Helix Technologies Pty Ltd

Project	Demo QA	Client	Helix Demo QA
Project No.	4567	Design Date	20/06/2017
Category	Demo Slurry QA	Atmos. Press	94.88 kPa
Network Type	Liquid	Calc. Method	Darcy
Description	Copper Mine Tailings Pipeline - Bingham slurry new		

Copper Tailings Pipeline - Bingham slurry. Flow reduced to 37l/s closer to transition. This sample uses the updated Warman method from the Warman Slurry Manual 2002.
Critical Velocity Vc is 1.38m/s and operating velocity in discharge pipe is 1.41m/s. This is the economic maximum flow rate for the system.

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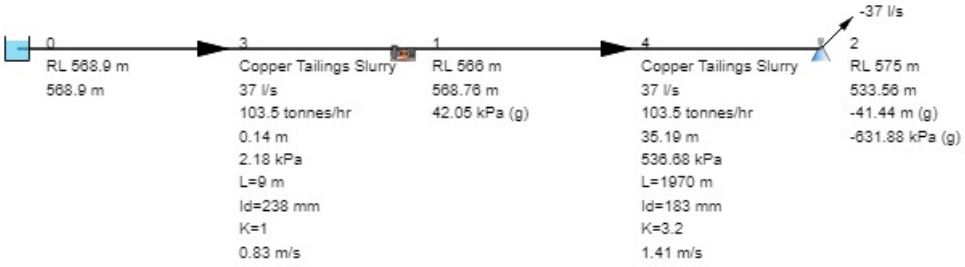

Copper Mine Tailings Pipeline - Bingham slurry new

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Category	Demo Slurry QA	Atmos. Press	94.88 kPa
Description	Copper Mine Tailings Pipeline - Bingham slurry new		

Pipe No	3	From node to node	0 - 1
Description		Equipment No	
Slurry Type	Bingham Plastic		
Slurry Description	Copper Tailings Slurry		
Slurry Reference	Copper Tailings		
SG Carrier Liquid Sl	1	Liquid Viscosity	1 cP
SG of Dry Solids	3.5	SG of Mixture	1.56
Conc. by Mass Cw	49.97 % w/w	Concentration by Vol	22.2 % v/v
Solids Flow Rate	103.5 tonnes/hr	Particle Size d50	0.02 mm
Yield Stress To	10 Pa	Co-eff of Rigidity n	0.03 Pa-s
Yield Stress Tw 8V/D	10.839 Pa	Shear Rate 8V/D	27.956 -s
Hedstrom No.	978706	Pressure Drop / m	182.16 Pa/m
Critical Velocity Vc	1.35 m/s	Critical Flow Rate	60.13 l/s
Reynolds No at Vc	15168.63		
Pump Wear Factor Pw	1	Pump Head Ratio HR	0.97
Pipe Description	Steel Pipe 10" Rubber lined	Pipe Class	
Nominal Diameter	250 mm	Inside Diameter	238 mm
Outside Diameter	273 mm	Pipe Length	9 m
Pipe Roughness	0.025 mm	Allowable Press.	0 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	37 l/s	Velocity	0.83 m/s
Friction Loss	0.11 m	Fitting Losses	0.04 m
Slurry Losses	0 m	Orifice Losses	0 m
Fixed Head Loss	0 m	Booster Pump Head	0 m
Total Head Loss	0.14 m	Total Pressure Drop	2.18 kPa
Entry Total Head	568.9 m	Exit Total Head	568.76 m
Entry Gauge Head	0 m	Exit Gauge Head	2.76 m
Reynolds No.	10260.2	Friction Factor	0.08061 (Darcy f)

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Description	Copper Mine Tailings Pipeline - Bingham slurry new		

Pipe No	4	From node to node	1 - 2
Description		Equipment No	
Slurry Type	Bingham Plastic		
Slurry Description	Copper Tailings Slurry		
Slurry Reference	Copper Tailings		
SG Carrier Liquid Sl	1	Liquid Viscosity	1 cP
SG of Dry Solids	3.5	SG of Mixture	1.56
Conc. by Mass Cw	49.97 % w/w	Concentration by Vol	22.2 % v/v
Solids Flow Rate	103.5 tonnes/hr	Particle Size d50	0.02 mm
Yield Stress To	10 Pa	Co-eff of Rigidity n	0.03 Pa-s
Yield Stress Tw 8V/D	11.845 Pa	Shear Rate 8V/D	61.496 -s
Hedstrom No.	578629	Pressure Drop / m	269.93 Pa/m
Critical Velocity Vc	1.38 m/s	Critical Flow Rate	36.24 l/s
Reynolds No at Vc	12602.91		
Pump Wear Factor Pw	1	Pump Head Ratio HR	0.97
Pipe Description	Polyethylene PE100 AS4130	Pipe Class	PN16
Nominal Diameter	225 mm	Inside Diameter	183 mm
Outside Diameter	225 mm	Pipe Length	1970 m
Pipe Roughness	0.001 mm	Allowable Press.	1600 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	3.2	Total Fittings kf	0
Flow Rate	37 l/s	Velocity	1.41 m/s
Friction Loss	34.87 m	Fitting Losses	0.32 m
Slurry Losses	0 m	Orifice Losses	0 m
Fixed Head Loss	0 m	Booster Pump Head	0 m
Total Head Loss	35.19 m	Total Pressure Drop	536.68 kPa
Entry Total Head	568.76 m	Exit Total Head	533.56 m
Entry Gauge Head	2.76 m	Exit Gauge Head	-41.44 m
Reynolds No.	13343.76	Friction Factor	0.0321 (Darcy f)

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Node No	0	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	568.9 m	Pressure Input	0 kPa
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	568.9 m		

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Node No	1	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	566 m	Pressure Input	0 kPa
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	568.76 m		
Pump Head	0 m	Pump Flow Rate	37 l/s
Pump Abs. Power	0 kW		

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Node No	2	Node Type	Nozzle
Description		Equipment No	
Rel. Level (RL)	575 m	Pressure Input	0 kPa
Nozzle K value	0	Ext Flow (+In/-Out)	-37 l/s
Int.(Gauge) Head	-41.44 m	Int.(Gauge) Pressure	-631.88 kPa
Total Node Head	533.56 m		