PROJECT COMPLETION REPORT
V15 PUMPING SYSTEM CONSTRUCTION
FARO MINE COMPLEX – FARO, YT

PREPARED FOR:

Yukon Government
Department of Energy, Mines and Resources
Assessment and Abandoned Mines Branch
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PREPARED BY:

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Faro Mine Closure

February 24, 2011

Denison Environmental Services
a division of Denison Mines Inc.

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1. PROJECT COMPLETION SUMMARY

1.1 Background

Due to decreasing water quality in the Grum V15 seep, YG requested DES to procure and install an insulated and heat traced pipeline and a pumping system capable of delivering flow from the V15 seep to Vangorda Pit. Other work associated with this project included extension of an existing 4160V overhead powerline.

1.2 Project Summary

- The following discussion includes YG Project Approvals: Highline (2010-08-26-01), Pipe Investigation (2010-08-30-01), Pipe Order (2010-09-10-02), Heat Trace / Pump Order (2010-10-05-01), V15 Civil Works (2010-10-21-01).
- On April 30th, 2010, this project was suspended at YG's direction.
- On August 25th, DES submitted a proposal to extend the existing highline to a location near the V15 seep. Approval for this work was received on August 27th. Poles for the highline extension were installed on August 28th. On August 31st, YG directed DES to procure three 25kVA transformers for this location instead of the DES recommended 50 kVA transformers. A PO for transformers and highline switch was submitted to NULine on September 1st. Installation of the transformers and air brake occurred on November 8th.
- On August 30th, YG requested DES to solicit quotes for the V15 insulated pipeline. A request for quotes was submitted to Yukon Pump, Precision and Wolseley on September 1st. Quotes from Yukon Pump and Wolseley were forwarded to YG on September 7th, with a request for further direction on the project. On September 14th, YG approved DES to procure the pipeline as quoted from Wolseley. A purchase order was submitted to Wolseley on September 14th. Upon receipt of the PO, Wolseley requested approval to substitute DR11 pipe for the specified DR 13.5 pipe. YG approval for this change was received on September 15th. Pipeline materials arrived on-site on October 11th. Pipeline construction began on November 1st and was effectively completed at November month-end. Remaining pipeline welds were completed following installation of heat-trace materials in January 2011.
- During the September 1st weekly meeting, YG requested DES to pursue quotes for the heat trace system. Information regarding this quote was sent to Wolseley on September 1st. A quote from Wolseley was forwarded to YG on September 7th, with a request for further direction on the project. DES held a conference call

with Wolseley and URECON on September 16th to discuss heat trace options. A revised quote was submitted by Wolseley on September 20th, and forwarded to YG by DES on that date. During discussions between DES and YG during the week ending September 26th, DES was requested to prepare a budget summary for YG approval to procure the materials as quoted. DES received formal approval to order the materials on October 8th. The order was placed with Wolseley on October 12th. Delivery of these materials occurred on December 30th.

- On September 14th, YG approved DES to work with local and remote pump vendors to size an appropriate pump for the V15 system. DES contacted Precision and Yukon pump to advise this procurement was pending and to discuss information needs. A request for quote was sent to Precision, Wolseley and Yukon Pump on September 27th. Yukon pump submitted the only acceptable quote on October 5th. YG approval to proceed was received on October 8th. The pump and associated electrical components and fittings were ordered from Yukon Pump on October 12th. Delivery of the above occurred on November 16th.
- Effective September 26th, secondary electrical connections, housing of electrical gear and system construction remained under YG's direct management (DES had not been requested to address these items). During the week of September 27th, DES discussed the equipment housing and secondary electrical connections with YG. YG requested these items be included in the budget for procurement of heat trace and the pump. A full budget summary with the above was provided to YG on October 5th. YG approval was received on October 8th. The items were ordered on October 12th. At October month-end, most of the secondary electrical materials had been delivered to site. However, a few items were back-ordered and were delivered in November.
- Construction of the secondary electrical work was substantially completed between November 8th and November 18th. Remaining work to be completed included installation of the heat trace controller and final hook-up of the V15 electrical building to the highline. This work was completed in January 2011.
- A field visit was conducted by YG and DES representatives on October 13th, to review V15 construction requirements. Following this visit, DES submitted a budget on October 20th to complete system construction. This budget was approved by YG on October 26th.

- Following completion of the potable water well project on January 21st, work resumed on the V15 heat trace and pipe installation work. At January month-end, the heat trace and insulation was approximately 95% complete.
- Completion of heat trace testing occurred on February 23rd. The project is effectively complete, however, several sections of pipeline and heat trace remain disassembled to facilitate winter maintenance of channels / culverts.
- YG toured the project during a YG site visit in early February. At that time DES advised YG that the system would benefit from a small 4160 / 600V transformer near the high point in the pipeline (to supply power to heat an AVAR building).
- At February month-end, the V15 pumping system was ready to operate within approximately 3-days notice (to connect pipe left apart as described above and to set the pump).

1.3 Vendor Documentation

Documentation from the pump, pipeline and heat trace vendors is included in Appendix C.

2. SCOPE

DES's work scope for this project is described in Project Approvals: Highline (2010-08-26-01), Pipe Investigation (2010-08-30-01), Pipe Order (2010-09-10-02), Heat Trace / Pump Order (2010-10-05-01), and V15 Civil Works (2010-10-21-01), attached as Appendix A.

3. SCHEDULE

Schedule milestones for this project included:

- April 2010 – YG suspension of all project work
- August 27th, 2010 – YG approval to extend highline
- August 28th, 2010 – Highline extension completed
- September 14th, 2010 – YG approval to procure pipeline
- September 14th, 2010 – Pipeline ordered
- October 8th, 2010 – YG approval to procure heat trace, pump and electrical components

- October 11th, 2010 – Pipeline materials arrived on-site
- October 12th, 2010 – Heat trace, pump and electrical components ordered
- October 26th, 2010 – YG approval to construct project
- November 1st, 2010 – Pipeline welding began
- November 8th, 2010 – Transformers and highline switch delivered and installed
- November 16th, 2010 – Pump and fittings arrived on-site
- January 2010 – Project substantially completed
- February 2010 – Project construction / electrical testing completed

4. BUDGET

Tables 1 through 5 detail the original estimate and final project costs.

TABLES

Table 1 - Project Budget / Invoicing - 2010-08-26-01 (Highline)
Project 14026 - V15 Pumping System Construction

Date: 31-Jan-11
Period from: 26-Nov-10 to 31-Dec-10
Approval number: 2010-08-26-01
Invoice number: 34689

ORIGINAL APPROVAL AMOUNT: **$ 58,607.06**
Change Order No.:
Net Change via Change Orders $ -
CONTRACT SUM TO DATE **$ 58,607.06**

WBS #	Item	Quantity	Unit	Unit Price	Shipping	Total Cost Est.	Aug-10	Sep-10	Oct-10	Dec-10	Total amount to Date		Current Billing		Remaining Quantity
											Quantity	Cost	Quantity	Cost	
	Task 1 - Extend existing highline and hang transformers														
	DES Labor Cost - Phase 1														
	Project Manager	6.00	HR	$ 135.00	$ -	$ 810.00	$ 945.00		$ 135.00		8.0	$ 1,080.00	-	$ -	$ (270.00)
	Construction Monitor	10.00	HR	$ -	$ -	$ -					-	$ -	-	$ -	$ -
	Admin Clerk	8.00	HR	$ 33.22	$ -	$ 265.76					-	$ -	-	$ -	$ 265.76
	Health and Safety Officer	2.00	HR	$ 58.39		$ 116.78					-	$ -	-	$ -	$ 116.78
	Electrician	20.00	HR	$ 52.02	$ -	$ 1,040.40	$ 728.28				14.0	$ 728.28	-	$ -	$ 312.12
	Foreman	3.00	HR	$ 51.90		$ 155.70					-	$ -	-	$ -	$ 155.70
	HD Operator	10.00	HR	$ 38.33		$ 383.30	$ 459.96				12.0	$ 459.96	-	$ -	$ (76.66)
				Subtotal	**$ -**	**$ 2,771.94**	**$ 2,133.24**		**$ 135.00**			**$ 2,268.24**		**$ -**	**$ 503.70**
	Subcontracted Services														
	Labour and Equipment	38.00	HR	$ 391.00	$ -	$ 14,858.00	$ -			$ 11,730.00		$ 11,730.00		$ 11,730.00	$ 3,128.00
	Materials	1.00	EA	$ 3,718.75	$ -	$ 3,718.75	$ -			$ 3,718.75		$ 3,718.75		$ 3,718.75	$ -
	45' Class 3 Poles	2.00	EA	$ 949.50	$ -	$ 1,899.00	$ -			$ 1,899.00		$ 1,899.00		$ 1,899.00	$ -
	#2 Sparrow Conductor	640.00	M	$ 1.05	$ -	$ 672.00	$ -			$ 672.00		$ 672.00		$ 672.00	$ -
	600 Amp Airbrake	1.00	EA	$ 5,800.00	$ -	$ 5,800.00	$ -			$ 5,800.00		$ 5,800.00		$ 5,800.00	$ -
	25KVA Transformer 4160 /600	3.00	EA	$ 2,640.00	$ 1,000.00	$ 8,920.00	$ -			$ 6,220.00		$ 6,220.00		$ 6,220.00	$ 2,700.00
	Cluster Mounting Bracket	1.00	EA	$ 270.00	$ -	$ 270.00	$ -			$ 270.00		$ 270.00		$ 270.00	$ -
	Subsistance	4.00	EA	$ 480.00	$ -	$ 1,920.00	$ -			$ 960.00		$ 960.00		$ 960.00	$ 960.00
	Mobilization	1.00	EA	$ 4,000.00	$ -	$ 4,000.00	$ -			$ 4,000.00		$ 4,000.00		$ 4,000.00	$ -
	Misc. Tools and Supplies	1.00	EA	$ 1,500.00	$ -	$ 1,500.00	$ -			$ 1,000.00		$ 1,000.00		$ 1,000.00	$ 500.00
				Subtotal	**$ -**	**$ 43,557.75**	**$ -**			**$ 36,269.75**		**$ 36,269.75**		**$ 36,269.75**	**$ 7,288.00**

	Total Cost Est.								
Consulting	$ -	$ -					$ -		$ -	$ -
Materials and Services	$ 43,557.75	$ -			$ 36,269.75		$ 36,269.75		$ 36,269.75	$ 7,288.00
DES Labor	$ 2,771.94	$ 2,133.24		$ 135.00	$ -		$ 2,268.24		$ -	$ 503.70
DES Markup	$ 6,949.45	$ 319.99		$ 20.25	$ 5,440.46		$ 5,780.70		$ 5,440.46	$ 1,168.76
Total	$ 53,279.14	$ 2,453.23		$ 155.25	$ 41,710.21		$ 44,318.69		$ 41,710.21	$ 8,960.46

Table 2 - Project Budget / Invoicing - 2010-08-30-01 (Pipe Investigation)
Project 14026 - Grum V15 Pipeline Construction

Date: 31-Oct-10
Period from: Sept 26,2010 **to** 26-Oct-10
Approval number: 2010-08-30-01
Invoice number: 34619

ORIGINAL APPROVAL AMOUNT: **$ 3,835.73**
Change Order No.:
Net Change via Change Orders $ -
CONTRACT SUM TO DATE **$ 3,835.73**

WBS #	Item	Quantity	Unit	Unit Price	Shipping	Total Cost Est.	Sep-10	Oct-10	Total amount to Date		Current Billing		Remaining Quantity
									Quantity	Cost	Quantity	Cost	
DES Labor Cost													
	Pipeline Procurement												
L1	Project Manager	20.00	HR	$ 135.00	$ -	$ 2,700.00	$ 2,295.00	$ 405.00	20.0	$ 2,700.00	3.0	$ 405.00	$ -
L2	Construction Monitor	-	HR	$ -	$ -	$ -	$ -			$ -		$ -	$ -
L3	Admin Assistant	10.00	HR	$ 33.22	$ -	$ 332.20	$ 49.83	$ 166.10	7.5	$ 215.93	5.0	$ 166.10	$ 116.27
L4	Health and Safety Officer	-	HR	$ 47.90	$ -	$ -	$ -			$ -		$ -	$ -
L5	Electrician	-	HR	$ 52.02	$ -	$ -	$ -			$ -		$ -	$ -
				Subtotal	$ -	$ 3,032.20	$ 2,344.83	$ 571.10		$ 2,915.93		$ 571.10	$ 116.27
						Total Cost Est.							
				Consulting		**$ -**							
				Materials and Services		**$ -**				**$ -**		**$ -**	**$ -**
				DES Labor		**$ 3,032.20**	**$ 2,344.83**	**$ 571.10**		**$ 2,915.93**		**$ 571.10**	**$ 116.27**
				DES Markup		**$ 454.83**	**$ 351.72**	**$ 85.67**		**$ 437.39**		**$ 85.67**	**$ 17.44**
				Total		**$ 3,487.03**	**$ 2,696.55**	**$ 656.77**		**$ 3,353.32**		**$ 656.77**	**$ 133.71**

Table 3 - Project Budget / Invoicing - 2010-09-10-02 (Pipe Order)
Project 14026 - Grum V15 Pipeline Construction

Date: 31-Oct-10
Period from: 25-Sep-10 to 26-Oct-10
Approval number: 2010-09-10-02
Invoice number:

ORIGINAL APPROVAL AMOUNT: **$ 123,868.34**
Change Order No.:
Net Change via Change Orders $ -
CONTRACT SUM TO DATE **$ 123,868.34**

WBS #	Item	Quantity	Unit	Unit Price	Shipping	Total Cost Est.	Sep-10	Oct-10	Total amount to Date		Current Billing		Remaining Quantity
									Quantity	Cost	Quantity	Cost	
Materials, Equipment and Services													
M1	Piping Materials to extend from V15 sump to Vangorda Pit	multiple		multiple	$ 7,650.00	$ 84,537.71	$ -	$ 87,799.74		$ 87,799.74		$ 87,799.74	$ 4,387.97
M2	Miscellaneous fittings and supplies	multiple		multiple	$ -	$ 2,500.00	$ -		-	$ -	-	$ -	$ 2,500.00
				Subtotal	**$ 7,650.00**	**$ 87,037.71**	**$ -**	**$ 87,799.74**		**$ 87,799.74**		**$ 87,799.74**	**$ 6,887.97**
DES Labor Cost													
Task 1	**Pipeline Procurement**												
L1	Project Manager	20.00	HR	$ 135.00	$ -	$ 2,700.00							
L2	Construction Monitor	-	HR	$ -	$ -	$ -	$ -						
L3	Admin Assistant	10.00	HR	$ 33.22	$ -	$ 332.20	$ -						
L4	Health and Safety Officer	-	HR	$ 47.90	$ -	$ -	$ -						
L5	Electrician	-	HR	$ 52.02	$ -	$ -							
				Subtotal	$ -				separate approval				
Task 2	**Investigate Pump**												
L1	Project Manager	20.00	HR	$ 135.00	$ -	$ 2,700.00	$ 1,350.00	$ 1,620.00	22.0	$ 2,970.00	12.0	$ 1,620.00	$ (270.00)
L2	Construction Monitor	-	HR	$ -	$ -	$ -	$ -		-	$ -	-		$ -
L3	Admin Assistant	8.00	HR	$ 33.22	$ -	$ 265.76	$ -	$ 83.05	2.5	$ 83.05	2.5	$ 83.05	$ 182.71
L4	Health and Safety Officer	-	HR	$ 47.90	$ -	$ -	$ -		-	$ -	-		$ -
L5	Electrician	8.00	HR	$ 52.02	$ -	$ 416.16	$ 208.08		4.0	$ 208.08		$ -	$ 208.08
				Subtotal	$ -	**$ 3,381.92**	**$ 1,558.08**	**$ 1,703.05**		**$ 3,261.13**		**$ 1,703.05**	**$ 120.79**

	Total Cost Est.							
		$ -			**$ -**			
Materials and Services	**$ 94,687.71**	**$ -**	**$ 87,799.74**		**$ 87,799.74**		**$ 87,799.74**	**$ 6,887.97**
DES Labor	**$ 3,381.92**	**$ 1,558.08**	**$ 1,703.05**		**$ 3,261.13**		**$ 1,703.05**	**$ 120.79**
DES Markup	**$ 14,710.44**	**$ 233.71**	**$ 13,425.42**		**$ 13,659.13**		**$ 13,425.42**	**$ 1,051.31**
Total	**$ 112,780.07**	**$ 1,791.79**	**$ 102,928.21**		**$ 104,720.00**		**$ 102,928.21**	**$ 8,060.07**

Table 4 - Project Budget / Invoicing - 2010-10-05-01 (Heat Trace / Pump Order)
Project 14026 - V15 Pumping System Construction

Date: 3-Jan-10
Period from: 26-Nov-10 to 31-Dec-10
Approval number: 2010-10-05-01
Invoice number: 34687

ORIGINAL APPROVAL AMOUNT: **$ 127,660.53**
Change Order No.:
Net Change via Change Orders $ -
CONTRACT SUM TO DATE **$ 127,660.53**

#	Item	Quantity	Unit	Unit Price	Shipping	Total Cost Est.	Oct-10	Nov-10	Dec-10	Total amount to Date		Current Billing		Remaining Quantity
										Quantity	Cost	Quantity	Cost	
Materials, Equipment and Services														
M1	Heat trace materials for V15 Pipeline	1.00	EA	$ 69,000.00	$ 3,000.00	$ 72,000.00			$ 67,792.82		$ 67,792.82		$ 67,792.82	$ 4,207.18
M2	Secondary electrical components (estimate)	1.00	EA	$ 6,000.00	$ 500.00	$ 6,500.00	$ 881.88	$ 4,010.84			$ 4,892.72	-	$ -	$ 1,607.28
M3	Repairs to temporary structure (estimate)	1.00	EA	$ 1,000.00		$ 1,000.00					$ -		$ -	$ 1,000.00
M4	FLYGT BS-2140 Submersible Pump	1.00	EA	$ 12,379.00		$ 12,379.00		$ 12,379.00			$ 12,379.00		$ -	$ -
M5	DIODE 50 WATT 5.6 Volt	1.00	EA	$ 136.00		$ 136.00		$ 136.00			$ 136.00		$ -	$ -
M6	CABLE 14 AWG/3 (CPE) TYPE SHD-GC	62.00	M	$ 33.10		$ 2,052.20		$ 2,052.20			$ 2,052.20		$ -	$ -
M7	ITT W&WW CUSTOM BUILT SIMPLEX CONTROLLER	1.00	EA	$ 3,925.00		$ 3,925.00		$ 3,925.00			$ 3,925.00		$ -	$ -
M8	4" - 3" bell reducer	1.00	EA	$ 29.40		$ 29.40		$ 29.40			$ 29.40		$ -	$ -
M9	N46-300Al Camlock	1.00	EA	$ 12.10		$ 12.10		$ 12.10			$ 12.10		$ -	$ -
M10	N43-300 Al Camlock	1.00	EA	$ 19.76		$ 19.76		$ 19.76			$ 19.76		$ -	$ -
M11	Feed of Red, Layflat hose	3.00	FT	$ 2.44		$ 7.32		$ 7.32			$ 7.32		$ -	$ -
M12	3 1/2" center punch clamps	4.00	EA	$ 1.25		$ 5.00		$ 10.00			$ 10.00		$ -	$ (5.00)
M13	Shipping all of Yukon Pump Items	1.00	EA		$ 500.00	$ 500.00		$ 300.00			$ 300.00		$ -	$ 200.00
				Subtotal	**$ 4,000.00**	**$ 98,565.78**	**$ 881.88**	**$ 22,881.62**	**$ 67,792.82**		**$ 91,556.32**		**$ 67,792.82**	**$ 7,009.46**
DES Labor Cost														
Task 1 - D	**Determine requirements and procure secondary electrical components**													
L1	Project Manager	10.00	HR	$ 135.00	$ -	$ 1,350.00	$ 2,025.00			15.0	$ 2,025.00		$ -	$ (675.00)
L2	Construction Monitor	-	HR	$ -	$ -	$ -					$ -		$ -	$ -
L3	Admin Assistant	8.00	HR	$ 33.22	$ -	$ 265.77	$ 83.05	$ 83.05		5.0	$ 166.10		$ -	$ 99.67
L4	Health and Safety Officer	-	HR		$ -	$ -					$ -		$ -	$ -
L5	Electrician	20.00	HR	$ 52.02	$ -	$ 1,040.40					$ -		$ -	$ 1,040.40
				Subtotal	$ -	$ 2,656.17	**$ 2,108.05**	**$ 83.05**	**$ -**		**$ 2,191.10**		**$ -**	**$ 465.07**
						Total Cost Est.								
				Materials and Services		**$ 98,565.78**	**$ 881.88**	**$ 22,881.62**	**$ 67,792.82**		**$ 91,556.32**		**$ 67,792.82**	**$ 7,009.46**
				DES Labor		**$ 2,656.17**	**$ 2,108.05**	**$ 83.05**	**$ -**		**$ 2,191.10**		**$ -**	**$ 465.07**
				DES Markup		**$ 15,183.29**	**$ 448.49**	**$ 3,444.70**	**$ 10,168.92**		**$ 14,062.11**		**$ 10,168.92**	**$ 1,121.18**
				Total		**$ 116,405.24**	**$ 3,438.42**	**$ 26,409.37**	**$ 77,961.74**		**$ 107,809.53**		**$ 77,961.74**	**$ 8,595.71**

Table 5 - Project Budget / Invoicing - 2010-10-21-01 (V15 Civil Works)
Project 14026 - V15 Pumping System Construction

Date:
Period from:
Approval number: 2010-10-21-01
Invoice number:

ORIGINAL APPROVAL AMOUNT: **$ 56,195.54**
Change Order No.:
Net Change via Change Orders $ -
CONTRACT SUM TO DATE **$ 56,195.54**

#	Item	Quantity	Unit	Unit Price	Shipping	Total Cost Est.	Nov-10	Dec-10	Jan-11	Feb-11	Total amount to Date		Current Billing		Remaining Quantity
											Quantity	Cost	Quantity	Cost	
DES Labor Cost															
Task 1 - V15 Pipeline Construction															
L1	Project Manager	28.00	HR	$ 135.00	$ -	$ 3,780.00	$ 2,025.00	$ 1,012.50			22.5	$ 3,037.50		$ -	$ 742.50
L2	Engineering Assistant	60.00	HR	$ 56.11	$ -	$ 3,366.60						$ -		$ -	$ 3,366.60
L3	Admin Assistant	24.00	HR	$ 33.22	$ -	$ 797.31	$ 66.44	$ 265.76	$ 49.83		11.5	$ 382.03		$ -	$ 415.28
L4	Health and Safety Officer	4.00	HR	$ 47.90	$ -	$ 191.60						$ -		$ -	$ 191.60
L5	Foreman	70.00	HR	$ 51.90	$ -	$ 3,633.00	$ 3,529.20	$ 986.10			87.0	$ 4,515.30		$ -	$ (882.30)
L6	HD Operator	452.00	HR	$ 38.33	$ -	$ 17,325.16	$ 10,687.46	$ 6,439.44	$ 4,299.17	$ 3,219.72	531.0	$ 24,645.79	84.0	$ 3,219.72	$ (7,320.63)
L7	Electrician	84.00	HR	$ 52.02	$ -	$ 4,369.68			$ 1,742.67		33.5	$ 1,742.67		$ -	$ 2,627.01
L8	Contract Electrician	88.00	HR	$ 110.00	$ 1,280.00	$ 10,960.00		$ 7,230.00		$ 2,850.00		$ 10,080.00		$ 2,850.00	$ 880.00
				Subtotal	$ -	**$ 44,423.35**	**$ 16,308.10**	**$ 15,933.80**	**$ 6,091.67**	**$ 6,069.72**		**$ 44,403.29**		**$ 6,069.72**	**$ 20.06**
						Total Cost Est.									
					Consulting	**$ -**									
					Materials and Services	**$ -**						**$ -**		**$ -**	**$ -**
					DES Labor	**$ 44,423.35**	**$ 16,308.10**	**$ 15,933.80**	**$ 6,091.67**	**$ 6,069.72**		**$ 44,403.29**		**$ 6,069.72**	**$ 20.06**
					DES Markup	**$ 6,663.50**	**$ 2,446.22**	**$ 2,390.07**	**$ 913.75**	**$ 910.46**		**$ 6,660.49**		**$ 910.46**	**$ 3.01**
					Total	**$ 51,086.85**	**$ 18,754.32**	**$ 18,323.87**	**$ 7,005.42**	**$ 6,980.18**		**$ 51,063.78**		**$ 6,980.18**	**$ 23.07**

FIGURES

Denison Environmental Services

Faro Mine Complex
Approximate Alignment of V15 Pipeline

Drawn	Date
TP	25/02/11

Figure 1

Pipeline alignment and feature information collected by DES using recreational grade GPS units.

APPENDIX A

YG PROJECT APPROVAL

Yukon
Energy, Mines and Resources
Énergie, Mines et Ressources

Faro Mine Complex

PROJECT APPROVAL

Assessment and Abandoned Mines
Box 2703, K-419
Whitehorse, Yukon Y1A 2C6

Contract #: GN0853-3096-57059

Project Approval (YYYY-MM-DD-##) : A 2010-08-26-01

Project Title	Grum V15 Electrical - Highline Extension				
Date Initiated	Aug 26, 2010	Budget #:	5.4	Reference #	DES Budget # 14026

Scope

Rationale for Work

In order to prepare for possible future environmental risk in the Grum V15 area, a pumping system is to be installed in 2010. The current electrical system does not reach the V15 area and as such requires upgrade.

Description of Work

This work involves, but is not limited to, the following:

- Installation of two power poles
- Installation of 600 AMP Airbrake
- Installation of 4160-600 transformer bank (sizing of transformers to be determined at a later date*)

*Note: YG must approve quote before transformers are procured. This approval includes a quote for 3 x 50KVA transformers, however these may be reduced to 3 x 25KVA, contingent on pricing.

Budget

Description of Item/Resource	Total
DES Labour	$2,771.94
Nuline labour, materials and expenses	$43,557.75
Contingency (10%)	$4,632.97
DES Markup (15%)	$7,644.40
	$58,607.06

Costs will be reimbursed according to itemized invoices, hourly time sheets and receipts as submitted, up to a maximum amount as stated above. Rationale must be provided **in advance** for any costs which exceed these amounts.

Comments

Although full mob/demob costs are included as part of this approval, Nuline's site visits are to coincide with other work on site (where possible) in order to minimize these costs.

SIP Classification

5.2.2.1 Special Projects

Fee Classification

8.4 Costs plus percentage fee (C+%)

The approval is only valid between the stated dates and cannot be used to exceed the above figure. To amend this approval a change order must be approved before any work can commence. Please quote the Project approval number on all invoices.

Schedule

Start Date: Aug 26, 2010

Finish Date : Oct 31, 2010

Milestones and objectives

This work is to be completed in two phases (trips). Payment due upon completion of the following milestones:

- Phase 1 - August 2010 - Installation of poles and extension of highline
- Phase 2 - September/October 2010 - Installation of transformer bank and switch

Schedule for Deliverables

All work to be completed by October 31, 2010

Title Recommended by Name Karen Furlong

Signature Karen Furlong Date Aug. 26, 2010

Title Approved By Name Ian Ludgate

Signature Date Aug. 27/10

Title Senior Project Manager Name Deborah Pitt

Signature Date 27/08/10

Table 1 - Budget and Payment Milestones
Project 14026 - V15 Pumping System Improvements

	Item	Vendor	Delivery Date	Quantity	Unit	Unit Cost Est.	Shipping	Total Cost Est.	DES Markup	Est Total Cost	Payment Milestone	YG Approval Status
Consulting Services												
C1												
CX						$ -	$ -	$ -	$ -	$ -		
						Subtotal	**$ -**	**$ -**	**$ -**	**$ -**		
Task 1 - Extend existing highline and hang transformers												
DES Labor Cost - Phase 1												
	Project Manager	DES		6.00	HR	$ 135.00	$ -	$ 810.00	$ 121.50	$ 931.50		
	Construction Monitor	DES		10.00	HR	$ -	$ -	$ -	$ -	$ -		
	Admin Clerk	DES		8.00	HR	$ 33.22	$ -	$ 265.76	$ 39.86	$ 305.62		
	Health and Safety Officer	DES		2.00	HR	$ 58.39	$ -	$ 116.78	$ 17.52	$ 134.30		
	Electrician	DES		20.00	HR	$ 52.02	$ -	$ 1,040.40	$ 156.06	$ 1,196.46		
	Foreman	DES		3.00	HR	$ 51.90	$ -	$ 155.70	$ 23.36	$ 179.06		
	HD Operator	DES		10.00	HR	$ 38.33	$ -	$ 383.30	$ 57.50	$ 440.80		
					Subtotal		**$ -**	**$ 2,771.94**	**$ 415.79**	**$ 3,187.73**	Monthly T&M	No Approval Received
Subcontracted Services												
	Labour and Equipment	NULine		38.00	HR	$ 391.00	$ -	$ 14,858.00	$ 2,228.70	$ 17,086.70		
	Materials	NULine		1.00	EA	3,718.75	$ -	$ 3,718.75	$ 557.81	$ 4,276.56		
	45' Class 3 poles	NULine		2.00	EA	$ 949.50	$ -	$ 1,899.00	$ 284.85	$ 2,183.85		
	#2 Sparrow Conductor	NULine		640.00	M	$ 1.05	$ -	$ 672.00	$ 100.80	$ 772.80		
	600 Amp Airbrake	NULine		1.00	EA	$ 5,800.00	$ -	$ 5,800.00	$ 870.00	$ 6,670.00		
	50KVA Transformer 4160 / 600 (may change to 25KVA - YG to approve)	NULine		3.00	EA	$ 2,640.00	$ 1,000.00	$ 8,920.00	$ 1,338.00	$ 10,258.00		
	Cluster Mounting Bracket	NULine		1.00	EA	$ 270.00	$ -	$ 270.00	$ 40.50	$ 310.50		
	Subsistance	NULine		4.00	EA	$ 480.00	$ -	$ 1,920.00	$ 288.00	$ 2,208.00		
	Mobilization	NULine		1.00	EA	$ 4,000.00	$ -	$ 4,000.00	$ 600.00	$ 4,600.00		
	Misc. Tools and Supplies	NULine		1.00	EA	$ 1,500.00	$ -	$ 1,500.00	$ 225.00	$ 1,725.00		
						Subtotal	**$ 1,000.00**	**$ 43,557.75**	**$ 6,533.66**	**$ 50,091.41**	Monthly T&M	No Approval Received

Notes:
1. Scope involves extending existing V15 powerline by 2 poles, installation of an airbrake switch and installation of a transformer bank (size to be determined). Secondary connections are not included.
2. DES labor cost assumes Construction Monitor is paid under another PAW code. If not, the above price will require revision.

	Total Cost Est.	DES Markup	Est Total Cost		
Consulting	**$ -**	**$ -**	**$ -**		
Materials and Services	**$ 43,557.75**	**$ 6,533.66**	**$ 50,091.41**		
DES Labor	**$ 2,771.94**	**$ 415.79**	**$ 3,187.73**		
Total	**$ 46,329.69**	**$ 6,949.45**	**$ 53,279.14**	**Monthly T&M**	**No Approval Received**

Yukon
Energy, Mines and Resources
Énergie, Mines et Ressources

Faro Mine Complex

PROJECT APPROVAL

Assessment and Abandoned Mines
Box 2703, K-419
Whitehorse, Yukon Y1A 2C6

Contract #: GN0853-3096-57059

Project Approval (YYYY-MM-DD-##) : A 2010-08-30-01

Project Title: Grum V15 Pipeline Procurement

Date Initiated: Aug 30, 2010 | Budget #: 5.4 | Reference #:

Scope

Rationale for Work

In order to prepare for possible future environmental risk in the Grum V15 area, a pumping system is to be installed in 2010. The current electrical system does not reach the V15 area and as such requires upgrade.

Description of Work

This approval includes the labour involved for DES to procure the following (using information provided by YG):

- ~1190m HDPE DR13.5 pipe, including fittings , heat trace, 2" urethane foam insulation and HDPE jacket
- Vacuum brake valve

Budget

Description of Item/Resource	Total
Project manager - 20 hrs x 135.00	$2,700.00
Admin assistant - 10 hrs x 33.22	$332.20
Contingency (10%)	$303.22
% Fee (15%)	$500.31
	$3,835.73

Costs will be reimbursed according to itemized invoices, hourly time sheets and receipts as submitted, up to a maximum amount as stated above. Rationale must be provided **in advance** for any costs which exceed these amounts.

Comments

SIP Classification

5.2.2.1 Special Projects

Fee Classification

8.4 Costs plus percentage fee (C+%)

The approval is only valid between the stated dates and cannot be used to exceed the above figure. To amend this approval a change order must be approved before any work can commence. Please quote the Project approval number on all invoices.

Schedule

Start Date: Aug 30, 2010

Finish Date: Sep 6, 2010

Milestones and objectives

Payment due upon YG approval of vendor quote.

Schedule for Deliverables

Quote to be received by September 6 at the latest in order to procure the pipe asap.

Title Recommended by

Name Karen Furlong

Signature

Date Aug. 30/10

Title Approved By

Name Ian Ludgate

Signature

Date Sept. 1/10

Title Senior Project Manager

Name Deborah Pitt

Signature

Date 03/09/10

Yukon
Energy, Mines and Resources
Énergie, Mines et Ressources

Faro Mine Complex

PROJECT APPROVAL

Assessment and Abandoned Mines
Box 2703, K-419
Whitehorse, Yukon Y1A 2C6

Contract #: GN0853-3096-57059

Project Approval (YYYY-MM-DD-##) : A 2010-09-10-02

Project Title	Grum V15 Pipeline Procurement - Order of pipeline				
Date Initiated	Sep 10, 2010	Budget #:	5.4	Reference #	DES Budget # 14026

Scope

Rationale for Work

In order to prepare for possible future environmental risk in the Grum V15 area, a pumping system is to be installed in 2010.

Description of Work

This approval includes the procurement of pipeline and miscellaneous parts as outlined on the attached RFQ, modified September 10, 2010.

This approval also includes the labour required for DES to spec and receive quotes for the pump as outlined on attached "Table 1 - Budget and Payment Milestones - 14026 V15 Pumping System", Task 2.

Budget

Description of Item/Resource	Total
Materials	$87,037.71
DES Labour	$3,381.93
Shipping	$7,500.00
Contingency	$9,791.96
% Fee (15%)	$16,156.74
	$123,868.34

Costs will be reimbursed according to itemized invoices, hourly time sheets and receipts as submitted, up to a maximum amount as stated above. Rationale must be provided **in advance** for any costs which exceed these amounts.

Comments

DES labour involves pump procurement and design only; labour to obtain heat trace specifications and quotes were previously approved in "2010-08-30-01 SIGNED Grum V15 Pipeline Procurement - Quotes and Design 5.4".

SIP Classification

5.2.2.1 Special Projects

Fee Classification

8.4 Costs plus percentage fee (C+%)

The approval is only valid between the stated dates and cannot be used to exceed the above figure. To amend this approval a change order must be approved before any work can commence. Please quote the Project approval number on all invoices.

Schedule

Start Date: Sep 10, 2010

Finish Date: Sep 30, 2010

Milestones and objectives

Schedule for Deliverables

1. Pipe and miscellaneous parts (including heat trace components) to be ordered as soon as possible (by September 12, 2010).
2. Pump RFQ and design to be provided to YG by September 30, 2010 (but earlier if possible).

Title: Recommended by — Name: Karen Furlong

Signature: Karen Furlong — Date: Sept. 10/10

Title: Technical Advisor — Name: John Brodie, P.Eng

Signature: K. Furlong, As per MJB — Date: Sept. 10/10

Title: Approved By — Name: Ian Ludgate

Signature — Date: Sept. 13/10

Title: Senior Project Manager — Name: Deborah Pitt

Signature — Date: 14/09/10

Table 1 - Budget and Payment Milestones
14026 - V15 Pumping System

Item #	Item	Vendor	Delivery Date	Quantity	Unit	Unit Cost Est.	Shipping	Total Cost Est.	DES Markup	Est Total Cost	Payment Milestone	YG Approval Status
Consulting Services												
						Subtotal	**$ -**	**$ -**	**$ -**	**$ -**		
Materials, Equipment and Services												
M1	Piping materials to extend from V15 sump to Vangorda Pit	Wolseley	est Oct 18	multiple		multiple	$ 7,650.00	$ 84,537.71	$ 13,828.16	$ 106,015.87	Monthly T&M	No Approval Received
M2	Miscellaneous fittings and supplies	Wolseley	est Oct 18	multiple		multiple		$ 2,500.00	$ 375.00	$ 2,875.00	Monthly T&M	No Approval Received
						Subtotal	**$ 7,650.00**	**$ 87,037.71**	**$ 14,203.16**	**$ 108,890.87**		
DES Labor Cost												
Task 1 - Pipeline Procurement												
L1	Project Manager	DES		20.00	HR	$ 135.00	$ -	$ 2,700.00	$ 405.00	$ 3,105.00		
L2	Construction Monitor	DES		-	HR	$ -	$ -	$ -	$ -	$ -		
L3	Admin Assistant	DES		10.00	HR	$ 33.22	$ -	$ 332.21	$ 49.83	$ 382.05		
L4	Health and Safety Officer	DES		-	HR	$ 47.90	$ -	$ -	$ -	$ -		
L5	Electrician	DES		-	HR	$ 52.02	$ -	$ -	$ -	$ -		
						Subtotal	**$ -**	**$ -**	**$ -**	**$ -**	Approved Seperately on Sept 3, 2010	
Task 2 - Investigate Pump												
L1	Project Manager	DES		20.00	HR	$ 135.00	$ -	$ 2,700.00	$ 405.00	$ 3,105.00	Monthly T&M	No Approval Received
L2	Construction Monitor	DES		-	HR	$ -	$ -	$ -	$ -	$ -	Monthly T&M	No Approval Received
L3	Admin Assistant	DES		8.00	HR	$ 33.22	$ -	$ 265.77	$ 39.87	$ 305.64	Monthly T&M	No Approval Received
L4	Health and Safety Officer	DES		-	HR	$ 47.90	$ -	$ -	$ -	$ -	Monthly T&M	No Approval Received
L5	Electrician	DES		8.00	HR	$ 52.02	$ -	$ 416.16	$ 62.42	$ 478.58		
						Subtotal	**$ -**	**$ 3,381.93**	**$ 507.29**	**$ 3,889.22**		

Notes:
1. Piping materials per Wolseley quote as modified by DES for quantity adjustments
2. The above labor does not constitute design services. System design is being performed by YG.
3. The above does not include procurement of any electrical components.

YG NOTE: DES Labour for investigation of pump

	Total Cost Est.				
Consulting	**$ -**	**$ -**	**$ -**		
Materials and Services	**$ 87,037.71**	**$ 14,203.16**	**$ 108,890.87**		
DES Labor	**$ 3,381.93**	**$ 507.29**	**$ 3,889.22**		
Total	**$ 90,419.64**	**$ 14,710.45**	**$ 112,780.09**		

Denison Environmental Services

a division of Denison Mines Inc.

P.O.Box 280
Faro, YT
Y0B 1K0

Site Phone: (867) 994 - 2600
Fax (867) 994 - 2378

G.S.T. Registration # 88630 0482 RP0002
WebSite: www.denisonenvironmental.com

Get Quotes | Order

Request For Quotes

Recommended Vendor

Name:	Wolseley Engineered Pipe Pacific
Address:	20175 - 102 Ave.
City/Prov:	Langley, BC
Phone:	604-513-4300
Fax :	604-513-4301
Postal Code:	V1M 4B4

Date: 1-Sep-10

Requisitioned By : Jon Bronson
Job No. : 07-034
Account No. : 016 634411 14026 4512

PLEASE GO OUT FOR QUOTATION AND / OR ORDER (AS INDICATED ABOVE) THE FOLLOWING ITEMS:

QTY.	UNITS	DESCRIPTION			UNIT PRICE	TOTAL
		Project Name: V15 Pumping System Improvements	**Lead Time FOB Faro**			
		Project Number: 14026	**(weeks)**			
		NOTE: the below was modified by DES on Sept 10 to adjust quantites				
50	FT	4" Black 150# Suction Hose			$ 8.66	$ 433.00
3	EA	4" NPT KC Nipple			$ 10.93	$ 32.79
2	EA	4" 8 bolt flange RF Threaded			$ 20.47	$ 40.94
4	EA	4" Flange bolt and gasket kit - **HDPE x CI length**			$ 20.77	$ 83.08
1	EA	4" x 3" Flanged HDPE Reducer, DR 13.5, **c/w Insulation Kit**			$ 288.85	$ 288.85
3	EA	3" HDPE Flanged T - DR 13.5 **c/w Insulation Kit**			$ 288.85	$ 866.55
4000	FT	3" DR13.5 HDPE Pipe-insulated(2")-**100mil Extruded HDPE casing**-1 heat trace channel	4-5 Wks ARO		$ 17.11	$ 68,440.00
80	EA	Insulation joint kits for 3" HDPE pipe (2" insulation) - Ext. HDPE casing			$ 64.93	$ 5,194.40
16	EA	3" HDPE Flange C/W Ductile Iron Backup Ring			$ 29.69	$ 475.04
2	EA	3" 90 Deg HDPE Elbow - flanged - DR 13.5 **c/w Insulation Kit**			$ 308.92	$ 617.84
2	EA	3" 45 Deg HDPE Elbow - flanged - DR 13.5 **c/w Insulation kit**			$ 308.92	$ 617.84
3	EA	3" Wafer Style Butterfly Valve - no lug - gear operated			$ 194.35	$ 583.05
6	EA	3" Flange bolt and gasket kit - **HDPE x CI Length**			$ 11.62	$ 69.72
4	EA	3" Flange bolt and gasket kit - **CI x CI Length**			$ 11.62	$ 46.48
10	EA	3" Flange bolt and gasket kit - **HDPE x HDPE**			$ 13.36	$ 133.60
5	EA	3" x 12" long CS flanged spool piece			$ 301.30	$ 1,506.50
3	EA	3" blind flange			$ 13.48	$ 40.44
2	EA	3" flange X 2" FIP adapter			$ 40.50	$ 81.00
2	EA	2" ball valve			$ 48.50	$ 97.00
4	EA	2" CS threaded nipple - 6" long			$ 4.75	$ 19.00
1	EA	2" air / vacuum release valve			$ 482.62	$ 482.62
1	EA	shipping all of the above FOB Faro Mine Site (assume only 1 of the HDPE pipe options)			$ 7,650.00	$ 7,650.00

	SUBTOTAL	$ 87,799.74
GST	5%	$ 4,387.97
PST	(as applicable)	$ -
	TOTAL	$ 92,187.71

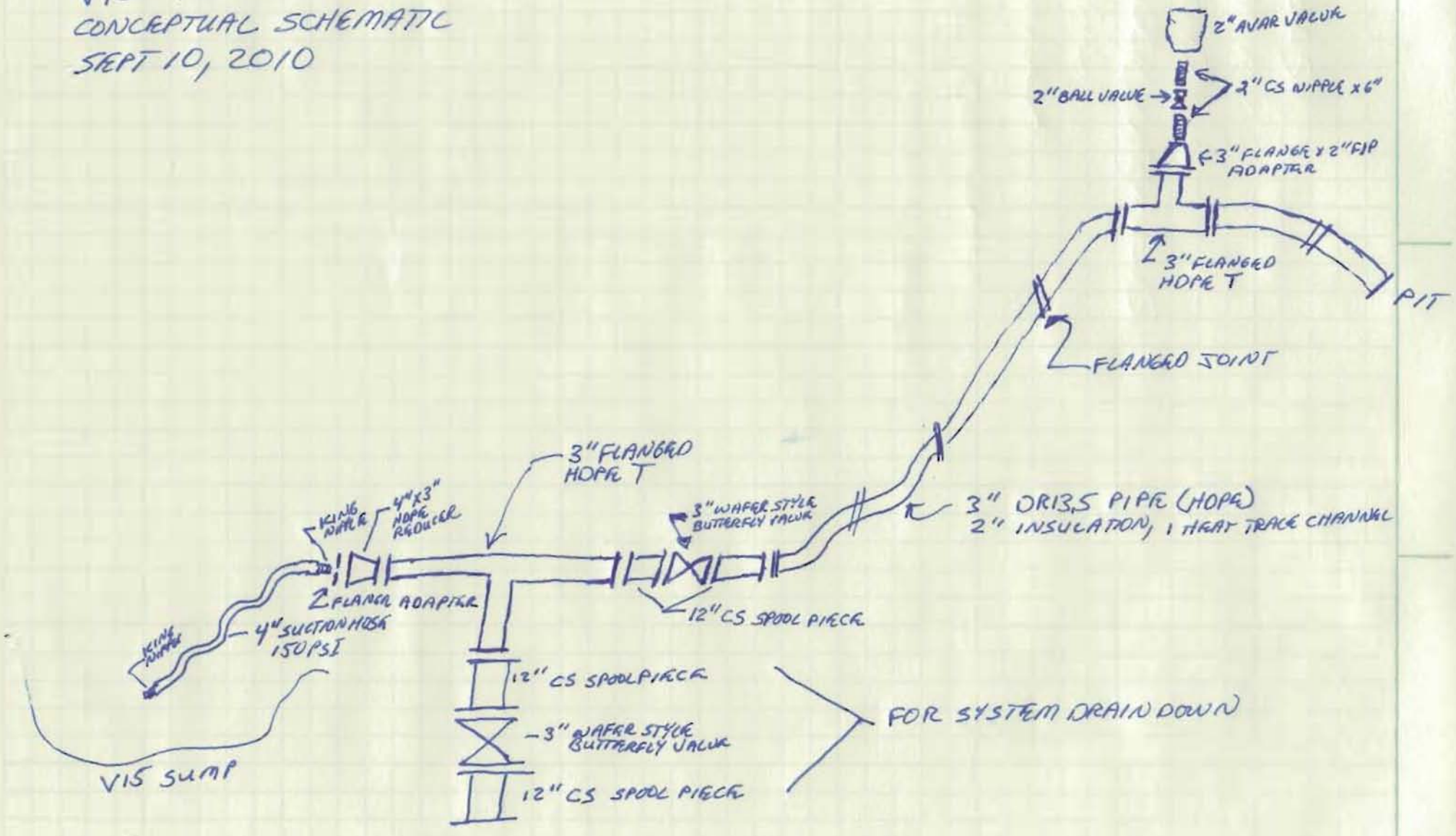
* GST applied to SUBTOTAL and SH

Sales Representative:
Shipping Instructions:

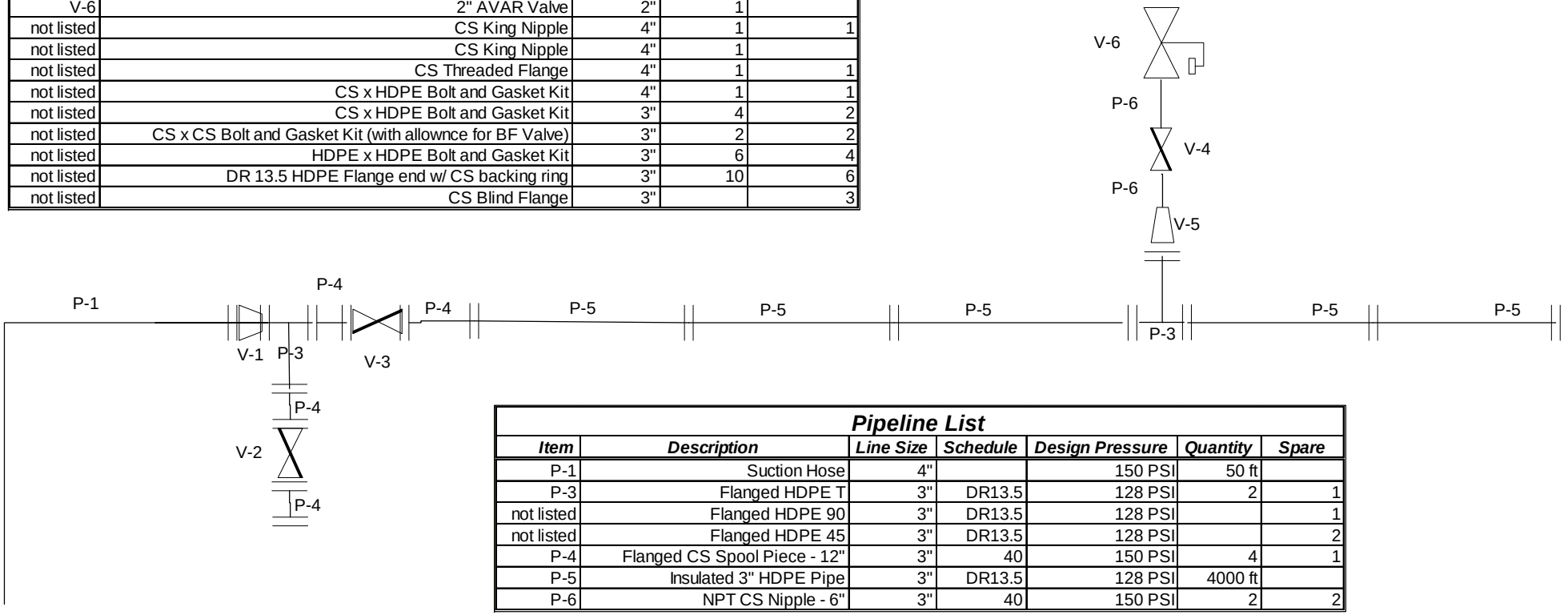
Request Rec'd by : Jon Bronson
Project Manager Approval: Jon Bronson

HAVE YOU CONSIDERED?
Environment ☑
Health & Safety ☑
Comments:

VIS PIPELINE
CONCEPTUAL SCHEMATIC
SEPT 10, 2010



Valve and Fitting List				
Item	*Description*	*Line Size*	*Quantity*	*Spare*
V-1	Flanged 4" x 3" HDPE Reducer	4" x 3"	1	
V-2	Gear Op, Wafer Style Butterfly Valve	3"	1	1
V-3	Gear Op, Wafer Style Butterfly Valve	3"	1	
V-4	Ball Valve	2"	1	1
V-5	3" Flange x 2" FPT Adapter	3" x 2"	1	1
V-6	2" AVAR Valve	2"	1	
not listed	CS King Nipple	4"	1	1
not listed	CS King Nipple	4"	1	
not listed	CS Threaded Flange	4"	1	1
not listed	CS x HDPE Bolt and Gasket Kit	4"	1	1
not listed	CS x HDPE Bolt and Gasket Kit	3"	4	2
not listed	CS x CS Bolt and Gasket Kit (with allownce for BF Valve)	3"	2	2
not listed	HDPE x HDPE Bolt and Gasket Kit	3"	6	4
not listed	DR 13.5 HDPE Flange end w/ CS backing ring	3"	10	6
not listed	CS Blind Flange	3"		3



Pipeline List						
Item	*Description*	*Line Size*	*Schedule*	*Design Pressure*	*Quantity*	*Spare*
P-1	Suction Hose	4"		150 PSI	50 ft	
P-3	Flanged HDPE T	3"	DR13.5	128 PSI	2	1
not listed	Flanged HDPE 90	3"	DR13.5	128 PSI		1
not listed	Flanged HDPE 45	3"	DR13.5	128 PSI		2
P-4	Flanged CS Spool Piece - 12"	3"	40	150 PSI	4	1
P-5	Insulated 3" HDPE Pipe	3"	DR13.5	128 PSI	4000 ft	
P-6	NPT CS Nipple - 6"	3"	40	150 PSI	2	2

Yukon
Energy, Mines and Resources
Énergie, Mines et Ressources

Faro Mine Complex

PROJECT APPROVAL

Assessment and Abandoned Mines
Box 2703, K-419
Whitehorse, Yukon Y1A 2C6

Contract #: GN0853-3096-57059

Project Approval (YYYY-MM-DD-##) : A 2010-10-05-01

Project Title	Grum V15 Heat Trace and Pump Procurement				
Date Initiated	Oct 5, 2010	Budget #:	5.4	Reference #	DES Budget # 14026

Scope

Rationale for Work

In order to prepare for possible future environmental risk in the Grum V15 area, a pumping system is to be installed in 2010.

Description of Work

This approval includes the procurement of heat trace, pump and miscellaneous electrical parts as outlined on the attached budget table "Heat Trace Procurement, Pump Procurement and Secondary Electrical Specification and Procurement".

This approval also includes the labour required for DES to spec and procure items for the secondary electrical connections in the area.

Budget

Description of Item/Resource	Total
Materials	$98,565.78
DES Labour	$2,656.17
Shipping	$4,000.00
Contingency (5%)	$5,787.21
% Fee (15%)	$16,651.37
	$127,660.53

Costs will be reimbursed according to itemized invoices, hourly time sheets and receipts as submitted, up to a maximum amount as stated above. Rationale must be provided **in advance** for any costs which exceed these amounts.

Comments

SIP Classification
5.2.2.1 Special Projects

Fee Classification
8.4 Costs plus percentage fee (C+%)

The approval is only valid between the stated dates and cannot be used to exceed the above figure. To amend this approval a change order must be approved before any work can commence. Please quote the Project approval number on all invoices.

Schedule

Start Date: Oct 5, 2010

Finish Date: Dec 31, 2010

Milestones and objectives

% Fee for final month will be paid upon submission of a final closure report detailing work completed and new pipeline arrangement.

Schedule for Deliverables

All items to be ordered by October 13, 2010.

Title Recommended by Name Karen Furlong

Signature Karen Furlong Date Oct 8/10

Title Technical Advisor Name John Brodie, P.Eng

Signature Please see attached email Date

Title Approved By Name Ian Ludgate

Signature for Brodie / FOR Date OCT 12/10

Title Senior Project Manager Name Deborah Pitt

Signature Date 12/10/10

Table 1 - Budget and Payment Milestones
14026 - V15 Pumping System
Heat Trace Procurement, Pump Procurement and Secondary Electrical Specification and Procurement

Item #	Item	Vendor	Delivery Date	Quantity	Unit	Unit Cost Est.	Shipping	Total Cost Est.	DES Markup	Est Total Cost	Payment Milestone	YG Approval Status
Consulting Services												
						Subtotal	**$ -**	**$ -**	**$ -**	**$ -**		
Materials, Equipment and Services												
M1	Heat trace materials for V15 Pipeline	Wolseley	TBD	1.00	EA	$ 69,000.00	$ 3,000.00	$ 72,000.00	$ 10,800.00	$ 82,800.00	Monthly T&M	No Approval Received
M2	Secondary electrical components (estimate)	multiple	TBD	1.00	EA	$ 6,000.00	$ 500.00	$ 6,500.00	$ 975.00	$ 7,475.00	Monthly T&M	No Approval Received
M3	Repairs to temporary structures (estimate)	multiple	TBD	1.00	EA	$ 1,000.00	$ -	$ 1,000.00	$ 150.00	$ 1,150.00	Monthly T&M	No Approval Received
M4	FLYGT BS-2140 SUBMERSIBLE PUMP	Yukon Pump	TBD	1.00	EA	$ 12,379.00	$ -	$ 12,379.00	$ 1,856.85	$ 14,235.85	Monthly T&M	No Approval Received
M5	DIODE 50 WATT 5.6VOLT	Yukon Pump	TBD	1.00	EA	$ 136.00	$ -	$ 136.00	$ 20.40	$ 156.40	Monthly T&M	No Approval Received
M6	CABLE 14 AWG/ 3 (CPE) TYPE SHD-GC	Yukon Pump	TBD	62.00	M	$ 33.10	$ -	$ 2,052.20	$ 307.83	$ 2,360.03	Monthly T&M	No Approval Received
M7	ITT W&WW CUSTOM BUILT SIMPLEX CONTROLLER	Yukon Pump	TBD	1.00	EA	$ 3,925.00	$ -	$ 3,925.00	$ 588.75	$ 4,513.75	Monthly T&M	No Approval Received
M8	4” – 3” bell reducer	Yukon Pump	TBD	1.00	EA	$ 29.40	$ -	$ 29.40	$ 4.41	$ 33.81	Monthly T&M	No Approval Received
M9	N46-300Al Camlock	Yukon Pump	TBD	1.00	EA	$ 12.10	$ -	$ 12.10	$ 1.82	$ 13.92	Monthly T&M	No Approval Received
M10	N43-300Al Camlock	Yukon Pump	TBD	1.00	EA	$ 19.76	$ -	$ 19.76	$ 2.96	$ 22.72	Monthly T&M	No Approval Received
M11	Feet of Red, Layflat hose	Yukon Pump	TBD	3.00	FT	$ 2.44	$ -	$ 7.32	$ 1.10	$ 8.42	Monthly T&M	No Approval Received
M12	3 ½ “ center punch clamps	Yukon Pump	TBD	4.00	EA	$ 1.25	$ -	$ 5.00	$ 0.75	$ 5.75	Monthly T&M	No Approval Received
M13	Shipping all of Yukon Pump Items	Yukon Pump	TBD	1.00	EA	$ -	$ 500.00	$ 500.00	$ 75.00	$ 575.00	Monthly T&M	No Approval Received
						Subtotal	**$ 4,000.00**	**$ 98,565.78**	**$ 14,784.87**	**$ 113,350.65**		
DES Labor Cost												
Task 1 - Determine requirements and procure secondary electrical components												
L1	Project Manager	DES		10.00	HR	$ 135.00	$ -	$ 1,350.00	$ 202.50	$ 1,552.50	Monthly T&M	No Approval Received
L2	Construction Monitor	DES		-	HR	$ -	$ -	$ -	$ -	$ -	Monthly T&M	No Approval Received
L3	Admin Assistant	DES		8.00	HR	$ 33.22	$ -	$ 265.77	$ 39.87	$ 305.64	Monthly T&M	No Approval Received
L4	Health and Safety Officer	DES		-	HR	$ 47.90	$ -	$ -	$ -	$ -	Monthly T&M	No Approval Received
L5	Electrician	DES		20.00	HR	$ 52.02	$ -	$ 1,040.40	$ 156.06	$ 1,196.46	Monthly T&M	No Approval Received
						Subtotal	**$ -**	**$ 2,656.17**	**$ 398.43**	**$ 3,054.60**		

Notes:
1. The above labor does not constitute design services.
2. The above estimates do not include construction.

	Total Cost Est.		
Consulting	**$ -**	**$ -**	**$ -**
Materials and Services	**$ 102,565.78**	**$ 14,784.87**	**$ 113,350.65**
DES Labor	**$ 2,656.17**	**$ 398.43**	**$ 3,054.60**
Total	**$ 105,221.95**	**$ 15,183.29**	**$ 116,405.24**

Karen.Furlong

From: John Brodie [mjohnbrodie@shaw.ca]
Sent: Friday, October 08, 2010 3:11 PM
To: Karen.Furlong
Cc: Kaori.Torigai
Subject: RE: Grum V15 Heat Trace Approval

Karen
I have looked over the proposed heat trace design as organized by DES and prepared by others.
The approach seems reasonable.

John Brodie, P. Eng.
Brodie Consulting Ltd.
604-922-2034; fax 604-922-9520; cell 604-790-1853
mjohnbrodie@shaw.ca

From: Karen.Furlong@gov.yk.ca [mailto:Karen.Furlong@gov.yk.ca]
Sent: Thursday, October 07, 2010 10:41 AM
To: mjohnbrodie@shaw.ca
Cc: Kaori.Torigai@gov.yk.ca
Subject: Grum V15 Heat Trace Approval

Hi John,

Attached is the Grum V15 heat trace/pump/secondary electrical approval for your signature asap.

Thanks,
Karen

Karen Furlong, EIT
Project Manager
Assessment and Abandoned Mines, K-419
T: 867-456-6764 Cell: 867-332-4431
F: 867-456-6780
Email: karen.furlong@gov.yk.ca

Purchase Requisition

Denison Environmental Services

a division of Denison Mines Inc.

P.O.Box 280
Faro, YT
Y0B 1K0

Site Phone: (867) 994-2600
Fax (867) 994-2378

G.S.T. Registration # 88630 0482 RP0002
WebSite: www.denisonenvironmental.com

Get Quotes **Order**

Recommended Vendor

Name:	**EECOL Electric**
Address:	9034 Quartz Road
City/Prov.:	Whitehorse, Yukon
Phone:	(867) 633-7711
Fax :	(867) 633-7710
Postal Code:	Y1A 2Z5

Date: September 27th, 2010

Requisitioned By : Chris Wilkinson

JOB NO: 016 634411 14026 4111

QTY.	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
30	meters	30 meters of 3 C/2 Teck	$ 19.71	$ 591.36
1	ea	Heat Shrink Cap for 3 C/2 Teck	$ 14.45	$ 14.45
2	ea	Teck Connectors for 3 C/2 Teck	$ 44.02	$ 88.04
1	ea	1 1/4 LB	$ 16.62	$ 16.62
2	ea	1 1/4- 6" Galvanized Nipple	$ 7.17	$ 14.34
6	ea	1 1/4 Locknuts	$ 0.26	$ 1.55
6	ea	1 1/4 Plastic Bushing	$ 0.18	$ 1.07
1	ea	1100 T6103 125Amp/3W 72" L S-Through	$ 123.71	$ 123.71
1	ea	Square D CH363 100A 600V 3P Switch	$ 341.93	$ 341.93
3	ea	FRZ OTS100 Class K5 One-Time Fuse 600v	$ 20.10	$ 60.30
1	ea	Square D CH362 60Amp 600V 3P Switch	$ 160.64	$ 160.64
3	ea	FRZ OTS60 Class K5 One-Time Fuse 600V	$ 11.87	$ 35.61
1	ea	Square D CH361 30Amp 600V 3P Switch	$ 139.13	$ 139.13

Sub Total	$ 1,588.74
SHIPPING & HANDLING	
GST	
PST	
Total	$ 1,588.74

* GST applied to Subtotal and SH

Sales Representative:	Shawn
Shipping Instructions:	**Small's Expediting**

Request Rec'd by :	C.W Chris Wilkinson
Manager Approval:	Roy Morrell

HAVE YOU CONSIDERED?
Environment ☑
Health & Safety ☑
Comments:

Purchase Requisition

Denison Environmental Services

Faro Mine Closure

Get Quotes **Order**

a division of Denison Mines Inc.

P.O.Box 280 Site Phone: (867) 994-2600

Faro, YT Fax (867) 994-2378

Y0B 1K0

G.S.T. Registration # 88630 0482 RP0002

WebSite: www.denisonenvironmental.com

Recommended Vendor

Name:	**EECOL Electric**
Address:	9034 Quartz Road
City/Prov.:	Whitehorse, Yukon
Phone:	(867) 633-7711
Fax :	(867) 633-7710
Postal Code:	Y1A 2Z5

Date: September 27th, 2010

Requisitioned By : Chris Wilkinson

JOB NO: 016 634411 140264111

QTY.	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
		Total from Page 1:	$ 1,588.74	$ 1,588.74
3	ea	FRZ OTS20 Class K5 One-Time Fuse 600V	$ 7.85	$ 23.55
1	ea	Square D CH 361 30Amp 600V 3P Switch	$ 139.13	$ 139.13
3	ea	FRZ OTS10 Class K5 One- Time Fuse 600V	$ 7.85	$ 23.55
4	ea	SCF Galvinized Nipple, 1X6 Threaded Nipple	$ 5.41	$ 21.64
16	ea	IBV CI1708 1" Steel Locknut	$ 0.18	$ 2.89
8	ea	IBV CI2708, 1" Plastic Bushing	$ 0.15	$ 1.21
80	FT.	TEC TK8/3CU 1KV Teck Cable	$ 5.81	$ 465.12
80	FT.	COM ARM INST 16/2PR Armoured Instrument Cable 300V	$ 4.47	$ 357.38
1	ea	OCL OAS05036T 5KW 600V 1/3 PH Unit Heater	$ 876.36	$ 876.36
1	ea	BMG BC1005V 5KVA 600-120/240V 1PH Trans CU	$ 513.00	$ 513.00
1	ea	Square D CQO124M125C60 24CCT, 125 Amp ,1 PH, 60 Amp MB QO L/C	$ 55.97	$ 55.97
6	ea	Square D QO115 Plug-In Breaker 15Amp	$ 10.06	$ 60.36

Sub Total	$ 4,128.91
SHIPPING & HANDLING	
GST	
PST	
Total	$ 4,128.91

* GST applied to Subtotal and SH

Sales Representative:	Shawn
Shipping Instructions:	**Small's Expediting**

Request Rec'd by :	C.W. Chris Wilkinson
Manager Approval:	Roy Morrell

HAVE YOU CONSIDERED?

Environment ☑

Health & Safety ☑

Comments:

Purchase Requisition

Denison Environmental Services

a division of Denison Mines Inc.

P.O.Box 280
Faro, YT
Y0B 1K0

Site Phone: (867) 994-2600
Fax (867) 994-2378

G.S.T. Registration # 88630 0482 RP0002
WebSite: www.denisonenvironmental.com

Get Quotes **Order**

Page # 3

Recommended Vendor

Name:	**EECOL Electric**
Address:	9034 Quartz Road
City/Prov.:	Whitehorse, Yukon
Phone:	(867) 633-7711
Fax :	(867) 633-7710
Postal Code:	Y1A 2Z5

Date: September 27th, 2010

Requisitioned By : Chris Wilkinson

JOB NO: 016 634411 14026 4111

QTY.	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
		Total from Page 2:	$ 4,128.91	$ 4,128.91
2	ea	CPM WN23AUNVEB81U 2L 4ft. 120/ 277V T8 Wrap Fixture	$ 44.05	$ 88.10
50	ea	IBV CI5004 1/2" Zinc EMT S-Screw Conn	$ 0.24	$ 11.90
100	FT.	SCF EMT Conduit 1/2" EMT Conduit	$ 0.29	$ 28.97
		These items are all for the V-15 Project as requested by Doug.		

Sub Total	$ 4,257.88
SHIPPING & HANDLING	
GST	$ 212.89
PST	
Total	$ 4,470.77

* GST applied to Subtotal and SH

Sales Representative: Shawn

Shipping Instructions: **Small's Expediting**

Request Rec'd by : C.W. Chris Wilkinson

Manager Approval: Roy Morrell

HAVE YOU CONSIDERED?

Environment ☑

Health & Safety ☑

Comments:

EECOL ELECTRIC 8676337710 09/22/2010 11:45

EECOL ELECTRIC

QUOTATION

XXXXXXXXXXXXXXXXXXXX

CUSTOMER COPY

DATE 9/22/10

TIME 12:46:56

EECOL ELECTRIC CORP.
9034 QUARTZ ROAD
WHITEHORSE, YT Y1A 2Z5

(PH. 867 633 7711)

*** REQUEST FOR PRICING ***

INQUIRY #: 203-0060392

CREDIT	COPIES	TERRITORY	CUSTOMER'S PURCHASE ORDER NUMBER	ORDERED FROM
				SHAWN PIERCE

INVOICE DENISON ENVIRONMENTAL SERVICES
BOX 280
DENENV FARO, YT YOB 1K0

ORDER DATE

SHIP TO (SUBJECT TO APPROVAL)
DENISON ENVIRONMENTAL SERVICES
FARO MINE COMPLEX
BOX 280
FARO YT YOB 1KO

VENDOR	ITEM	DESCRIPTION	UOM	PRICE	ORDERED	EXTENSION XXXXXXXXXX	STOCK CHECK XXXXXXXXX
TECK CABLE	TEC	TK2/3CU 1KV TECK CABLE	1000	19711.96	30	591.36	
T&B	THS	HSC300-600 SHRINK CAP 3.5" 300-600	100	1445.26	1	14.45	
T&B	THS	ST125-470 1-1/4" TECK CONNECTOR	100	4401.80	2	88.04	
T&B (IBERV	IBV	CILBA-1 1/4 "LB" RIG & EMT CONDUIT BODY	100	1661.59	1	16.62	
STEEL COND	SCF	GALV NIP 1-1/4X6 THREADED NIPPLE	100	717.05	2	14.34	
T&B (IBERV	IBV	CI1710 1-1/4" STEEL LOCKNUT	100	25.87	6	1.55	
T&B (IBERV	IBV	CI2710 1-1/4" PLASTIC BUSHING	100	17.78	6	1.07	
EXM MANUFA	EUR	1100 T6103 125A/3W 72"L S-TROUGH	1	123.71	1	123.71	
SCHNEIDER	SQD	CH363 100A 600V 3P SWITCH	1	341.93	1	341.93	
MERSEN CAN	FRZ	OTS100 CLASS K5 ONE-TIME FUSE 600V	1	20.10	3	60.30	
SCHNEIDER	SQD	CH362 60A 600V 3P SWITCH	1	160.64	1	160.64	
MERSEN CAN	FRZ	OTS60 CLASS K5 ONE-TIME FUSE 600V	1	11.87	3	35.61	

CONTINUED...

THE ABOVE GOODS, SHIPPED IN PERFECT CONDITION, ARE AT BUYER'S RISK. IF FOUND DAMAGED ON ARRIVAL, CLAIM MUST BE MADE IMMEDIATELY AGAINST THE TRANSPORT COMPANY. DO NOT RETURN GOODS WITHOUT OUR PERMISSION. RESTOCKING CHARGE ON ALL GOODS AS ORDERED.

RECEIVED ABOVE IN GOOD ORDER X _____

CHECKED BY _____

EECOL ELECTRIC

QUOTATION

XXXXXXXXXXXXXXXXXXXX

CUSTOMER COPY

EECOL ELECTRIC CORP.
9034 QUARTZ ROAD
WHITEHORSE, YT Y1A 2Z5
(PH. 867 633 7711)

DATE 9/22/10
TIME 12:46:56

*** REQUEST FOR PRICING ***
INQUIRY #: 203-0060392

CREDIT	COPIES	TERRITORY	CUSTOMER'S PURCHASE ORDER NUMBER	ORDERED FROM
				SHAWN PIERCE

INVOICE
DENENV

DENISON ENVIRONMENTAL SERVICES
BOX 280
FARO, YT YOB 1K0

ORDER DATE

SHIP TO

(SUBJECT TO APPROVAL)
DENISON ENVIRONMENTAL SERVICES
FARO MINE COMPLEX
BOX 280
FARO YT YOB 1KO

VENDOR	ITEM DESCRIPTION	UOM	PRICE	ORDERED	EXTENSION XXXXXXXXXXXXX	STOCK CHECK XXXXXXXXX
SCHNEIDER	SQD CH361 30A 600V 3P SWITCH	1	139.13	1	139.13	
MERSEN CAN	FRZ OTS20 CLASS K5 ONE-TIME FUSE 600V	1	7.85	3	23.55	
SCHNEIDER	SQD CH361 30A 600V 3P SWITCH	1	139.13	1	139.13	
MERSEN CAN	FRZ OTS10 CLASS K5 ONE-TIME FUSE 600V	1	7.85	3	23.55	
STEEL COND	SCF GALV NIP 1X6 THREADED NIPPLE	100	541.07	4	21.64	
T&B (IBERV	IBV CI1708 1" STEEL LOCKNUT	100	18.09	16	2.89	
T&B (IBERV	IBV CI2708 1" PLASTIC BUSHING	100	15.09	8	1.21	
TECK CABLE	TEC TK8/3CU 1KV TECK CABLE	1000	5814.06	80	465.12	
COMMUNICAT	COM ARM INST 16/2PR ARMOURED INSTRUMENT CABLE 300V	1000	4467.24	80	357.38	
OUBLLET CA	OCL OAS05036T 5KW 600V 1/3PH UNIT HEATER	1	876.36	1	876.36	
BEMAG TRAN	BMG BC1005V 5KVA 600-120/240V 1PH TRANS CU	1	513.00	1	513.00	
SCHNEIDER	SQD CQO124M125C60 24CCT,125A,1PH,60A MB QO L/C	1	55.97	1	55.97	

THE ABOVE GOODS, SHIPPED IN PERFECT CONDITION, ARE AT BUYER'S RISK. IF FOUND DAMAGED ON ARRIVAL, CLAIM MUST BE MADE IMMEDIATELY AGAINST THE TRANSPORT COMPANY. DO NOT RETURN GOODS WITHOUT OUR PERMISSION. RESTOCKING CHARGE ON ALL GOODS AS ORDERED.

RECEIVED ABOVE IN GOOD ORDER X _____

CHECKED BY _____

EECOL ELECTRIC

EECOL ELECTRIC CORP.
9034 QUARTZ ROAD
WHITEHORSE, YT Y1A 2Z5

(PH. 867 633 7711)

QUOTATION

XXXXXXXXXXXXXXXXXXXX

CUSTOMER COPY

PAGE 3 OF 3
DATE 9/22/10
TIME 12:46:56

*** R E Q U E S T F O R P R I C I N G ***

INQUIRY #: 203-0060392

CREDIT	COPIES	TERRITORY	CUSTOMER'S PURCHASE ORDER NUMBER	ORDERED FROM
				SHAWN PIERCE

INVOICE DENISON ENVIRONMENTAL SERVICES
BOX 280
DENENV FARO, YT YOB 1K0

ORDER DATE

SHIP TO (SUBJECT TO APPROVAL)
DENISON ENVIRONMENTAL SERVICES
FARO MINE COMPLEX
BOX 280
FARO YT YOB 1KO

VENDOR	ITEM DESCRIPTION	UOM	PRICE	ORDERED	EXTENSION XXXXXXXXXXXX	STOCK CHECK XXXXXXXXX
SCHNEIDER	SQD QO115 PLUG-IN BREAKER 15A	1	10.06	6	60.36	
COOPER LIG	CPM WN232AUNVEB81U 2L 4FT 120/277V T8 WRAP FIXT	1	44.05	2	88.10	
T&B (IBERV	IBV CI5004 1/2" ZINC EMT S-SCREW CONN	100	23.79	50	11.90	
STEEL COND	SCF EMT CONDUIT 1/2 EMT CONDUIT SOLD PER FOOT	100	28.97	100	28.97	
	PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.					
			GRAND TOTAL (BEFORE TAXES)		4257.88	
			GST		212.89	
			TOTAL		4470.77	

THE ABOVE GOODS, SHIPPED IN PERFECT CONDITION, ARE AT BUYER'S RISK. IF FOUND DAMAGED ON ARRIVAL, CLAIM MUST BE MADE IMMEDIATELY AGAINST THE TRANSPORT COMPANY. DO NOT RETURN GOODS WITHOUT OUR PERMISSION. RESTOCKING CHARGE ON ALL GOODS AS ORDERED.

RECEIVED ABOVE IN GOOD ORDER X _____

CHECKED BY _____

EECOL ELECTRIC 8676337710 09/22/2010 11:45

YUKON PUMP LTD

Pumps, Hose, Tanks, Pipe, Hydraulics, Filters & Fittings

Date: October 5, 2010
To: Jon Bronson, Project Manager
Dennison Environmental Services
Re: Quote for pump(s) Faro Mine Dewatering Project.

Jon,
We are please to provide you with the quote for Flygt pumps and hardware below. As you are aware, this quote contemplates operating one pump for most of the year, bringing a second one on line when it is required. For the purpose of this quote, only the first pump is considered.
Best regards
Doug Fry

Qty	Description	Unit Price	Total Price
NOTE: The following will be installed/set-up with each pump already; - Diode - 200 feet of Shielded GC cable - manual control/starter			
1	2140.010-0137 FLYGT BS-2140 SUBMERSIBLE PUMP 600 VOLT 3/60 19HP/14.2KW 3485 RPMHT IMP 234 CONN 3" C.E.=20-22MM DIA. VERSION:STANDARD	12,379.00	$12,379.00
1	13-40 01 13 DIODE 50 WATT 5.6VOLT (1/4"-28UNF)	136.00	$136.00
62	13-41 00 29 CABLE 14 AWG/ 3 JACKETCHLORINATED POLYETHYLENE (CPE) TYPE SHD-GC	33.10	$2052.20
1	13-00 93 68 ITT W&WW CUSTOM BUILT SIMPLEX CONTROLLER (30"H X 24"W X 8"D) IN EEMAC 12 INDOOR ENCLOSURE COMPLETE WITH; -60 AMP UNFUSED DISCONNECT WITH PADLOCK HANDLE -100AMP BREAKER C/W ELECTRONIC GFI -CLASS 10 OVERLOAD RELAY	3,925.00	$3925.00
1	4" – 3" bell reducer	29.40	$2940
1	N46-300Al Camlock	12.10	$12.10
1	N43-300Al Camlock	19.76	$1976
3	Feet of Red, Layflat hose	2.44	7.32
4	3 ½ " center punch clamps	1.25	$5.00
Total Price CAD			**$18,565.78 + tax and shipping***

* Estimated shipping charges from Vancouver to Whitehorse - $225.00

Delivery Time - 5 weeks from order – including unit assembly in Vancouver and shipping to Whitehorse

The Yukon's Complete Industrial Products Source
120- B Industrial Road, Whitehorse, Yukon, Y1A 2T9
Phone# 867-633-3478 / Fax# 867-633-5422
E-mail – info.yukonpump@northwestel.net

Denison Environmental Services

a division of Denison Mines Inc.

P.O.Box 280
Faro, YT
Y0B 1K0

Site Phone: (867) 994 - 2600
Fax (867) 994 - 2378

G.S.T. Registration # 88630 0482 RP0002
WebSite: www.denisonenvironmental.com

Get Quotes **Order**

Purchase Requisition

Recommended Vendor

Name:	Wolseley Canada
Address:	20175 - 102 Ave
City/Prov:	Langley, B.C.
Phone:	604-513-4300
Fax :	604-513-4301
Postal Code:	V1M 4B4

Date:	27-Sep-10
Requisitioned By :	Jon Bronson
Job No :	016 634411 14026 4111

QUANTITY	UNIT	ITEM	UNIT PRICE	TOTAL
		Project Name: V15 Pumping Improvements		
		Project Number: 14026		
4000	ft	Series heat trace cable model #SC-3SC30-CT	$ 10.52	$ 42,080.00
1	ea	Electronic thermostat model # UTC-6330-01	$ 3,208.50	$ 3,208.50
1	ea	100 ohms RTD temperature sensor #URTD-15-G with 15 mtrs of grey PVC lead wire	$ 134.28	$ 134.28
1	ea	100 ohms RTD temperature sensor #URTD-15-R with 15 mtrs of red PVC lead wire	$ 134.28	$ 134.28
20	ea	Series cable power connection Kit model #3SC-12PT	$ 367.52	$ 7,350.40
1	ea	Series cable end termination kit model #3SC-STC	$ 197.80	$ 197.80
9	ea	Custom fabricated painted steel junction box support for 3" pipe with 2" of insulation	$ 508.00	$ 4,572.00
9	ea	Nema 4 FRP Junction box with stainless steel hinge and latches,	$ 371.00	$ 3,339.00
		Robroy model # J1816HLL		
		Spare Materials		
400	ft	Series heat trace cable model #SC-3SC30-CT	$ 10.52	$ 4,208.00
1		100 ohms RTD temperature sensor #URTD-15-G with 15 mtrs of grey PVC lead wire	$ 134.28	$ 134.28
1		100 ohms RTD temperature sensor #URTD-15-R with 15 mtrs of red PVC lead wire	$ 134.28	$ 134.28
				$ -
		Vendor to reference PO # on all invoices.		
		Vendor must not exceed PO amount without written approval from DES.		
			Sub Total	$ 65,492.82

Yukon
Energy, Mines and Resources
Énergie, Mines et Ressources

Faro Mine Complex

PROJECT APPROVAL

Assessment and Abandoned Mines
Box 2703, K-419
Whitehorse, Yukon Y1A 2C6

Contract #: GN0853-3096-57059

Project Approval (YYYY-MM-DD-##) : A 2010-10-21-01

Project Title	Grum V15 Civil Works				
Date Initiated	Oct 21, 2010	Budget #:	5.4.5	Reference #	DES Budget # 14026

Scope

Rationale for Work

In order to prepare for possible future environmental risk in the Grum V15 area, a pumping system is to be installed in 2010.

Description of Work

This work involves, but is not limited to, the following:

- Unloading of pipe and staging of pipe materials
- Installation of pipeline and heat trace from Grum V15 to the Vangorda Pit (including fusion, pipe fitting installation and joint insulation)
- Repair and relocation of building (to be used to house secondary electrical connections) from behind shop to the V15 area
- Construction and installation of AVAR shack
- Installation of secondary electrical connections, 3 x 25KVA transformers and 600 AMP Airbrake. (**Please refer to note in budge comments section.)

This is the final approval for this work. All components are to be installed and connected and ready for operation (YG will advise of date of initial system start-up).

Budget

Description of Item/Resource	Total
DES Labour	$33,463.35
NULine Labour **	$10,960.00
Contingency (10%)	$4,442.34
% Fee	$7,329.85
	$56,195.54

Costs will be reimbursed according to itemized invoices, hourly time sheets and receipts as submitted, up to a maximum amount as stated above. Rationale must be provided **in advance** for any costs which exceed these amounts. Contingency may only be accessed with prior written approval from the Project Manager.

Comments

** Note: Installation of 3 x 25KVA transformers and 600 AMP Airbrake were included in "Approval # 2010-08-26-01 - Grum V15 Highline Extension" and are not to be billed as part of this project.

SIP Classification
5.2.2.1 Special Projects

Fee Classification
8.4 Costs plus percentage fee (C+%)

The approval is only valid between the stated dates and cannot be used to exceed the above figure. To amend this approval a change order must be approved before any work can commence. Please quote the Project approval number on all invoices.

Schedule

Start Date: Oct 21, 2010

Finish Date : Jan 14, 2011

Milestones and objectives

% Fee for final month will be paid upon submission of a final closure report detailing work completed and new pipeline arrangement. This report must include the following :

- Final alignment drawings for new electrical highline
- Electrical system overview including transformers and secondary electrical connections
- Pipeline and heat trace specifications
- Drawings with new pipeline alignment and connections
- Pump specifications and set up
- Overall description of project including civil works.
- Budget analysis

DES Insert (Oct. 26, 2010). The drawings referenced above will be prints from Global Mapper. Alignment information will be collected with hand-held (recreation grade) GPS equipment and transposed onto Global Mapper.

Schedule for Deliverables

All work to be completed by December 1 with final report due on or before January 14, 2011.

Title Recommended by Name Karen Furlong

Signature Karen Furlong Date Oct. 26/10

Title Approved By Name Ian Ludgate

Signature Date Oct. 31/10

Title Senior Project Manager Name Deborah Pitt

Signature Date 02/11/10

Title Name

Signature Date

Table 1 - Draft Budget Estimate
14026 - V15 Pumping System Construction

Item #	Item	Vendor	Delivery Date	Quantity	Unit	Unit Cost Est.	Shipping	Total Cost Est.	DES Markup	Est Total Cost
Consulting Services										
						Subtotal	**$ -**	**$ -**	**$ -**	**$ -**
Materials, Equipment and Services										
									$ -	$ -
									$ -	$ -
						Subtotal	**$ -**	**$ -**	**$ -**	**$ -**
Task 1 - V15 Pipeline Construction										
L1	Project Manager	DES		28.00	HR	$ 135.00	$ -	$ 3,780.00	$ 567.00	$ 4,347.00
L2	Engineering Assistant	DES		60.00	HR	$ 56.11	$ -	$ 3,366.60	$ 504.99	$ 3,871.59
L3	Admin Assistant	DES		24.00	HR	$ 33.22	$ -	$ 797.31	$ 119.60	$ 916.91
L4	Health and Safety Officer	DES		4.00	HR	$ 47.90	$ -	$ 191.60	$ 28.74	$ 220.34
L5	Foreman	DES		70.00	HR	$ 51.90	$ -	$ 3,633.00	$ 544.95	$ 4,177.95
L6	HD Operator	DES		452.00	HR	$ 38.33	$ -	$ 17,325.16	$ 2,598.77	$ 19,923.93
L7	Electrician	DES		84.00	HR	$ 52.02	$ -	$ 4,369.68	$ 655.45	$ 5,025.13
L8	Contract Electrician	NULine		88.00	HR	$ 110.00	1,280.00	$ 10,960.00	$ 1,644.00	$ 12,604.00
						Subtotal	**$ 1,280.00**	**$ 44,423.35**	**$ 6,663.50**	**$ 51,086.86**

Notes:

	Total Cost Est.		
Consulting	**$ -**	**$ -**	**$ -**
Materials and Services	**$ -**	**$ -**	**$ -**
DES Labor	**$ 44,423.35**	**$ 6,663.50**	**$ 51,086.86**
Total	**$ 44,423.35**	**$ 6,663.50**	**$ 51,086.86**

Karen.Furlong

From: John Brodie [mjohnbrodie@shaw.ca]
Sent: Wednesday, November 03, 2010 10:57 AM
To: 'Jon Bronson'; Kaori.Torigai; Karen.Furlong
Cc: 'Roy Morrell'; 'Kristian Autio'; 'Jay Cherian'
Subject: RE: V15 spillway

Agreed.

John Brodie, P. Eng.
Brodie Consulting Ltd.
604-922-2034; fax 604-922-9520; cell 604-790-1853
mjohnbrodie@shaw.ca

From: Jon Bronson [mailto:jbronson@denisonenvironmental.com]
Sent: Wednesday, November 03, 2010 10:52 AM
To: Kaori.Torigai@gov.yk.ca; Karen.Furlong@gov.yk.ca; mjohnbrodie@shaw.ca
Cc: Roy Morrell; Kristian Autio; Jay Cherian
Subject: V15 spillway

Kaori - During today's weekly meeting, we discussed the pros/cons of damming the current discharge location for the V15 pond now vs damming the discharge location at the time pumping is determined to be required. As this structure is small, DES would prefer to not modify the current discharge until the decision is made to begin pumping. If needed during inclement weather, DES can rapidly construct a berm in this location with sand bags and plastic (or similar), and follow-up with a permanent structure during better weather.

Jon Bronson
Project Manager

t: 867-994-2600 | c: 867-334-3711 | f: 867-994-2378
Faro Care and Maintenance Project
Box 280, Faro, YT Y0B 1K0

t: 705-848-9191 | f: 705-848-5814
8 Kilborn Way, Elliot Lake, ON P5A 2T1

Denison Environmental Services
www.denisonenvironmental.com

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Yukon
Energy, Mines and Resources
Énergie, Mines et Ressources

Assessment and Abandoned Mines
Box 2703, K-419
Whitehorse, Yukon Y1A 2C6

Faro Mine Complex

PROJECT APPROVAL

Contract #: GN0853-3096-57059

Project Approval (YYYY-MM-DD-##) : A 2010-10-21-01-C01

Project Title: CHANGE ORDER Grum V15 Civil Works

Date Initiated: Nov 26, 2010 | Budget #: 5.4.5 | Reference #: DES Budget # 14026

Scope

Rationale for Work

In order to prepare for possible future environmental risk in the Grum V15 area, a pumping system is to be installed in 2010.

Description of Work

This is a change order to allow for extension of this project to February 28 to allow for long-lead time components to be installed (heat trace). All work is to be completed and final report submitted by this end date. This change order does not involve a budget modification.

This work involves, but is not limited to, the following:

- Unloading of pipe and staging of pipe materials
- Installation of pipeline and heat trace from Grum V15 to the Vangorda Pit (including fusion, pipe fitting installation and joint insulation)
- Repair and relocation of building (to be used to house secondary electrical connections) from behind shop to the V15 area
- Construction and installation of AVAR shack
- Installation of secondary electrical connections, 3 x 25KVA transformers and 600 AMP Airbrake. (**Please refer to note in budge comments section.)

This is the final approval for this work. All components are to be installed and connected and ready for operation (YG will advise of date of initial system start-up).

Budget

Description of Item/Resource	Total
DES Labour	$33,463.35
NULine Labour **	$10,960.00
Contingency (10%)	$4,442.34
% Fee	$7,329.85
	$56,195.54

Costs will be reimbursed according to itemized invoices, hourly time sheets and receipts as submitted, up to a maximum amount as stated above. Rationale must be provided **in advance** for any costs which exceed these amounts. Contingency may only be accessed with prior written approval from the Project Manager.

Comments

** Note: Installation of 3 x 25KVA transformers and 600 AMP Airbrake were included in "Approval # 2010-08-26-01 - Grum V15 Highline Extension" and are not to be billed as part of this project.

SIP Classification	Fee Classification
5.2.2.1 Special Projects	8.4 Costs plus percentage fee (C+%)

The approval is only valid between the stated dates and cannot be used to exceed the above figure. To amend this approval a change order must be approved before any work can commence. Please quote the Project approval number on all invoices.

Schedule

Start Date: Oct 21, 2010

Finish Date: Feb 28, 2011

Milestones and objectives

% Fee for final month will be paid upon submission of a final closure report detailing work completed and new pipeline arrangement. This report must include the following :

- Final alignment drawings for new electrical highline
- Electrical system overview including transformers and secondary electrical connections
- Pipeline and heat trace specifications
- Drawings with new pipeline alignment and connections
- Pump specifications and set up
- Overall description of project including civil works.
- Budget analysis

REFER TO DFS COMMENTS ON ORIGINAL APPROVAL re DRAWINGS

Schedule for Deliverables

This is a change order to allow for extension of this project to February 28 to allow for long-lead time components to be installed (heat trace). All work is to be completed and final report (as described in "Milestones and Objectives" submitted by this end date. This change order does not involve a budget modification.

All work to be completed by December 1 with final report due on or before January 14, 2011.

Title Recommended by Name Karen Furlong

Signature Karen Furlong Date Nov. 26/10

Title Approved By Name Ian Ludgate

Signature Date DEC 15/10

Title Senior Project Manager Name Deborah Pitt

Signature Date 17/12/10

Title Name

Signature Date

APPENDIX B

PHOTO DOCUMENTATION

Installing Highline Switch

Constructing Power Distribution Building

Power Distribution Building

Heat Trace Controller and 100A Main Disconnect

Pump Starter Panel

60A Heat Trace Disconnect – 30A Heater Disconnect

30A Heater Disconnect – 30A Lighting Trans. Disconnect

5kVA 600V / 120-240 Transformer

25 kVA 4160 / 600V Transformers

Highline Switch

Placing V15 Pipeline

Installing V15 Pipeline Culvert

V15 Pipeline Welding

Installing V15 Heat Trace

Installing Insulation Joint Kits

V15 AVAR Valve

Pump Bypass / Drain Manifold

Heat Trace Junction

APPENDIX C

VENDOR DOCUMENTATION

YUKON PUMP LTD

Pumps, Hose, Tanks, Pipe, Hydraulics, Filters & Fittings

Date: October 5, 2010
To: Jon Bronson, Project Manager
Dennison Environmental Services
Re: Quote for pump(s) Faro Mine Dewatering Project.

Jon,
We are please to provide you with the quote for Flygt pumps and hardware below. As you are aware, this quote contemplates operating one pump for most of the year, bringing a second one on line when it is required. For the purpose of this quote, only the first pump is considered.
Best regards
Doug Fry

Qty	Description	Unit Price	Total Price
NOTE: The following will be installed/set-up with each pump already; - Diode - 200 feet of Shielded GC cable - manual control/starter			
1	2140.010-0137 FLYGT BS-2140 SUBMERSIBLE PUMP 600 VOLT 3/60 19HP/14.2KW 3485 RPMHT IMP 234 CONN 3" C.E.=20-22MM DIA. VERSION:STANDARD	12,379.00	$12,379.00
1	13-40 01 13 DIODE 50 WATT 5.6VOLT (1/4"-28UNF)	136.00	$136.00
62	13-41 00 29 CABLE 14 AWG/ 3 JACKETCHLORINATED POLYETHYLENE (CPE) TYPE SHD-GC	33.10	$2052.20
1	13-00 93 68 ITT W&WW CUSTOM BUILT SIMPLEX CONTROLLER (30"H X 24"W X 8"D) IN EEMAC 12 INDOOR ENCLOSURE COMPLETE WITH; -60 AMP UNFUSED DISCONNECT WITH PADLOCK HANDLE -100AMP BREAKER C/W ELECTRONIC GFI -CLASS 10 OVERLOAD RELAY	3,925.00	$3925.00
1	4" – 3" bell reducer	29.40	$2940
1	N46-300Al Camlock	12.10	$12.10
1	N43-300Al Camlock	19.76	$1976
3	Feet of Red, Layflat hose	2.44	7.32
4	3 ½ " center punch clamps	1.25	$5.00
Total Price CAD			**$18,565.78 + tax and shipping***

* Estimated shipping charges from Vancouver to Whitehorse - $225.00

Delivery Time - 5 weeks from order – including unit assembly in Vancouver and shipping to Whitehorse

The Yukon's Complete Industrial Products Source
120- B Industrial Road, Whitehorse, Yukon, Y1A 2T9
Phone# 867-633-3478 / Fax# 867-633-5422
E-mail – info.yukonpump@northwestel.net

(1)

FLYGT

Design pipe system

Project: Faro Dewatering - Case1 · **10/01/2010**

Customer: Yukon Pump

Jay Sommerfeld

Individual 1

					No of
Length	**50.0**	ft	Discharge conn.	0.25	**0**
Material	**Hose**		90° bend	0.25	**0**
Pressure class	**HOSE**		Valve	0.30	**0**
Dimension	**101.60**	inch	T-connection	1.00	**0**
C-factor	**130.000**		Check valve	0.90	**0**
Inner diam.	**4.0**	inch	Outlet	1.00	**0**
			Own	0.00	**0**
			Total:	**0.00**	
Water velocity:	**2.4**	ft /s	Loss in pipe section:		**0.3** ft

Flygt

ITT Industries

(2)

FLYGT

Design pipe system

Project: Faro Dewatering - Case1 **10/01/2010**

Customer: Yukon Pump

Jay Sommerfeld

Common 1

					No of
Length	**4000.0**	ft	Discharge conn.	0.25	**0**
Material	**HDPE**		90° bend	0.25	**0**
Pressure class	**DR11**		Valve	0.30	**0**
Dimension	**75.00**	inch	T-connection	1.00	**0**
C-factor	**140.000**		Check valve	0.90	**0**
Inner diam.	**2.8**	inch	Outlet	1.00	**0**
			Own	0.00	**0**
			Total:	**0.00**	
Water velocity:	**4.9**	ft /s	Loss in pipe section:		**129.8** ft

Individual 1 *Common 1*

Total flow:	**95.0**	USgpm	No of	Head losses:	Total head:
Geodetic Head:	**200.0**	ft	**1**	**130.2** ft	**330.2** ft

Hazen-Williams

Flygt

ITT Industries

(3) 1 - PUMP RUNNING IN SYSTEM.

PERFORMANCE CURVE

PRODUCT	TYPE
BS2140.010	HT

DATE	PROJECT	CURVE NO	ISSUE
2010-10-01	Faro Dewatering	63-234-00-0260	3

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.86	0.82	0.72
MOTOR EFFICIENCY	87.5 %	88.0 %	87.0 %
GEAR EFFICIENCY	---	---	---

MOTOR SHAFT POWER	19	hp
STARTING CURRENT ...	157	A
RATED CURRENT ...	18	A
RATED SPEED	3485	rpm
TOT.MOM.OF INERTIA ...	0.026	kgm2
NO. OF BLADES	4	

IMPELLER DIAMETER: 208 mm

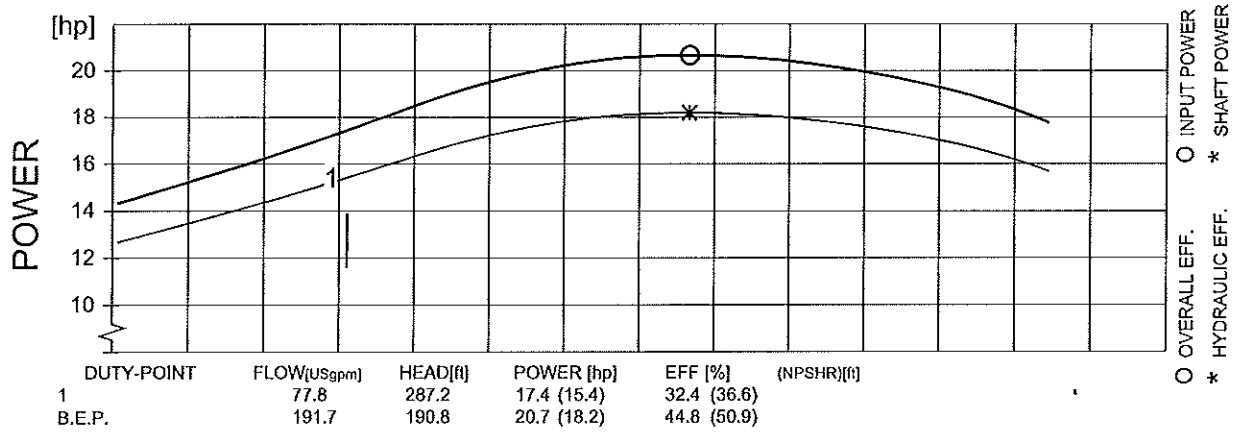
MOTORTYPE	STATOR	REV
19-16-2AA	02D	12

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	600 V	2

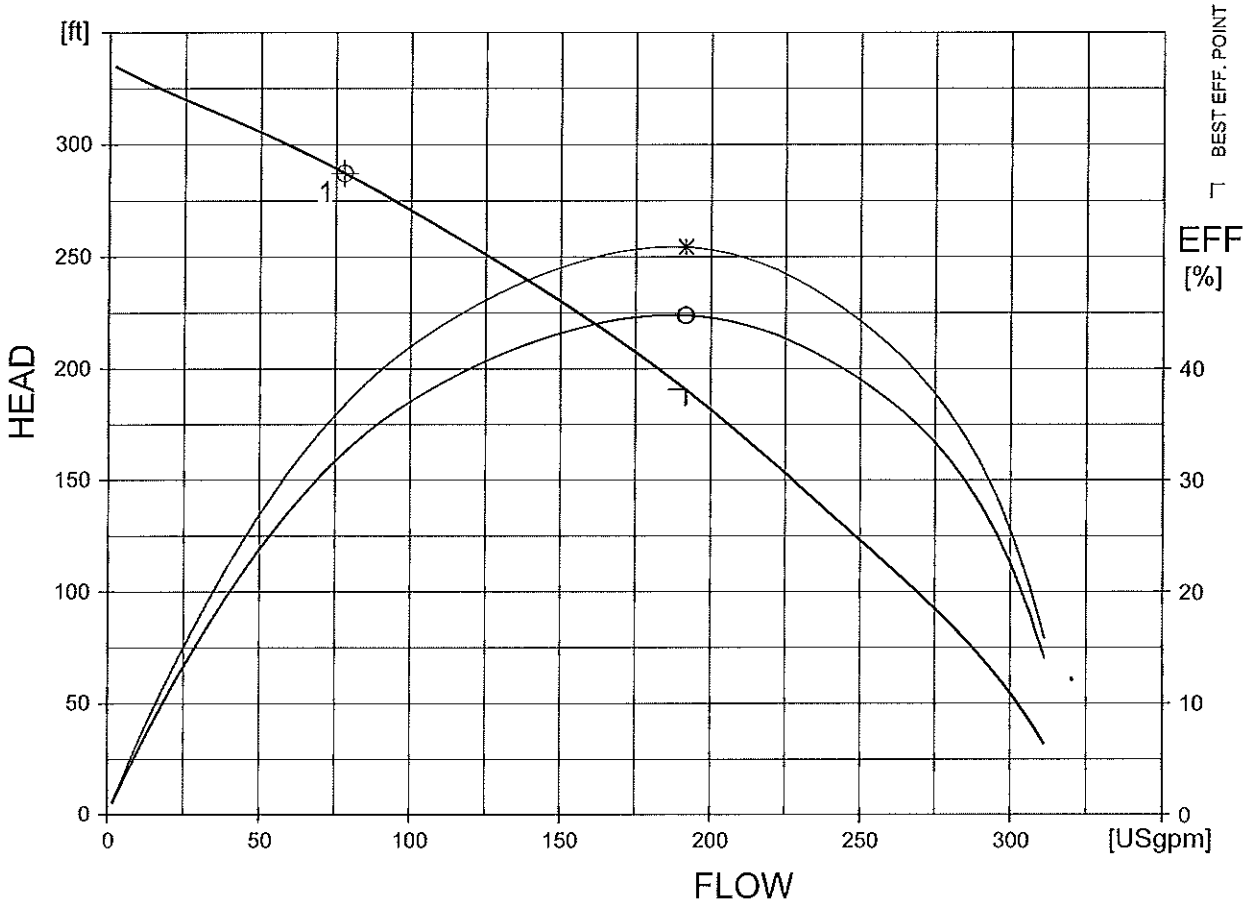
GEARTYPE	RATIO
---	---

COMMENTS

INLET/OUTLET	IMP. THROUGHLET
- / 3.0 inch	---



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF [%]	(NPSHR)[ft]
1	77.8	287.2	17.4 (15.4)	32.4 (36.6)	
B.E.P.	191.7	190.8	20.7 (18.2)	44.8 (50.9)	



FLYPS3.1.6.6 (20090313)

Performance with clear water and rating data at 40 °C

FLYGT CURVE

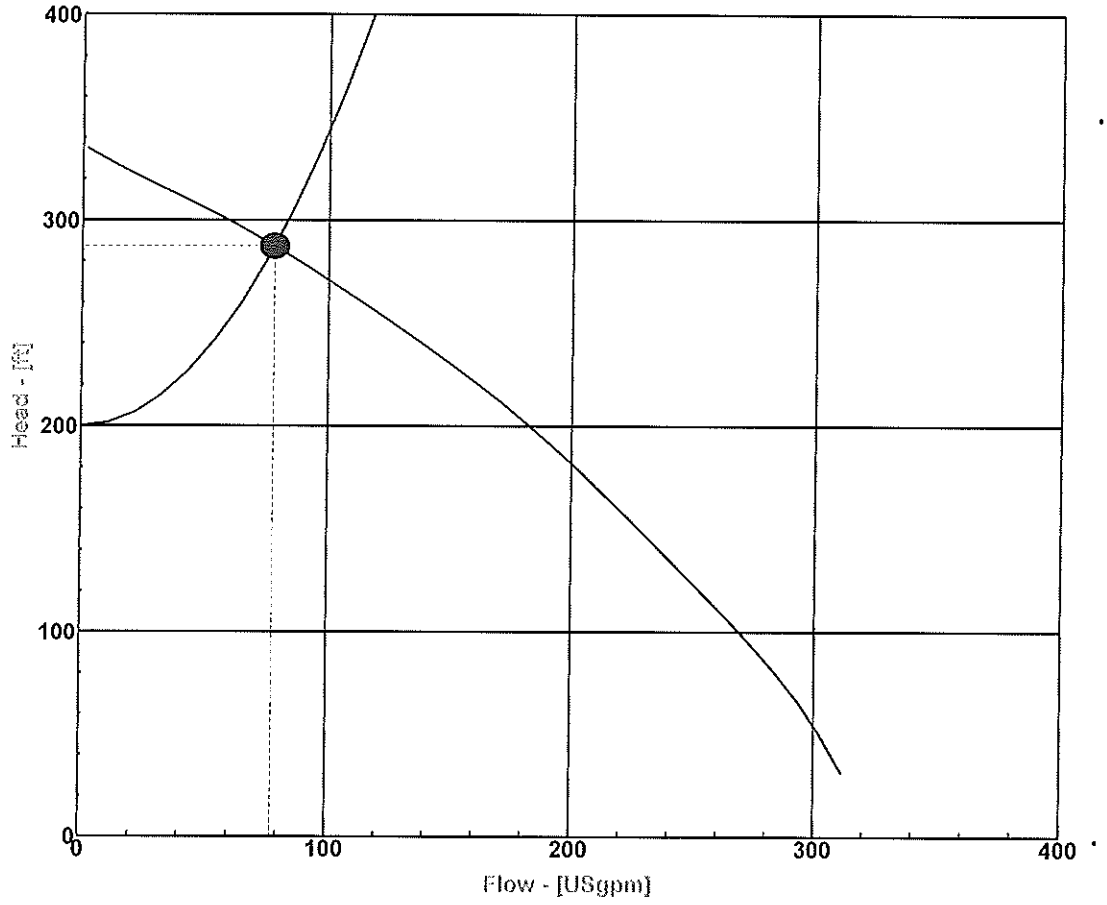
(4)

FLYGT

Duty Analysis - Duty conditions

Project: Faro Dewatering

Owner: Jay Sommerfeld



Pump curve

1 BS 2140 63-234-00-0260

PRODUCT DATA

Rat. pow.: 19 hp

Imp.diam.: 208 mm

Vanes: 4

Throughlet: 0 inch

DUTY CONDITIONS

No of pumps: 1

Flow: 77.8 USgpm

Head: 287.2 ft

Hydraulic power: 15.4 hp

Hydraulic eff.: 36.6 %

Spec. energy: 2783.5 kWh/mg

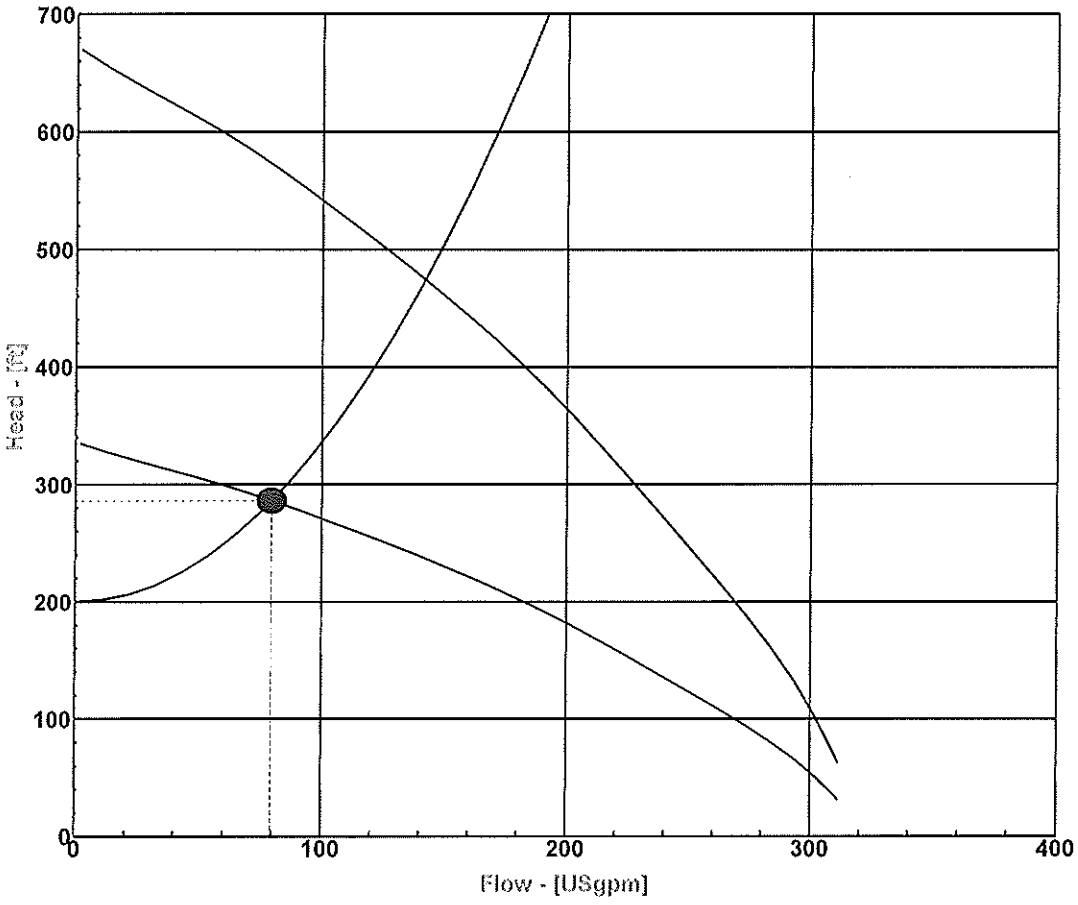
FLYGT (5)

Duty Analysis - Duty conditions

Project: Faro Dewatering

Owner: Jay Sommerfeld

1 PUMP RUNNING IN TANDUM SYSTEM



Pump curve

1 BS 2140 63-234-00-0260

PRODUCT DATA

Rat. pow.: 19 hp

Imp.diam.: 208 mm

Vanes: 4

Throughlet: 0 inch

DUTY CONDITIONS

No of pumps: 1

Flow: 79.5 USgpm

Head: 286.0 ft

Hydraulic power: 15.5 hp

Hydraulic eff.: 37.1 %

Spec. energy: 2734.9 kWh/mg

NPSH-req.: 0.0 ft

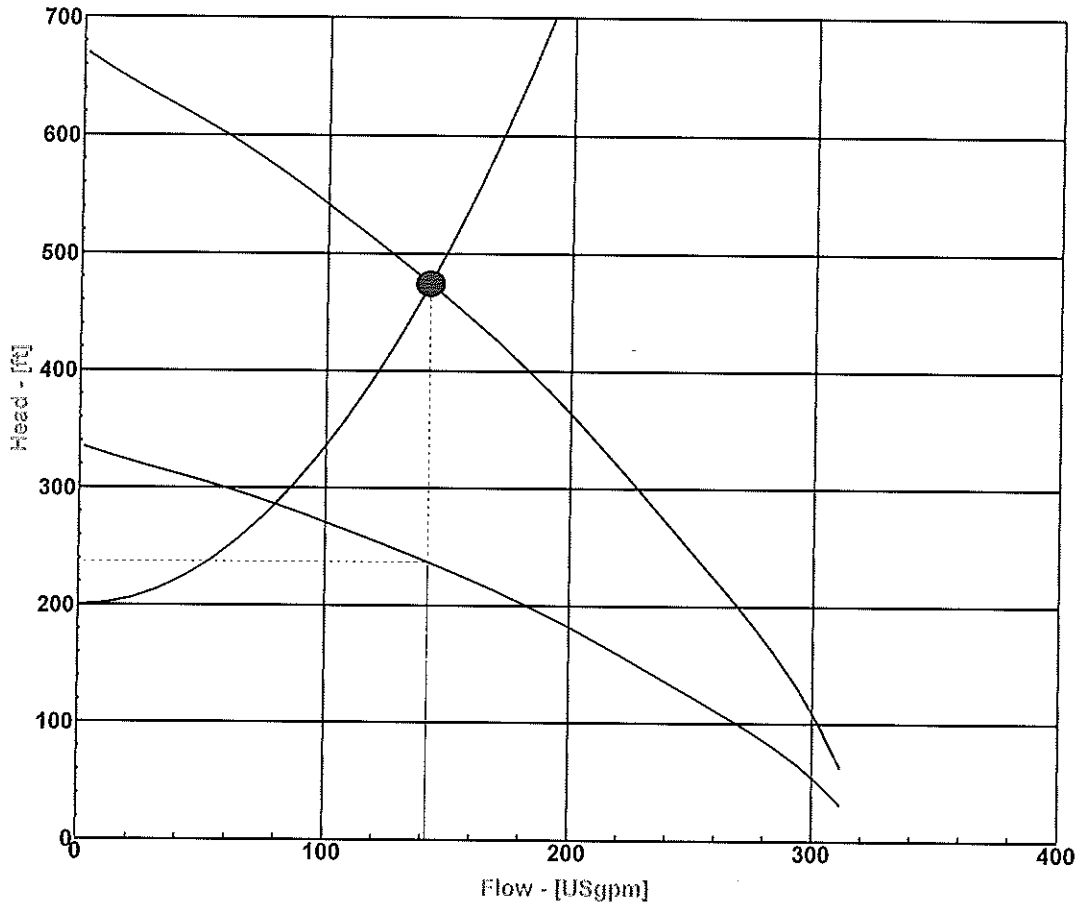
FLYGT (6)

Duty Analysis - Duty conditions

Project: Faro Dewatering

Owner: Jay Sommerfeld

2 PUMPS RUNNING IN TANDUM SYSTEM



Pump curve

2 BS 2140 63-234-00-0260

PRODUCT DATA

Rat. pow.: 19 hp

Imp.diam.: 208 mm

Vanes: 4

Throughlet: 0 inch

DUTY CONDITIONS

No of pumps: 2

Flow: 141.9 USgpm

Head: 237.1 ft

Hydraulic power: 35.3 hp

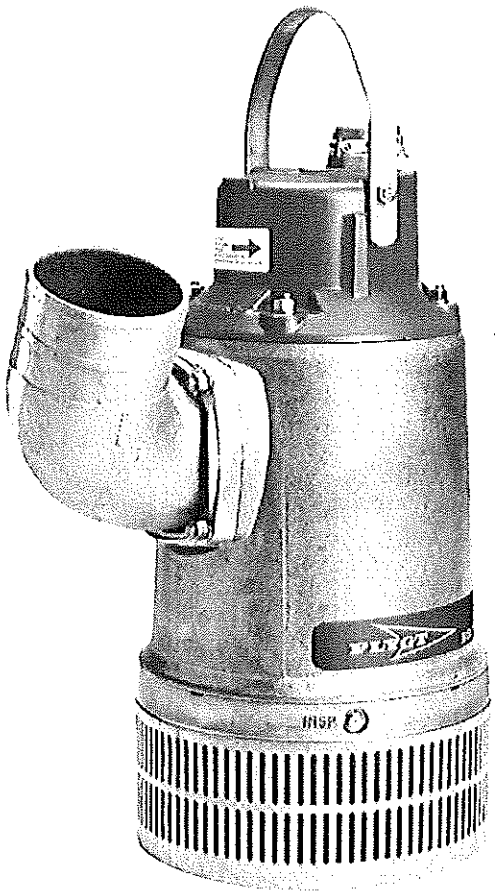
Hydraulic eff.: 48.2 %

Spec. energy: 3501.9 kWh/mg

FLYGT

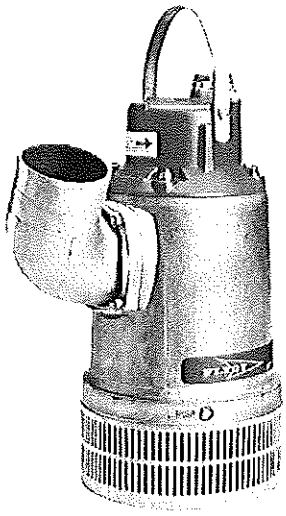
Technical specification

Submersible pump B 2140, 60 Hz



Flygt

ITT Industries



BIBO 2140

Product

Submersible pump for dewatering building yards, draining water in flooded areas, and other similar applications. The pump can handle water containing relatively abrasive solids.

Denomination

Product code	2140.010
Installation	S
Impeller characteristics	MT, HT

Process data

Liquid temperature	max +40 °C
Depth of immersion	max 20 m
The pH of the pumped liquid	pH 5 - 8
Liquid density	max 1100 kg/m^3
Strainer hole size	6 mm x 50 mm

Motor data

Frequency	60 Hz
Insulation class	H (+180 °C)
Voltage variation	
- continuously running	max ± 5%
- intermittent running	max ± 10%
Voltage imbalance between phases	max 2%
No. of starts/hour	max 30

Cable

Direct-on-line start

SUBCAB®	4G4+2x1,5 mm^2
	4G6+2x1,5 mm^2

Y/D start

SUBCAB®	7G2,5+2x1,5 mm^2
	7G4+2x1,5 mm^2

Monitoring equipment

Thermal contacts opening temperature	125 °C

Material

Impeller	High chrome alloyed cast iron
Wear parts	Nitrile rubber
Stator housing	Aluminium
Strainer	Galvanized steel
Shaft	Stainless steel
O-rings	Nitrile rubber

Mechanical face seals

Alternative	Inner seal	Outer seal
1	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbid	Corrosion resistant cemented carbide/ Corrosion resistant cemented carbid

Surface Treatment

The pump top is sprayed with blue paint.

Weight

See dimensional drawing.

Option

Polyurethane-lined wear parts	POLY-LIFE®
Other cables	
Zinc anodes	
Tandem connection	

Accessories

Adapters, hose connections and other mechanical accessories.

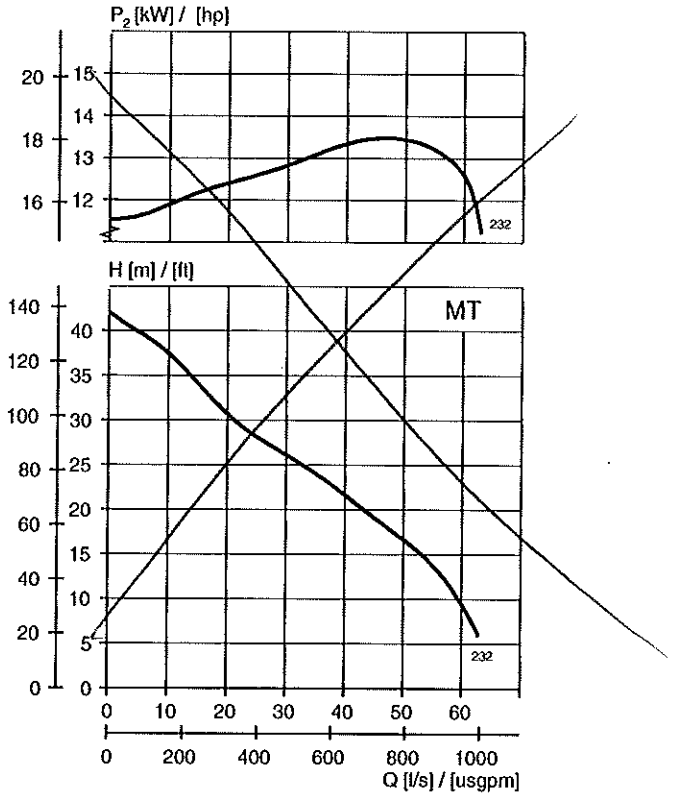
Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

See separate booklet or www.flygt.com, for further information.

MT-Motor rating and performance curve

Curve/Impeller No	Rated Power, kW	Rated current, A	Starting current, A	Power factor cos φ	Ex proof version available
460 V, 60 Hz, 3 ~, 3480 r/min					
232	14,2	23,0	195	0,88	No
234	14,2	23,0	195	0,88	No

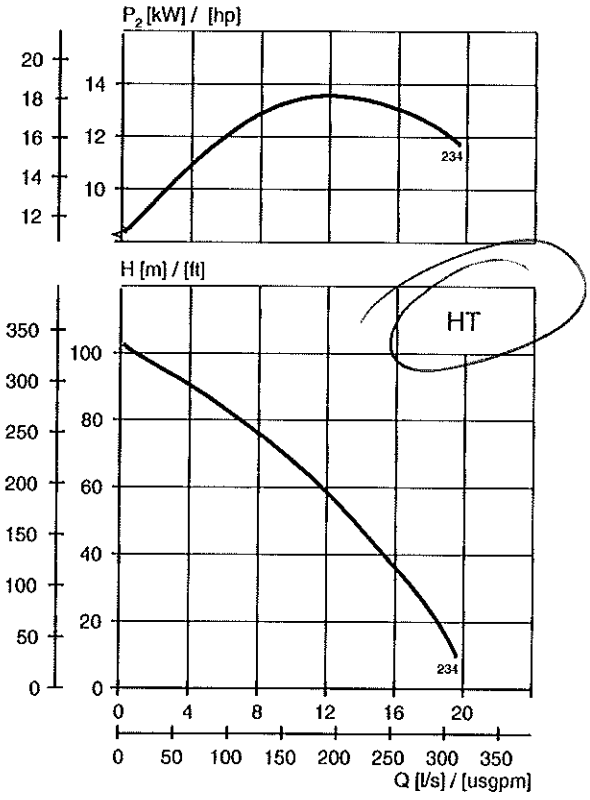
Y/D starting current is approximately 1/3 of D starting current.



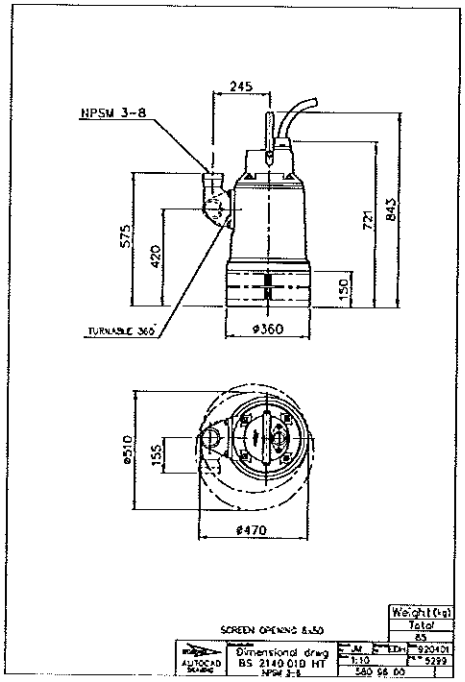
HT-Motor rating and performance curve

Curve/Impeller No	Rated Power, kW	Rated current, A	Starting current, A	Power factor cos φ	Ex proof version available
460 V, 60 Hz, 3 ~, 3480 r/min					
234	14,2	23,0	195	0,88	No

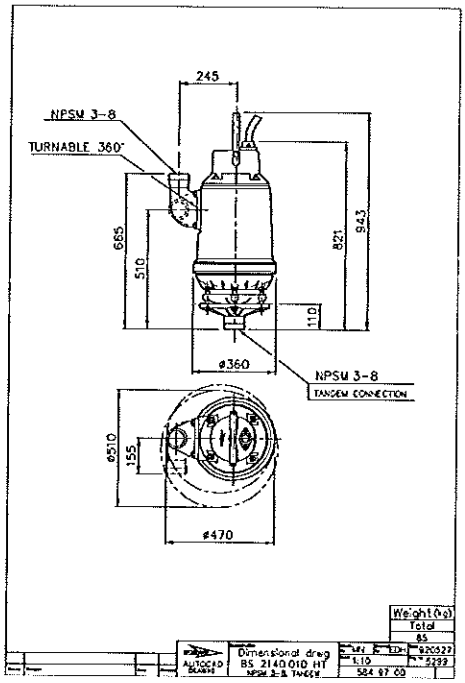
Y/D starting current is approximately 1/3 of D starting current.



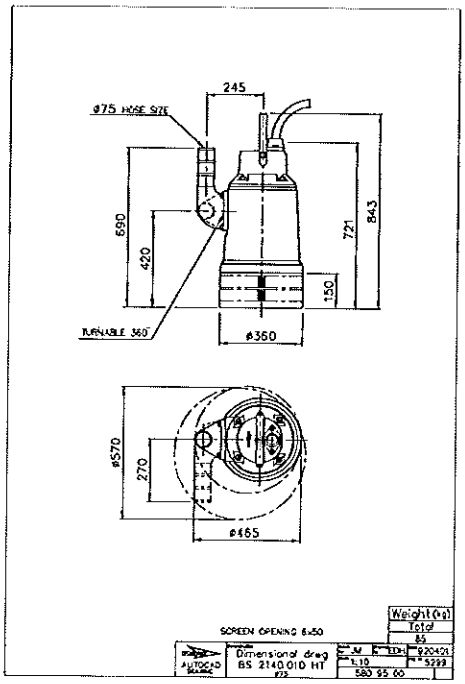
HT, S-installation



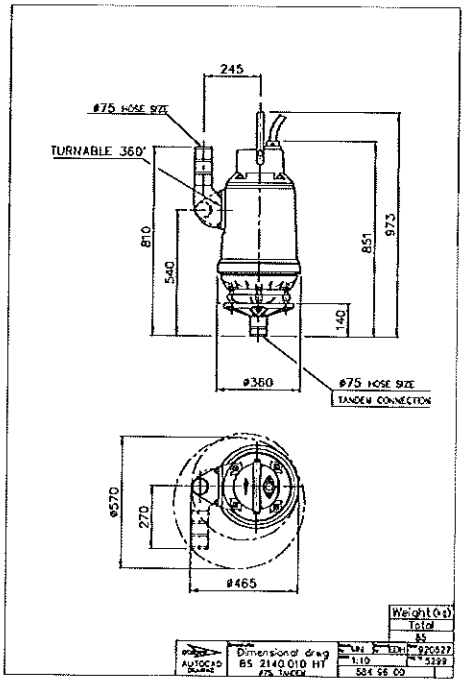
HT, S-installation



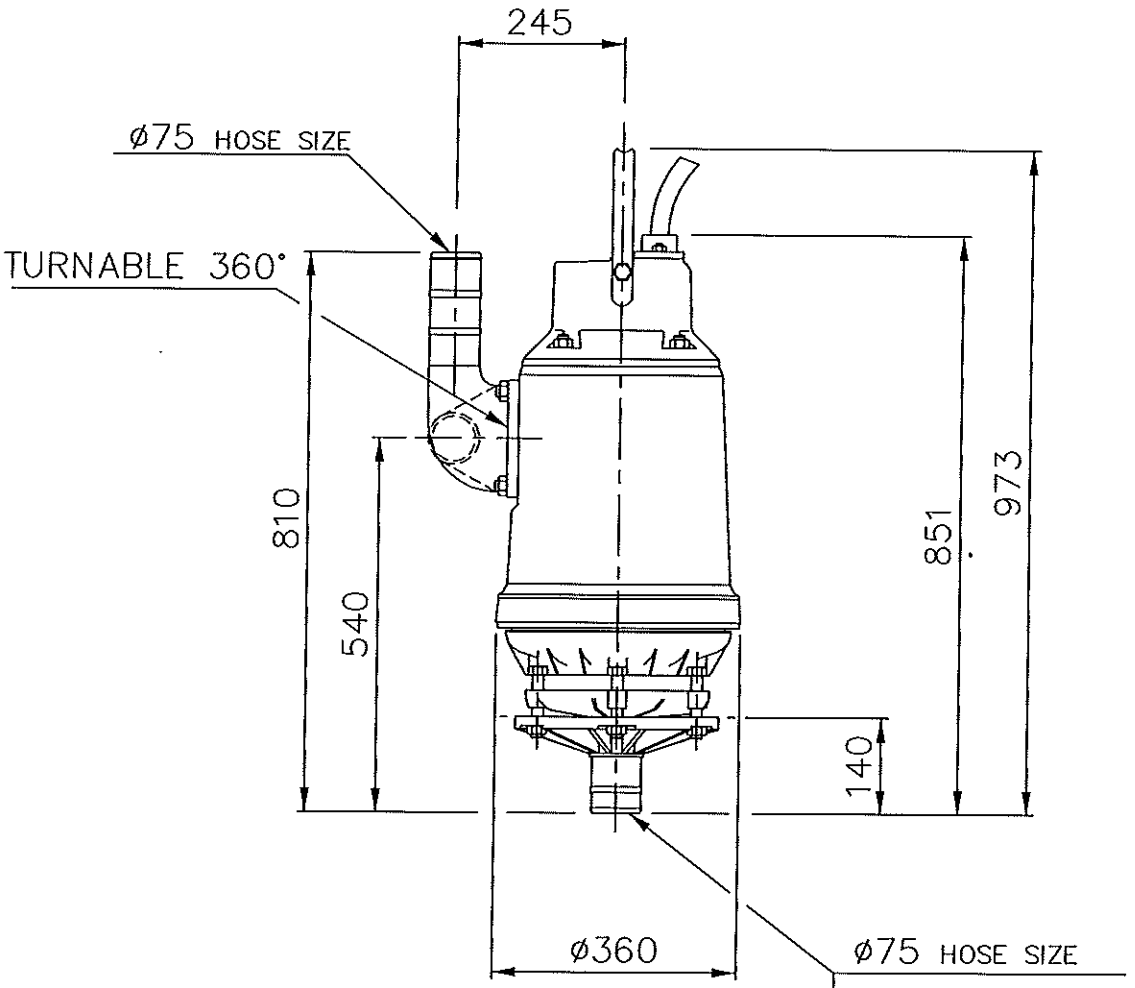
HT, S-installation

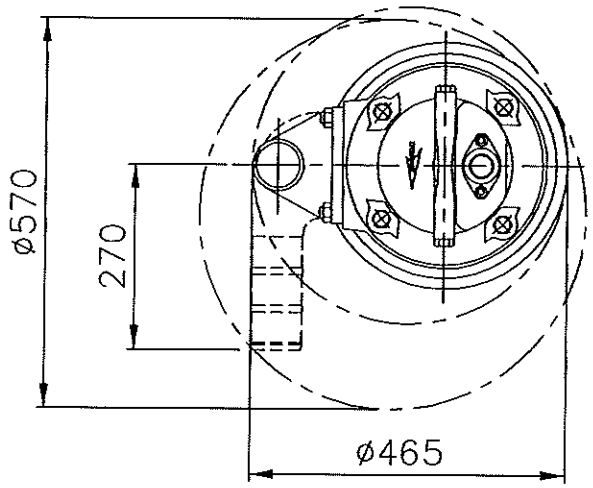


HT, S-installation



(7)





Weight (kg)
Total
85

AUTOCAD DRAWING

Denomination: Dimensional drwg BS 2140.010 HT Dia 75/Dia 75,Std,Tandem

Drawn by	Checked by	Date
NK		080825
Scale 1:10		Reg no 5299
5849600		1

ORDER ACKNOWLEDGEMENT

WOLSELEY
Engineered Pipe Group

PLEASE MAIL REMITTANCE TO:

Wolseley Canada Inc.
#106 - 1661 Portage Avenue
Winnipeg, MB R3J 3T7
Ph: (204) 783-8849
Fax: (204) 783-8943

Sales Order No: V08188

Order Date: 09/15/10

SOLD TO
DENISON ENVIRONMENTAL SERVICES
BOX 280
ATTEN: JOANNE MORRELL
FARO YT

Y0B 1K0

SHIP TO
DENISON ENVIRONMENTAL SERVICES
FARO MINE COMPLEX
100 MINE SITE RD
FARO YT
PO# FP027 / 867-994-2600

J0B 1K0

Your PO No.	G.S.T.	Ship Date	Ship Via	
FP027	EXTRA	09/15/10	MANITOULIN FFA	
Job Name	**P.S.T.**	**F.O.B.**	**PPD Charge**	**Collect**
	EXTRA			

Order Qty	Ship Qty	B/O Qty	Product Code	Description	Unit Price	Total
50 FT	0	50	T.WH.04.150.HOSE	4"BLACK 150# WATER SUCTION HOSE ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	8.66 FT	433.00
3 EA	0	3	T.WH.04.NPT.NIP	4"PLATED NPT KC NIPPLE ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	10.93 EA	32.79
2 EA	0	2	T.WH.04.A105.FLG	4"A105 RF 8-BOLT FS THREADED FLANGE - ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	20.47 EA	40.94
4 EA	4	0	BT.SS.04.CIXPE	4"BOLT-PAC 304SS CI X POLY 8 5/8"X4"BOLTS, NUTS & GASKET	20.77 EA	83.08
1 EA	0	1	FMF.43.011.RED	4"X3"DR11 HDPE MOLDED REDUCER C/W FLANGED ENDS	288.85 EA	288.85
1 EA	0	1	UK.FF.43.RED.2	2"INSUL KIT FOR 4"X3"FLANGED REDUCER		
3 EA	0	3	FMF.03.011.TEE	3"DR11 HDPE MOLDED TEE C/W ALL ENDS FLANGED	288.85 EA	866.55
3 EA	0	3	UK.FF.03.TEE.2	2"INSUL KIT FOR 3"HDPE FLANGED TEE		
4000 FT	0	4000	PTC.03.011.50.2.0	3"DR11 HDPE X 50' C/W 2" INSL 1 HTC, URECON .100"CASING	17.11 FT	68440.00

Accepted By: _____

INTEREST CHARGES OF 2% PER MONTH COMPOUNDED (26.8% PER ANNUM) WILL BE CHARGED ON OVERDUE ACCOUNTS.

ANY RETURN OF MERCHANDISE MUST BE AUTHORIZED BY THE SELLER PRIOR TO SHIPMENT.

	Subtotal
866778566 RT0002	**H.S.T./G.S.T.**
	P.S.T.
	Invoice Total

WOLSELEY
Engineered Pipe Group

ORDER ACKNOWLEDGEMENT

PLEASE MAIL REMITTANCE TO:

Wolseley Canada Inc.
#106 - 1661 Portage Avenue
Winnipeg, MB R3J 3T7
Ph: (204) 783-8849
Fax: (204) 783-8943

Sales Order No: V08188

Order Date: 09/15/10

SOLD TO
DENISON ENVIRONMENTAL SERVICES
BOX 280
ATTEN: JOANNE MORRELL
FARO YT

Y0B 1K0

SHIP TO
DENISON ENVIRONMENTAL SERVICES
FARO MINE COMPLEX
100 MINE SITE RD
FARO YT
PO# FP027 / 867-994-2600

J0B 1K0

Your PO No.	G.S.T.	Ship Date	Ship Via	
FP027	EXTRA	09/15/10	MANITOULIN FFA	
Job Name	P.S.T.	F.O.B.	PPD Charge	Collect
	EXTRA			

Order Qty	Ship Qty	B/O Qty	Product Code	Description	Unit Price	Total
80 EA	0	80	JK.0203.18.CS	JOINT KIT X 18"FOR 3"IPS PIPE 8.00"OD CASING & HEAT SHRINK	64.93 EA	5194.40
16 EA	16	0	SF.03.011	3"DR11 HDPE IPS FLANGE ADAPTER	29.69 EA	475.04
16 EA	16	0	BU.03.0DI	3"DR7 IPS D.I. BACK UP RING		
2 EA	0	2	FMF.03.011.90E	3"DR11 MOLDED HDPE 90 ELBOW C/W ALL ENDS FLANGED	308.92 EA	617.84
2 EA	0	2	UK.FF.03.90E.2	2"INSUL KIT FOR 3"HDPE FLANGED 90 ELBOW		
2 EA	0	2	FMF.03.011.45E	3"DR11 HDPE MOLDED 45 ELBOW C/W FLANGE EACH END	308.92 EA	617.84
2 EA	0	2	UK.FF.03.45E.2	ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE 2"INSUL KIT FOR 3"HDPE FLANGED 45 ELBOW		
3 EA	0	3	WH.BFV.03.WFR	3"WAFER STYLE BUTTERFLY VALVE DI BODY, AL.BRZ DISC, EPDM SEAT, GEAR KITZ 5122EG	194.35 EA	583.05
6 EA	6	0	BT.SS.03.CIXPE	3"BOLT-PAC 304SS CI X POLY 4 5/8"X4"BOLTS, NUTS & GASKET	11.62 EA	69.72
4 EA	0	4	BT.SS.03.CIXCI	3"BOLT-PAC 304SS CI X CI 4 5/8"X3"BOLTS,NUT & GASKET	11.62 EA	46.48

Accepted By: _____

INTEREST CHARGES OF 2% PER MONTH COMPOUNDED (26.8% PER ANNUM) WILL BE CHARGED ON OVERDUE ACCOUNTS.

ANY RETURN OF MERCHANDISE MUST BE AUTHORIZED BY THE SELLER PRIOR TO SHIPMENT.

866778566 RT0002

Subtotal	
H.S.T./G.S.T.	
P.S.T.	
Invoice Total	

WOLSELEY
Engineered Pipe Group

ORDER ACKNOWLEDGEMENT

PLEASE MAIL REMITTANCE TO:

Wolseley Canada Inc.
#106 - 1661 Portage Avenue
Winnipeg, MB R3J 3T7
Ph: (204) 783-8849
Fax: (204) 783-8943

Sales Order No: V08188

Order Date: 09/15/10

SOLD TO

DENISON ENVIRONMENTAL SERVICES
BOX 280
ATTEN: JOANNE MORRELL
FARO YT

Y0B 1K0

SHIP TO

DENISON ENVIRONMENTAL SERVICES
FARO MINE COMPLEX
100 MINE SITE RD
FARO YT
PO# FP027 / 867-994-2600

J0B 1K0

Your PO No.	G.S.T.	Ship Date	Ship Via	
FP027	EXTRA	09/15/10	MANITOULIN FFA	
Job Name	**P.S.T.**	**F.O.B.**	**PPD Charge**	**Collect**
	EXTRA			

Order Qty	Ship Qty	B/O Qty	Product Code	Description	Unit Price	Total
10 EA	0	10	BT.SS.03.PEXPE	3"BOLT-PAC 304SS POLY X POLY 4 5/8"X5"BOLTS,NUTS & GASKET	13.36 EA	133.60
5 EA	0	5	T.FF.03.12.PS	3"X 12"LONG CARBON STEEL PIPE SPOOL FLANGED ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	301.30 EA	1506.50
3 EA	0	3	WH.BF.03.ST	3"BLIND FLANGE CARBON STEEL	13.48 EA	40.44
2 EA	0	2	WH.CF.03.02.CI	3"X2"IPT C.I. 150# COMPANION FLANGE	40.50 EA	81.00
2 EA	0	2	WH.BV.02.TH.BS	2"BRASS THREAD BALL VALVE	48.50 EA	97.00
4 EA	0	4	WH.02.06.BK.N	2"X6"BLACK NIPPLE	4.75 EA	19.00
1 EA	0	1	T.WH.02.AIR.VRV	2"AIR VACUUM RELEASE VALVE ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	482.62 EA	482.62
				FREIGHT CHARGE		7650.00

Accepted By: _____

INTEREST CHARGES OF 2% PER MONTH COMPOUNDED (26.8% PER ANNUM) WILL BE CHARGED ON OVERDUE ACCOUNTS.

ANY RETURN OF MERCHANDISE MUST BE AUTHORIZED BY THE SELLER PRIOR TO SHIPMENT.

	Subtotal	87799.74
866778566 RT0002	**H.S.T./G.S.T.**	4389.99
	P.S.T.	0.00
	Invoice Total	**92189.73**

PE 3408

TABLE 1 (ALL DIMENSIONS IN INCHES)

Nominal Pipe Size	Average Outside Diameter	DR 13.5 (128 psi)			DR 11 (160 psi)			DR 9 (200 psi)			DR 7.3 (254 psi)			DR 6.3 (300 psi)		
		Average Inside Diameter	Minimum Wall Thickness	Average Weight (lbs/ft)	Average Inside Diameter	Minimum Wall Thickness	Average Weight (lbs/ft)	Average Inside Diameter	Minimum Wall Thickness	Average Weight (lbs/ft)	Average Inside Diameter	Minimum Wall Thickness	Average Weight (lbs/ft)	Average Inside Diameter	Minimum Wall Thickness	Average Weight (lbs/ft)
3	3.500	2.950	0.259	1.15	2.825	0.318	1.38	2.676	0.389	1.65	2.484	0.479	1.97	2.322	0.556	2.23
4	4.500	3.793	0.333	1.90	3.633	0.409	2.29	3.440	0.500	2.73	3.193	0.616	3.26	2.986	0.714	3.68
5	5.563	4.689	0.412	2.91	4.491	0.506	3.50	4.253	0.618	4.17	3.947	0.762	4.99	3.691	0.883	5.62
6	6.625	5.585	0.491	4.12	5.348	0.602	4.96	5.064	0.736	5.92	4.701	0.908	7.07	4.396	1.052	7.97
7	7.125	6.006	0.528	4.77	5.752	0.648	5.74	5.447	0.792	6.85	5.056	0.976	8.18	4.727	1.131	9.22
8	8.625	7.271	0.639	6.99	6.963	0.784	8.41	6.593	0.958	10.03	6.120	1.182	11.98	5.723	1.369	13.51
10	10.750	9.062	0.796	10.85	8.678	0.977	13.06	8.218	1.194	15.59	7.628	1.473	18.62	7.133	1.706	20.99
12	12.750	10.748	0.944	15.27	10.293	1.159	18.37	9.747	1.417	21.92	9.047	1.747	26.19	8.460	2.024	29.53
13	13.375	11.275	0.991	16.80	10.797	1.216	20.22	10.224	1.486	24.13	9.491	1.832	28.82	8.874	2.123	32.49
14	14.000	11.801	1.037	18.41	11.302	1.273	22.15	10.702	1.556	26.43	9.934	1.918	31.58	9.289	2.222	35.60
16	16.000	13.487	1.185	24.04	12.916	1.455	28.93	12.231	1.778	34.53	11.353	2.192	41.24	10.616	2.540	46.50
18	18.000	15.173	1.333	30.43	14.531	1.636	36.62	13.760	2.000	43.70	12.773	2.466	52.20	11.943	2.857	58.85
20	20.000	16.859	1.481	37.57	16.145	1.818	45.21	15.289	2.222	53.95	14.192	2.740	64.44	13.270	3.175	72.66
22	22.000	18.545	1.630	45.45	17.760	2.000	54.70	16.818	2.444	65.28	15.611	3.014	77.98			
24	24.000	20.231	1.778	54.09	19.375	2.182	65.10	18.347	2.667	77.68	17.030	3.288	92.80			
26	26.000	21.917	1.926	63.49	20.989	2.364	76.41	19.876	2.889	91.17	18.449	3.562	108.91			
28	28.000	23.603	2.074	73.63	22.604	2.545	88.61	21.404	3.111	105.74						
30	30.000	25.289	2.222	84.52	24.218	2.727	101.72	22.933	3.333	121.38						
32	31.594	26.633	2.340	93.74	25.505	2.872	112.82	24.152	3.510	134.62						
36	36.000	30.347	2.667	121.71	29.062	3.273	146.48									
40	39.469	33.271	2.924	146.30												
42	42.000	35.404	3.111	165.66												
48	47.382															
54	54.000															
55	55.295															
63	63.209															

	Static and Surge Pressure Ratings @ 73.4°F(23°C) - For Water Service									
	DR32.5	DR26	DR21	DR17	DR15.5	DR13.5	DR11	DR9	DR7.3	DR6.3
Working Pressure Rating (WPR) (psi)	50	64	80	100	110	128	160	200	254	300
WPR & Recurring Dynamic Surge (psi)	75	96	120	150	165	192	240	300	381	450
Corresponding Sudden Velocity Change (fps)[1]	3.2	3.5	3.9	4.4	4.6	4.9	5.5	6.1	6.8	7.4
WPR & Occasional Dynamic Surge (psi)	100	128	160	200	220	256	320	400	508	600
Corresponding Sudden Velocity Change (fps)[1]	6.3	7.1	7.9	8.8	9.2	9.9	11.0	12.2	13.6	14.7

NOTE 1:

The estimated maximum change in water velocity that corresponds to a given pressure surge has been calculated in accordance with the procedure given in AWWA Committee Report on Design and Installation of Polyethylene Pipe Made in Accordance with AWWA C906.

These corresponding velocity change figures relate to unburied pipe. Depending on actual backfill conditions, these velocity change figures may be reduced by up to 20%.

D-040

PATENTED

Water

Combination Air Valve “BARAK”

Description

The D-040 Combination Air Valve has the features of both an Air-release valve and an Air/vacuum valve.

The Air-release component of the D-040 is designed to automatically release to the atmosphere small pockets of air as they accumulate along a pipeline when the pipeline or piping system is full and operating under pressure.

The Air/vacuum component is designed to automatically discharge or admit large volumes of air during the filling or draining of a pipeline or piping system. This valve will open to relieve negative pressures whenever water column separation occurs.

Operation

The air & vacuum component, with the large orifice, discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during its drainage and at water column seperation.

High velocity air should not blow the float shut. Water will lift the float and cause sealing of the valve.

At any time during system operation, should the internal pressure of the system fall below atmospheric pressure, air will re-enter the system, preventing down-surge and cavitation.

The smooth release of air prevents pressure surges and other destructive phenomena.

Admitting air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air re-entry is essential to efficiently drain the system.

The automatic small orifice air release component releases entrapped air in the pressurized systems.

Without air valves pockets of accumulated air may cause the following destructive phenomena:

- Obstruction to effective flow and hydraulic conductivity of the system along with a throttling effect similar to a partially closed valve. In extreme cases this will cause complete flow stoppage.
- Accelerate cavitation damages.
- High-pressure surges.
- Accelerate corrosion.
- Danger of a high-energy burst of compressed air.

As the system starts to fill, the valve functions according to the following stages:

1. Entrapped air is released by the valve
2. Liquid enters the valve, lifting the float which draws the "seal plug" to its sealing position.
3. Entrapped air, which accumulates at peaks along the system (where combination air valves should be installed), rises to the top of the valve, which in turn displaces the liquid in the valve's body.
4. The float descends, peeling the "rolling seal", the smaller orifice opens and the accumulated air is released.
5. Liquid penetrates into the valve and the float rises unrolling the rolling seal to its sealing position.

When internal pressure falls below atmospheric pressure (negative pressure):

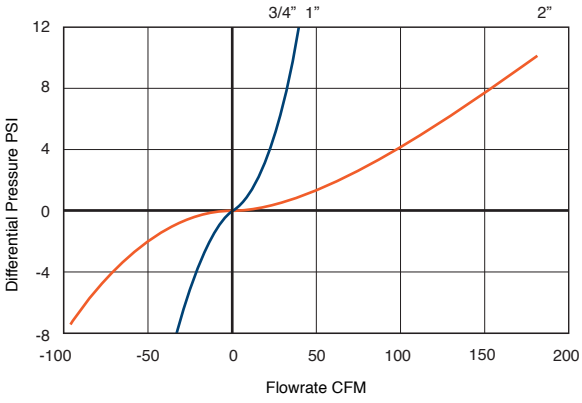
1. Both orifices will be immediately unplugged and the float drops away.
2. Air is admitted to the system.

Main Features

- Working pressure range: 3- 250 psi.
- Testing pressure: 360 psi.
- Working Temperature: 140^0 f.
- Maximum working temperature for short time period: 194^0 f.
- Light, simple and reliable structure.
- The valve discharges air at high velocity, without premature closing.
- The automatic air release orifice is very large relative to the size of the air valve body, therefore it discharges air at high flow rates.
- The size of the automatic orifice lessens the danger of its obstruction by debris.
- The rolling seal mechanism of the valve is less sensitive to pressure differential than a direct float seal. It is due to its comparably large orifice and its wide pressure range 3- 250 psi.
- The body is made of high strength composite materials and all operating parts are made of specially selected, corrosion-resistant materials.
- Due to its light weight, the valve may be installed on plastic piping systems, as well as other lightweight piping.

D-040

AIR & VACUUM FLOWRATE

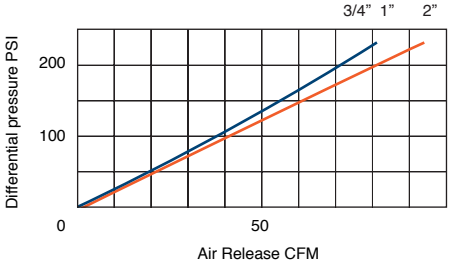


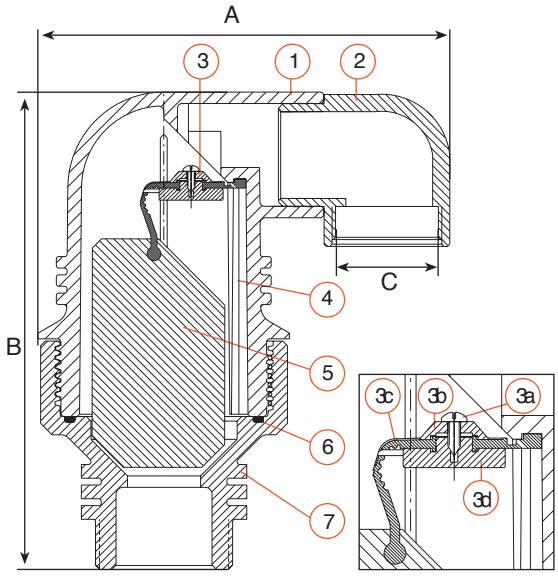
D-040 2"

D-040 ST 2"

D-040 NT 2"

AUTOMATIC AIR RELEASE





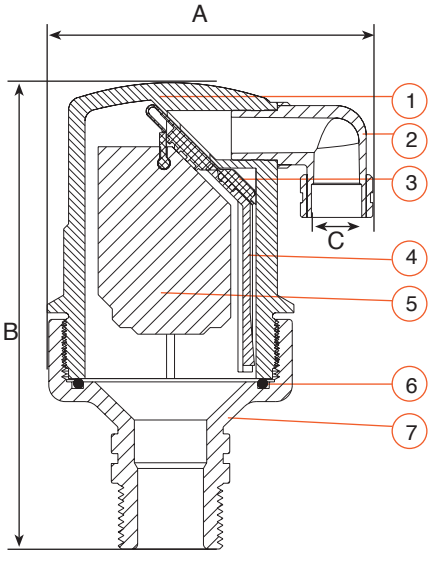
DIMENSIONS AND WEIGHT

Nominal Size	Dimensions A	B	internal C	external	Weight Lbs	Orifice Area Sq.in Air & Vacu.	Auto.
D-040 3/4" 1"	3.9	5.5	3/8	0.86	0.73	0.155	0.012
D-040 2"	7	8.2	1 1/2	2.16	2.35	1.246	0.018
D-040 NT 2"	5	8.2	1 1/2	2.16	2.2	1.246	0.018

D-040 3/4" 1"

PARTS LIST AND SPECIFICATION

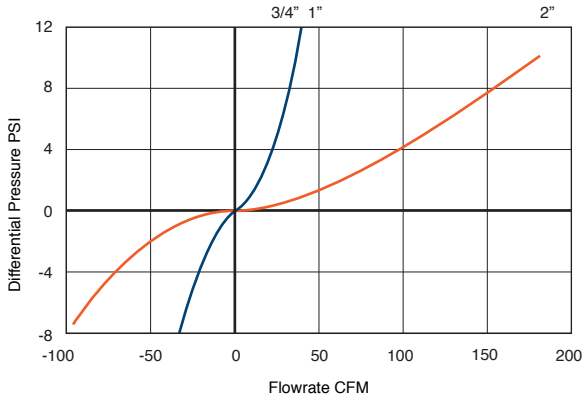
No.	Part	Material
1.	Body	NSF 61 Certified Reinforced Nylon
2.	Discharge outlet	NSF 61 Certified Polypropylene
3.	3/4" 1" Rolling Seal	NSF 61 Certified E.P.D.M.
	2" Seal Plug Assembly	
3a.	Screws	Stainless Steel
3b.	Plug Cover	NSF 61 Certified Reinforced Nylon
3c.	Rolling Seal	NSF 61 Certified E.P.D.M.
3d.	Plug	NSF 61 Certified Reinforced Nylon
4.	Clamping Stem	NSF 61 Certified Reinforced Nylon
5.	Float	NSF 61 Certified Foamed Polypropylene
6.	O - Ring	NSF 61 Certified NBR 70
7.	Base	NSF 61 Certified Reinforced Nylon



D-040-C

A.R.I. FLOW CONTROL ACCESSORIES

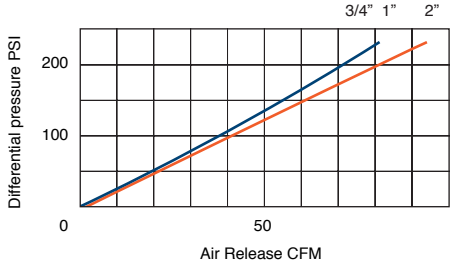
AIR & VACUUM FLOWRATE

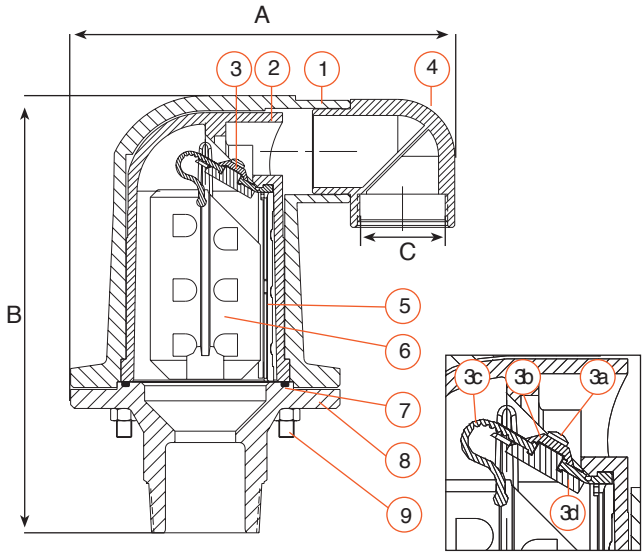


D-040-C

D-040-STST

AUTOMATIC AIR RELEASE





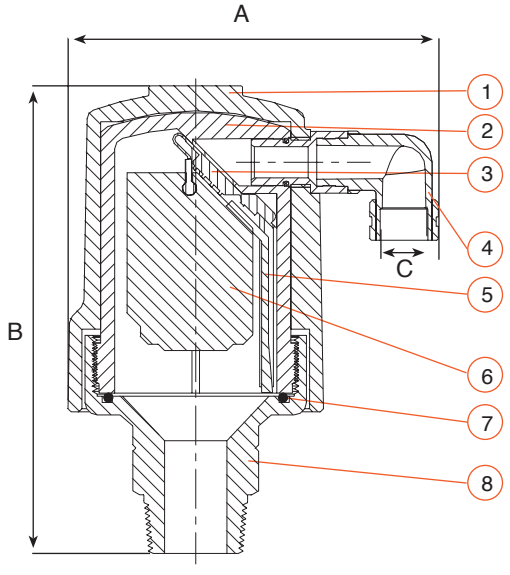
DIMENSIONS AND WEIGHT

Nominal Size	Dimensions A	B	internal C	external	Weight Lbs	Orifice Area Sq.in Air & Vacu.	Auto.
D-040-C 1"	4.7	5.9	3/8	0.86	3.75	0.127	0.0077
D-040-C 2"	8	9	1 1/2	2.16	11.9	1.246	0.0186
D-040 STST 2"	7.0	8.2	1 1/2	2.16	8.96	1.246	0.0186

D-040-C 3/4" 1"

PARTS LIST AND SPECIFICATION

No.	Part	Material
1.	Body	Cast Iron ASTM A48 CL.35B
2.	Sleeve	NSF 61 Certified Reinforced Nylon
3.	3/4" 1" Rolling Seal	NSF 61 Certified E.P.D.M.
	2" Seal Plug Assembly	
3a.	Screws	Stainless Steel
3b.	Plug Cover	NSF 61 Certified Reinforced Nylon
3c.	Rolling Seal	NSF 61 Certified E.P.D.M.
3d.	Plug	NSF 61 Certified Reinforced Nylon
4.	Discharge outlet	NSF 61 Certified Polypropylene
5.	Clamping Stem	NSF 61 Certified Reinforced Nylon
6.	Float	NSF 61 Certified Foamed Polypropylene
7.	O - Ring	NSF 61 Certified NBR 70
8.	Base 3/4" 1"	Stainless Steel ASTM A744 CF8M (NSF)
	2"	Cast Iron ASTM A48 CL.35B
9.	Bolts & Nuts	Stainless Steel ASTM A744 CF8M (NSF)



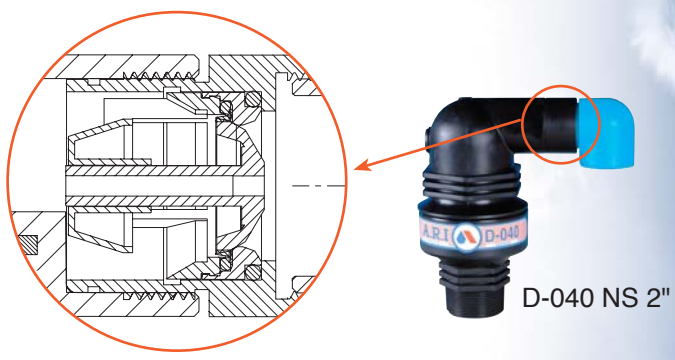
Valve Selection

The D-040 air valve is available:
- With 3/4", 1" male NPT connections.
- With 2" female NPT connections.
- D-040 body made of composite materials.
- D-040-C with anti-vandalism cover.
- D-040 STST body made of Stainless Steel.
- D-040 ST with Stainless Steel base.

ACCESSORIES

One Way

D040-V -With a vacuum guarding, out-only attachment, which only allows air discharge, not allowing air intake (all models).
D-040-I -With a vacuum breaking, In-only attachment, which only allows air intake, not allowing air discharge (D-040 2" only).
D-040-NS -With a non-slam, discharge-throttling attachment, which allows free air intake, but throttles air discharge (D-040 2" only).



D-040 NS 2"

Screen

Prevents penetration of debris and insects and can be assembled on the valve before or after the Discharge outlet.
Each strainer has 2 threaded connections 1.5” NPSM/ 2” NPSM .

Air Valve Enclosure

A.R.I. air valve enclosure is used to protect air valve , for above surface air valve installations.
The special enclosure protects and hide the air valves from vandalism and damages.

A.R.I. FLOW CONTROL ACCESSORIES Ltd. reserves the right to make product changes without prior notice. To insure receiving updated information on parts specifications, please call the export dept. at the A.R.I. factory. A.R.I. FLOW CONTROL ACCESSORIES Ltd. shall not be held liable for any errors. All rights reserved.

ORDER ACKNOWLEDGEMENT

WOLSELEY
Engineered Pipe Group

PLEASE MAIL REMITTANCE TO:

Wolseley Canada Inc.
#106 - 1661 Portage Avenue
Winnipeg, MB R3J 3T7
Ph: (204) 783-8849
Fax: (204) 783-8943

Sales Order No: V08264
Order Date: 10/12/10

SOLD TO
DENISON ENVIRONMENTAL SERVICES
BOX 280
ATTEN: JOANNE MORRELL
FARO YT

Y0B 1K0

SHIP TO
DENISON ENVIRONMENTAL SERVICES
FARO MINE COMPLEX
100 MINE SITE RD
FARO YT
PO#FP035

J0B 1K0

Your PO No.	G.S.T.	Ship Date	Ship Via	
FP035	EXTRA	11/19/10	MANITOULIN PPD/CHG	
Job Name	**P.S.T.**	**F.O.B.**	**PPD Charge**	**Collect**
V15 / 14026	EXTRA			

Order Qty	Ship Qty	B/O Qty	Product Code	Description	Unit Price	Total
4000 FT	0	4000	T.UE.3SC30CT.600	URECON SC 3SC30-CT SERIES HEAT TRACE CABLE 600 VOLTS ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	10.52 FT	42080.00
1 EA	0	1	UE.UTC.6330.01	UTC-6330-01 THERMOSTAT, GFI 600V, 30A, 3 POLE BREAKER	3208.50 EA	3208.50
1 EA	0	1	UE.URTD.15.G	URTD-15.G RTD SENSOR C/W 15 METER GREY LEAD WIRE	134.28 EA	134.28
1 EA	0	1	UE.URTD.15.R	URTD-15-R RTD SENSOR C/W 15 METER RED LEAD WIRE	134.28 EA	134.28
20 EA	0	20	T.UE.3SC12PT.CLC	3SC-12PT COLD LEAD CONNECTION KIT ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	367.52 EA	7350.40
1 EA	0	1	UE.3SC.STC	3SC-STC END TERMINATION FOR SC-3SC40-CT HEATING CABLE	197.80 EA	197.80
9 EA	0	9	T.UE.JUNCT.SUPP	CUSTOM FABRICATED STEEL JUNCTION BOX SUPPORT ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	508.00 EA	4572.00
9 EA	0	9	T.UE.NEMA4	ROBROY MODEL #J1816HLL NEMA 4 JUNCTION BOX C/W ACCESSORIES ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	371.00 EA	3339.00

Accepted By: _____

INTEREST CHARGES OF 2% PER MONTH COMPOUNDED (26.8% PER ANNUM) WILL BE CHARGED ON OVERDUE ACCOUNTS.

ANY RETURN OF MERCHANDISE MUST BE AUTHORIZED BY THE SELLER PRIOR TO SHIPMENT.

	Subtotal
866778566 RT0002	**H.S.T./G.S.T.**
	P.S.T.
	Invoice Total

WOLSELEY
Engineered Pipe Group

ORDER ACKNOWLEDGEMENT

PLEASE MAIL REMITTANCE TO:

Wolseley Canada Inc.
#106 - 1661 Portage Avenue
Winnipeg, MB R3J 3T7
Ph: (204) 783-8849
Fax: (204) 783-8943

Sales Order No: V08264

Order Date: 10/12/10

SOLD TO
DENISON ENVIRONMENTAL SERVICES
BOX 280
ATTEN: JOANNE MORRELL
FARO YT

Y0B 1K0

SHIP TO
DENISON ENVIRONMENTAL SERVICES
FARO MINE COMPLEX
100 MINE SITE RD
FARO YT
PO#FP035

J0B 1K0

Your PO No.	G.S.T.	Ship Date	Ship Via	
FP035	EXTRA	11/19/10	MANITOULIN PPD/CHG	
Job Name	**P.S.T.**	**F.O.B.**	**PPD Charge**	**Collect**
V15 / 14026	EXTRA			

Order Qty	Ship Qty	B/O Qty	Product Code	Description	Unit Price	Total
400 FT	0	400	T.UE.3SC30CT.600	URECON SC 3SC30-CT SERIES HEAT TRACE CABLE 600 VOLTS ITEM IS SPECIAL ORDER AND THEREFORE NOT RETURNABLE .	10.52 FT	4208.00
1 EA	0	1	UE.URTD.15.G	URTD-15.G RTD SENSOR C/W 15 METER GREY LEAD WIRE	134.28 EA	134.28
1 EA	0	1	UE.URTD.15.R	URTD-15-R RTD SENSOR C/W 15 METER RED LEAD WIRE	134.28 EA	134.28
				FREIGHT CHARGE		2300.00

Accepted By: _____

INTEREST CHARGES OF 2% PER MONTH COMPOUNDED
(26.8% PER ANNUM) WILL BE CHARGED ON OVERDUE ACCOUNTS.

ANY RETURN OF MERCHANDISE MUST BE AUTHORIZED
BY THE SELLER PRIOR TO SHIPMENT.

	Subtotal	67792.82
866778566 RT0002	**H.S.T./G.S.T.**	3389.64
	P.S.T.	0.00
	Invoice Total	**71182.46**

Raychem®

SC
SC/H

D100
0AT0
011A

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Series-resistance heating cables for longline systems

Electrical freeze protection for long pipelines in both nonhazardous and hazardous locations.

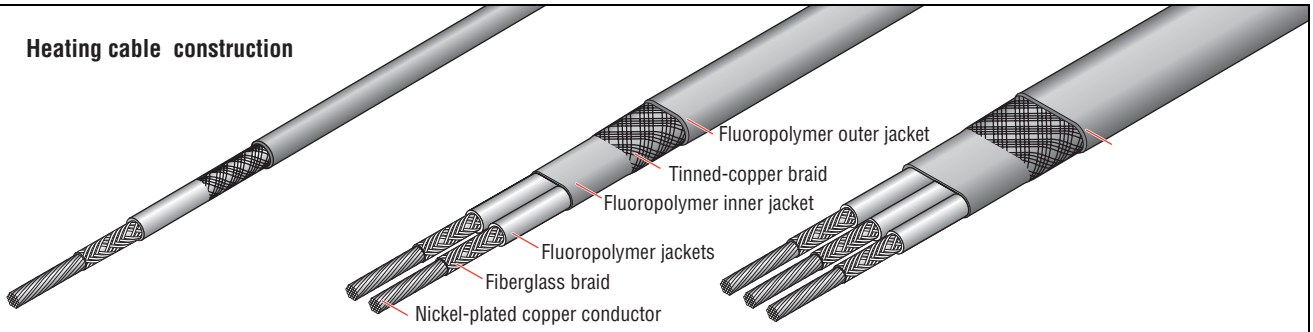
SC and SC/H series-resistance technology provides freeze protection and high-temperature maintenance for longline applications.

This series-resistance type heating cable can withstand continuous exposure temperatures up to 482°F (250°C), and is suitable for use in hazardous locations and in areas exposed to corrosives. SC heating cables can be used for continuous circuit lengths to 12,000 feet (3659 m), powered from a single source.

Raychem® brand SC heating cables meet the requirements of the U.S. National Electrical Code and the Canadian Electrical Code.

For additional information, contact your Tyco Thermal Controls representative or call Tyco Thermal Controls at (800) 545-6258.

Heating cable construction



Single conductor (1SC) **Dual conductor (2SC)** **Triple conductor (3SC)**

Application		
Area classification	Nonhazardous and hazardous locations; 1SC cables for use in low mechanical abuse areas only.	
Chemical resistance	Organic and aqueous inorganic chemicals and corrosives	
Supply Voltage	Maximum 600 Vac	
Temperature Rating	**SC**	**SC/H**
Maximum continuous exposure (Power off)	400°F (204°C)	482°F (250°C)
Minimum installation temperature	–40°F (–40°C)	–40°F (–40°C)
Temperature ID Number (T-Rating)	Established by calculating the maximum sheath temperature for the application. Contact Tyco Thermal Controls for assistance.	

Approvals

1SC

Non Hazardous Locations

CSA

Hazardous Locations

CSA Ex e II T[1] [2]

[1] for T-Rating, see design documentation
[2] for 1SC60-CT, 1SC70-CT, and 1SC80-CT only

2SC

Hazardous Locations

CSA FM APPROVED — Class I, Div. 2, Groups A, B, C, D
Class II, Div. 2, Groups F, G
Class III

For T-Rating, see design documentation

Ex II 2 GD Ex e II T* (see schedule) Ex tD A21 IP66
Baseefa06ATEX0189X

IEC IECEx Ex e II T* (see schedule) Ex tD A21 IP66
IECEx BAS 06.0049X

CSA Ex e II T[1]

[1] For T-Rating, see design documentation

3SC

Hazardous Locations

CSA FM APPROVED — Class I, Div. 2, Groups A, B, C, D
Class II, Div. 2, Groups F, G
Class III

For T-Rating, see design documentation

Ex II 2 GD Ex e II T* (see schedule) Ex tD A21 IP66
Baseefa06ATEX0189X

Ex e II T* (see schedule) Ex tD A21 IP66
IECEx BAS 06.0049X

CSA Ex e II T[1]

[1] For T-Rating, see design documentation

Application

Design and Installation

SC and SC/H applications must be designed and approved by Tyco Thermal Controls. Series heating cable technology requires that SC cables must not be overlapped. The use of appropriate control and monitoring equipment specified by Tyco Thermal Controls is required.

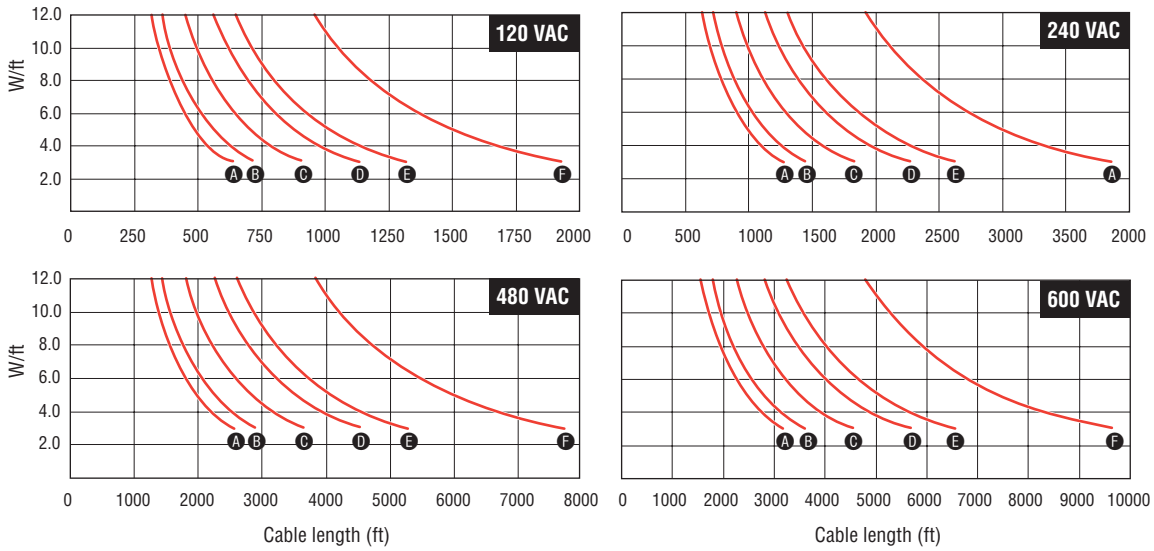
Nominal Power Output Rating

These graphs are general guides to selection. Actual designs require consideration of other important variables and must be confirmed by Tyco Thermal Controls. Also, many other voltages and electrical configurations are possible.

Nominal Power Output at 68°F (20°C)

For 2SC Cables

- Ⓐ 2SC30
- Ⓑ 2SC40
- Ⓒ 2SC50
- Ⓓ 2SC60
- Ⓔ 2SC70
- Ⓕ 2SC80

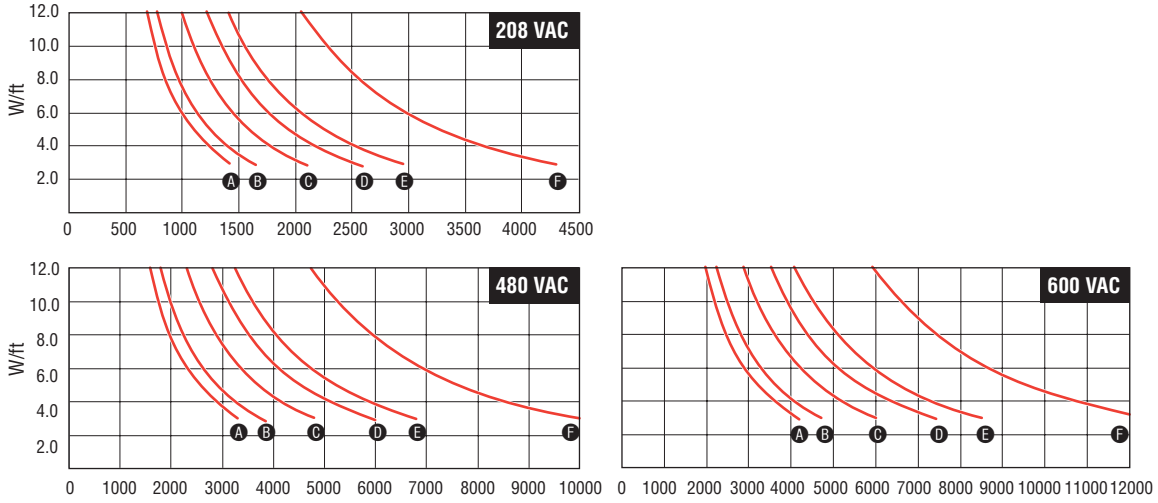


Nominal Power Output at 68°F (20°C)

For 3SC Cables

- Ⓐ 3SC30
- Ⓑ 3SC40
- Ⓒ 3SC50
- Ⓓ 3SC60
- Ⓔ 3SC70
- Ⓕ 3SC80

Note: Voltages shown are 3-phase transformer phase-to-phase voltages. The heater is assumed to be in WYE



Ground-Fault Protection

Tyco Thermal Controls and national electrical codes require both ground-fault protection of equipment and a grounded metallic covering on all heating cables. The DigiTrace® HTPI and HTPG distribution panels meet this requirement. The following ground-fault breakers can also be used: Square D Type QOB-EPD or QO-EPD, TraceGuard 277®, Cutler Hammer Type QBGFEP. For 3SC heating cables, ground-fault protection can be provided with 3-pole 30 mA GFPD breakers or by using ground-fault relay system as shown in the SC Installation and Maintenance Manual.

Product Characteristics

SC or SC/H	Conductor size	Cable resistance (nominal) @ 68°F (20°C) ohms/ft	ohms/m	Weight (nominal) lb/10 ft	Maximum circuit breaker size	Cable Dimensions (nominal)	Minimum bend radius
		(Single conductor cable)					
1SC30-CT	18	0.00590	0.01935	0.4	30	0.22" diameter	1"
1SC40-CT	16	0.00458	0.01502	0.5	30	0.23" diameter	1"
1SC50-CT	14	0.00290	0.00951	0.6	30	0.24" diameter	1"
1SC60-CT	12	0.00187	0.00613	0.7	60	0.26" diameter	1"
1SC70-CT	10	0.00120	0.00394	0.9	80	0.29" diameter	1"
1SC80-CT	8	0.00065	0.00213	1.2	100	0.32" diameter	1"
		(Dual conductor cable)					
2SC30-CT	18	0.01180	0.03869	0.8	40	0.41" x 0.27"	1"
2SC40-CT	16	0.00916	0.03004	1.0	40	0.42" x 0.28"	1"
2SC50-CT	14	0.00580	0.01902	1.2	40	0.45" x 0.29"	1"
2SC60-CT	12	0.00374	0.01226	1.4	60	0.5" x 0.31"	1"
2SC70-CT	10	0.00240	0.00787	1.8	80	0.55" x 0.34"	1"
2SC80-CT	8	0.00130	0.00426	2.4	100	0.61" x 0.37"	1"
		(Triple conductor cable, resistance per conductor)					
3SC30-CT	18	0.00590	0.01935	1.2	40	0.56" x 0.27"	1"
3SC40-CT	16	0.00458	0.01502	1.5	40	0.58" x 0.28"	1"
3SC50-CT	14	0.00290	0.00951	1.8	40	0.62" x 0.29"	1"
3SC60-CT	12	0.00187	0.00613	2.1	60	0.68" x 0.31"	1"
3SC70-CT	10	0.00120	0.00394	2.7	80	0.75" x 0.34"	1"
3SC80-CT	8	0.00065	0.00213	3.6	100	0.85" x 0.37"	1"

Components

Tyco Thermal Controls offers a full range of components for power connections, splices, and end termination. These components must be used to ensure proper functioning of the product and compliance with warranty, code, and approvals requirements.

Raychem

SC Components and Accessories

D100 0AT0 011A

Visit www.tycothermal.com for more information on our ten-year extended warranty.

Tyco Thermal Controls offers a full range of power connections, splices, and end terminations for use with SC, SC/H and SC/F heating cables. These components must be used to ensure proper functioning of the product and compliance with warranty, code, and approvals requirements.

SC component kits include specially sized grommets, solder and splices and therefore must be ordered according to the correct SC cable in use. All above-insulation components use a NEMA 4X-rated re-enterable enclosures. All below-insulation component kits use a high temperature potting compound and are rated NEMA 4.

Approvals

Hazardous Locations

2SC & 3SC Components

Class I, Div. 2, Groups A, B, C, D
Class II, Div. 2, Groups F, G
Class III
For T-Rating, see design documentation

Ex e II T* (see schedule) Ex tD A21 IP66
IECEx BAS 06.0049X(1)

(1) For Above-Insulation Kits only

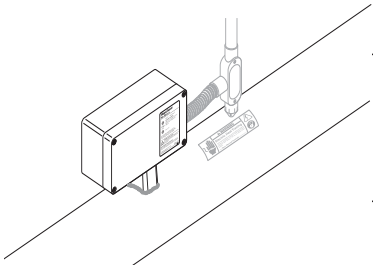
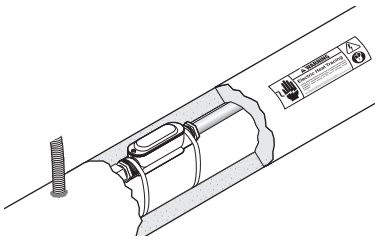
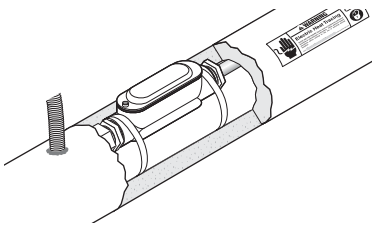
1SC, 2SC & 3SC Components

Ex e II T (2) (3)

(2) For T-Rating, see design documentation

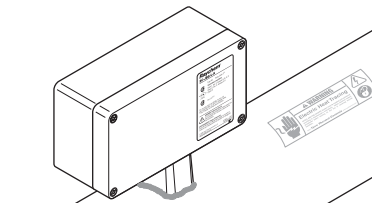
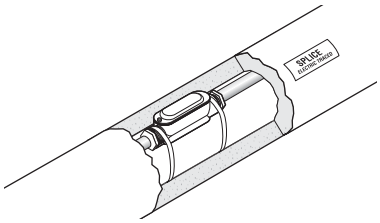
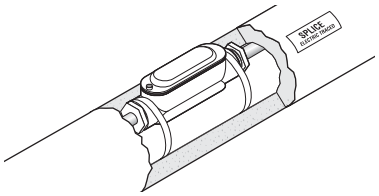
(3) For 1SC60-CT, 1SC70-CT and 1SC80-CT only

Power Connection Kits

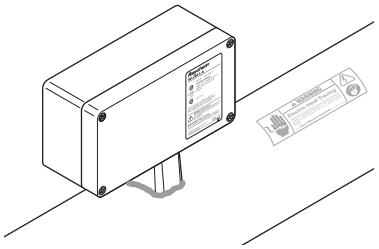
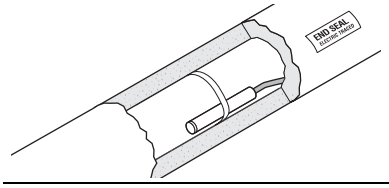
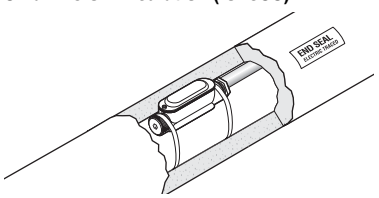
Product name	Description	Catalog number	Heating cable compatibility (SC,SC/H andSC/F) (1)
Above-Insulation 	Polymeric enclosure and stand with captive sealing grommet. The box has one 1" NPT entry hole. Includes 5-ft cold-lead wires.	SC-JBP-S-A	2SC30, 3SC30 2SC40, 3SC40 2SC50, 3SC50
	Box dimensions: 8.6" x 4.7" x 3.6" (220 mm x 120 mm x 90 mm) Stand height: 4.7" (120 mm)	SC-JBP-L-A	2SC60, 3SC60 2SC70, 3SC70 2SC80, 3SC80
Small Below-Insulation 	Copper-free aluminum conduit body with epoxy finish. The conduit body has two 1/2" entries and large top opening with cover for easy potting. Includes 5-ft cold-lead wires and a 3-ft flexible stainless steel armor. Condulet dimensions: 1/2" body – 5.5" x 1.5" x 1.5" (140 mm x 38 mm x 38 mm)	1SC-12PT	1SC30 1SC40 1SC50
		2SC-12PT	2SC30 2SC40 2SC50
		3SC-12PT	3SC30 3SC40 3SC50
Large Below-Insulation 	Copper-free aluminum conduit body with epoxy finish. The conduit body has two 1" NPT entries and large top opening with cover for easy potting. Includes 5 ft cold-lead wires and a 3-ft flexible stainless steel armor. Condulet dimensions: 1" body – 7" x 2" x 2" (178 mm x 51 mm x 51 mm)	1SC-8PT 1SC-6PT 1SC-4PT	1SC60 1SC70 1SC80
		2SC-8PT 2SC-6PT 2SC-4PT	2SC60 2SC70 2SC80
		3SC-8PT 3SC-6PT 3SC-4PT	3SC60 3SC70 3SC80

(1) SC/F cables are not available in 1 conductor construction.

Splice Connection Kits

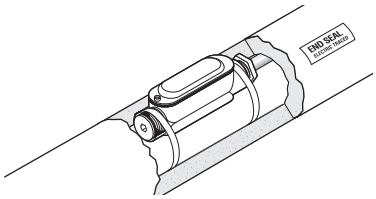
Product name	Description	Catalog number	Heating cable compatibility (SC, SC/H and SC/F) [1]
Above-Insulation 	Polymeric enclosure and stand with captive sealing grommet. Box dimensions: 8.6" x 4.7" x 3.6" (220 mm x 120 mm x 90 mm) Stand height: 4.7" (120 mm)	SC-JBS-S-A SC-JBS-L-A	2SC30, 3SC30 2SC40, 3SC40 2SC50, 3SC50 2SC60, 3SC60 2SC70, 3SC70 2SC80, 3SC80
Small Below-Insulation 	Copper-free aluminum conduit body with epoxy finish. The conduit body has two 1/2" NPT entries and large top opening with cover for easy potting. Condulet dimensions: 1/2" body – 5.5" x 1.5" x 1.5" (140 mm x 38 mm x 38 mm)	1SC-SSC 2SC-SSC 3SC-SSC	1SC30, 1SC60 1SC40, 1SC70 1SC50, 1SC80 2SC30, 2SC40 2SC50 3SC30, 3SC40 3SC50
Large Below-Insulation 	Copper-free aluminum conduit body with epoxy finish. The conduit body has two 1" NPT entries and large top opening with cover for easy potting. Condulet dimensions: 1" body – 7" x 2" x 2" (178 mm x 51 mm x 51 mm)	2SC-LSC 3SC-LSC	2SC60 2SC70 2SC80 3SC60 3SC70 3SC80

End Termination Kits

Product name	Description	Catalog number	Heating cable compatibility (SC, SC/H and SC/F) [1]
Above-Insulation 	Polymeric enclosure and stand with captive sealing grommet. Box dimensions: 8.6" x 4.7" x 3.6" (220 mm x 120 mm x 90 mm) Stand height: 4.7" (120 mm)	SC-JBE-S-A SC-JBE-L-A	2SC30, 3SC30 2SC40, 3SC40 2SC50, 3SC50 2SC60, 3SC60 2SC70, 3SC70 2SC80, 3SC80
Small Below-Insulation (for 2SC) 	Stainless steel 1/2" plug with grommet and potting compound. Plug dimensions: 0.5" (12.7 mm) diameter, 2.4" (61 m) long	2SC-STC	2SC30 2SC40 2SC50
Small Below-Insulation (for 3SC) 	Copper-free aluminum conduit body with epoxy finish. The conduit body has two 1/2" NPT entries and large top opening with cover for easy potting. Includes threaded NPT close-up plug. Condulet dimensions: 1/2" body – 5.5" x 1.5" x 1.5" (140 mm x 38 mm x 38 mm)	3SC-STC	3SC30 3SC40 3SC50

[1] SC/F cables are not available in 1 conductor construction.

End Termination Kits

Product name	Description	Catalog number	Heating cable compatibility (SC, SC/H and SC/F) [1]
Large Below-Insulation 	Copper-free aluminum conduit body with epoxy finish. The conduit body has two 1" NPT entries and large top opening with cover for easy potting. Includes threaded NPT close-up plug. Condulet dimensions: 1" body – 7" x 2" x 2" (178 mm x 51 mm x 51 mm)	2SC-LTC 3SC-LTC	2SC60 2SC70 2SC80 3SC60 3SC70 3SC80

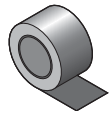
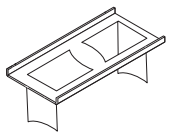
Identification tag

Product name	Description	Catalog number	Heating cable compatibility (SC, SC/H and SC/F)
Circuit Tag 	SC cable circuit identification tag. A metal tag for attachment to the power connection of each circuit. Tag information includes cable catalog number, watts, volts, amps, circuit length, maximum sheath temperature, hazardous location information and circuit number.	SC-NPLATE-CIRCUIT-ID-TAG	All

Labels

Product name	Description	Catalog number	Heating cable compatibility (SC, SC/H and SC/F)
ETL Tag 	"Electric Traced" label for identifying traced pipes and tanks.	ETL-ENGLISH	All

Attachment Products

Product name	Description	Catalog number	Heating cable compatibility (SC, SC/H and SC/F)
GT-66 	1/2" x 66' (12.5 mm x 20 m) roll of glass tape for attaching heating cable to pipe. Not for stainless steel pipes or for installation temperatures above 40°F (4°C).	GT-66	All
GS-54 	1/2" x 54' (62.5 mm x 16.5 m) roll of glass tape for attaching heating cable to pipe. For stainless steel pipes or for any installation temperatures below 40°F (4°C).	GS-54	All
AT-180 	2 1/2" x 180' (62.5 mm x 55 m) of aluminum tape for attaching cable to pipe. Minimum installation temperature is 32°F (0°C).	AT-180	All
Pipe Adapter 	Pipe adapter for SC-JB Kits increase the stand height by 1.5".	SC-JB-PIPE ADAPTER	All

WOLSELEY
Engineered Pipe Group

September 20, 2010

We are pleased to quote you on the following:

Item	Quantity	*Description*	Unit Price

****** HEAT TRACE SECTION ******

The heat loss calculations used for the design of the proposed heat tracing system are made using the following assumptions:
Insulation: ***2" thick of Urecon insulation.***
Minimum ambient: ***-50 °C***
Maintain temperature: ***3 °C***
Voltage available: ***600 volts 3 phases***

4000 ft of 3"ø HDPE pipe
One heat trace channel is required on the pipe
Feed point location (1): At one end

4000 ft	**Series heat trace cable model #SC-3SC30-CT for a total connected load of 14.5 kW. (will be adequate for circuit lengths ranging from 3500ft to 4020ft)**	***$ 10.52/ft***
	****** or ******	
4000 ft	**Series heat trace cable model #SC-3SC40-CT for a total connected load of 18.3 kW. (this model will be adequate for circuit lengths ranging from 3900ft to 4500ft)**	***$ 11.02/ft***
1	**Electronic thermostat model # UTC-6330-01 with ground fault detection circuitry, 600 Vac, 30 A, 3-pole circuit breaker and contactor in a Nema 4 painted steel enclosure. Factory set @; control: 3 °C, high limit: 65 °C for protection of plastic piping. (Circuit breaker might need to be changed if heat trace cable length is not 4000ft)**	***$3,208.50 ea.***
1	**100 ohms RTD temperature sensor # URTD-15-G with 15 meters of grey PVC lead wire**	***$134.28 ea.***
1	**100 ohms RTD temperature sensor # URTD-15-R with 15 meters of red PVC lead wire**	***$134.28 ea.***
1	**Series cable Power connection kit model #3SC-12PT. (For connection of heating cable to the thermostat)**	***$367.52 ea.***
18	**Series cable Power connection kit model #3SC-12PT. (For connection of heating cable to junction boxes at every 400ft)**	***$367.52 ea.***
1	**Series cable end termination kit model #3SC-STC. (Under insulation)**	***$197.80 ea.***
9	***Custom fabricated painted steel junction box support for 3" pipe with 2" of insulation as per Urecon dwg # JB-BK-8.***	***$508.00/ea***
9	***Nema 4 FRP junction box with stainless steel hinge and latches, Robroy***	***$371.00/ea***

model # J1816HLL c/w backplate. For heating cable power connections, series connections and for RTD connections.

Spare materials as requested

400 ft	**Series heat trace cable model #SC-3SC30-CT**	*$ 10.52/ft*
	***** or *****	
400 ft	**Series heat trace cable model #SC-3SC40-CT**	*$ 11.02/ft*
1	**100 ohms RTD temperature sensor # URTD-15-G with 15 meters of grey PVC lead wire**	*$134.28 ea.*
1	**100 ohms RTD temperature sensor # URTD-15-R with 15 meters of red PVC lead wire**	*$134.28 ea.*

Exceptions: ***Power distribution or interconnecting wiring, conduit, main disconnect, main breaker, installation, to be supplied by others.***

Regards,

Cory Wilkinson
Regional Manager

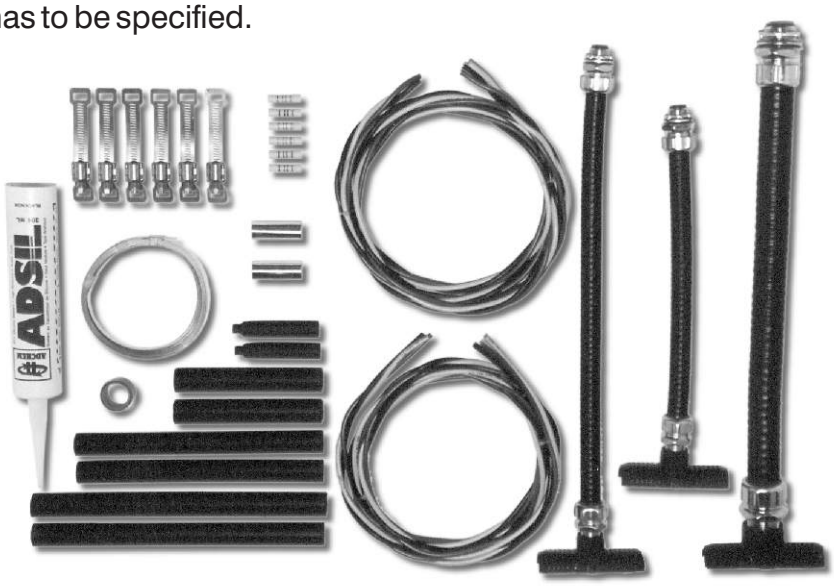
URECON
PRE-INSULATED PIPE

ELECTRIC TRACING FOR FREEZE PROTECTION

Urecon offers a complete range of Thermocable® electric heat tracing cable and controls for freeze protection, on both metal and plastic pipe systems.

PFK-Custom Power feed kit:

A custom power feed kit is required when two controlling (pipe) temperature sensors are to be installed on a given pre-insulated pipe. As specified by the customer, it would contain the material required to bring power from an electronic thermostat to one or two THERMOCABLE® on a pre-insulated pipe. This could include; power leads, splices, end caps, one length of flexible metallic conduit to protect the power leads and two lengths of flexible metallic conduit to protect the temperature sensor wiring (not included). Each conduit length has to be specified.



URTD Temperature sensor:

100 ohms RTD temperature sensor for use with the UTC line of electronic thermostats. Available with 6 m *(20 ft)*, 15 m *(50 ft)* or 30 m *(100 ft)* of grey or red PVC extension lead wire for ease of identification.

A-300 Aluminum foil tape:

50 mm *(2 in)* wide x 45 m *(150 ft)* long roll of aluminum foil adhesive tape. Used to tape the temperature sensor(s) in place to enhance temperature transfer and to secure THERMOCABLE® at connection points, valves, etc.

SERIES TYPE HEATING CABLES FOR LONG LINE ELECTRIC TRACING

Series type heating cables are desirable when heated lengths exceed the limitations of THERMOCABLE®. A series type cable has a constant power output throughout its length and may be used to trace pre-insulated pipes to 2500 m *(8200 ft)* or more in length from one power supply point. This is a lightweight product, easy to pull into heat trace conduits and provides proven long term performance and reliability.

Series type heat trace cable cannot be cut to length in the field. Each application must be engineered and a cable of the appropriate resistance chosen for the application (voltage, circuit length and power output).

Although long electrical circuit lengths are possible, the series type cable must be supplied in shorter physical lengths to permit conduit pulling. If installed above ground, series junction boxes may be used to connect the cables together; if buried, the cable may be spliced under the thermal insulation at these points.

Cable construction:

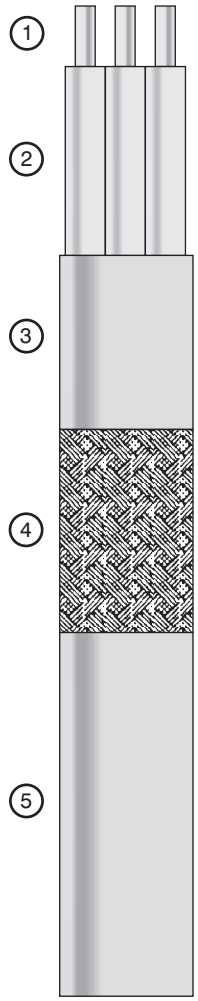
1) 1, 2 or 3 heating conductors.

2) Fluoropolymer insulation.

3) Fluoropolymer insulation.

4) Metallic braid.

5) Fluoropolymer overjacket.

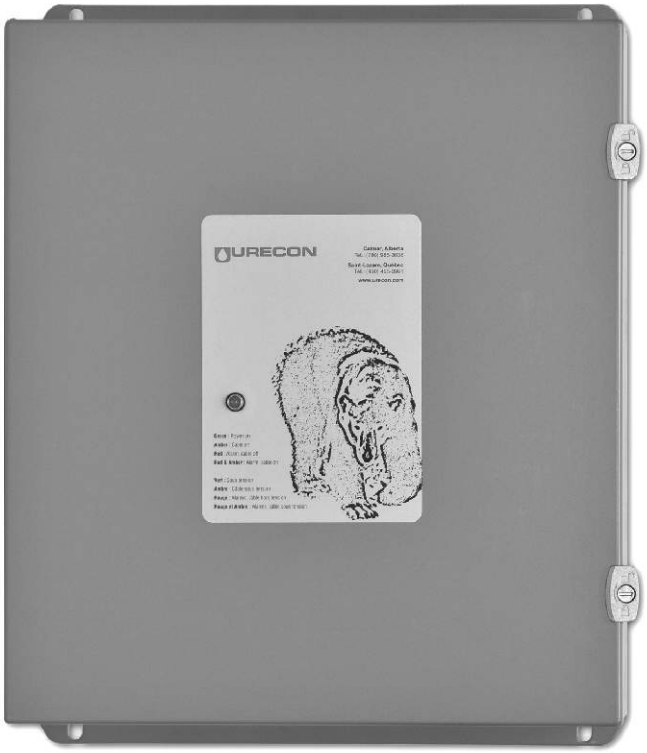


Its features are:

- Long circuit lengths from one feed point.
- Three phase, 600 / 347 V wye connected circuits possible.
- Manufactured in single and multi- conductor format.
- Smooth Fluoropolymer outer jacket for easy pulling into conduit.
- Moisture resistant.
- Each application must be fully engineered.
- Rated up to 600 V.
- Urecon 600 V electronic thermostat available.
- CSA approved.

ELECTRONIC THERMOSTAT

Three-phase contactor version



This state-of-the-art three-phase electronic thermostat is designed to control heating loads up to 600 Vac having a total current draw not exceeding 60 A. It 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:

- 208, 480 or 600 Vac operation as specified for the use.
- Choice of 3 pole circuit breaker sized for the application (15 to 60 A).
- 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 second 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 dedicated level for each sensor. Feature is enabled at customer request.

- On-off control with a 1°C *(1.8 °F)* temperature deadband 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. This feature forces "on" or "off" the output to suit the application, it can be used to force "off" the heating system during normal recirculation of the piping network.
- 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.

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 platinum RTD sensor(s). It can also be programmed for 2 252 ohms 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 on pages 30 - 31.

Numbering sequence : UTC-**V3AA-xx**

'V' in the catalog number denotes the operating voltage, i.e. : 2 for 208, 4 for 480 or 6 for 600. It also indicates the control transformer's voltage i.e. : 208/120, 480 /120 or 600/120.

'3' in the catalog number denotes the number of poles on the circuit breaker.

'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 as listed in tables 5 and 6 (pages 30 - 31).

For example;

- model number **UTC-6320-01** would depict a 600 volts controller with a 3-pole, 20 A circuit breaker and programmed for control on plastic piping using one controlling sensor and one high limit sensor.
- model number **UTC-6345-31** would depict a 600 volts controller with a 3-pole, 45 A circuit breaker and programmed for control on metal piping using two controlling sensors.

Possible combinations :

volts	15 amp	20 amp	25 amp	30 amp	35 amp	40 amp	45 amp	50 amp	60 amp
208 V	2315	2320	2325	2330	2335	2340	2345	2350	2360
480 V	4315	4320	4325	4330	4335	4340	4345	4350	4360
600 V	6315	6320	6325	6330	6335	6340	6345	6350	6360

Three-phase contactor version UTC 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, grey painted steel with ¼ turn latches.

Indicator light: Nema 4 multi-function three color LED.

Input voltage range : 208, 480 or 600 Vac, 50/60 Hz, 3-phase / 4-wire as specified.

Monitoring and alarming : The electronics monitor low temperature, ground fault current, open / shorted temperature sensor(s) and high cable temperature.

Operating ambient : -40 to +40 °C *(-40 to +104 °F).*

Power output : 3-pole contactor output rated 60 A - 600 Vac.

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

Spring loaded signal terminals for # 28 to # 12AWG

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:

Note: You can use the default settings of the following features by selecting the appropriate program code as shown in tables 5-6 on pages 30-31.

Auto-cycle : When the temperature controller is energised, 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. Can be disabled at the factory upon special request.

Ground fault detection : Factory adjustable to trip and alarm 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 continuous mode.

Temperature control : three 3-wire 100 Ω @ 0 °C Platinum RTD (alpha=0,00385 Ω/Ω/°C), lead compensated to 20 Ω per lead.
or
three 2-wire 2 252 Ω @ 25 °C NTC Thermistor.

Deadband : 1 to 5 °C *(1.8 to 9 °F).*

Control temperature setpoint range : -5 to 75 °C *(23 to 167 °F).*

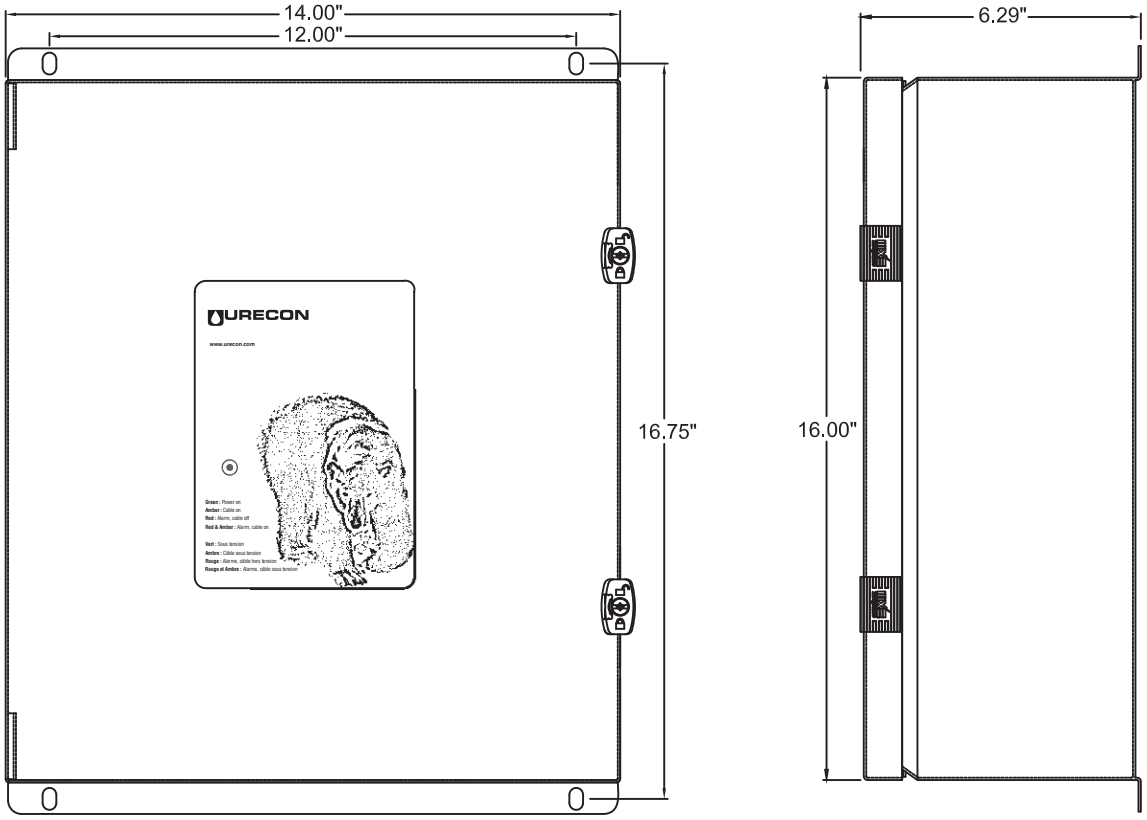
Low temperature alarm : Feature can be enabled to provide low temperature alarm on TS1 and TS2.

Low temperature setpoint range : -10 to 75 °C *(14 to 167 °F).*

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.

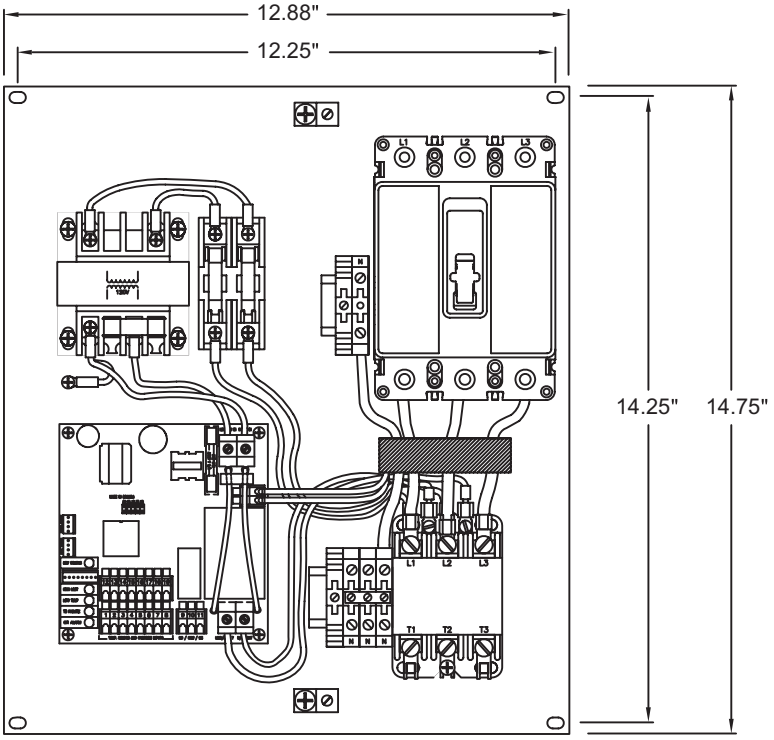
High temperature setpoint range : 25 to +100 °C *(77 to +212 °F).*

Three-phase contactor version electronic thermostat



FRONT VIEW

LEFT SIDE VIEW



BACKPLATE

Three-phase contactor version UTC 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, grey painted steel with clips.

Indicator light: Nema 4 multi-function three color LED.

Input voltage range : 208, 480 or 600 Vac, 50/60 Hz, 3-phase / 4-wire as specified.

Monitoring and alarming : The electronics monitor low temperature, ground fault current, open / shorted temperature sensor(s) and high cable temperature.

Operating ambient : -40 to +40 °C *(-40 to +104 °F).*

Power output : 3-pole contactor output rated 60 A - 600 Vac.

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

Spring loaded signal terminals for # 28 to # 12AWG

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:

Note: You can use the default settings of the following features by selecting the appropriate program code as shown in tables 5-6 on pages 30-31.

Auto-cycle : When the temperature controller is energised, 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. Can be disabled at the factory upon special request.

Ground fault detection : Factory adjustable to trip and alarm 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 continuous mode.

Temperature control :	three 3-wire 100 Ω @ 0 oC Platinum RTD (alpha=0,00385 Ω/Ω/°C), lead compensated to 20 Ω per lead. or three 2-wire 2 252 Ω @ 25 °C NTC Thermistor.
Deadband :	1 to 5 °C *(1.8 to 9 °F).*
Control temperature setpoint range :	-5 to 75 °C *(23 to 167 °F).*
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).*
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 setpoint range :	25 to +100 °C *(77 to +212 °F).*

Installation:

- 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.
- 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.

Wiring:

- A wiring diagram for the controllers is shown on page 32.

- Use only 90 °C rated power cable.
- 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.
- Grounding terminals are provided for connection of system ground leads. Proper system grounding is required for safe and correct operation of the controller's protection feature.
- Shields on the temperature sensor wiring should be grounded only at the controller end using the appropriate terminals provided (# 4, 8 and 15).
- 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. (refer to Urecon's commissioning log).

Temperature sensor location:

- Install the temperature sensor(s) on the pipe wall and cover with aluminum foil tape to enhance heat transfer.
- The controlling sensor(s) is (are) to be taped directly to the pipe wall, 180° away from the heating cable.
- The controlling sensor(s) TS1 and TS2 (when enabled) should be located at the expected coldest point(s) of the piping system.
- If controlling a pipe which enters 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.
- Loop resistance should not exceed 40 ohms.
- Verify that the temperature sensor(s) is(are) wired correctly. Refer to the wiring diagram on page 32.

TABLE 5 PROGRAM CODES FOR USE WITH STANDARD TEMPERATURE SENSOR (URTD-xx-y)

Program code # for use with 100 ohms RTD on plastic pipe		01	02	03	04	05	06	07	08	11	12	13	14	15	16	17	18
Function	Range																
TS 1 control setpoint	-5 to +75 degree C	3 °C	3 °C	5 °C	5 °C	10 °C	10 °C	15 °C	15 °C	3 °C	3 °C	5 °C	5 °C	10 °C	10 °C	15 °C	15 °C
Low TS 1 alarm enabled	No or Yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
Low TS 1 alarm setpoint	-10 to +75 degree C	-	1 °C	-	3 °C	-	5 °C	-	10 °C	-	1 °C	-	3 °C	-	5 °C	-	10 °C
TS 2 enabled	No or Yes	no	no	no	no	no	no	no	no	yes	yes	yes	yes	yes	yes	yes	yes
TS 2 control setpoint	-5 to +75 degree C	-	-	-	-	-	-	-	-	3 °C	3 °C	5 °C	5 °C	10 °C	10 °C	15 °C	15 °C
Low TS 2 alarm enabled	No or Yes	-	-	-	-	-	-	-	-	no	yes	no	yes	no	yes	no	yes
Low TS 2 alarm setpoint	-10 to +75 degree C	-	-	-	-	-	-	-	-	-	1 °C	-	3 °C	-	5 °C	-	10 °C
TS 3 enabled	No or Yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
TS 3 high limit cutout	25 to 100 degree C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C
TS1 and TS 2 deadband	1 to 5 degree C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C
TS type	100 ohms RTD or 2252 ohms Thermistor	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD
Latch TS failure alarms	No or Yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
TS failure mode	Off or On	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on
Override input mode	Manual = 0 or Timed = 1 to 48 hours	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Override output state	Off or On	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on
Active override input state	Open or Closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
Ground fault trip enabled	No or Yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Ground fault alarm current level	30 or 100mA	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Auto-cycle	No or Yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Program code # for use with 100 ohms RTD on metal pipe		21	22	23	24	25	26	27	28	31	32	33	34	35	36	37	38
Function	Range																
TS 1 control setpoint	-5 to +75 degree C	3 °C	3 °C	5 °C	5 °C	10 °C	10 °C	15 °C	15 °C	3 °C	3 °C	5 °C	5 °C	10 °C	10 °C	15 °C	15 °C
Low TS 1 alarm enabled	No or Yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
Low TS 1 alarm setpoint	-10 to +75 degree C	-	1 °C	-	3 °C	-	5 °C	-	10 °C	-	1 °C	-	3 °C	-	5 °C	-	10 °C
TS 2 enabled	No or Yes	no	no	no	no	no	no	no	no	yes	yes	yes	yes	yes	yes	yes	yes
TS 2 control setpoint	-5 to +75 degree C	-	-	-	-	-	-	-	-	3 °C	3 °C	5 °C	5 °C	10 °C	10 °C	15 °C	15 °C
Low TS 2 alarm enabled	No or Yes	-	-	-	-	-	-	-	-	no	yes	no	yes	no	yes	no	yes
Low TS 2 alarm setpoint	-10 to +75 degree C	-	-	-	-	-	-	-	-	-	1 °C	-	3 °C	-	5 °C	-	10 °C
TS 3 enabled	No or Yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
TS 3 high limit cutout	25 to 100 degree C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TS1 and TS 2 deadband	1 to 5 degree C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C	1 °C
TS type	100 ohms RTD or 2252 ohms Thermistor	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD	RTD
Latch TS failure alarms	No or Yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
TS failure mode	Off or On	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on
Override input mode	Manual = 0 or Timed = 1 to 48 hours	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Override output state	Off or On	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on
Active override input state	Open or Closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed	closed
Ground fault trip enabled	No or Yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Ground fault alarm current level	30 or 100mA	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Auto-cycle	No or Yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Wiring Diagram