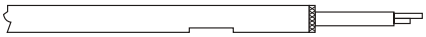


2. Remove 10 cm *(4 in)* of overjacket by scoring around and down the middle of the jacket. Unravel the braid and cut it close to the overjacket. Caution, do not cut into the insulating sheath.

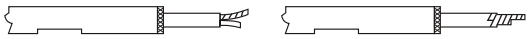


3. Cut back the layer of insulating sheath approximately 13 mm *(1/2 in)*. On cables with a fiberglass rope, remove the rope by unwinding it all the way against the insulation and cut. Remove the spiral heating wire and cut.

4. Cut back the layer of inner insulation jacket and remove to expose the two insulated bus wires. Cut 7 mm *(1/4 in)* from the bus wire on the indentation side.

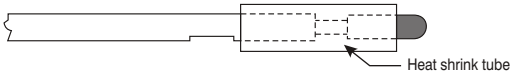


5. Wrap the Teflon® tape around each conductor and over a maximum of 10 mm *(3/8 in)* of the insulating sheath taking care to cover the ends of the conductors and overlapping the tape to a minimum of half it's width. DO NOT CONNECT THE TWO BUS WIRES TOGETHER, THIS WILL CAUSE A SHORT CIRCUIT.



6. Slide the expanded heat shrinkable cap over the end of the cable. Shrink the cap by applying heat from the closed end towards the open end. Cap starts to shrink at 135 °C (275 °F), as heat is applied move the heat source around the cap to ensure even shrinkage. When the cap has shrunk enough to conform to the cable, and sealant is seen to flow, discontinue heating.

7. Slide the heat shrink over the end cap, grounding braid and overjacket, leaving 12 mm *(1/2 in)* of the end cap protruding. Shrink into place to seal the over jacket and end cap.



INSTALLATION OF # S1334-COJ SPLICE KIT.

Splice kit contain the following components :

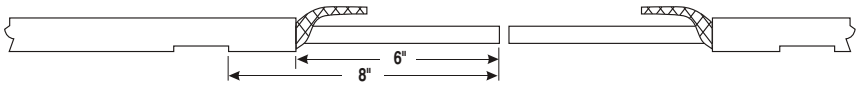
- One 90 cm *(36 in)* roll of Teflon® tape.
- Four blue insulated butt splice connectors for #14-16 AWG wires.
- 30 cm *(12 in)* of #14 AWG green grounding wire.
- Four yellow insulated butt splice connectors for #12 AWG wire.
- 30 cm *(12 in)* of #12 AWG green grounding wire.
- One short heat shrink tube 25 cm *(10 in)* long.
- One long heat shrink tube 30 cm *(12 in)* long.

SPLICING PROCEDURE FOR THERMOCABLE®:

Locate the nichrome heating wire connection nodes, be sure to cut the strip at the correct location as per the following diagram to avoid possible 'dead zones'.

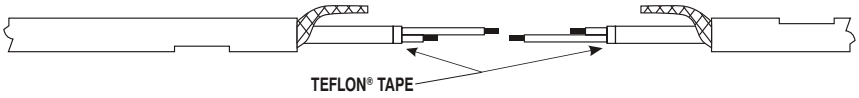
SPLICING PROCEDURE:

1 Cut cable 20 cm *(8 in)* from the heater zone indent and remove 15 cm *(6 in)* of overjacket by scoring around and down the middle of the jacket. Caution, do not cut into the braid and insulating sheath. Unravel the braid and twist into a pigtail. Repeat the same for the end of the other cable to be spliced.



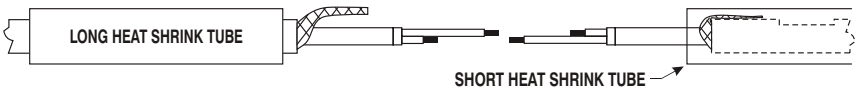
2 Remove 7 cm *(3 in)* of insulating sheath. Prepare cable ends by removing the fiberglass rope (on cables having one) and the exposed nichrome heating wire back to the center insulating sheath and cut. Take care not to cut through the insulation on the bus wires.

3 Cut one alternate bus wire on each cable to 3 cm *(1 in)*. Remove 7 mm *(¼ in)* of insulation from each wire end. Apply Teflon® tape over no more than 10 mm *(3/8 in)* on each of the insulating sheath and inner insulation to insulate the bare nichrome element wire end.

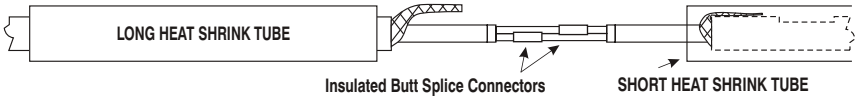


4 Slide the long heat shrink tube over the end of one cable and push it back 30 cm *(12 in)* out of the way.

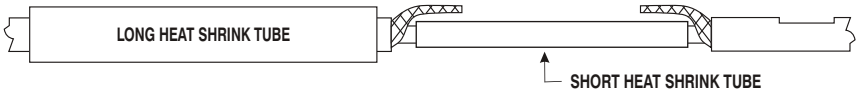
5 Slide the short/smaller diameter heat shrink tube over the bus wires and braid of the other cable end.



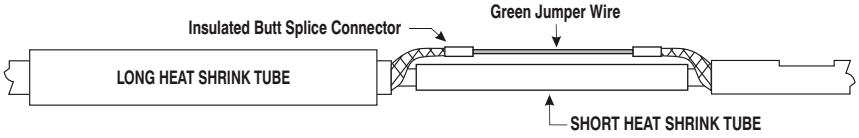
6 Position the insulated butt splice connectors over the copper bus wires and crimp into place. Use an approved installation tool for the installation of the crimp connectors. **Note : Use the blue butt splice connectors only on C8-120-COJ THERMOCABLE® and use the yellow butt splice connectors on all other THERMOCABLE® having #12 AWG bus wires.**



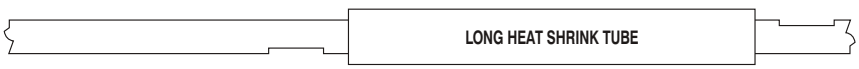
7 Slide the short heat shrink tube up and centered over the butt splices. Shrink into place.



8 Join the two pigtailed braids directly, or with the green jumper wire using the butt splice connectors. Here again the blue butt splices and #14 AWG wire are used only on C8-120-COJ and the yellow butt splices and #12 AWG wire are used on all other THERMOCABLE® having #12 AWG bus wires.



9 Slide the long heat shrink tube over the entire spliced assembly , center it and shrink into position.



10 Never exceed the maximum circuit length permitted and always control the cable with a thermostat. Use a thermostat with a high temperature limit on plastic pipes.

INSTALLATION OF # PS1337-12-COJ POWER FEED SPLICE KIT (FOR ALL CABLES EXCEPT C8-120-COJ)

Power feed splice kit contain the following components :

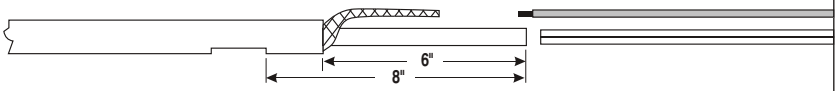
- One 90 cm *(36 in)* roll of Teflon® tape.
- Three yellow insulated butt splice connectors for #12 AWG wire.
- One short heat shrink tube 25 cm *(10 in)* long.
- One long heat shrink tube 30 cm *(12 in)* long.
- One heat shrink end cap.
- One heat shrink tube 15 cm *(6 in)* long.

PROCEDURE TO SPLICE THERMOCABLE® TO POWER WIRING:

Locate the nichrome heating wire connection node, be sure to cut the heating cable at the correct location as per the following diagram to avoid unnecessary "dead zone". Use approved # 12 AWG 600 V insulated wiring such as TEW, RW90 or RWU90 of the appropriate length to splice to the THERMOCABLE®.

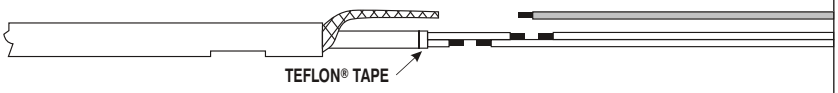
SPLICING PROCEDURE :

1 Cut cable 20 cm *(8 in)* from the heater zone indent and remove 15 cm *(6 in)* of overjacket by scoring around and down the middle of the jacket. Caution, do not cut into the braid and insulating sheath. Unravel the braid and twist into a 7 cm *(3 in)* long pigtail.



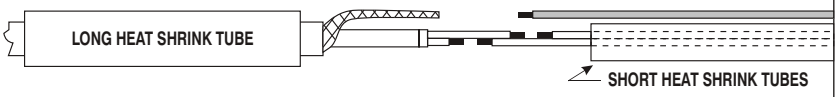
2 Remove 7 cm *(3 in)* of insulating sheath. Prepare cable ends by removing the fiberglass rope (on cables having one) and the exposed nichrome heating wire back to the center insulating sheath and cut. Take care not to cut through the insulation on the bus wires.

3 Cut one bus wire to 3 cm *(1 in)*. Remove 7 mm *(¼ in)* of insulation from each bus wire end. Apply Teflon® tape over no more than 10 mm *(3/8 in)* on each of the insulating sheath and inner insulation to insulate the bare nichrome element wire end.

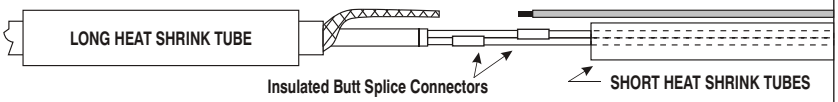


4 Slide the long heat shrink tube over the end of the heating cable and push it back 30 cm *(12 in)* out of the way.

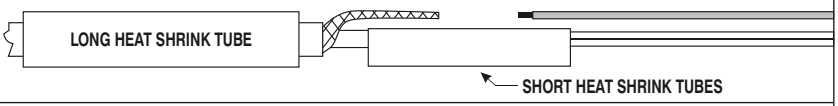
5 Slide the short/smaller diameter heat shrink tube over the two power wires and push it back out of the way.



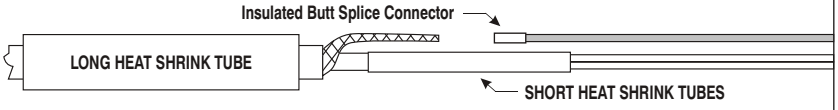
6 Position the yellow insulated butt splice connectors over the heating cable bus wires and #12 AWG power wires and crimp into place. Use an approved installation tool for the installation of the crimp connectors.



7 Slide the short heat shrink tube over the splice and against the pigtailed braid. Shrink into place.

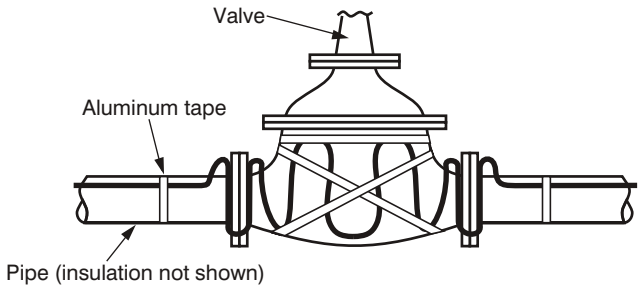


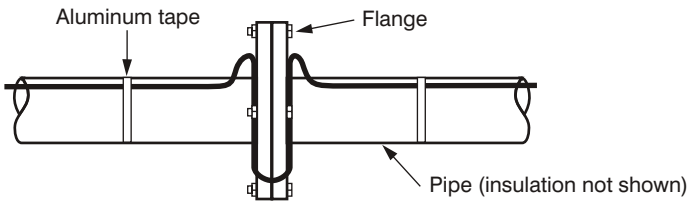
8 Splice the pigtailed braid to the #12 AWG grounding wire using a yellow insulated butt splice connector.



9 Slide the long heat shrink tube over the entire spliced assembly , center it and shrink into position.

10 Never exceed the maximum circuit length permitted and always control the cable with a thermostat. Use a thermostat with a high temperature limit on plastic pipes.





EXTRA CABLE ALLOWANCE

Nominal pipe size		Flange (pair)		Gate valve	
mm	*(in)*	cm	*(in)*	cm	*(in)*
13	*½*	23	*9*	30	*12*
19	*¾*	23	*9*	30	*12*
25	*1*	30	*12*	30	*12*
32	*1¼*	30	*12*	38	*15*
40	*1½*	38	*15*	46	*18*
50	*2*	38	*15*	61	*24*
64	*2½*	46	*18*	61	*24*
75	*3*	46	*18*	76	*30*
100	*4*	61	*24*	91	*36*
150	*6*	61	*24*	107	*42*
200	*8*	76	*30*	122	*48*
250	*10*	91	*36*	137	*54*
300	*12*	107	*42*	152	*60*
350	*14*	122	*48*	168	*66*
400	*16*	137	*54*	183	*72*
450	*18*	168	*66*	213	*84*
500	*20*	183	*72*	229	*90*
550	*22*	198	*78*	229	*90*
600	*24*	213	*84*	244	*96*

IMPORTANT:

- Prior and after installation, check the heating cable with a 500 volt (minimum) insulation tester (megger) between each conductor and ground. Values shall not be less than one megohm, in accordance with Table 24 of the Canadian Electrical Code, Part 1.
- Using a multimeter, measure the cable resistance and record in the commissioning log for future reference.
- Metal structures or materials used for the support of, or on which the heating cable is installed, shall be grounded in accordance with section10 of the Canadian Electrical Code, Rule 62-310(3). The grounding braid must also be electrically grounded at the power source.
- Never use THERMOCABLE® for internal tracing (inside the pipe).
- Always use a thermostat with high temperature limit (for plastic pipe) and make sure the sensor(s) is (are) properly located on the pipe, under the insulation.
- The heating cable must not become embedded in the insulation.
- Energize heating circuit with proper voltage.

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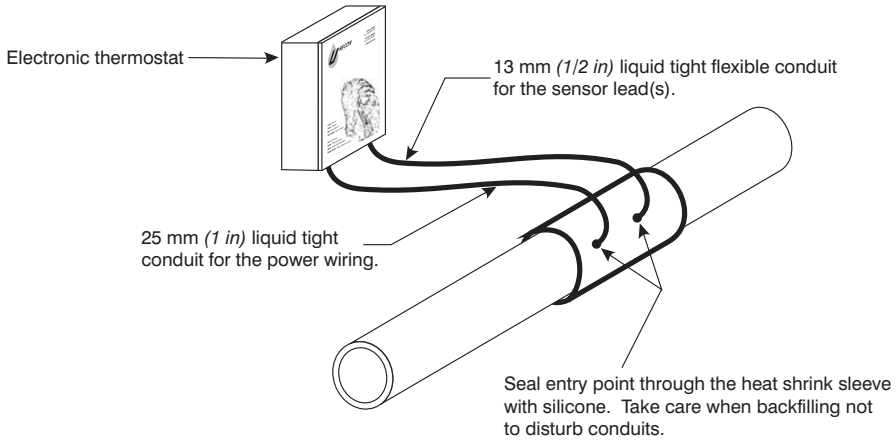
INSTALLATION INSTRUCTION #3E

PFK-1 (Power feed kit)

One PFK-1 power feed kit contains all the necessary electrical components to connect two THERMOCABLE® to an electronic thermostat of the UTC series. The thermostat may be located up to 6 m *(20 ft)* away from the pipe (PFK's for longer distances are available by special order).



Each kit contains:

ITEM	QUANTITY	DESCRIPTION
		Components for the installation and connection of the heating cable
1	2 x 7 m	# 12 AWG, three-conductor power wiring.
2	6 m	25 mm *(1 in)* liquid tight flexible conduit (assembled to items 3 and 4).
3	2	Connector to join the 25 mm *(1 in)* flexible conduit to the thermostat and to the plastic shoe (assembled to items 2 and 4).
4	1	Plastic shoe (assembled to items 3 and 4).
5	1	Sealing ring for item 3 (at the thermostat).

6	2	PS1337-12-COJ splice kit to splice # 12 AWG bus wire THERMOCABLE® to the power wiring.

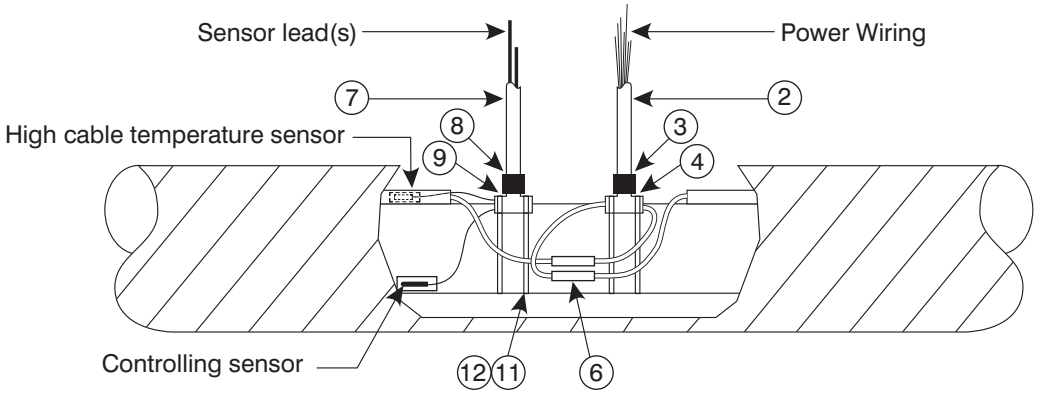
Components for the installation of the sensor(s)

7	6 m	13 mm *(½ in)* liquid tight flexible conduit (assembled to items 8 and 9).
8	2	Connector to join the 13 mm *(½ in)* flexible conduit to the thermostat and to the plastic shoe (assembled to items 7 and 9).
9	1	Plastic shoe (assembled to items 7 and 8).
10	1	Sealing ring for item 8 (at the thermostat).

Miscellaneous components

11	4	13 mm *(½ in)* wide x 2 m *(6 ft 6 in)* long stainless steel strap, to fasten the plastic shoes to the pipe.
12	4	Band-it clip to secure strap.
13	1	Silicone caulking, to seal conduit entry points through the heat shrink sleeve.
14	1	Installation instruction # 24 for heat shrink wrap.

NOTE: Item numbers are keyed to those on the diagram.



Assembly instruction:

1) Install the thermostat in an appropriate location within 6 m *(20 ft)* of the pipeline.

2) Normally the power feed kit is attached to the pipe at a pipe joint, where the insulation is removed. If it is desired to make the connection at a point other than the pipe joint, you will have to remove 450 mm *(18 in)* of jacket and insulation exposing the pipe and trace conduit. Cut and remove the jacket and insulation carefully so as not to nick or damage the pipe. Ensure that the insulation faces on the pipe are square to the axis of the pipe.

3) Cut a 300 mm *(12 in)* length of trace conduit without damaging the hidden THERMOCABLE® if it has already been installed.

4) Cut the 13 mm *(½ in)* and 25 mm *(1 in)* liquid tight flexible conduits to the appropriate length.

5) Cut two appropriate sized holes in the center of the heat shrink sleeve to permit a snug passage ot the two conduits. Remove the connectors and the shoes from the conduits. Pull the conduits through the holes in the heat shrink sleeve ensuring that the mastic adhesive side of the sleeve is facing the pipe.

6) Reinstall the connectors and plastic pipe shoes.

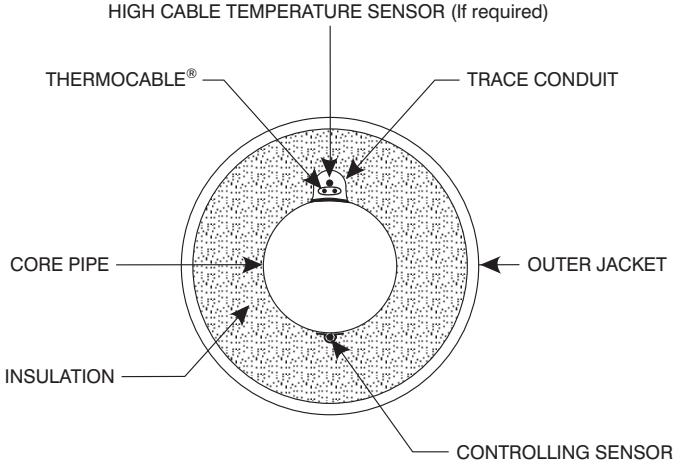
7) Using the connectors provided (ensuring that the gasket is on the exterior side), connect the liquid tight flexible conduits to the bottom of the thermostat enclosure.

8) When more than one temperature sensor is used, they have to be identified according to their use i.e. : controlling sensor or high cable temperature sensor (on plastic pipe) in order to connect them to the proper terminals. As a general rule, when multiple sensors are required, they can be supplied with two different color lead wires.

9) Pull the sensor wire(s) through the 13 mm *(½ in)* conduit. Connect the sensor(s) to the proper terminals in the thermostat. Install the sensor(s) in their proper location with aluminum tape; the high cable temperature sensor is to be taped to an active zone of the THERMOCABLE® (not the cold lead) within the trace channel, the controlling sensor is to be taped directly to the pipe 180° away from the heating cable. If the thermostat is controlling a pipe which enters a heated building, the sensors must be located at least 3 m *(10 ft)* away from the outside wall to avoid inaccurate temperature sensing. **The accurate identification and positioning of the sensors is absolutely essential to the efficient and safe operation of the system.**

IMPORTANT

PLACE THE HIGH CABLE TEMPERATURE SENSOR IN CONTACT WITH AN ACTIVE ZONE OF HEATING CABLE.



IMPORTANT

TAPE THE CONTROLLING SENSOR DIRECTLY TO THE PIPE, 180° FROM THE HEATING CABLE, UNDER THE INSULATION.

10) Pull the power wiring through the 25 mm *(1 in)* flexible conduit. Splice the power wiring to the heating cable following the THERMOCABLE® installation instructions for the power splice. Connect to the appropriate terminals in the thermostat in accordance with the installation instructions supplied. **NOTE: In severe conditions, it is preferable to bring the heating cable(s) through the conduit directly to the thermostat without any splice and power wiring. In the case of heating cables with a power output of 13 watts/meter *(4 watts/foot)* or greater, a dedicated flexible conduit should be used for each cable.**

11) Attach the two plastic shoes to the pipe in the same longitudinal axis and secure with the Band-it clamps, tighten with a screwdriver. Ensure that the pipe is continuously heat traced by overlapping the power wiring and entering the shoe on the opposite side to the heat tracing circuit.

12) Trim the insulation half shells to ensure a tight fit in the insulation void on the pipe. Notch out two holes to permit passage of the two flexible liquid tight conduits.

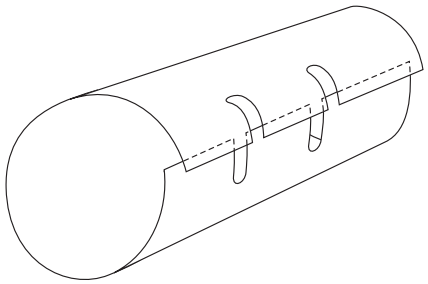
13) Before installing the insulation, test the heat tracing circuit(s) to ensure that the thermostat and THERMOCABLE® are operating properly.

14) Apply silicone caulking liberally around the neck of the plastic shoes and install the half shells.

15) Pull down the heat shrink sleeve and install as per the installation instruction supplied.

16) The flexible conduit should be positioned and protected so that it does not become damaged by passing traffic. If the pipe is to be buried, the conduit should be well protected during the backfilling operation so that it is not torn away from the pipe.

17) If the piping installation is metal jacketed, a similar metal jacket should now be installed on the joint, by cutting notches in the overlapping edges as shown in the following illustration. The final overlap should face down. Caulking should be used to seal all cracks.



Rolled metal cover, field cut to accomodate two PFK conduits.

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INSTALLATION INSTRUCTION #44E

ELECTRONIC THERMOSTAT

Model No. UTC-2030-(program code #) and Model No. UTC-2230-(program code #) (with 2-pole circuit breaker) and Contactor version

These electronic thermostats are designed to control one or more heating cables having a total current draw that does not exceed 30 A for the relay version and up to 60 A for the contactor version. They can be fitted with up to three temperature sensors as required by the application. Because separate temperature sensors are used, they may be installed on the pipe during the initial installation phase while the controller itself may only be installed at a later date.

Features include:

- Universal power supply allowing operation at 120 to 240 Vac without wiring modifications.
- Internal ground fault detection circuitry eliminating the need for an external ground fault device. Alarm only or alarm and trip is activated when ground fault condition is present.
- Three temperature sensor inputs: TS1 for pipe temperature control, TS2 (when enabled) for pipe temperature control at another location on the piping system and TS3 (when enabled) to serve as a high temperature limit for plastic piping protection. An alarm is activated when an enabled "open" or "shorted" sensor is detected.
- Low temperature alarm on both controlling sensors TS1 and TS2. Alarm level is factory set at a dedicated level for each sensor.
- On-off control with a 1°C *(1.8 °F)* temperature differential for accurate control of piping systems. This close tolerance control can save thousands of kilowatt-hours of power consumption and is ideal to control electric tracing systems in locations where power is costly.
- Override input (factory programmable): timed between 1-48 hours or non-timed.
- Auto-cycle function (when enabled) momentarily turns on heating cable at 24 hours interval to monitor ground fault condition of the load.
- One three-color LED indicator lamp mounted on the door of the controller operates as follows:
  - Green: When illuminated, the power supply to the controller is 'on' and the pipe temperature at the sensor is above the setpoint. When extinguished, the power supply is 'off'.
  - Amber: When illuminated, the temperature controller is calling for heat.
  - Red: When illuminated, this indicates that one of the alarms has been triggered. Controller is not calling for heat.
  - Amber and Red (alternating): This indicates that one of the alarms has been triggered. Controller is calling for heat.
- Non-volatile memory retains all programmed parameters in the event of a power outage.

Conducted and radiated emissions FCC/DOC statement of compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular

installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003.

Installation:

- Be sure that the personnel involved in the installation and servicing is qualified and familiar with electrical equipment, their ratings and applicable codes.
- The wide ambient operating temperature range of the temperature controller allows installation in any convenient location. Considerations should include exposure to weather elements and accessibility for maintenance and testing.
- Mounting hole positions are shown on the drawings in annexes A, B and C.
- Backplate should be removed from the enclosure before any holes are drilled or cut to prevent damage due to flying debris.
- Conduit/cable entries should be made on the bottom of the enclosure to reduce the possibility of water entry. Avoid having holes drilled on the sides adjacent to the electronic components.
- The user may choose to drill 3 mm *(1/8 in)* drain holes on the bottom of the enclosure on both the left and right sides (note that drilling holes in the enclosure compromises the Nema 4 rating).
- Use connector bushings suitable for the enclosure type and install such that the completed installation remains waterproof.

Wiring:

- Always verify wiring connections before applying power to the controller. To avoid injury or equipment damage, do not install or remove wiring while controller is powered.
- To minimize chances of loose connections, lever-operated spring-loaded terminals are used for signal wiring.
- Use shielded, twisted, three-conductor wire for the extension of the RTD leads.
- Use shielded, twisted, two-conductor wire for the extension of the thermistor leads.
- Shields on the temperature sensor wiring should be grounded only at the controller end using the appropriate terminals provided (# 4, 8 and 15).

  Note: Some sensor constructions may have continuity between the drain wire and the metal housing at the tip; in this case, the drain wire should not be connected to ground. Drain wire continuity should be verified with a digital multi-meter.
- To minimize the risk of damages to the controller due to a cable fault, the integrity of the heating cable should be verified by:
  - ✤ Performing a high voltage insulation test.
  - ✤ Measuring the load resistance with an ohmmeter.
  - ✤ In both cases, the results should be recorded for future reference.

Sensor type:

This temperature controller can be factory programmed to operate with one of two different types of temperature sensor. By default, the controller is programmed for 100 ohms @ 0 °C *(32 °F)* Platinum RTD sensor(s). It can also be programmed for 2 252 ohms @ 25 °C *(77 °F)* thermistor(s) on special request. The last two digits of the controller's catalog number indicate the programming code. Control program codes from 01 to 49 are for use with RTDs and codes from 51 to 99 are for thermistors. Ensure that the proper type of temperature sensor is used with the controller. Program codes are listed in annex E and is identified by a label on the electronics.

Sensor location:

- Install the temperature sensor(s) with aluminum foil tape to enhance heat transfer.
- The controlling sensor is to be taped directly to the pipe wall, 180° away from the heating cable.
- The controlling sensor(s) TS1 and TS2 (when feature enabled) should be located at the expected coldest point(s) of the piping system.
- If controlling a pipe entering a heated building, the sensor(s) must be located at least 3 m *(10 ft)* away from the outside wall to avoid inaccurate temperature sensing.
- The high cable temperature sensor (TS3) is to be taped to an active heating zone of the heating cable (not to the cold lead), within the heat trace channel.

Note: The accurate identification and positioning of the sensor(s) are essential for an efficient and safe operation of the system.

Troubleshooting :

Temperature sensor failure :

This alarm will indicate that one of the sensors is not operating properly. The temperature sensor may fail due to an "open" or "shorted" condition. Ensure that you are using the correct type of sensor i.e. : 3-wire RTD or 2-wire thermistor (refer to program code table in annex E), and that it is wired correctly.

Probable causes of alarm :

- Incorrect or damaged field wiring, “open” leads or excess resistance due to broken or damaged wires or loose connections.
- Damaged or inoperative temperature sensor.
- Wrong type of sensor used.

When using RTDs :

- Ensure that the RTD is a 3-wire 100 ohms @ 0 °C *(32 °F)* Platinum type.
- Disconnect the RTD wiring from the input terminals.
- Measure the resistance between the source (white) and sense (black) leads at the controller. It should not exceed 40 ohms. Excessive lead resistance will cause a sensor failure alarm and must be corrected. Look for loose terminals, excessive lead length or insufficient wire gauge and correct as necessary.
- Measure the resistance between the source (white) or sense (black) lead and the common (red) lead of the RTD at the controller. It should be between 84 and 178 ohms depending on the probe temperature and lead resistance. Refer to the resistance table in annex F.
- Verify that the RTD is wired correctly. Refer to the wiring diagram in annex D.
- Ensure that the RTD extension wire (when used) is grounded at one end only, normally at the controller terminal.

When using thermistors :

- Ensure that the thermistor is a 2-wire 2 252 ohms @ 25 °C *(77 °F)* NTC thermistor.
- Disconnect the thermistor wiring from the input terminals.
- Measure the resistance between both leads of the thermistor at the controller. It should be between 75,593 and 152 ohms depending on the probe temperature and lead resistance. Refer to the resistance table in annex F.
- Verify that the thermistor is wired correctly. Refer to the wiring diagram in annex D.
- Ensure that the thermistor extension wire (when used) is grounded at one end only, normally at the controller terminal.

Low temperature alarm (when enabled) :

This alarm will appear when the temperature at the sensor decreases below the low temperature setpoint.

Probable causes of alarm :

- Alarm setpoint too close to maintain temperature setpoint.
- Flow of cold liquid.
- Empty pipe venting out in the atmosphere.
- Damaged or missing thermal insulation.
- Heating cable not sized properly for the application.
- Damaged heating cable.
- Recent power outage allowing pipe to cool under setpoint.

Seemingly incorrect temperature :

Disconnect the temperature sensor from the input terminals at the controller.

When using RTDs :

- To evaluate the temperature at an RTD, measure the resistance from source or sense lead wire to the common lead wire and substract the resistance measured between source and sense lead wires. The resulting value can be cross-referenced to the table in annex F.

When using thermistors :

- To evaluate the temperature at a thermistor, measure the resistance between both leads. The resulting value can be cross-referenced to the table in annex F.

In both cases, you can usually determine if the temperature obtained from the list is representative of the conditions on the pipe. If you have more than one sensor installed, you can compare the readings. Note that when comparing values of a sensor on the pipe with a sensor on the heating cable, you should ensure that the heating cable has been de-energized for a substantial period of time to allow for both sensors to be in similar temperature environments.

GFI alarm :

This alarm is caused by a ground fault leakage current in excess of the setting.

Probable causes of alarm :

- Alarm level set too close to normal leakage current.
- Damaged cable insulation or moisture presence.
- Poor cable splice or termination.
- Moisture in enclosure that provides a conductive ground path sufficient to trigger the alarm.

UTC-2030 SPECIFICATIONS:

Alarm output : 1 A max, 240 Vac max., 50/60 Hz, SPDT (form C) relay output configured for "fail-safe" operation.

Approvals : CSA "C" - "US" for ordinary locations.

Enclosure: Nema 4, gray painted steel with ¼ turn latch.

Indicator light: Nema 4 multi-function three color LED.

Input voltage range : 120-240 Vac, 50/60 Hz.

Monitoring and alarming : The electronics monitor low temperature, ground fault current and open / shorted temperature sensor(s).

Operating ambient temp.: -40 to +40 °C *(-40 to +104 °F).*

Power output : 2-pole relay output rated 30 A - 240 Vac.

Terminal blocks:

Power terminals for #22 to #8 AWG

Power in:	L1, N or L2.
Heater out:	H1, N or H2

Signal terminals for #28 to #12 AWG

Sensors:	TS1:	#1-2-3-4.
	TS2:	#5-6-7-8.
	TS3:	#12-13-14-15.
	Alarm relay:	#9-10-11.
	Alarm reset:	#16-17.
	Override input:	#18-19.

Valid temperature range: -40 to +100 °C *(-40 to +212 °F).*

FACTORY PROGRAMMABLE:

Auto-cycle : When the temperature controller is energized, and then at 24 hours intervals, the controller performs an auto-cycle test by turning on the load to measure the ground fault leakage current. If the measured ground fault current is above the set level, the ground fault current alarm is activated.

Ground fault detection : Factory adjustable to trip or alarm only. Setting @ 30 or 100 ma.

Remote override : The user may force the unit on/off via a remote dry contact. Factory adjustable to operate in timed (1-48 hours) or non-timed mode.

Temperature control : three 3-wire 100 Ω @ 0 °C *(32 °F)* Platinum RTD (alpha=0,00385 Ω/Ω/°C), lead compensated to 20 Ω per lead.
or
three 2-wire 2 252 Ω @ 25 °C *(77 °F)* NTC Thermistor.

Deadband : 1 to 5 °C *(1.8 to 9 °F)* see ANNEX E.

Control temperature setpoint range: -5 to 75 °C *(23 to 167 °F)* see ANNEX E.

Low temperature alarm : Feature can be enabled to provide low temperature alarm on TS1 and TS2.

Low temperature setpoint range: -10 to 75 °C *(14 to 167 °F)* see ANNEX E.

High cable temperature: The third temperature sensor (referred to as TS3) is used as a high cable temperature limit for plastic piping system protection. When TS3 is enabled, the high limit feature will override demand for heat and shut off the load when a high cable temperature condition is reached.

High temperature set point range: 25 to 100 °C *(77 to 212 °F)* see ANNEX E.

UTC-2230 SPECIFICATIONS :

Same specifications as the UTC-2030, with the addition of :

Circuit breaker : 2-pole, 30 A, 240 Vac, pre-wired to the temperature control board.

Terminal blocks: Incoming power lugs at the circuit breaker for: #14 to #4 AWG

CONTACTOR VERSION SPECIFICATIONS :

Same specifications as the UTC-2030, except for the following :

Sequence of number is : UTC-VPAA-xx

'V' in the catalog number denotes the operating voltage, i.e. : 2 for 208, 4 for 480 or 6 for 600 .

'P' in the catalog number denotes the number of poles on the circuit breaker, i.e. : 2 or 3.

'AA' in the catalog number denotes the amperage of the circuit breaker, i.e. : 15, 20, 25, 30, 35, 40, 45, 50 or 60.

'xx' in the catalog number denotes the control program code (see annex E).

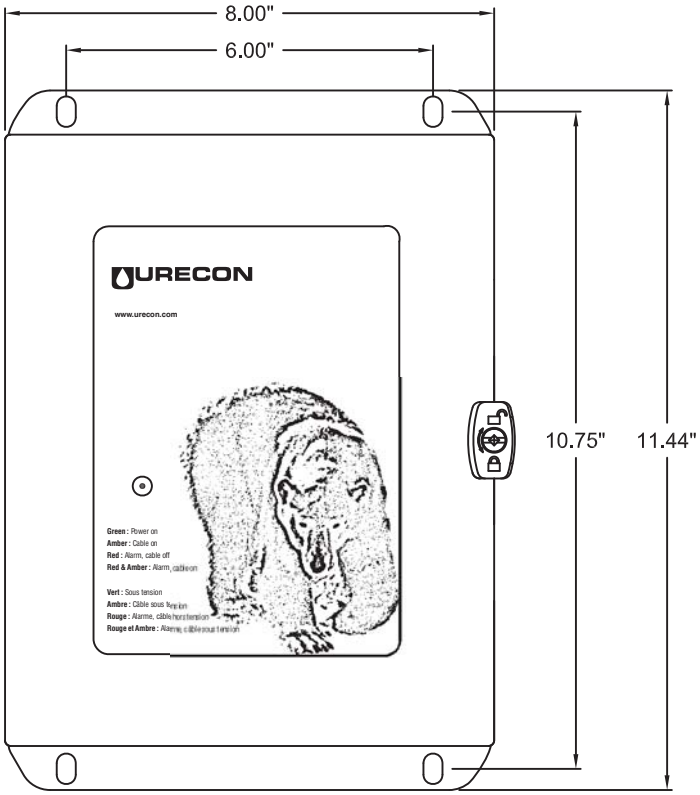
Input voltage : 208, 480 or 600 Vac, 50/60 Hz, 3-phase / 4-wire.

Power output : 3-pole contactor output rated 60 A - 600 V ac.

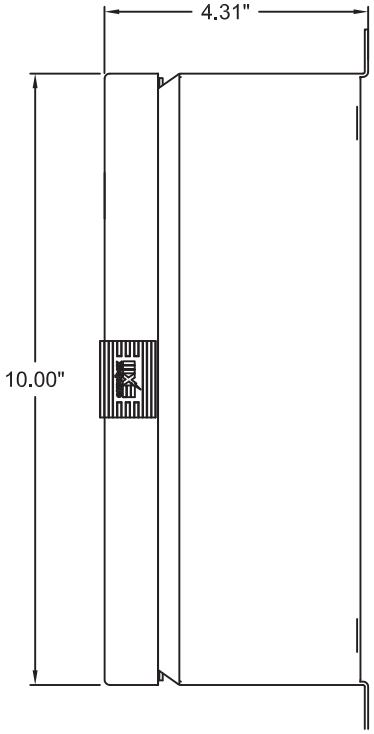
Terminal blocks:	Power in terminals;	L1, L2 and L3:	#14 to # 4 AWG
	Heater terminals;	H1, H2 and H3:	#14 to # 3 AWG
	Neutral terminals:		#14 to # 6 AWG

ANNEXE / ANNEX **A**

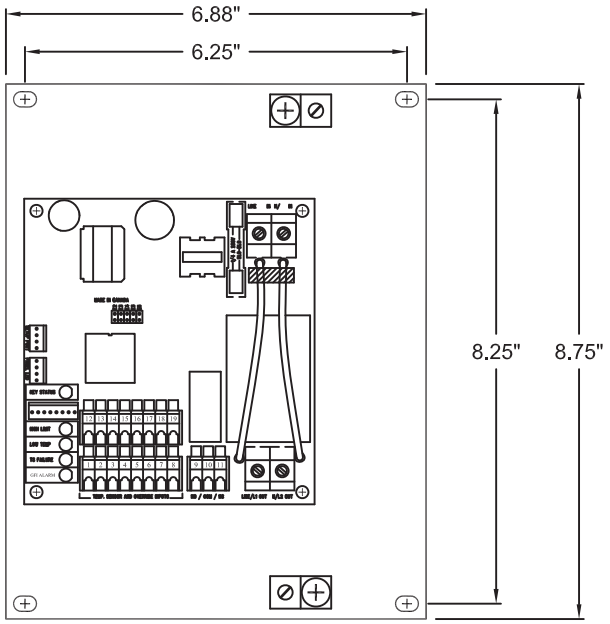
UTC-2030
Thermostat électronique / Electronic thermostat



ÉLÉVATION / FRONT VIEW



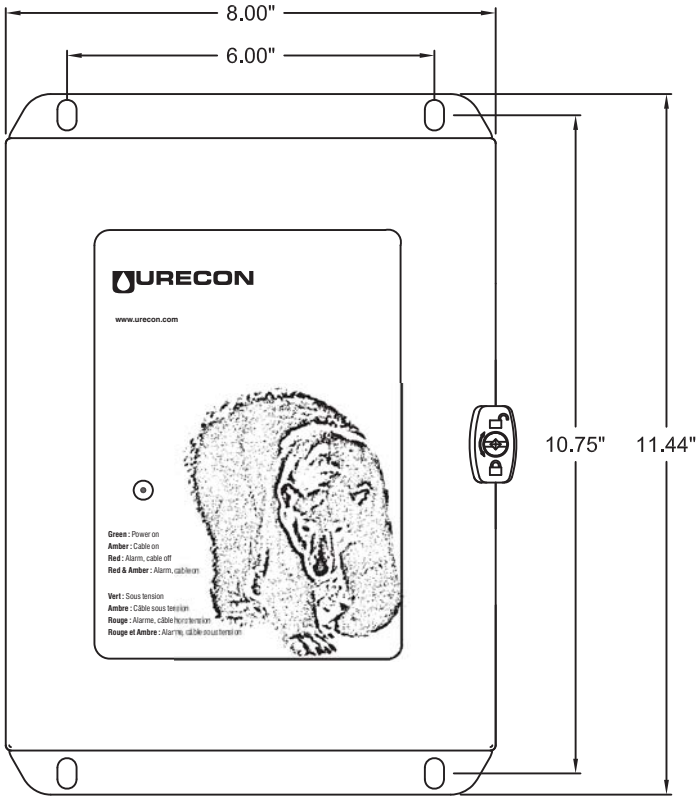
PROFIL / LEFT SIDE VIEW



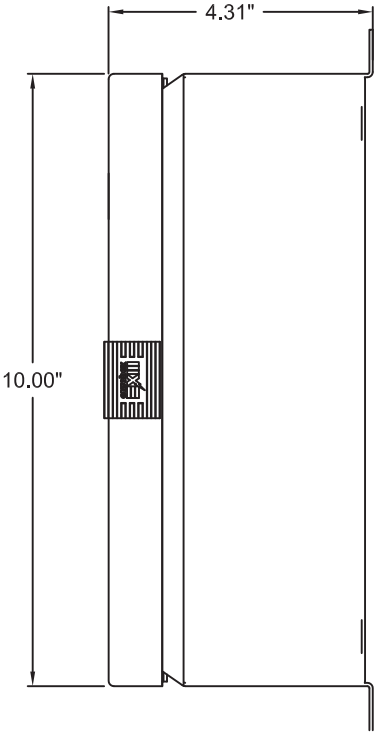
PLAQUE DE FOND / BACKPLATE

ANNEXE / ANNEX **B**

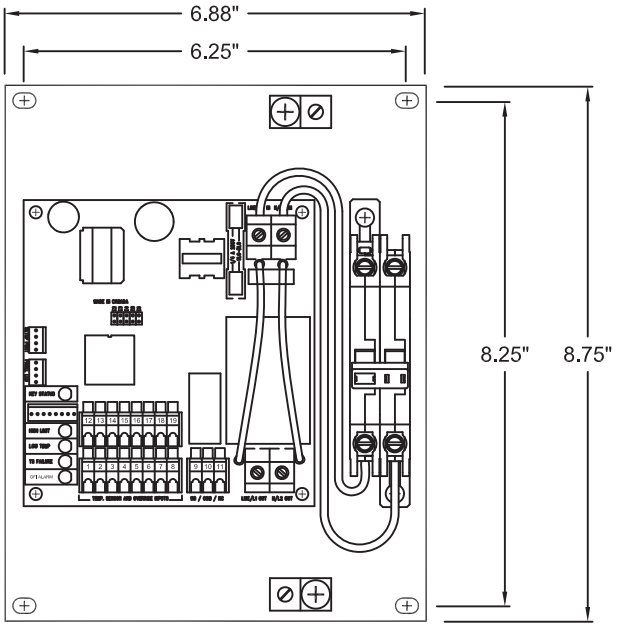
UTC-2230
Thermostat électronique / Electronic thermostat



ÉLÉVATION / FRONT VIEW



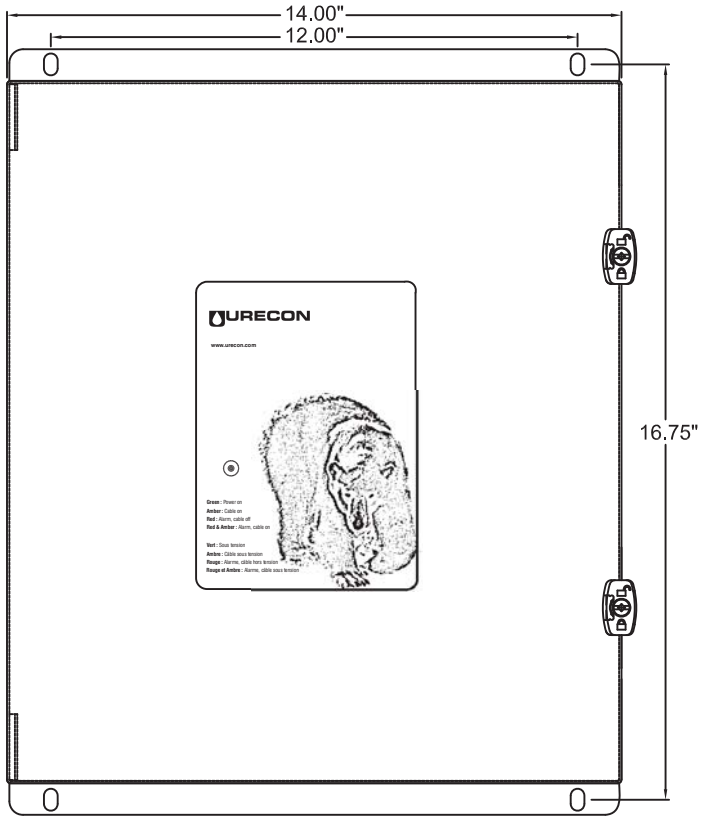
PROFIL / LEFT SIDE VIEW



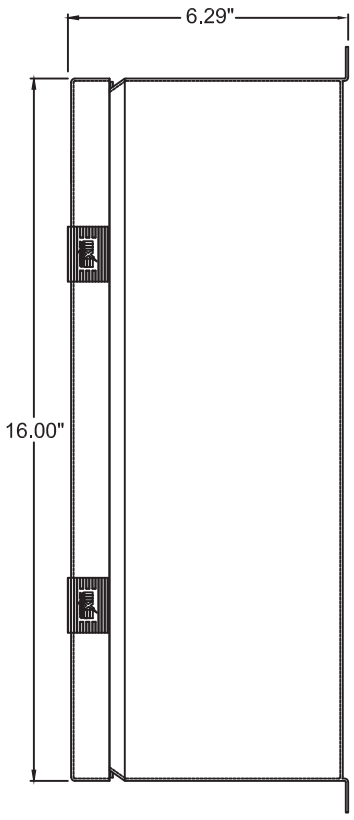
PLAQUE DE FOND / BACKPLATE

ANNEXE / ANNEX **C**

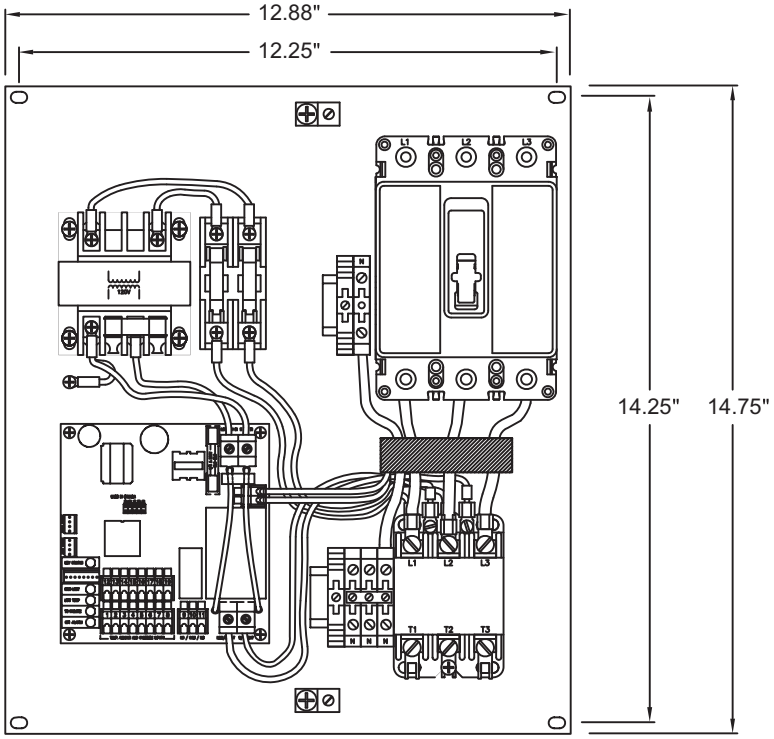
Thermostat électronique à contacteur / Contactor version electronic thermostat



ÉLÉVATION / FRONT VIEW

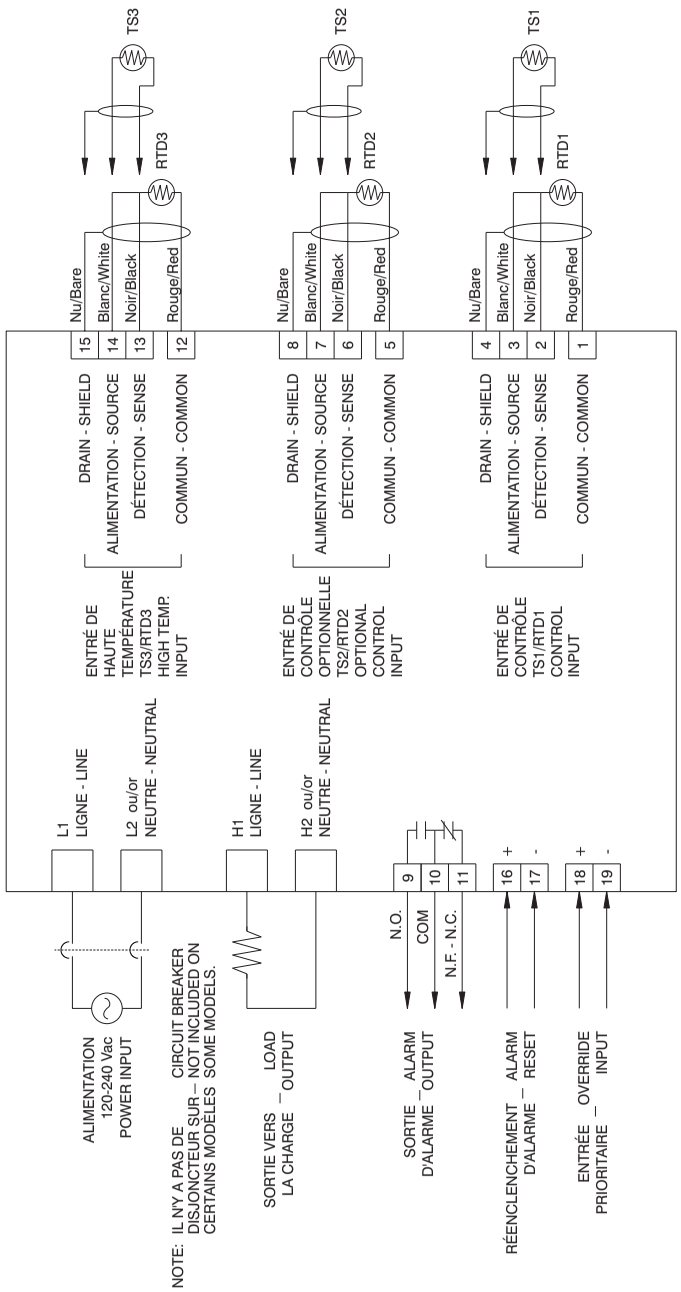


PROFIL / LEFT SIDE VIEW



PLAQUE DE FOND / BACKPLATE

Schéma de câblage / Wiring Diagram



ANNEXE / ANNEX **E**

UTC-2030-xx, UTC-2230-xx, UTC-VPAA-xx

xx doit être remplacé par le code de programmation approprié

xx is to be replaced by the appropriate program code number

code de programmation pour RTD RTD program code		Capteur de contrôle TS1 (alarme en indice) Température Controlling sensor TS1 (alarm in subscript)	Capteur de contrôle TS2 (alarme en indice) Température Controlling sensor TS2 (alarm in subscript)	Capteur de haute température TS3 Température High temperature sensor TS3	code de programmation pour thermistance Thermistor program code	
POUR TUYAU DE PLASTIQUE FOR PLASTIC PIPE	01	3 °C *(37.4 °F)*	–	65 °C *(149 °F)*	51	POUR TUYAU DE PLASTIQUE FOR PLASTIC PIPE
	02	3_{1} °C *(37.4$_{33.8}$ °F)*	–	65 °C *(149 °F)*	52	
	03	5 °C *(41 °F)*	–	65 °C *(149 °F)*	53	
	04	5_{3} °C *(41$_{37.4}$ °F)*	–	65 °C *(149 °F)*	54	
	05	10 °C *(50 °F)*	–	65 °C *(149 °F)*	55	
	06	10_{5} °C *(50$_{41}$ °F)*	–	65 °C *(149 °F)*	56	
	07	15 °C *(59 °F)*	–	65 °C *(149 °F)*	57	
	08	15_{10} °C *(59$_{50}$ °F)*	–	65 °C *(149 °F)*	58	
	11	3 °C *(37.4 °F)*	3 °C *(37.4 °F)*	65 °C *(149 °F)*	61	
	12	3_{1} °C *(37.4$_{33.8}$ °F)*	3_{1} °C *(37.4$_{33.8}$ °F)*	65 °C *(149 °F)*	62	
	13	5 °C *(41 °F)*	5 °C *(41 °F)*	65 °C *(149 °F)*	63	
	14	5_{3} °C *(41$_{37.4}$ °F)*	5_{3} °C *(41$_{37.4}$ °F)*	65 °C *(149 °F)*	64	
	15	10 °C *(50 °F)*	10 °C *(50 °F)*	65 °C *(149 °F)*	65	
	16	10_{5} °C *(50$_{41}$ °F)*	10_{5} °C *(50$_{41}$ °F)*	65 °C *(149 °F)*	66	
	17	15 °C *(59 °F)*	15 °C *(59 °F)*	65 °C *(149 °F)*	67	
	18	15_{10} °C *(59$_{50}$ °F)*	15_{10} °C *(59$_{50}$ °F)*	65 °C *(149 °F)*	68	
POUR TUYAU DE MÉTAL FOR METAL PIPE	21	3 °C *(37.4 °F)*	–	–	71	POUR TUYAU DE MÉTAL FOR METAL PIPE
	22	3_{1} °C *(37.4$_{33.8}$ °F)*	–	–	72	
	23	5 °C *(41 °F)*	–	–	73	
	24	5_{3} °C *(41$_{37.4}$ °F)*	–	–	74	
	25	10 °C *(50 °F)*	–	–	75	
	26	10_{5} °C *(50$_{41}$ °F)*	–	–	76	
	27	15 °C *(59 °F)*	–	–	77	
	28	15_{10} °C *(59$_{50}$ °F)*	–	–	78	
	31	3 °C *(37.4 °F)*	3 °C *(37.4 °F)*	–	81	
	32	3_{1} °C *(37.4$_{33.8}$ °F)*	3_{1} °C *(37.4$_{33.8}$ °F)*	–	82	
	33	5 °C *(41 °F)*	5 °C *(41 °F)*	–	83	
	34	5_{3} °C *(41$_{37.4}$ °F)*	5_{3} °C *(41$_{37.4}$ °F)*	–	84	
	35	10 °C *(50 °F)*	10 °C *(50 °F)*	–	85	
	36	10_{5} °C *(50$_{41}$ °F)*	10_{5} °C *(50$_{41}$ °F)*	–	86	
	37	15 °C *(59 °F)*	15 °C *(59 °F)*	–	87	
	38	15_{10} °C *(59$_{50}$ °F)*	15_{10} °C *(59$_{50}$ °F)*	–	88	

ANNEXE / ANNEX **F**

Capteurs de température utilisés avec les thermostats électroniques de la série UTC.

Temperature sensors used with the UTC line of electronic thermostats.

Thermistance / Thermistor (Modèle précedent / Previous model) **de / of 2 252 ohms @ 25 °C *(77 °F)***	
Température Temperature	**Résistance Resistance**
-40 °C *(-40 °F)*	75 593 Ω
-35 °C *(-31 °F)*	54 542 Ω
-30 °C *(-22 °F)*	39 789 Ω
-25 °C *(-13 °F)*	29 331 Ω
-20 °C *(-4 °F)*	21 839 Ω
-15 °C *(5 °F)*	16 416 Ω
-10 °C *(14 °F)*	12 453 Ω
-5 °C *(23 °F)*	9 529,2 Ω
0 °C *(32 °F)*	7 353,0 Ω
5 °C *(41 °F)*	5 719,1 Ω
10 °C *(50 °F)*	4 482,3 Ω
15 °C *(59 °F)*	3 538,8 Ω
20 °C *(68 °F)*	2 813,6 Ω
25 °C *(77 °F)*	2 252,0 Ω
30 °C *(86 °F)*	1 814,2 Ω
35 °C *(95 °F)*	1 470,6 Ω
40 °C *(104 °F)*	1 192,2 Ω
45 °C *(113 °F)*	983,4 Ω
50 °C *(122 °F)*	810,9 Ω
55 °C *(131 °F)*	672,2 Ω
60 °C *(140 °F)*	560,1 Ω
65 °C *(149 °F)*	468,9 Ω
70 °C *(158 °F)*	394,5 Ω
75 °C *(167 °F)*	333,3 Ω
80 °C *(176 °F)*	282,9 Ω
85 °C *(185 °F)*	241,1 Ω
90 °C *(194 °F)*	206,3 Ω
95 °C *(203 °F)*	177,2 Ω
100 °C *(212 °F)*	152,8 Ω

RTD de Platine / Platinum RTD (Modèle courant / Current model) **de / of 100 ohms @ 0 °C *(32 °F)***	
Température Temperature	**Résistance Resistance**
-40 °C *(-40 °F)*	84,27 Ω
-35 °C *(-31 °F)*	86,25 Ω
-30 °C *(-22 °F)*	88,22 Ω
-25 °C *(-13 °F)*	90,19 Ω
-20 °C *(-4 °F)*	92,16 Ω
-15 °C *(5 °F)*	94,12 Ω
-10 °C *(14 °F)*	96,09 Ω
-5 °C *(23 °F)*	98,04 Ω
0 °C *(32 °F)*	100,00 Ω
5 °C *(41 °F)*	101,95 Ω
10 °C *(50 °F)*	103,90 Ω
15 °C *(59 °F)*	105,85 Ω
20 °C *(68 °F)*	107,79 Ω
25 °C *(77 °F)*	109,73 Ω
30 °C *(86 °F)*	111,67 Ω
35 °C *(95 °F)*	113,61 Ω
40 °C *(104 °F)*	115,54 Ω
45 °C *(113 °F)*	117,47 Ω
50 °C *(122 °F)*	119,40 Ω
55 °C *(131 °F)*	121,32 Ω
60 °C *(140 °F)*	123,24 Ω
65 °C *(149 °F)*	125,16 Ω
70 °C *(158 °F)*	127,07 Ω
75 °C *(167 °F)*	128,98 Ω
80 °C *(176 °F)*	130,89 Ω
85 °C *(185 °F)*	132,80 Ω
90 °C *(194 °F)*	134,70 Ω
95 °C *(203 °F)*	136,60 Ω
100 °C *(212 °F)*	138,50 Ω

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Field Memorandum

Project Name:	NFRD Drain SIS	**To:**	Chad Brassard
Project #:	0533-010-06	**Copied:**	Jim Cassie
Company:	BGC Engineering Inc.	**From:**	Joan Roca
Date:	20150217	**Record #:**	*20150217_NFRDSIS_FM4_ Outstanding Activities and Recommendations*

Subject: NFRDSIS Construction. Outstanding Activities and Recommendations

1.0. Introduction

On January 30, 2015, Pelly Construction Ltd. (PCL) mobilized to the Faro Mine to complete the construction activities related to the NFRD SIS project. As commented with YG, some activities could not be completed before demobilization and will have to be completed by others at a later stage. The purpose of this Field Memorandum is to record the outstanding activities and recommendations for its completion.

2.0. Outstanding Issues and Recommendations

A complete description of the outstanding is included in the BGC Day Shift Reports. The following is a summary of the outstanding construction activities not completed by PCL:

- **Installation of earth anchor piles along the pipeline**. The installation of anchor piles each 20 m shall be as per Detail 7 on Drawing FRNF-XD-02-16_Rev 0.
- **Relocation of pipeline inside the protection flume** (toe of rock fill slope, S-Wells area).
- **Installation of heater inside shelter #4** (and associated electrical installation).
- **Secondary containment for the 500 kVA transformer** (and associated earthworks). No concept design was available at the time of producing this memorandum.
- **Removal of turbidity curtain (upstream headpond)**
- **Grading of haul road trafficable surface (Borrow D and pipeline crossing areas)**
- **Completion of the Operating and Maintenance Manual.** At the time of producing this memorandum, BGC has no records showing that the issues listed on the email from February 10, 2015 have been addressed.

The completion of these activities is assumed to occur in spring and summer 2015.

In addition, BGC recommends the following activities be performed:

- Temperature monitoring of components inside the air/vacuum and drain valve structures (shelters #1, #2, #3, #4 and #5) during operations on cold weather.
- Temperature monitoring of water at pipeline inlet (C-Can) and outlet (pipeline discharge) during operations on cold weather.

- Visual monitoring of USAR fill/cut slopes stability during frost-free conditions. If required, the cut slopes shall be graded or modified.
- Maintenance of ditches and silt fences to prevent erosion of road fill and to prevent saturation of the subgrade.
- Grading of the USAR and DSAR trafficable surface after the winter season (during frost free conditions).
- Visual monitoring of stock piled material at spoil areas during and after rain events. If required, the piles shall be graded or modified and new sediment and control measures implemented.
- Monitoring of water flows and Zn concentrations at emerging points, diversion channels, pumping sump and NF2A channel. If required, modify the diversion berms at the toe of the rock drain or interrupt the pumping of water at the C-Can. It may also be necessary to modify or change the location or depth of the sump pump at NF2A feeding the manhole sump.
- Removal/relocation of pumping system (downstream to NF2A water sampling station). The completion of this activity is assumed to occur at the end of this winter (2015).

3.0. Closure:

BGC prepared this document for the account of YG. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation.

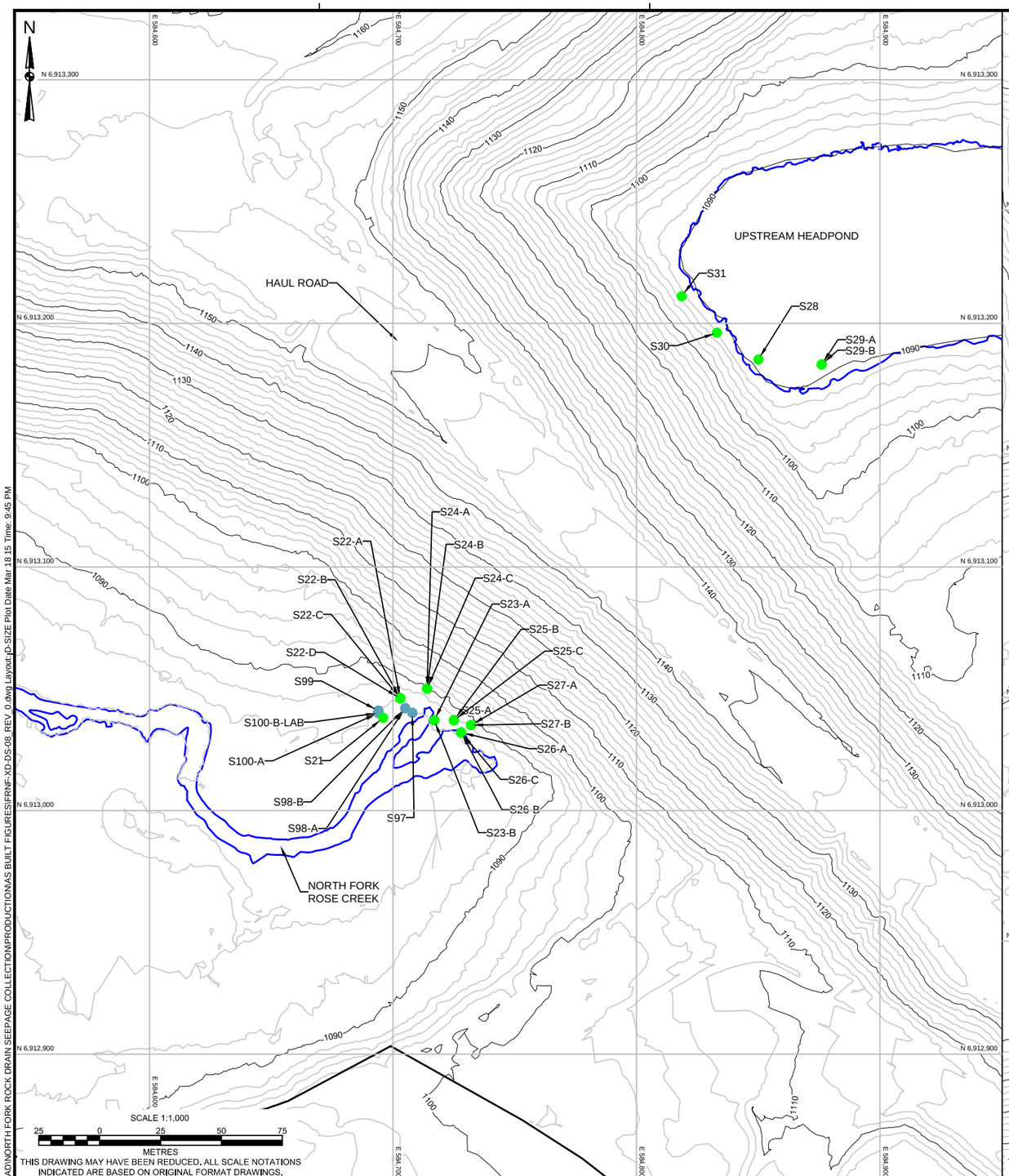
We trust the above satisfies your requirements at this time. Should you have any questions or comments, please do not hesitate to contact us.

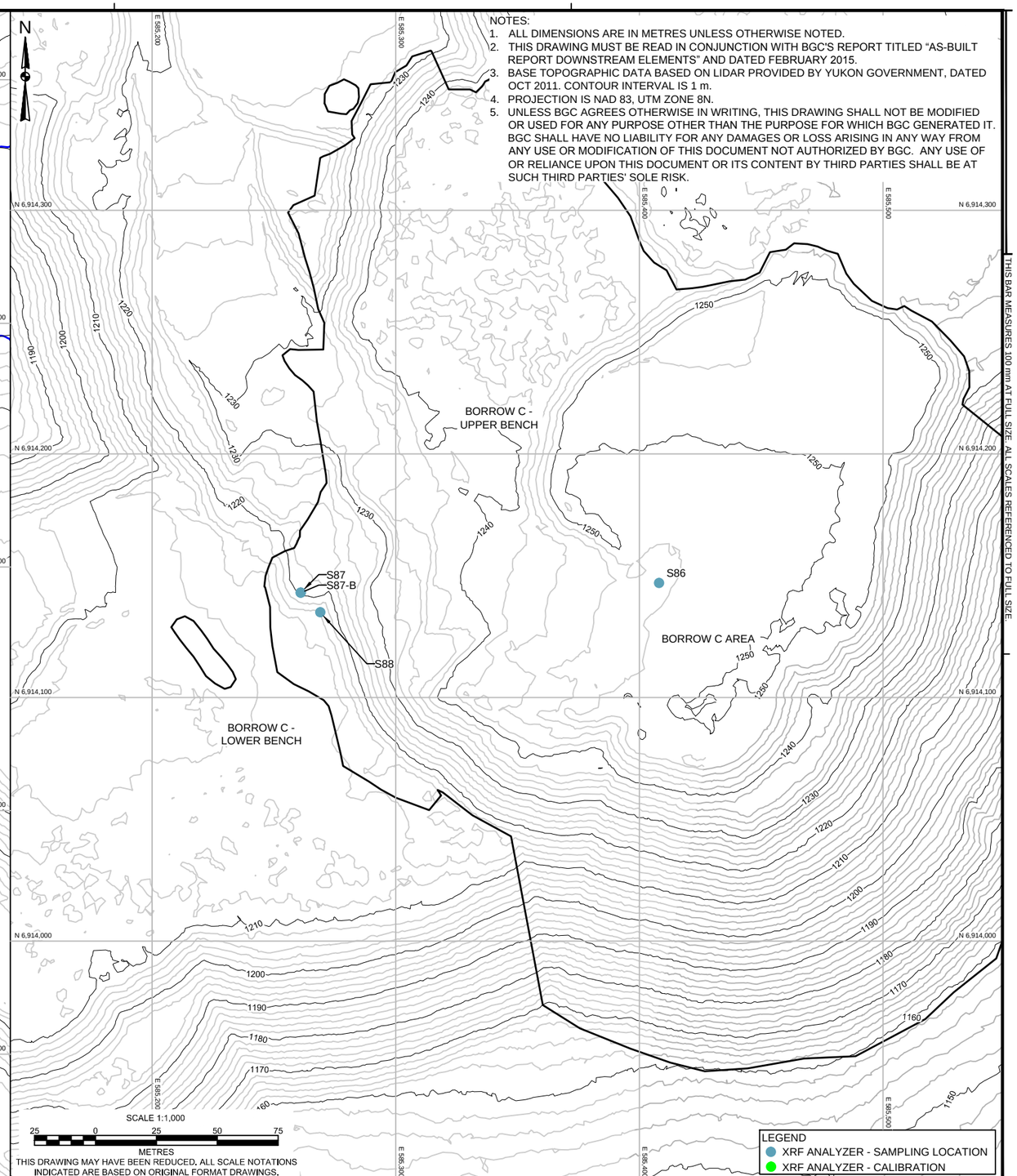
BGC Representative:	Joan Roca	**Date:**	20150217
Reviewed by:	Jim Cassie, P.Eng.	**Date:**	20150217

APPENDIX D
XRF TESTING PROGRAM

XRF TESTING PROGRAM – LIST OF CONTENTS

ID	Description	Date
1	Drawing FRNF-XD-US-08 – Sampling locations	March 17, 2015
2	XRF Test Results (Table)	November 19, 2014
3	XRF Test Results – Existing NFRD Rock Fill (Table)	November 19, 2014
4	Certificate of Calibration for XRF Analyzer from Elemental Controls Ltd.	July / August, 2014
5	Certificate of Analysis for XRF Analyzer from Elemental Controls Ltd.	January 11, 2007
6	XRF Laboratory Test Results - Certificate of Analysis - SGS Canada Inc.	November 25, 2014





NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "AS-BUILT REPORT DOWNSTREAM ELEMENTS" AND DATED FEBRUARY 2015.
3. BASE TOPOGRAPHIC DATA BASED ON LIDAR PROVIDED BY YUKON GOVERNMENT, DATED OCT 2011. CONTOUR INTERVAL IS 1 m.
4. PROJECTION IS NAD 83, UTM ZONE 8N.
5. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.

THIS BAR MEASURES 100 mm AT FULL SIZE. ALL SCALES REFERENCED TO FULL SIZE.

X:\Projects\0533 YK-Gov\007\CAD\NORTH FORK ROCK DRAIN SEEPAGE COLLECTION\PRODUCTION\AS BUILT FIGURES\FRNF-XD-DS-08_REV_0.dwg Layout: D-SIZE Plot Date: Mar 18 15 Time: 9:45 PM

REVISION INFORMATION

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS
0	15	03	17	WKL	JR	JWC	GWF	AS-BUILT 2015

REV. NO.	YY	MM	DD	DRAWN	DESIGN	CHECK	APPROVED	REVISION / ISSUED DESCRIPTIONS

DRAWN BY: WKL	CHECK DRAWING: GCB
DESIGN BY: JR	CHECK DESIGN: GWF
LEAD ENGINEER: JR	APPROVAL DATE: MARCH 17, 2015
PROJECT MANAGER: JWC	APPROVAL DATE: MARCH 17, 2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Yukon Government

PROJECT: NORTH FORK ROCK DRAIN SEEPAGE INTERCEPTION SYSTEM

TITLE: DOWNSTREAM XRF TEST AND CALIBRATION SAMPLING LOCATION

SCALE:	DWG No.:	REV.:
1:2,000	FRNF-XD-DS-08	0

BGC INTERNATIONAL
AN APPLIED EARTH SCIENCES COMPANY

Project Number 0533010-06

NFRD SIS (FARO MINE) - XRF TESTING PROGRAM

FILL SAMPLES FOR CONSTRUCTION OF DOWNSTREAM ELEMENTS

Sample ID	Sample By	Fill Type	Approximate Location (m)			XRF Test Details			Comments
			Work Area	Easting	Northing	Test By	Zn (ppm)	Error (±)	
s86	JR	GRF	BC	585,408	6,914,147	JR	495.58	31.42	BC Lower bench. Source of GRF. Approved.
s87	JR	GRF	BC	585,261	6,914,143	JR	1,256.47	51.08	BC Lower bench. Source of GRF. Test on sample presenting alteration (reddish). Do second test but recommend monitoring.
s87-b	JR	GRF	BC	585,261	6,914,143	JR	397.40	32.67	BC Lower bench. Source of GRF. Test on sample presenting some alteration (minor) but mainly grey. Approved but continue monitoring.
s88	JR	GRF	BC	585,269	6,914,135	JR	544.99	35.10	BC Lower bench. Source of GRF. Some reddish but mainly grey. Approved.
s97	JR	N/A	DSSC	584,708	6,913,040	JR	90.05	16.90	Sample from rock broken with rock hammer at NF2A. Grey sample. Material removed during excavation
s98-a	JR	N/A	DSSC	584,705	6,913,042	JR	8,515.88	308.18	Sample from rock broken with rock hammer at NF2A. Orangish layer covering sample (precipitate). Rocks removed to expose emerging points. Do not put back into Creek.
s98-b	JR	N/A	DSSC	584,705	6,913,042	JR	8,379.68	304.21	Sample from rock broken with rock hammer at NF2A. Orangish layer covering sample (precipitate). Rocks removed to expose emerging points. Do not put back into Creek.
s99	JR	Cobbles and Boulders (BA)	DSSC	584,694	6,913,041	JR	93.94	15.07	Sample from backfill placed around the manhole (collected on the pile before placing). Fines discarded. Approved.
s100-a	JR	Cobbles and Boulders (BA)	DSSC	584,694	6,913,040	JR	69.15	11.00	Sample from backfill placed around the manhole (collected on the pile before placing). Fines discarded. . Approved.
s100-b-lab	JR	Cobbles and Boulders (BA)	DSSC	584,694	6,913,040	JR	98.49	13.41	Sample from backfill placed around the manhole (collected on the pile before placing). Approved. Sample sent to Laboratory

Notes:
1) BA = Borrow A
2) BC = Borrow C
3) GRF = General Rock Fill
4) Samples tested at the Faro Mine site with a Thermo Scientific Niton XRF Analyzer (model XL3t 500) rented to Elemental Controls Limited (ECL)

Table by: JOAN ROCA (BGC)

YUKON GOVERNMENT

Date: November 19, 2014

BGC INTERNATIONAL
AN APPLIED EARTH SCIENCES COMPANY

Project Number 0533010-06

NFRD SIS (FARO MINE) - XRF TESTING PROGRAM

FILL SAMPLES FROM EXISTING ROCK FILL (NFRD)

Sample ID	Sample By	Fill Type	Approximate Location (m)			XRF Test Details			Comments
			Work Area	Easting	Northing	Test By	Zn (ppm)	Error (±)	
s21	JR	Existing Rock Fill	NF2A	584,696	6,913,038	JR	828.92	37.05	Samples collected under water from more impacted side within NF2A. Test on rock with orange precipitate
s22-a	JR	Existing Rock Fill	NF2A	584,703	6,913,046	JR	1,081.06	131.73	Samples collected from more impacted side within NF2A. Test on rock with orange precipitate
s22-b	JR	Existing Rock Fill	NF2A	584,703	6,913,046	JR	477.72	89.97	Samples collected from more impacted side within NF2A. Grey sample.
s22-c	JR	Existing Rock Fill	NF2A	584,703	6,913,046	JR	601.75	100.45	Samples collected from more impacted side within NF2A. Grey sample.
s22-d	JR	Existing Rock Fill	NF2A	584,703	6,913,046	JR	1,321.48	45.99	Samples collected from more impacted side within NF2A. Test on rock with orange precipitate
s23-a	JR	Existing Rock Fill	NF2A	584,717	6,913,037	JR	226.98	58.90	Samples collected from less impacted side within NF2A. Grey sample.
s23-b	JR	Existing Rock Fill	NF2A	584,717	6,913,037	JR	401.64	28.17	Samples collected from less impacted side within NF2A. Grey sample.
s24-a	JR	Existing Rock Fill	NF2A	584,714	6,913,050	JR	<LOD	84.90	Samples collected within NF2A at a higher elevation. Grey sample.
s24-b	JR	Existing Rock Fill	NF2A	584,714	6,913,050	JR	<LOD	95.32	Samples collected within NF2A at a higher elevation. Grey sample.
s24-c	JR	Existing Rock Fill	NF2A	584,714	6,913,050	JR	342.80	35.75	Samples collected within NF2A at a higher elevation. Grey sample.
s25-a	JR	Existing Rock Fill	NF2B	584,725	6,913,037	JR	<LOD	54.77	Samples collected close to seep points at NF2B. No orange staining observed
s25-b	JR	Existing Rock Fill	NF2B	584,725	6,913,037	JR	444.76	92.69	Samples collected close to seep points at NF2B. No orange staining observed
s25-c	JR	Existing Rock Fill	NF2B	584,725	6,913,037	JR	1,607.22	58.08	Samples collected close to seep points at NF2B. Orange staining observed
s26-a	JR	Existing Rock Fill	NF2B	584,728	6,913,032	JR	<LOD	105.07	Samples collected close to seep points at NF2B. No orange staining observed
s26-b	JR	Existing Rock Fill	NF2B	584,728	6,913,032	JR	<LOD	74.70	Samples collected close to seep points at NF2B. No orange staining observed
s26-c	JR	Existing Rock Fill	NF2B	584,728	6,913,032	JR	65.52	13.19	Samples collected close to seep points at NF2B. No orange staining observed
s27-a	JR	Existing Rock Fill	NF2B	584,732	6,913,035	JR	<LOD	80.74	Samples collected close to seep points at NF2B. No orange staining observed

Table by: JOAN ROCA (BGC)

YUKON GOVERNMENT

Date: November 19, 2014

NFRD SIS (FARO MINE) - XRF TESTING PROGRAM
FILL SAMPLES FROM EXISTING ROCK FILL (NFRD)

Sample ID	Sample By	Fill Type	Approximate Location (m)			XRF Test Details			Comments
			Work Area	Easting	Northing	Test By	Zn (ppm)	Error (±)	
s27-b	JR	Existing Rock Fill	NF2B	584,732	6,913,035	JR	29.38	7.78	Samples collected close to seep points at NF2B. No orange staining observed
s28	JR	Existing Rock Fill	US	584,850	6,913,185	JR	5,553.76	860.65	Soil sample collected in between rock boulders at the rock drain (US-NF2B side)
s29-a	JR	Existing Rock Fill	US	584,876	6,913,183	JR	416.37	38.26	Sample from rock drain (US-NF2B side). Grey sample
s29-b	JR	Existing Rock Fill	US	584,876	6,913,183	JR	9,588.24	200.09	Sample from rock drain (US-NF2B side). Red/orange staining on rock
s30	JR	Existing Rock Fill	US	584,833	6,913,196	JR	356.16	27.23	Sample from rock drain (US-NF2A side)
s31	JR	Existing Rock Fill	US	584,818	6,913,211	JR	36.61	12.11	Sample from rock drain (US-NF2A side). Rock broken with rock geological hammer. Test on fresh fracture face. Grey

Notes:
1) Samples tested at the Faro Mine site with a Thermo Scientific Niton XRF Analyzer (model XL3t 500) rented to Elemental Controls Limited (ECL)

Table by: JOAN ROCA (BGC)

YUKON GOVERNMENT

Date: November 19, 2014

ELEMENTAL CONTROLS

3230 Wharton Way
Mississauga, ON L4X 2C1
Tel: 905-282-9974
Fax: 905-282-9519
www.elementalcontrols.com

Certificate of Calibration - Standard Mining

Model:	XL3t 500	**Software:**	8.4A
Serial:	32536	**Source:**	X-Ray Tube
Resolution:	178.52 eV / Escale: 7.92	**Date:**	July-18-14
Resolution 2:	N/A		

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
SiO2 Blank	Sn	0	0	0.10	0.00	0.00	OK	< LOD
	Pd	0	0	0.10	0.00	0.00	OK	< LOD
	Ag	0	0	0.10	0.00	0.00	OK	< LOD
	Bal	100.00	98.00	100.00	99.91	0.00	OK	
	Mo	0	0	0.10	0.00	0.00	OK	< LOD
	Nb	0	0	0.10	0.00	0.00	OK	< LOD
	Zr	0	0	0.10	0.00	0.00	OK	< LOD
	Bi	0	0	0.10	0.00	0.00	OK	< LOD
	As	0	0	0.10	0.00	0.00	OK	< LOD
	Pb	0	0	0.10	0.00	0.00	OK	
	W	0	0	0.10	0.00	0.01	OK	< LOD
	Zn	0	0	0.10	0.00	0.00	OK	< LOD
	Cu	0	0	0.10	0.00	0.00	OK	< LOD
	Re	0	0	0.10	-	-	-	
	Ta	0	0	0.10	-	-	-	
	Hf	0	0	0.10	-	-	-	
	Ni	0	0	0.10	0.00	0.00	OK	< LOD
	Co	0	0	0.10	0.00	0.00	OK	< LOD
	Fe	0	0	0.10	0.00	0.00	OK	< LOD
	Mn	0	0	0.10	0.00	0.01	OK	< LOD
	Cr	0	0	0.10	0.02	0.00	OK	
	V	0	0	0.10	0.01	0.00	OK	
	Ti	0	0	0.10	0.00	0.00	OK	< LOD

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST 25D	Sn	-	-	-	0.00	0.01	-	
	Pd	-	-	-	0.00	0.00	-	
	Ag	-	-	-	0.00	0.00	-	
	Bal	45.50	33.00	46.00	38.80	1.77	OK	
	Mo	-	-	-	0.00	0.00	-	
	Nb	-	-	-	0.00	0.00	-	
	Zr	-	-	-	0.00	0.00	-	
	Bi	-	-	-	0.00	0.00	-	
	As	-	-	-	0.00	0.00	-	
	Pb	-	-	-	0.00	0.00	-	
	W	-	-	-	0.00	0.02	-	
	Zn	-	-	-	0.06	0.01	-	
	Cu	-	-	-	0.05	0.01	-	
	Re	-	-	-	-	-	-	
	Ta	-	-	-	-	-	-	
	Hf	-	-	-	-	-	-	
	Ni	-	-	-	0.04	0.01	-	
	Co	-	-	-	0.10	0.03	-	
	Fe	2.74	2.00	4.00	3.21	0.12	OK	
	Mn	51.78	50.00	65.00	56.63	1.65	OK	
	Cr	-	-	-	0.00	0.01	-	
	V	-	-	-	0.02	0.02	-	
	Ti	-	-	-	0.10	0.03	-	

BS 103	Sn	-	-	-	0.01	0.01	-
	Pd	-	-	-	0.00	0.00	-
	Ag	-	-	-	0.00	0.00	-
	Bal	40.10	30.00	50.00	37.12	2.22	OK
	Mo	-	-	-	0.00	0.00	-
	Nb	-	-	-	0.00	0.00	-
	Zr	-	-	-	0.00	0.00	-
	Bi	-	-	-	0.00	0.00	-
	As	-	-	-	0.01	0.00	-
	Pb	-	-	-	0.00	0.00	-
	W	-	-	-	0.00	0.03	-
	Zn	-	-	-	0.03	0.01	-
	Cu	-	-	-	0.00	0.01	-
	Re	-	-	-	-	-	-
	Ta	-	-	-	-	-	-
	Hf	-	-	-	-	-	-
	Ni	-	-	-	0.00	0.02	-
	Co	-	-	-	0.00	0.08	-
	Fe	59.40	55.00	70.00	61.00	2.18	OK
	Mn	0.50	0.40	1.00	0.57	0.04	OK
	Cr	-	-	-	0.02	0.01	-
	V	-	-	-	0.00	0.02	-
	Ti	-	-	-	0.03	0.02	-

BCS 355	Sn	31.42	29.40	33.40	31.73	1.63	OK
	Pd	-	-	-	0.00	0.00	-
	Ag	-	-	-	0.00	0.00	-
	Bal	-	-	-	48.52	2.31	-
	Mo	-	-	-	0.00	0.00	-
	Nb	-	-	-	0.00	0.00	-
	Zr	-	-	-	0.00	0.00	-
	Bi	0.02	-	-	0.01	0.00	-
	As	0.14	0.05	0.25	0.09	0.01	OK
	Pb	0.01	-	-	0.01	0.00	-
	W	0.35	0.28	0.42	0.29	0.03	OK
	Zn	0.06	0.02	0.10	0.05	0.01	OK
	Cu	0.09	0.04	0.14	0.07	0.01	OK
	Re	-	-	-	-	-	-
	Ta	-	-	-	-	-	-
	Hf	-	-	-	-	-	-
	Ni	-	-	-	0.01	0.01	-
	Co	-	-	-	0.00	0.04	-
	Fe	17.08	15.70	18.70	16.50	0.62	OK
	Mn	-	-	-	0.16	0.03	-
	Cr	-	-	-	0.02	0.01	-
	V	-	-	-	0.00	0.02	-
	Ti	0.37	0.29	0.45	0.34	0.03	OK

BCS 308	Bal	60.00	50.00	70.00	59.22	1.29	OK
	Cr	28.39	22.40	34.40	28.24	0.82	OK
	V	-	-	-	0.12	0.02	-
	Ti	-	-	-	0.05	0.03	-

This certificate is issued in accordance with Thermo Fisher Scientific factory specifications.
The measurements were found to be within specification limits at the time of manufacture and calibration.

Standards are traceable to National Institute of Standards & Technology (NIST) standards, or other government bodies.

Technician: N. Dhakal

Signed: Dhakal

ELEMENTAL CONTROLS

3230 Wharton Way
Mississauga, ON L4X 2C1
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www.elementalcontrols.com

Certificate of Calibration - Standard Soil

Model:	XL3t 500	**Software:**	8.4A
Serial:	32536	**Source:**	X-Ray Tube
Resolution:	175.78 eV / Escale: 7.92	**Date:**	July-21-14
Resolution 2:	N/A		

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
SiO2 Blank	Ba	0	-200	200	6.94	35.34	OK	< LOD
	Cs	0	-260	260	16.61	11.53	OK	< LOD
	Te	0	-220	220	17.44	35.68	OK	< LOD
	Sb	0	-120	80	-2.92	12.83	OK	< LOD
	Sn	0	-120	70	-1.98	12.89	OK	< LOD
	Cd	0	-50	50	3.70	9.11	OK	< LOD
	Ag	0	-30	30	6.29	6.12	OK	< LOD
	Pd	0	-50	50	13.48	10.19	OK	< LOD
	Mo	0	-10	10	0.26	2.25	OK	< LOD
	Zr	0	-10	10	0.61	1.78	OK	< LOD
	Sr	0	-10	10	0.10	1.03	OK	< LOD
	U	0	-10	10	-1.48	2.56	OK	< LOD
	Rb	0	-10	210	0.38	1.10	OK	< LOD
	Th	0	-10	10	-1.47	2.35	OK	< LOD
	Pb	0	-10	10	0.20	3.67	OK	< LOD
	Se	0	-20	20	0.07	1.42	OK	< LOD
	As	0	-10	10	-0.81	2.60	OK	< LOD
	Hg	0	-10	10	-0.57	2.78	OK	< LOD
	Zn	0	-10	10	-0.12	3.85	OK	< LOD
	W	0	-60	60	-12.64	19.77	OK	< LOD
	Cu	0	-20	20	1.09	7.51	OK	< LOD
	Ni	0	-70	70	11.62	15.20	OK	< LOD
	Co	0	-50	50	0.30	8.61	OK	< LOD
	Fe	0	-50	50	-10.55	13.43	OK	< LOD
	Mn	0	-100	300	2.81	17.22	OK	< LOD
	Cr	0	-120	120	5.17	12.19	OK	< LOD
	V	0	-160	160	1.54	10.26	OK	< LOD
	Ti	0	-700	700	6.35	28.78	OK	< LOD
	Sc	0	-100	100	2.66	4.66	OK	< LOD
	Ca	0	-2000	2000	2.61	51.74	OK	< LOD
	K	0	-3000	3000	-57.21	69.45	OK	< LOD
	S	0	-140000	140000	29.38	210.30	OK	< LOD

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST LOW	Ba	968	638	1238	914.958	63.799	OK	
	Cs	5.3	-300	300	34.294	13.679	OK	
	Te	-	-300	300	2.988	41.725	OK	< LOD
	Sb	7.9	-90	100	-3.512	15.039	OK	< LOD
	Sn	-	-100	100	11.593	15.458	OK	< LOD
	Cd	0.38	-60	60	2.661	10.648	OK	< LOD
	Ag	0.41	-40	40	11.084	7.339	OK	
	Pd	-	-60	60	0.289	11.432	OK	< LOD
	Mo	2	-10	10	-1.448	2.805	OK	< LOD
	Zr	160	120	200	148.645	7.498	OK	
	Sr	231	-	-	222.661	7.423	-	
	U	3	-80	80	-1.518	7.211	OK	< LOD
	Rb	96	-	-	58.585	4.048	-	
	Th	11	-80	80	10.362	4.965	OK	
	Pb	18.9	0	35	1.741	6.213	OK	< LOD
	Se	1.57	-30	30	1.177	2.008	OK	< LOD
	As	17.7	0	35	15.099	5.794	OK	
	Hg	1.4	-10	10	1.45	3.894	OK	< LOD
	Zn	106	50	160	79.393	12.637	OK	
	W	2	-80	80	-2.103	28.056	OK	< LOD
	Cu	34.6	0	60	27.246	14.571	OK	
	Ni	88	0	125	71.918	23.751	OK	
	Co	13.4	-250	250	49.972	87.258	OK	< LOD
	Fe	35000	25000	35000	30531.422	406.981	OK	
	Mn	538	0	700	447.294	69.572	OK	
	Cr	130	50	200	110.297	25.027	OK	
	V	112	-300	400	147.626	50.357	OK	
	Ti	3420	2700	4100	3553.119	148.304	OK	
	Sc	NR	-250	250	38.989	37.816	OK	< LOD
	Ca	18900	13900	23900	19844.287	374.355	OK	
	K	20300	15300	25300	17564.73	453.877	OK	
	S	890	-150000	150000	103.341	708.209	OK	< LOD

NIST HIGH								
	Ba	707	507	907	810.15	70.47	OK	
	Cs	107	0	400	71.02	15.63	OK	
	Te	-	-300	300	95.24	47.76	OK	
	Sb	38.4	-100	110	55.26	17.75	OK	
	Sn	-	-100	100	43.04	17.76	OK	
	Cd	21.8	-10	50	29.05	12.49	OK	
	Ag	35.3	0	60	46.92	9.34	OK	
	Pd	-	-70	70	1.18	12.73	OK	< LOD
	Mo	19	0	30	14.04	3.71	OK	
	Zr	-	-	-	139.14	9.68	-	
	Sr	330	280	380	323.57	10.47	OK	
	U	25	10	40	24.64	13.24	OK	
	Rb	120	80	160	90.37	6.21	OK	
	Th	13	-80	80	66.69	28.42	OK	
	Pb	5532	5400	5700	5475.59	84.68	OK	
	Se	NR	-30	30	2.49	5.22	OK	< LOD
	As	626	510	750	689.81	65.29	OK	
	Hg	32.6	0	50	22.17	9.78	OK	
	Zn	6952	6700	7250	6978.83	117.37	OK	
	W	93	0	400	106.12	77.98	OK	< LOD
	Cu	2950	2700	3200	2829.93	85.48	OK	
	Ni	14.3	0	105	34.55	29.10	OK	< LOD
	Co	10	-270	270	-92.24	112.82	OK	< LOD
	Fe	33800	30420	37180	34439.21	476.41	OK	
	Mn	10100	9500	11000	9925.23	312.42	OK	
	Cr	39	-100	120	43.70	25.58	OK	
	V	76.6	-200	300	120.29	49.23	OK	
	Ti	2830	2260	3400	2676.40	141.77	OK	
	Sc	8.7	-160	160	55.89	32.00	OK	
	Ca	12500	8000	17000	10843.01	309.43	OK	
	K	21100	16100	26100	17614.92	483.48	OK	
	S	2400	-140000	140000	3021.30	970.56	OK	

RCRA							
	Ba	500	-	-	624.134	46.273	-
	Cs	-	-	-	36.197	13.572	-
	Te	-	-	-	19.233	41.48	-
	Sb	0	-	-	-2.625	16.23	-
	Sn	0	-	-	32.105	16.769	-
	Cd	500	-	-	550.271	19.802	-
	Ag	500	400	600	529.858	17.234	OK
	Pd	-	-	-	30.44	13.452	-
	Mo	-	-	-	1.407	3.173	-
	Zr	-	-	-	243.055	7.234	-
	Sr	-	-	-	187.783	6	-
	U	-	-	-	1.512	6.816	-
	Rb	-	-	-	92.132	5.119	-
	Th	-	-	-	24.258	6.912	-
	Pb	500	400	600	400.609	21.161	OK
	Se	500	400	600	442.954	15.03	OK
	As	500	400	600	417.491	20.451	OK
	Hg	-	-	-	3.577	4.788	-
	Zn	-	-	-	59.248	9.851	-
	W	-	-	-	15.31	29.538	-
	Cu	-	-	-	17.931	11.425	-
	Ni	-	-	-	16.745	21.483	-
	Co	-	-	-	18.04	75.689	-
	Fe	-	-	-	14916.551	237.801	-
	Mn	-	-	-	292.555	55.347	-
	Cr	-	-	-	967.936	34.836	-
	V	500	-	-	90.022	39.6	-
	Ti	-	-	-	3734.367	153.057	-
	Sc	-	-	-	12.902	25.527	-
	Ca	-	-	-	13686.744	333.832	-
	K	-	-	-	34651.57	695.01	-
	S	-	-	-	1262.821	671.689	-

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST MED	Ba	726	500	900	651.263	62.059	OK	
	Cs	6.1	-300	300	31.819	13.769	OK	
	Te	-	-300	300	21.079	42.139	OK	< LOD
	Sb	19.4	-80	100	25.193	15.668	OK	
	Sn	-	-90	90	20.633	15.624	OK	< LOD
	Cd	41.7	0	70	55.896	11.921	OK	
	Ag	4.63	-30	40	16.199	7.542	OK	
	Pd	-	-60	60	-0.215	11.478	OK	< LOD
	Mo	1.6	-10	10	2.974	3.147	OK	< LOD
	Zr	230	30	430	311.188	10.041	OK	
	Sr	245.3	180	300	226.237	7.649	OK	
	U	2.6	-15	15	3.294	8.368	OK	< LOD
	Rb	110	60	115	78.521	4.788	OK	
	Th	14	-20	50	18.247	10.124	OK	
	Pb	1162	1000	1200	1104.577	33.858	OK	
	Se	1.52	-10	15	2.297	2.781	OK	< LOD
	As	105	65	145	103.157	29.732	OK	
	Hg	6.25	-10	15	3.066	4.59	OK	< LOD
	Zn	350.4	250	450	307.044	22.665	OK	
	W	3	-80	80	15.79	31.413	OK	< LOD
	Cu	114	74	154	105.614	19.391	OK	
	Ni	20.6	-30	100	23.937	22.574	OK	< LOD
	Co	10	-200	200	165.28	81.907	OK	
	Fe	28900	20000	40000	24483.787	371.175	OK	
	Mn	638	300	700	452.292	69.763	OK	
	Cr	47	-250	300	46.295	21.329	OK	
	V	81.6	-300	350	110.973	41.879	OK	
	Ti	3060	2450	3670	2844.74	123.993	OK	
	Sc	9	-300	300	77.515	41.043	OK	
	Ca	28800	20160	37440	27026.629	406.039	OK	
	K	24500	17150	31850	20562.055	460.306	OK	
	S	420	-160000	160000	1103.969	746.32	OK	< LOD

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
TILL4	Ba	395	195	595	567.844	63.445	OK	
	Cs	12	-300	300	51.415	14.357	OK	
	Te	-	-300	300	75.915	44.325	OK	
	Sb	1	-100	100	4.066	15.76	OK	< LOD
	Sn	-	-100	100	56.043	16.615	OK	
	Cd	-	-70	70	3.056	11.084	OK	< LOD
	Ag	-	-50	50	-3.847	7.105	OK	< LOD
	Pd	-	-60	60	16.774	12.537	OK	< LOD
	Mo	16	0	30	11.405	3.465	OK	
	Zr	385	185	585	415.512	11.155	OK	
	Sr	109	50	150	111.949	5.593	OK	
	U	5	-20	20	1.25	9.17	OK	< LOD
	Rb	161	100	210	115.609	5.694	OK	
	Th	17.4	-40	70	49.205	7.834	OK	
	Pb	50	30	70	44.038	9.603	OK	
	Se	-	-15	15	0.85	2.622	OK	< LOD
	As	111	80	140	109.596	11.696	OK	
	Hg	-	-15	15	1.534	5.731	OK	< LOD
	Zn	70	45	95	56.421	13.119	OK	
	W	204	130	270	184.274	41.153	OK	
	Cu	237	200	280	215.375	24.592	OK	
	Ni	17	-50	90	35.491	23.604	OK	
	Co	8	-300	300	46.271	99.959	OK	< LOD
	Fe	39700	29700	49700	37843.348	467.498	OK	
	Mn	490	300	600	344.611	68.329	OK	
	Cr	53	-50	150	38.232	23.763	OK	
	V	67	-150	250	108.63	50.307	OK	
	Ti	4840	3870	5808	4756.468	156.378	OK	
	Sc	10	-150	150	41.75	26.853	OK	
	Ca	-	-	-	7421.025	264.395	-	
	K	-	-	-	24373.996	541.652	-	
	S	800	-130000	130000	382.502	745.456	OK	< LOD

DL1a	Ba	-	-	-	236.503	52.628	-
	Cs	-	-	-	1.256	12.168	-
	Te	-	-	-	-10.89	37.52	-
	Sb	-	-	-	1.119	13.632	-
	Sn	-	-	-	-6.351	13.621	-
	Cd	-	-	-	-7.577	9.391	-
	Ag	-	-	-	4.312	6.418	-
	Pd	-	-	-	10.639	10.681	-
	Mo	-	-	-	2.589	2.756	-
	Zr	-	-	-	95.856	5.567	-
	Sr	-	-	-	16.386	2.396	-
	U	116	93	140	113.169	11.794	OK
	Rb	-	-	-	70.289	4.596	-
	Th	76	60	92	80.44	8.8	OK
	Pb	-	-	-	53.426	9.114	-
	Se	-	-	-	0.692	2.006	-
	As	-	-	-	1.818	6.287	-
	Hg	-	-	-	0.549	3.512	-
	Zn	-	-	-	47.739	9.8	-
	W	-	-	-	12.102	24.874	-
	Cu	-	-	-	34.785	13.232	-
	Ni	-	-	-	11.838	17.506	-
	Co	-	-	-	36.992	37.418	-
	Fe	9000	-	-	5160.472	145.944	-
	Mn	-	-	-	73.856	34.227	-
	Cr	-	-	-	8.937	14.704	-
	V	-	-	-	72.266	23.613	-
	Tl	900	-	-	900.289	63.655	-
	Sc	-	-	-	1.672	11.044	-
	Ca	3000	-	-	2302.513	127.033	-
	K	2000	-	-	20725.002	349.919	-
	S	4000	-	-	702.008	430.067	-

This certificate is issued in accordance with Thermo Fisher Scientific factory specifications.
The measurements were found to be within specification limits at the time of manufacture and calibration.

Standards used for factory calibrations are certified reference materials (CRM) or reference materials (RM) where available.
Certificates of Analysis are available upon request.

Technician: N. Dhakal

Signed: Dhakal

ELEMENTAL CONTROLS

3230 Wharton Way
Mississauga, ON L4X 2C1
Tel: 905-282-9974
Fax: 905-282-9519
www.elementalcontrols.com

Inventory Checklist

Model: XL3+-500 **Date Out:** Aug 28/2014

Serial: 32536 **Date In:**

		Qty Out	Qty In	Location	Notes
1	Analyzer case and foam	1			
2	Lead foam insert	1			
3	Holster	1			
4	Holster belt	1			
5	Batteries	2			
6	Stylus	2			
7	Battery case	1			
8	Case lock	1			
9	Battery charger	1			
10	Charger cable	1			
11	Charger base (XL3)	1			
12	RS-232 Download cable	1			
13	USB Download Cable	1			
14	Reference Standard(s)	1set			5 std's
15	NDT software	1			
16	Quick Start Guide	1			
17	Quick Start Reference Sheet	1			
18	Weld mask	N/A			
19	Leak Test Certificate *(if applicable)*	N/A			

Analyzer Accessories/Peripherals

1	Mobile Test Stand	1			
2	Sample Cups	1			
3	Film / Mylar	1			
4					
5					
6					
7					
8					
9					
10					

Verfication
(For internal use only)

Outgoing: 180.79 ev 1σ.

Incoming:

ELEMENTAL CONTROLS

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Mississauga, ON L4X 2C1
Tel: 905-282-9974
Fax: 905-282-9519
www.elementalcontrols.com

Quality Control Inspection - Standard Soil

Model: XL3t 500
Serial: 32536
Resolution: 180.79 eV / Escale: 7.92

Software: 8.4A
Source: X-Ray Tube
Date: August-26-14

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST HIGH	Ba	707	507	907	766.20	69.85	OK	
	Cs	107	0	400	62.26	15.51	OK	
	Te	-	-300	300	90.18	47.53	OK	
	Sb	38.4	-100	110	30.87	17.29	OK	
	Sn	-	-100	100	35.01	17.55	OK	
	Cd	21.8	-10	50	26.12	12.38	OK	
	Ag	35.3	0	60	37.36	9.00	OK	
	Pd	-	-70	70	8.18	13.00	OK	< LOD
	Mo	19	0	30	11.78	3.65	OK	
	Zr	-	-	-	135.80	9.51	-	
	Sr	330	280	380	322.88	10.41	OK	
	U	25	10	40	30.50	13.50	OK	
	Rb	120	80	160	92.77	6.27	OK	
	Th	13	-80	80	32.15	25.05	OK	< LOD
	Pb	5532	5400	5700	5499.39	84.45	OK	
	Se	-	-30	30	2.28	5.07	OK	< LOD
	As	626	510	750	631.78	64.77	OK	
	Hg	32.6	0	50	24.30	9.44	OK	
	Zn	6952	6700	7250	6834.59	115.61	OK	
	W	93	0	400	44.61	74.69	OK	< LOD
	Cu	2950	2700	3200	2850.66	85.34	OK	
	Ni	14.3	0	105	18.85	28.88	OK	< LOD
	Co	10	-270	270	87.19	113.53	OK	< LOD
	Fe	33800	30420	37180	33408.82	467.39	OK	
	Mn	10100	9500	11000	9941.83	311.03	OK	
	Cr	39	-100	120	36.97	25.76	OK	< LOD
	V	76.6	-200	300	105.22	49.83	OK	
	Ti	2830	2260	3400	2708.34	144.61	OK	
	Sc	8.7	-160	160	33.23	31.78	OK	< LOD
	Ca	12500	8000	17000	10650.51	312.96	OK	
	K	21100	16100	26100	17458.64	490.78	OK	
	S	2400	-140000	140000	4265.59	1072.31	OK	

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
TILL4	Ba	395	195	595	508.059	61.928	OK	
	Cs	12	-300	300	49.037	14.11	OK	
	Te	-	-300	300	52.179	43.307	OK	< LOD
	Sb	1	-100	100	10.722	15.608	OK	< LOD
	Sn	-	-100	100	49.199	16.259	OK	
	Cd	-	-70	70	4.771	10.942	OK	< LOD
	Ag	-	-50	50	2.707	7.212	OK	< LOD
	Pd	-	-60	60	4.537	11.841	OK	< LOD
	Mo	16	0	30	10.243	3.48	OK	
	Zr	385	185	585	448.374	11.564	OK	
	Sr	109	50	150	116.79	5.712	OK	
	U	5	-20	20	-1.881	10.161	OK	< LOD
	Rb	161	-	-	112.456	5.618	-	
	Th	17.4	-40	70	56.396	8.837	OK	
	Pb	50	30	70	43.341	9.661	OK	
	Se	-	-15	15	3.388	2.827	OK	< LOD
	As	111	80	140	97.932	10.149	OK	
	Hg	-	-15	15	-0.497	5.488	OK	< LOD
	Zn	70	45	95	54.585	12.944	OK	
	W	204	130	270	166.418	40.023	OK	
	Cu	237	200	280	228.132	25.092	OK	
	Ni	17	-50	90	16.144	23.508	OK	< LOD
	Co	8	-300	300	212.553	102.962	OK	
	Fe	39700	29700	49700	33326.059	411.104	OK	
	Mn	490	300	600	380.523	69.996	OK	
	Cr	53	-50	150	30.519	23.855	OK	< LOD
	V	67	-150	250	127.837	51.349	OK	
	Ti	4840	3870	5808	4824.445	158.658	OK	
	Sc	10	-150	150	46.7	27.363	OK	
	Ca	-	-	-	7527.25	267.762	-	
	K	-	-	-	24180.563	544.172	-	
	S	800	-130000	130000	1257.017	823.304	OK	

Standard	Ele	Expected	Low	High	Measured	Error	Check	<LOD?
NIST 2780	Ba	993	844	1142	1210.32	70.57	Review	
	Cs	13	-10	100	82.38	15.04	OK	
	Te	-	0	150	125.16	46.00	OK	
	Sb	160	100	250	185.70	18.88	OK	
	Sn	-	-20	100	54.88	17.20	OK	
	Cd	12.1	5	30	25.08	11.85	OK	
	Ag	27	0	120	38.14	8.67	OK	
	Pd	-	-15	15	16.44	12.81	Review	< LOD
	Mo	11	0	20	6.23	3.36	OK	
	Zr	176	131	220	209.36	9.77	OK	
	Sr	217	195	239	228.51	8.32	OK	
	U	4	-20	20	7.96	12.33	OK	< LOD
	Rb	175	140	210	127.10	6.55	Review	
	Th	12	0	55	73.39	23.59	Review	
	Pb	5770	4904	6635	5066.16	76.30	OK	
	Se	5	-10	10	2.76	4.57	OK	< LOD
	As	48.8	0	90	23.66	55.20	OK	< LOD
	Hg	0.71	-15	15	1.74	6.33	OK	< LOD
	Zn	2570	1800	3340	2176.59	61.43	OK	
	W	-	-100	100	26.02	47.06	OK	< LOD
	Cu	215.5	151	280	188.36	25.75	OK	
	Ni	-	-100	100	10.24	24.29	OK	< LOD
	Co	-	-200	200	24.59	88.64	OK	< LOD
	Fe	27840	22272	33408	23402.38	361.90	OK	
	Mn	462	415	508	368.02	71.65	Review	
	Cr	-	0	70	22.72	22.03	OK	< LOD
	V	268	150	350	321.73	59.15	OK	
	Ti	6990	6291	7689	7206.62	178.64	OK	
	Sc	-	-20	20	12.93	15.71	OK	< LOD
	Ca	1950	1000	3000	1481.83	172.60	OK	
	K	33800	30420	37180	31894.10	566.52	OK	
	S	12630	5000	15000	12338.87	1309.64	OK	

Standards used for factory calibrations are certified reference materials (CRM) or reference materials (RM) where available.
Certificates of Analysis are available upon request.

Technician: C. Castillo

Signed: C. Castillo

ELEMENTAL CONTROLS

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Quality Control Inspection - Mining Mode

Model:	XL3t 500	**Software:**	8.4A
Serial:	32536	**Source:**	X-Ray Tube
Resolution:	172.51 eV / Escale: 7.92	**Date:**	August-26-14
Resolution 2:	N/A		

Standard	Ele	Expected (%)	Low	High	Measured	Error	Check	<LOD?
BCS 355	Ba	-	0	0.1	0.00	0.05	OK	< LOD
	Sb	-	0	0.1	0.00	0.01	OK	< LOD
	Sn	31.42	26.7	36.1	30.44	1.55	OK	
	Cd	-	0	0.1	0.02	0.01	OK	
	Pd	-	0	0.02	0.00	0.00	OK	< LOD
	Ag	-	0	0.02	0.00	0.00	OK	< LOD
	Bal	36.5	-	-	49.62	2.21	-	
	Mo	-	0	0.02	0.00	0.00	OK	< LOD
	Nb	-	0	0.02	0.00	0.00	OK	
	Zr	0.059	0	0.1	0.01	0.00	OK	
	Sr	-	0	0.05	0.00	0.00	OK	
	Rb	-	0	0.05	0.00	0.00	OK	
	Bl	0.015	0	0.025	0.01	0.00	OK	
	Se	-	0	0.05	0.00	0.00	OK	< LOD
	As	0.14	0.05	0.25	0.09	0.01	OK	
	Pb	0.012	0	0.05	0.00	0.00	OK	
	W	0.35	0.28	0.42	0.27	0.03	Review	
	Zn	0.06	0.02	0.1	0.04	0.01	OK	
	Cu	0.085	0.04	0.14	0.06	0.01	OK	
	Ni	-	0	0.05	0.01	0.01	OK	
	Co	-	0	0.05	0.00	0.04	OK	< LOD
	Fe	17.08	14	20	15.87	0.59	OK	
	Mn	-	0.1	0.5	0.18	0.03	OK	
	Cr	-	0	0.05	0.01	0.01	OK	
	V	-	0	0.05	0.02	0.01	OK	< LOD
	Ti	0.37	0.29	0.5	0.33	0.03	OK	
	Ca	2.63	1.6	6	2.09	0.12	OK	
	K	-	0	1.5	0.23	0.19	OK	< LOD
	S	0.5	0.3	0.7	0.69	0.52	OK	< LOD

Standard	Ele	Expected (%)	Low	High	Measured	Error	Check	<LOD?
NIST 2709	Ba	0.0979	-	-	0.060	0.007	-	
	Sb	-	-	-	0.000	0.001	-	< LOD
	Sn	-	-	-	0.000	0.002	-	< LOD
	Cd	-	-	-	0.000	0.001	-	< LOD
	Pd	-	-	-	0.000	0.001	-	< LOD
	Ag	-	-	-	0.000	0.001	-	< LOD
	Bal	-	-	-	91.108	0.199	-	
	Mo	-	-	-	0.001	0.001	-	< LOD
	Nb	-	-	-	0.002	0.001	-	
	Zr	0.0195	-	-	0.015	0.001	-	
	Sr	0.0239	-	-	0.021	0.001	-	
	Rb	0.0099	-	-	0.010	0.001	-	
	Bl	-	-	-	0.002	0.001	-	
	Se	-	-	-	0.000	0.001	-	< LOD
	As	0.00105	-	-	0.001	0.001	-	< LOD
	Pb	0.00173	-	-	0.002	0.001	-	
	W	-	-	-	0.000	0.009	-	< LOD
	Zn	0.0103	-	-	0.011	0.002	-	
	Cu	0.00339	-	-	0.004	0.003	-	< LOD
	Ni	0.0085	-	-	0.006	0.004	-	< LOD
	Co	-	-	-	0.000	0.015	-	< LOD
	Fe	3.36	-	-	3.910	0.102	-	
	Mn	0.0529	-	-	0.053	0.01	-	
	Cr	0.013	-	-	0.030	0.003	-	
	V	0.011	-	-	0.021	0.007	-	
	Ti	0.336	-	-	0.331	0.015	-	
	Ca	1.91	-	-	1.966	0.061	-	
	K	2.11	-	-	2.087	0.091	-	
	S	-	-	-	0.360	0.316	-	< LOD

TILL 4	Ba	-	-	-	0.02	0.01	-	
	Sb	-	-	-	0.00	0.00	-	< LOD
	Sn	-	-	-	0.00	0.00	-	< LOD
	Cd	-	-	-	0.00	0.00	-	< LOD
	Pd	-	-	-	0.00	0.00	-	< LOD
	Ag	-	-	-	0.00	0.00	-	< LOD
	Bal	-	-	-	90.85	0.21	-	
	Mo	-	-	-	0.00	0.00	-	
	Nb	-	-	-	0.00	0.00	-	
	Zr	-	-	-	0.04	0.00	-	
	Sr	-	-	-	0.01	0.00	-	
	Rb	-	-	-	0.02	0.00	-	
	Bl	-	-	-	0.01	0.00	-	
	Se	-	-	-	0.00	0.00	-	< LOD
	As	-	-	-	0.01	0.00	-	
	Pb	-	-	-	0.01	0.00	-	
	W	-	-	-	0.03	0.01	-	
	Zn	-	-	-	0.01	0.00	-	
	Cu	-	-	-	0.03	0.00	-	
	Ni	-	-	-	0.00	0.00	-	< LOD
	Co	-	-	-	0.00	0.02	-	< LOD
	Fe	3.97	3.5	5	4.71	0.12	OK	
	Mn	-	-	-	0.05	0.01	-	
	Cr	-	-	-	0.02	0.00	-	
	V	-	-	-	0.02	0.01	-	
	Ti	0.484	-	-	0.43	0.02	-	
	Ca	-	-	-	0.80	0.05	-	
	K	2.68	2.3	3.5	2.93	0.11	OK	
	S	-	-	-	0.00	0.37	-	< LOD

Standards are traceable to National Institute of Standards & Technology (NIST) s

Technician: C. Castillo

Signed: C Castillo

National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 2780

Hard Rock Mine Waste

This Standard Reference Material (SRM) is intended for use in the evaluation of methods and for the calibration of apparatuses used to determine heavy metals and other elements in hard rock mine waste and materials of a similar matrix. SRM 2780 is composed of material collected from a waste pile of an abandoned mine site near Silverton, CO. A unit of SRM 2780 consists of approximately 50 g of material of which 90 % passes a 150 µm (No. 100) sieve.

Certified Mass Fraction Values: Certified mass fraction values for 12 elements are listed in Table 1. A NIST certified value is a value for which NIST has the highest confidence in its accuracy in that all known or suspected sources of bias have been investigated or taken into account. All values are reported as mass fractions [1], on a dry-mass basis (see "Instructions for Drying"), and are based on measurements using a sample mass of at least 250 mg.

Reference Mass Fraction Values: Reference mass fraction values for seven elements are provided in Table 2. A NIST reference value is a noncertified value that is the best estimate of the true value based on available data; however, the value does not meet the NIST criteria for certification and is provided with associated uncertainties that may reflect only measurement reproducibility, may not include all sources of uncertainty, or may reflect a lack of sufficient statistical agreement among multiple analytical methods. Mass fraction values are on a dry-mass basis.

Information Mass Fraction Values: Information mass fraction values for 28 elements are provided in Table 3. An information value is a value that may be of use to the SRM user, but insufficient information is available to assess adequately the uncertainty associated with the value.

Expiration of Certification: The certification of **SRM 2780** is valid, within the measurement uncertainty specified, until **31 December 2014**, provided the SRM is handled and stored in accordance with instructions given in this certificate (see "Instructions for Use"). This certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

The overall direction and coordination of the technical measurements leading to the certification of this SRM were performed by G.C. Turk of the NIST Chemical Sciences Division.

Analytical measurements at NIST were performed by C.M. Beck II, W.R. Kelly, S.E. Long, J.L. Mann, A.F. Marlow, J.R. Sieber, R.D. Vocke, Jr., and L.L. Yu of the NIST Chemical Sciences Division.

Statistical consultation was provided by S.D. Leigh and D.D. Leber of the NIST Statistical Engineering Division.

Mine waste sample collection, preparation of the SRM, and contributing chemical analyses were performed by the U.S. Geological Survey (USGS) under the direction of S.A. Wilson. Details are described [3] in USGS Open-File Report 99-370 and is available by contacting the USGS Earth Science Information Center: telephone (303) 202-4210; or e-mail infoservices@usgs.gov.

Carlos A. Gonzalez, Chief
Chemical Sciences Division

Robert L. Watters, Jr., Director
Office of Reference Materials

Gaithersburg, MD 20899
Certificate Issue Date: 11 October 2012
Certificate Revision History on Last Page

Thermo Scientific™ Niton™ XRF Analyzers

CERTIFICATE OF ANALYSIS

Type P/N Element	RM 180-646 Till-4	CRM 180-649 NIST 2709a	Blank 180-647 SiO2 99.995%	QC Material 180-673 USGS SAR-M	QC Material 180-661 RCRA1
Ba Barium 56	395	979	<10	801	1000
Cs Cesium 55	12		<10		
Te Tellurium 52			<10	<10	
Sb Antimony 51	<30	<30	<10	<30	
Sn Tin 50			<10	2.76	
Cd Cadmium 48		<10	<10	5.27	500
Ag Silver 47			<10	<10	500
Pd Palladium 46			<10		
Mo Molybdenum 42	16		<10	13.1	
Zr Zirconium 40	385	195	<10		
Sr Strontium 38	109	239	<10	151	
U Uranium 92	<20	<10	<10	<10	
Rb Rubidium 37	161	99	<10	146	
Th Thorium 90	17.4	10.9	<10	17.2	
Pb Lead 82	50	17.3	<10	982	500

Type P/N Element	RM 180-646 Till-4	CRM 180-649 NIST 2709a	Blank 180-647 SiO2 99.995%	QC Material 180-673 USGS SAR-M	QC Material 180-661 RCRA1
Au Gold 79	<10		<10	<10	
Se Selenium 34			<10	<10	500
As Arsenic 33	111	10.5	<10	38.8	500
Hg Mercury 80		0.9	<10		
Zn Zinc 30	70	103	<10	930	
W Tungsten 74	204		<10		
Cu Copper 29	237	33.9	<10	331	
Ni Nickel 28	<60	85	<10		
Co Cobalt 27		<50	<10	<50	
Fe Iron 26	39700	33600	<10	29900	
Mn Manganese 25	490	529	<10	5220	
Cr Chromium 24	<65	130	<10	79.7	500
V Vanadium 23	67	110	<10	67.2	
Ti Titanium 22	4840	3360	<10	3800	
Sc Scandium 21	<90	11.1	<10	<90	

Part Number: 410-014a

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—continued next page

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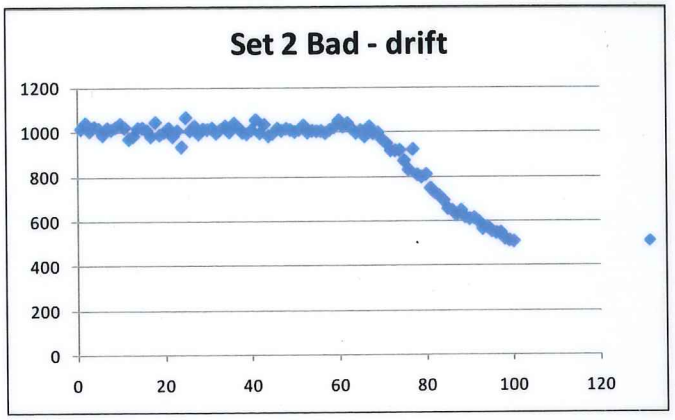
Thermo SCIENTIFIC

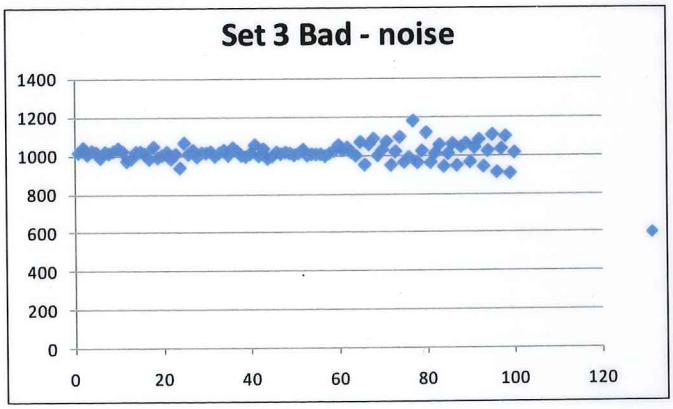
Thermo Scientific Niton XRF Analyzers

CERTIFICATE OF ANALYSIS — PAGE 2

Type P/N Element	RM 180-646 Till-4	CRM 180-649 NIST 2709a	Blank 180-647 SiO2 99.995%	QC Material 180-673 USGS SAR-M	QC Material 180-661 RCRA1
Ca Calcium 20		19100	<10	6100	
K Potassium 19		21100	<10	29400	
Cl Chlorine 17					
S Sulfur 16	800		<10		
P Phosophorus 15	880	688	<10	70	
Si Silicon 14	303833	303000	<10	338000	
Al Aluminum 13	20400	73700	<10	63000	
Mg Magnesium 12	7598	14600	<10	5000	

Requires GOLDD technology for mining & minerals mode





Notes:

- All results are listed in ppm (mg/kg).
- To convert to %, divide by 10,000; e.g. 39700ppm Fe (Till-4) is 3.97%.
- Original certificates of analysis (if available) are on TOPS and can be requested from customer support.
- While every effort is made to ensure the high quality of these reference samples and their data, the use of the materials and interpretation of the results is the sole responsibility of the user.

Use of reference materials

The reference materials provided with your analyzer are to help ensure the ongoing performance of your analyzer. These standards should be analyzed on a daily basis and the values obtained checked against this certificate of analysis. For quality assurance purposes you may wish to keep a running chart of the values obtained and monitor them for consistency.

If one or more of the elements begins to change in terms of reported concentration outside of the normal expected variability, the sample may have become damaged or contaminated. This may occur for a number of reasons. For example, oils and salts may transfer from hand contact onto the surface, dust or lint from the surroundings may be deposited onto the sample, or the thin film on the front of the cup may have pinholes or have been torn. If the cup film has torn or has been damaged in any other way, it should be replaced immediately; this will prevent loss of the material and prevent contamination of the instrument and other samples.

If the film has been torn and the sample exposed for a period of time, then it may be best to assume the sample is contaminated. Dispose of it following your local regulations, and then replace it as soon as possible. Also check the front window of the instrument and clean or replace it if necessary.

Examples of daily quality assurance charts are shown above; learn to understand normal variance and recognize drift and noise. Results from your instrument may be as much as +/-20% of the listed values, depending on the model you have. However, by using the same integration time every time, your results should be consistent with themselves. If you have more questions, please refer to the Statistical Aspects of Spectrometry section of the manual under Reference Documents, or call our Customer Support group.

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Analytical Reference Materials International

Provisional Certificate of Analysis

Certified Reference Material

Grade: 1-1/4Cr 1/2Mo / UNS K11572

Part Number (Q.A. NO.): **IARM 35HN**

Certificate Date: **01/11/2007** Certificate No.: **35HN-01112007-IARM-P** Revision Date: **01/11/2007**

Interpretation of Data

1. Certified values listed below reflect analysis results submitted by qualified analytical laboratories using a combination of methods and instrumentation that emulate actual methods and instrumental techniques currently utilized in the analytical community and are reported as % wt. unless otherwise noted.
2. Any data reported and enclosed by a **parentheses ( ) is a "best estimate" and is NOT CERTIFIED.** This data could not be quantified sufficiently for certification. It was however, reported by enough laboratories to be considered as potentially present in the matrix of the material being examined.
3. The "Inter-laboratory Analysis Program" (ILAP) utilized in the establishment of the data are an ongoing program with permanent membership. Certain elements may be selected by a consensus of the members for more extensive testing. Therefore the data in **brackets [ ] indicates further testing is in process.**
4. The **"±Estimated Uncertainty"** is enclosed by a **parentheses ( ) below** the individual **element's concentration** and is based on a Confidence Interval at 95%. Included in this estimated uncertainty, are the combined effects of method imprecision, material inhomogeneity, and any bias between methods.

Important: A "User Registration Card" accompanies all shipments. This card should be completed immediately upon receipt of materials with the appropriate user information. This is the only way in which ARMI can guarantee customer updates or possible data modifications!

Aluminum	Arsenic	Boron	Carbon	Calcium	Cobalt	Chromium	Copper
[0.027]	[0.003]	[0.0003]	[0.13]		[0.004]	[1.11]	[0.031]
[(0.002)]	[(0.001)]	[(0.0001)]	[(0.002)]		[(0.001)]	[(0.01)]	[(0.002)]
Manganese	**Molybdenum**	**Nitrogen**	**Niobium**	**Nickel**	**Oxygen**	**Phosphorus**	**Lead**
[0.57]	[0.48]	[0.0074]	[0.002]	[0.071]	[0.002]	[0.004]	[<0.001]
[(0.01)]	[(0.01)]	[(0.0003)]	[(0.0004)]	[(0.001)]	[(0.001)]	[(0.001)]	
Sulfur	**Antimony**	**Silicon**	**Tin**	**Titanium**	**Vanadium**	**Tungsten**	**Zirconium**
[0.028]	[<0.002]	[0.56]	[0.002]	[0.002]	[0.004]	[0.004]	[<0.002]
[(0.001)]		[(0.01)]	[(0.0003)]	[(0.0003)]	[(0.0004)]	[(0.001)]	

The laboratories participating in the "Inter-Laboratory Analysis Program" (ILAP) and certification of this material are as follows:

AK Steel - Middletown, OH
ATI Allvac - Lockport, NY
Bodycote Materials Testing - Portland, OR
Colonial Metals Co. - Columbia, PA
Deloro Stellite, Inc. - Belleville, ON
IMR Test Labs - Lansing, NY
Koppel Steel - Koppel, PA
MetalTek International, Inc. - Waukesha, WI
Special Metals IncoTest - Hereford, UK
Tensile Testing - Cuyahoga Hts., OH
Algoma Steel, Inc. - Sault Ste. Marie, ON
Bodycote Materials Testing - Chicago, IL
Cannon Muskegon Corp. - Muskegon, MI
Crucible Research - Pittsburgh, PA
Ellwood National Steel - Irvine, PA
Jorgensen Forge Corp. - Seattle, WA
Laboratory Testing, Inc. - Hatfield, PA
MSI Testing & Engineering, Inc. - Melrose Park, IL
Staveley Services Materials Testing - Gary, IN
The Timken Company - Canton, OH
Anderson Laboratories, Inc. - Greendale, WI
Bodycote Materials Testing - Los Angeles, LA
Carpenter Technology Corporation - Reading, PA
Crucible Specialty Metals - Syracuse, NY
Ellwood Quality Steel - New Castle, PA
Kalco Metals, Inc - Farrell, PA
Lockheed Martin Astronautics - Littleton, CO
Outokumpu Stainless OY - Tornio Finland
Stork Materials Testing and Inspection - Huntington Beach, CA
Wheeling Pittsburgh Steel Corp. - Mingo Junction, OH

Traceability: All members of the "Inter-Laboratory Analysis Program" (ILAP) listed above validate test methods and instrument performance utilizing SRMs produced by the National Institute of Standards and Technology, (NIST) as well as other CRMs and RMs produced by recognized Certifying Bodies from around the world. The specific SRMs, CRMs and RMs applicable to the material covered by this certificate are: NIST 1262A, 1264A, BS 60C, 61C, 68C, 1962, 2941, 4931, NIST 361, IARM 35C, BS 2-1, LECO 501-643, 501-644, BS 3941, IARM 35A, 35B, LECO 501-501, 501-510, 501-550, NIST 1261A, 1263A, ALPHA AR873, LECO 501-550, IARM 35A, 35B, 35C, 35D, LECO 501-503, 501-550, IARM 35C, LECO 501-643, BCS 409, 351, 454/1, 462/1, LECO 501-551, 502-102, R5657, NIST 1263A, 1763, BS 12D, 46, ALPHA AR872, AR890, LECO 501-550, NIST 1761, 1762, 1763, 1764, 1765, 1766, 1767, NIST 1217, 1225, 1763, NIST 1166, 1263, 1265, 1765, BS 45, 61D, 3931, XCCS, 12X12749, ALPHA AR 1653, LECO 501-676, NIST 293, 337A, 361, 1160, 1161, 1162, 1163, 1164, 1754, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, BAS 401/1, 402/1, 403/1, 404/1, 405/1, 406/1, 407/2, 408/1, 409/1, 410/2, JSS ST01, IARM 31D, LECO 501-510, 501-645,SUS INOX, RE 12/19, C/17, D/18, BS CSN-3, CSN-4, LECO 501-871, NIST 1286, IARM 30B,

A specific line of traceability is established to NIST and other Certifying Bodies for those elements that are noted as "Certified Values" on the Certificates of Analyses referenced above.

See Reverse Side for Statistical Data and Additional Information Regarding this Material.

700 Corporate Cr., Suite A • Golden, Colorado 80401 • Telephone (303) 216-2621 • FAX (303) 216-2649

The following data and accompanying statements represent all pertinent information reported in the ILAP as it applies to the chemical characterization of this material as of 01/11/2007.

35H	Al	As	B	C	Co	Cr	Cu	Mn	Mo	N	Nb	Ni	O	P	Pb
1	0.029	0.0024	0.0002	0.144	0.0037	1.14	0.03	0.56	0.49	0.0074	0.001	0.07	0.0013	0.006	0.0002
2	0.030	0.0017	0.0005	0.1353	0.0066	1.108	0.031	0.564	0.4704	0.00735	0.0020	0.072	0.0021	0.0055	0.001
3	0.0268	0.0039	0.0001	0.1355	0.0036	1.104	0.0332	0.5521	0.4588	0.0081	0.0019	0.0717	0.000758	0.00565	0.0003
4	0.0274	0.002	0.00024	0.1346	0.0073	1.075	0.0340	0.549	0.47	0.0063	0.0016	0.076	0.0034	0.0031	0.0012
5	0.031	0.0023	0.00013	0.130	0.0040	1.091	0.041	0.571	0.474	0.00733	0.0028	0.073	0.0042	0.0045	0.0009
6	0.0293	0.0030	0.0002	0.134	0.0026	1.120	0.026	0.571	0.484	0.0070	0.003	0.072	0.0022	0.003	0.0014
7	0.0269	0.004	0.0003	0.1318	0.005	1.111	0.027	0.569	0.466	0.0069	0.0025	0.0668	0.0011	0.002	0.00115
8	0.023	0.0027	0.00020	0.135	0.004	1.098	0.032	0.583	0.470	0.00695	0.003	0.070	0.0009	0.0048	
9	0.032	0.0035	0.0004	0.133	0.002	1.103	0.0372	0.5749	0.4735	0.0065	0.001	0.076	0.00422	0.0051	
10	0.0205	0.0035	0.0006	0.137	0.004	1.102	0.019	0.562	0.469	0.0079	0.002	0.071	0.0018	0.007	
11	0.0250	0.0012		0.1337	0.0030	1.120	0.035	0.579	0.485	0.00841	0.0014	0.0686	0.00096	0.0016	
12	0.024	0.00245		0.144	0.0036	1.109	0.031	0.559	0.479	0.00876	0.0024	0.072	0.0013	0.0053	
13	0.0252			0.137		1.098	0.0314	0.553	0.4696	0.0079	0.0017	0.072		0.0041	
14	0.028			0.129		1.121	0.031	0.577	0.510	0.0083	0.0035	0.071		0.005	
15	0.02017			0.12538		1.13218	0.031	0.550	0.462	0.00730		0.070		0.0047	
16	0.0292			0.134		1.105	0.032	0.558	0.465	0.0067		0.0721		0.0031	
17	0.0268			0.1316		1.0855	0.01894	0.55192	0.48012	0.0072		0.0694		0.00416	
18	0.0245			0.1331		1.107	0.034	0.566	0.477			0.0681		0.0038	
19							0.0318	0.5638	0.4740					0.0045	
20							0.0345	0.591	0.4969					0.0038	
21							0.0251		0.505					0.00195	
Mean	0.0266	0.0027	0.0003	0.1343	0.0041	1.1072	0.0308	0.5652	0.4776	0.0074	0.0021	0.0712	0.0020	0.0042	0.0009
STDV.	0.0033	0.0009	0.0002	0.0045	0.0015	0.0158	0.0053	0.0117	0.0135	0.0007	0.0008	0.0024	0.0013	0.0014	0.0005
Certified	**0.027**	**0.003**	**0.0003**	**0.13**	**0.004**	**1.11**	**0.031**	**0.57**	**0.48**	**0.0074**	**0.002**	**0.071**	**0.002**	**0.004**	**<0.001**
95% C.I.	**0.002**	**0.001**	**0.0001**	**0.002**	**0.001**	**0.01**	**0.002**	**0.01**	**0.01**	**0.0003**	**0.0004**	**0.001**	**0.001**	**0.001**	
Methods	X,A,I,O	H,I,O	I,O	C,O	X,I,O	X,W,A,I,O	X,A,I,O	X,A,I,O	X,A,I,O	F,O	X,I,O	X,A,I,O	F	X,I,O	X,H,A,I,O

Legend: W = Classical, C = Combustion, F = Fusion, A = AA or GFAA, I = ICP or DCP, D = DC Arc, O = OE, X = XRF, G = GDMS, H = Hollow Cathode OE

35H	S	Si	Sn	Ti	V	W	Bi	Ca	Cd	Mg	Sb	Se	Ta	Zn	Zr
1	0.025	0.60	0.002	0.0022	0.003	0.0039	0.0065	0.00055		0.0007	0.0029	0.0035	0.014	0.0031	0.0022
2	0.026	0.545	0.0021	0.0015	0.0045	0.0051	0.0009	0.0002		0.0003	0.0010	<0.00003	<0.001	0.0027	0.003
3	0.0295	0.5658	0.0031	0.0023	0.0056	0.0042	<0.00003	0.001		0.00006	<0.001	0.00001	0.001	0.0010	0.0001
4	0.0276	0.558	0.0019	0.0017	0.0046	0.005	0.00004	<0.001			0.0008		0.001	0.0012	<0.001
5	0.0297	0.570	0.0026	0.0021	0.0046	0.0033	<0.001	<0.0001			<0.005		<0.001	0.0026	0.0004
6	0.027	0.551	0.002	0.002	0.0050	0.0021		0.00538			0.0054		0.00015	0.0019	0.0005
7	0.0306	0.565	0.0027	0.001	0.004	0.005					<0.0001				0.0008
8	0.0286	0.5729	0.0027	0.0017	0.004	0.0037					0.000542				
9	0.0277	0.547	0.0011	0.0013	0.005	0.0031									
10	0.0282	0.573	0.002	0.003	0.0033										
11	0.0259	0.543	0.0026	0.0017	0.0051										
12	0.0289	0.539	0.0010	0.0006	0.00472										
13	0.029	0.567	0.0019	0.0021	0.0042										
14	0.0252	0.552	0.0017	0.0021	0.0046										
15	0.028	0.576	0.0011	0.00135	0.0035										
16	0.02612	0.551			0.0032										
17	0.0286	0.5586													
18	0.0287	0.593													
19	0.0263														
20	0.02745														
Mean	0.0277	0.5626	0.0020	0.0018	0.0043	0.0039	0.0025	0.0018		0.0004	0.0021	0.0018	0.0040	0.0021	0.0012
STDV.	0.0016	0.0167	0.0006	0.0006	0.0008	0.0010	0.0035	0.0024		0.0003	0.0021	0.0025	0.0067	0.0009	0.0012
Certified	**0.028**	**0.56**	**0.002**	**0.002**	**0.004**	**0.004**					**<0.002**			**<0.003**	**<0.002**
95% C.I.	**0.001**	**0.01**	**0.0003**	**0.0003**	**0.0004**	**0.001**									
Methods	C,I,O	X,W,A,I,O	X,H,I,O	X,I,O	X,I,O	X,I,O					H,I,O			H,I,O	X,I,O

Legend: W = Classical, C = Combustion, F = Fusion, A = AA or GFAA, I = ICP or DCP, D = DC Arc, O = OE, X = XRF, G = GDMS, H = Hollow Cathode OE

The International Standards Organization (ISO) definitions, expressed in ISO Guide 30-1981-(E) list the following:

Certifying Body: A technically competent body (organization or firm, public or private) that issues a Reference Material Certificate. The only generally accepted certifying body in the United States is the U. S. Department of Commerce, National Institute of Standards & Technology, (NIST), Gaithersburg, MD.

Reference Material (RM): A material or substance with one or more properties which are sufficiently well established to be used for calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

Certified Reference Material (CRM): A reference material with one or more properties whose values are certified by a technically valid procedure accompanied by or traceable to a certificate or other documentation, which is issued by a Certifying Body.

Inter-Laboratory Analysis Program (ILAP): Although ASTM Standard E691-87 applies to inter-laboratory studies to "Determine the Precision of a Single Test Method", it is also a well thought out and logical plan for conducting an inter-laboratory program involving multiple techniques. Therefore, the planning, conducting, analyzing, protocol, and treatment of data resulting from this inter-laboratory program were performed utilizing the guidelines established in ASTM E691-87.

Methods of Analysis: In view of the fact, that the "Inter-Laboratory Analysis Program" entails a wide variety of materials, no single analytical method would provide optimum data results. Therefore, the methods utilized were a combination of ASTM Standard Methods for classical wet chemistry, ICP, AA, Optical Emission and X-Ray spectrometric methods. The determinations for Carbon, Sulfur, Nitrogen, and Oxygen are the result of combustion instrument procedures.

Selection of Materials: A **"batch"** or **"series"** is defined as a single bar of one continuous length and heat. The majority of materials are in wrought condition; other methods of manufacture are utilized as a less desirable resort. ILAP samples are taken by removing a section, a minimum of, every one-twelfth of total length from the entire bar. A portion of the section is converted to chips and thin (pin) disk for analysis by classical wet chemistry, ICP, AA, and combustion procedures, and the balance remains as a thick disk for OES and X-Ray analysis. Each member of the ILAP is furnished a sample pack from a specific location on the batch bar. This systematic sampling procedure results in the homogeneity being reflected as a product of the overall statistics and certified data. This method of homogeneity testing is in accordance with ISO Guide 34, regarding the systematic selection and testing of a representative number of units for the assessment of homogeneity.

William D. Britt, President & General Manager
Analytical Reference Materials International Corporation

Certificate No.: 35HN-01112007-IARM-P
Certificate Date: 01/11/2007
Revision Date/No.: 01/11/2007

Certificate of Analysis

Work Order : VC143661

[Report File No.: 0000009552]

To: **ACCOUNTS PAYABLE**
F406201 SGS CEMI INC.
3260 Production Way
BURNABY BC V5A 4W4

Date: Nov 25, 2014

P.O. No.	:	PO:3741/ PROJ: 1454 Faro
Project No.	:	-
No. Of Samples	:	5
Date Submitted	:	Nov 21, 2014
Report Comprises	:	Pages 1 to 2 (Inclusive of Cover Sheet)

Distribution of unused material:
Active files:

Certified By :

Cam Chiang
Assistant Operations Manager

SGS Minerals Services Geochemistry Vancouver conforms to the requirements of ISO/IEC 17025 for specific tests as listed on their scope of accreditation which can be found at http://www.scc.ca/en/search/palcan/sgs

Report Footer:

L.N.R. = Listed not received
n.a. = Not applicable
I.S. = Insufficient Sample
-- = No result

*INF = Composition of this sample makes detection impossible by this method

M after a result denotes ppb to ppm conversion, % denotes ppm to % conversion

Methods marked with an asterisk (e.g. *NAA08V) were subcontracted
Elements marked with the @ symbol (e.g. @Cu) denote assays performed using accredited test methods

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WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was (were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativity of the goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted. The findings report on the samples provided by the client and are not intended for commercial or contractual settlement purposes. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Final : VC143661 Order: PO:3741/ PROJ: 1454 Faro

Report File No.: 0000009552

Element	Zn
Method	GO_XRF77B
Det.Lim.	0.01
Units	%
Sample 47	0.01
Sample 61	0.02
Sample 67	0.02
Sample 81	0.01
Sample 100	<0.01
*Rep Sample 100	<0.01
*Std ME-4	1.11
*Blk BLANK	<0.01

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WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was (were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativity of the goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted. The findings report on the samples provided by the client and are not intended for commercial or contractual settlement purposes. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

APPENDIX E
UNDERHILL AS-BUILT SURVEYS

LIST OF UNDERHILL AS-BUILT SURVEYS

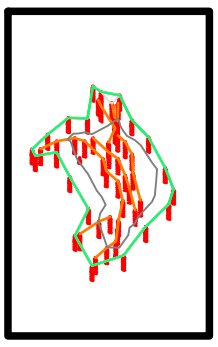
ID	Description	Date
1	20141106_DSAR 1 Ortho	November 6, 2014
2	20141106_DSAR 1	November 6, 2014
3	20141106_D14-194 DSAR	November 6, 2014
4	20141113_D14-194 DSAR Thickness	November 13, 2014
5	20141113_DSAR Final 1	November 13, 2014
6	20141113_DSAR Final 2	November 13, 2014
7	20141113_DSAR Final 3	November 13, 2014
8	20150219_Road Crossings	February 19, 2015
9	20150219_Road Crossings 2	February 19, 2015
10	20150219_Road Crossings 3	February 19, 2015

20141106_DSAR 1 ortho.pdf - Underhill Geomatics Ltd.

20141106_DSAR 1.pdf - Underhill Geomatics Ltd.

Road
Area = 842.59 m^2

Detail: Pile at Road entrance
Scale 1:500
Volume 44.4m^3



Road Shoulder Volume
122.4 m^3

Silt Fence 24.6m

Laydown
Area = 516.88 m^2

Area 1
258.57 m^2

Silt Fence 36.6m

Area 2
89.67 m^2

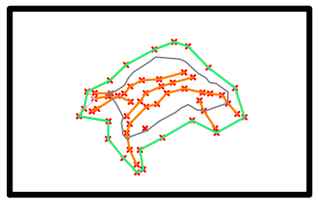
Area 3
101.06 m^2

Area 4
22.40 m^2

20141106_D14-194 DSAR.pdf - Underhill Geomatics Ltd.

Down Stream Access Road

Data point shown thus . . . . . ×



Detail: Pile at Road entrance
Scale 1:500
Volume 44.4m³

Match Line

Road Shoulder Volume 122.4 m³

Road CL

Cleared Road

Previously Cleared

Brush Pile

Toe of Pile

Brush Pile

Laydown Area
516.88 m²

Silt Fence 24.6m

Area 4
22.40 m²

Area 3
101.06 m²

Area 2
89.67 m²

Area 1
258.57 m²

Silt Fence 36.6m

Red Area 372.17 m²

Blue Area 427.48 m²

Road CL

Match Line

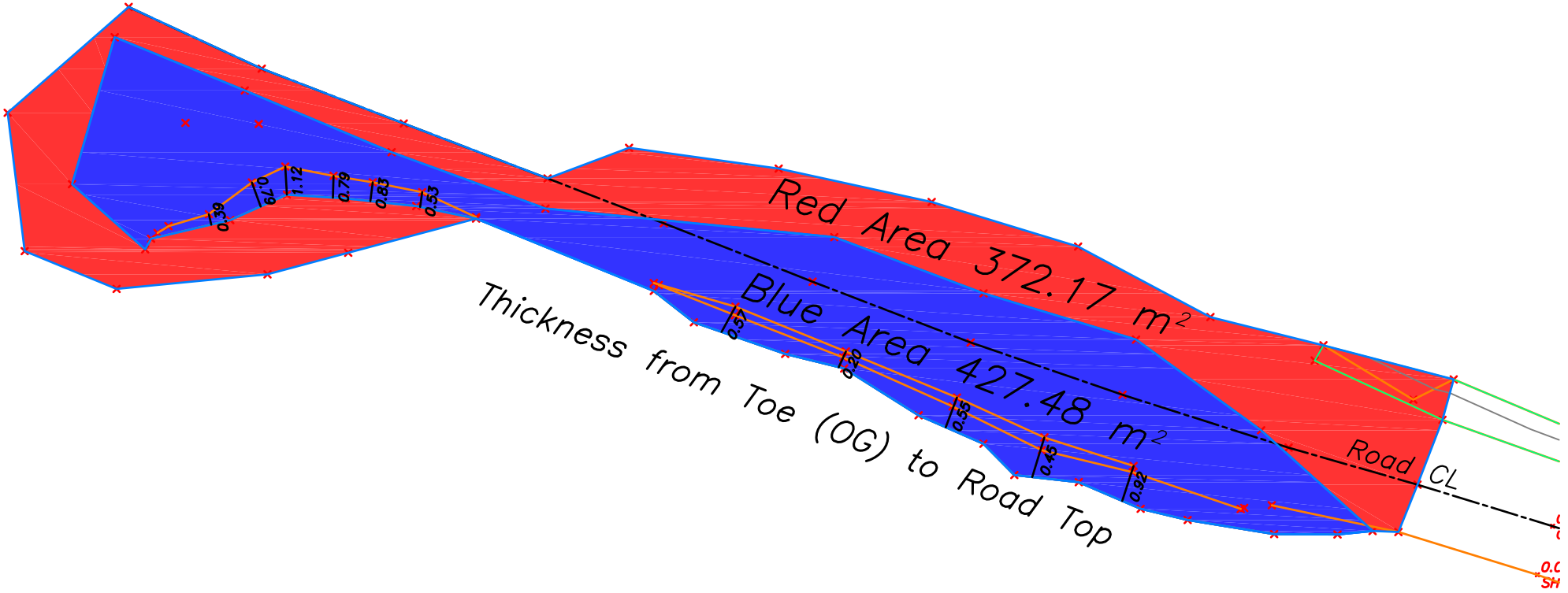
Scale 1:500

10 0 5 10 20 30 40 50 metres

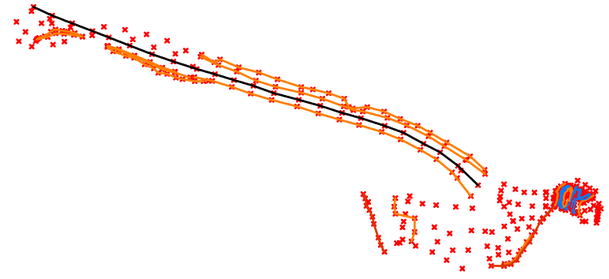
UNDERHILL GEOMATICS LTD.
PROFESSIONAL LAND SURVEYORS
WHITEHORSE, YUKON
Job: W14157

D14–194 SC

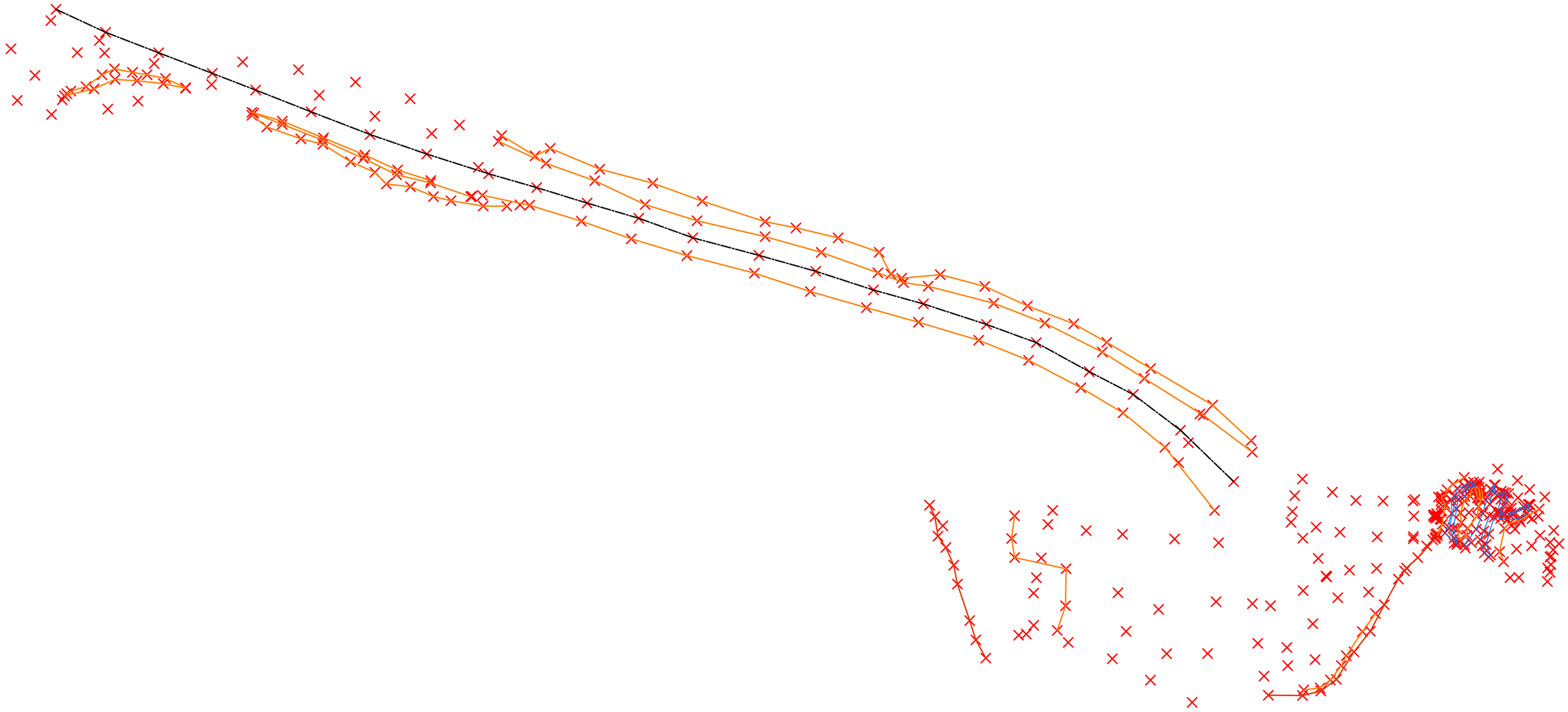
20141113_D14-194 DSAR Thickness.pdf - Underhill Geomatics Ltd.



20141113_DSAR Final 1.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "DSAR Final.dxf" created with the points listed on the excel file "DSAR Final.csv")

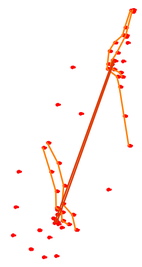


20141113_DSAR Final 2.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "DSAR Final.dxf" created with the points listed on the excel file "DSAR Final.csv")

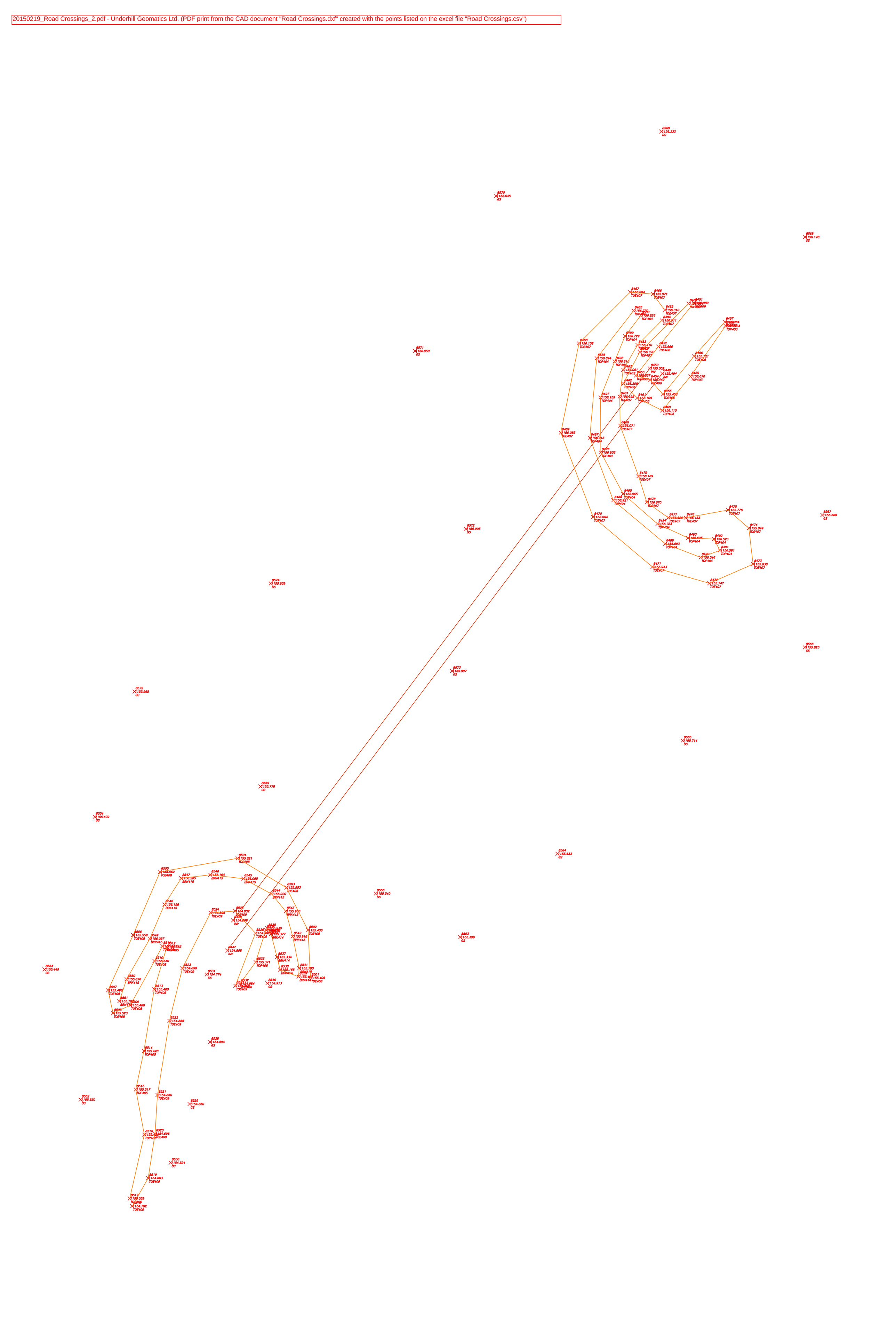


20141113_DSAR Final 3.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "DSAR Final.dxf" created with the points listed on the excel file "DSAR Final.csv")

20150219_Road Crossings.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "Road Crossings.dxf" created with the points listed on the excel file "Road Crossings.csv")



20150219_Road Crossings_2.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "Road Crossings.dxf" created with the points listed on the excel file "Road Crossings.csv")



20150219_Road Crossings_3.pdf - Underhill Geomatics Ltd. (PDF print from the CAD document "Road Crossings.dxf" created with the points listed on the excel file "Road Crossings.csv")