



# North Red Deer Regional Wastewater Services Commission

5432-56 Avenue, Lacombe AB T4L1E9 Tel: (403)782-1254 Fax: (403)782-5655 mgoudy@lacombe.ca

**May 21, 2019**

**Time 9:00 am-10:00 pm**

COUNCIL CHAMBERS  
LACOMBE AB

## **Invitees:**

**Members:** Councillor Ken Wigmore, Chairperson, Lacombe County  
Mayor Richard Poole, Vice Chairperson, Town of Blackfalds  
Mayor Grant Creasey, Director, City of Lacombe

**Others:** Matthew Goudy, CAO - NRDRWWSC  
Myron Thompson, CAO, Town of Blackfalds  
Preston Weran, Director of Infrastructure & Property Services, Town of Blackfalds  
Michael Minchin, Manager of Corporate Services, Lacombe County  
Keith Boras, Manager of Environmental & Protective Services, Lacombe County  
Justin de Bresser, Senior Manager of Financial Services, City of Lacombe  
Jordan Thompson, Director of Operations & Planning Services, City of Lacombe

**Guests:** Todd Simenson, Stantec Consulting Ltd.  
Joel Sawatzky, Stantec Consulting Ltd.

## **AGENDA**

1. Call to Order by Chair Wigmore
2. Adoption of Agenda
3. Adoption of Previous Minutes  
Regular Meeting Minutes- April 8, 2019
4. Appointment of Auditors
5. Town of Blackfalds Request
  - Legal Invoice



# North Red Deer Regional Wastewater Services Commission

5432-56 Avenue, Lacombe AB T4L1E9 Tel: (403)782-1254 Fax: (403)782-5655 mgoudy@lacombe.ca

6. Lacombe Lift Station

- Pump Update

7. Operational Report

8. Engineers Report

9. In Camera

- MEGlobal Expression of Interest \*
- Stantec General Engineering Services Proposal \*

*\*Hard copies of In Camera Items will be provided at the meeting*

10. Next meeting Date – June 17, 2019 at 10:00am

11. Adjournment

Attachments:

NRDRWWSC Minute -Draft – April 8, 2019

Blackfalds Legal Invoice IVC041252

NRDRWWSC Technical Memo#18

NRDRWWSC- Operational Report- May 21, 2019

Engineer's Report May 13, 2019

**REGIONAL WASTEWATER MEETING MINUTES**

**April 8, 2019**  
COUNCIL CHAMBERS  
LACOMBE AB

**In Attendance:**

**Members:** Councillor Ken Wigmore, Chair, Councillor, Lacombe County  
Mayor Richard Poole, Vice Chair, Mayor, Town of Blackfalds  
Mayor Grant Creasey, Director, Mayor, City of Lacombe

**Others:** Matthew Goudy, CAO, NRDRWWSC  
Myron Thompson, CAO, Town of Blackfalds  
Preston Weran, Director of Infrastructure & Property Services, Town of Blackfalds  
Michael Minchin, Manager of Corporate Services, Lacombe County  
John Van Doesburg, Commission Administrator, C&J Vanco Services Ltd.  
Justin de Bresser, Senior Manager - Financial Services, City of Lacombe  
Jordan Thompson, Director of Operations & Planning Services, City of Lacombe  
Amber Mitchell, Engineering Services Manager, City of Lacombe  
Denise Bellabono, Administrative Assistant, NRDRWWSC

**Guests:** Todd Simenson, Stantec Consulting Ltd.  
Darwin Durnie, Stantec Consulting Ltd.  
Steven Weninger, Stantec Consulting Ltd.  
Ryan Wachter, BDO Canada LLP  
Alan Litster, BDO Canada LLP  
Kirsten Khatib, MEGlobal  
Pravind Ramdial, MEGlobal  
Darren Berg, MEGlobal

**Regrets:** Keith Boras, Manager of Environmental & Protective Services, Lacombe County  
Joel Sawatzky, Stantec Consulting Ltd.

**1. Call to Order:**

Chair Wigmore called the meeting to order at 11:00am.

*CARRIED*

**2. Adoption of the Agenda:**

*MOVED by Director Creasey that the agenda for April 8, 2019 be adopted as amended.*

*CARRIED*

### 3. Adoption of Previous Minutes

Regular Meeting of December 10, 2018

*MOVED by Vice Chair Poole that the minutes for December 10, 2018 Meeting be adopted as presented.*

CARRIED

### 4. 2018 Audited Financial Statements

Ryan Wachter, a representative of BDO Canada LLP, presented to the Commission the North Red Deer Regional Wastewater Services Commission 2018 Financial Statements. As the first year of the pipeline being active expenses increased which includes operational cost and treatment charges. Highlighted was the long-term debt principal and interest repayment plan from 2019-2023 and thereafter.

*MOVED by Vice Chair Poole that the Commission accept and approve the North Red Deer Regional Wastewater Services Commission Consolidated Financial Statements December 2018, as attached to the memo.*

CARRIED

*Meeting recessed at 12:14pm*

*Meeting resumed at 12:37pm*

### 5. February Variance Report

Senior Manager de Bresser updated the Commission on the financial variances with an amendment to switch Blackfalds and Lacombe on the report. The current month expenditures and first 2 months of revenue were presented and are in line with the expectations. Budget requisitions are due to be billed fifty percent in June and the remaining fifty percent on December.

*MOVED by Director Creasey that the Commission accept the February 2019 Variance Report of as information.*

CARRIED

### 6. February Capital Report

Senior Manager de Bresser updated the Commission on the capital budget, moving all capital assets from work in progress to in use, which triggered a portion of depreciation for 2018. Capital Assets as of December 31, 2018 is \$69,436,269. Administration is in the final stages of finalizing all claims for each grant with Alberta Transportation.

*MOVED by Director Creasey that the Commission accept the February 2019 Capital Report of as information.*

CARRIED

### 7. Bylaw 4.1

Senior Manager de Bresser presented first, second and third reading Bylaw 4.1 to amend the Commissions Rates and Fees Bylaw 4. The amendment adjusts the rates and fees in order to be consistent with the budget.

*MOVED by Vice Chair Poole that the Commission give first reading to Bylaw 4.1 Rates and Fees.*

CARRIED

*MOVED by Director Creasey that the Commission give second to Bylaw 4.1 Rates and Fees.*

CARRIED

*MOVED by Vice Chair Poole that the Commission give third reading to Bylaw 4.1 Rates and Fees.*

CARRIED

## **8. Bylaw 1 Amendments**

CAO Goudy presented Bylaw 1.1 for third reading. The bylaw is to amend Bylaw 1 to align the term of directors with the municipal elections, which is a 4-year term and to remove the 3-year term of office for the chair and vice chair, as they are elected annually at the first meeting in November. First and second reading was passed at the Regular Commission meeting on December 10, 2018.

*MOVED by Director Creasey that the Commission give third reading to Bylaw 1.1 to align the term of directors to a 4-year term retrospective November 2017 and remove the 3-year terms of office for the chair and vice chair as presented for Bylaw No. 1.1.*

CARRIED

## **9. Membership Agreements**

CAO Goudy presented the Commission with the final draft of the Membership Agreement. Since the Commission meeting of June 27, 2018, further changes were requested by members of the Technical Committee, along with direction from direction of the board to document Lacombe County's capacity allocation.

*MOVED by Vice Chair Poole that the Commission approve the Draft Membership Agreement attached to this memorandum, and direct Administration to forward the Agreement to each respective member Council for endorsement and execution.*

CARRIED

## **10. Supply Services Agreement**

CAO Goudy presented the Commission with the final draft of the Supply of Services Agreement. Since the Commission meeting of June 27, 2018, further changes were requested by members of the Technical Committee, along with direction from the board to document Lacombe County's capacity allocation.

*MOVED by Director Creasey that the Commission approve the Draft Supply of Services Agreement attached to this memorandum, and direct Administration to forward the Agreement to each respective member Council for endorsement and execution.*

## 11. Lease Agreement

CAO Goudy presented the Commission with the final draft of the Supply of Services Agreement. Since the Commission meeting of June 27, 2018, further changes were requested by members of the Technical Committee.

*MOVED by Director Creasey that the Commission approve the Draft Lease Agreement attached to this memorandum, and direct Administration to forward the Agreement to the Town of Blackfalds' Council for endorsement and execution.*

CARRIED

## 12. Power Contract

Director Thompson presented the Commission for consideration three common power products that are available to industrial customers. The Commission's power contract with Enmax expired on January 31, 2019, and since has been on a month to month index contract. With identical power consumption for January and February, charges for February increased by 51% due to higher index pricing. Advantages, disadvantages and financial implications were provided for each product and varies in budget certainty.

*MOVED by Vice Chair Poole that Commission enter into a load following power contract with AUMA starting May 1st, 2019 ending April 30st, 2024.*

## 13. Stantec General Engineering Services Proposal

Deferred to the next meeting.

## 14. Operational Report

The operational report from January to end of March 2019 was presented by Director Thompson with updates on the equalization storage system for the Blackfalds and Lacombe Lift Stations, with Blackfalds in the final stages of completion. Troubleshooting continues as Stantec investigates and monitors the pump impeller and the possibility of continuous equipment vibration for all the pumps. The Odour Management Facility is managing well with no concerns.

*MOVED by Director Creasey to accept the Operational Monthly Report of April 8, 2019 as information.*

CARRIED

## 15. Engineers Report

Mr. Simenson updated the Commission on land acquisitions with final damage release payments and landowner signoffs are completed. A few remaining items at the Odour Management Facility including construction of the stairs to access the top of the biofilter and carbon tanks. Troubleshooting on the pumps at the Lacombe Lift Station continues and a detailed inspection with a

specialist on site is scheduled for April 11, 2019 to decide if the pump should be removed and returned to the suppliers to work on it further.

*MOVED by Director Creasey to accept the Engineer's Report of April 8, 2019 as information.*

CARRIED

## 16. MEGlobal

Pravind Ramdial, Kirsten Khatib, and Darren Berg, representatives from MEGlobal, presented to the Commission an expression of interest to connect to the North Red Deer Regional Wastewater collection system as a customer, while allowing MEGlobal to pursue regulatory approvals and further project definition. The scope of work would be to connect the existing effluent pipeline from the Prentiss Facility to the NRDRWWSC collection system with a tie in point location suggested in the Stantec Feasibility Study. Based on MEGlobal's capital budget cycle and in order to accommodate the farming off season, the ideal timeline would be to begin construction in winter 2019 and tying into the lines in spring 2020. No capital would be required by the Commission.

*MOVED by Director Creasey that Commission is in principle support of allowing MEGlobal industrial use.*

CARRIED

## 17. In Camera

*MOVED by Director Creasey to move IN CAMERA at 11:22am with administrative representatives to support the Commission to discuss the following item:*

- **MEGlobal**

CARRIED

*MOVED by Vice Chair Poole to move OUT CAMERA at 12:00pm.*

CARRIED

## 18. Next Meeting

The next meeting scheduled is for Monday May 21, 2019 at 9:00am in the City of Lacombe Council Chambers and June 17, 2019 at 10:00am in the City of Lacombe Council Chambers.

## 19. Adjournment:

*MOVED by Director Creasey that the North Red Deer Regional Wastewater Services Commission meeting of April 8, 2019 be adjourned at 1:25pm.*

CARRIED

---

Chair

---

Administrator

# Appointment of External Auditors for 2019 - NRDRWWSC

---

*Date: March 31, 2019*

*Prepared by: Justin de Bresser, Senior Manager – Financial Services*

*Presented by: Matthew Goudy, CAO*

## **PURPOSE:**

To recommend appointment of auditors for the Commission for 2019-2023 fiscal years.

## **BACKGROUND:**

The current contract for audit services will be completed April 2019 following the finalization of the 2018 Audit. Administration listed a Request for Proposal (RFP) on Alberta Purchasing Connection (APC) and on the City's of Lacombe's website soliciting proposals for the 2019 to 2023 period.

## **ISSUE ANALYSIS:**

The RFP was posted from October 15<sup>th</sup> to November 5<sup>th</sup> 2018. Three submissions were received from:

1. BDO Canada LLP,
2. RMS (Formally known as Collins Barrow) and
3. MNP

A committee of 3 employees was established to review the proposals over the following criteria:

Understanding the Proposal	5%
Experience with:	
Municipal Audits	5%
Commission Audits	5%
Personnel	10%
Audit Implementation	20%
Additional Services	5%
References	10%
Audit Fee	40%
<hr/>	
Total	100%

All 3 submissions were reviewed by the committee and it was noted that the participating firm's had similar experience and expertise with the performance of audits. The audit fees

were similar for all three proponents. It is Administrations recommendation to award the contract to BDO Canada LLP. BDO Canada LLP are the Commissions current auditors and their quoted price was the same as they quoted in 2014 with no inflationary increases over the next 5 years.

**FINANCIAL IMPLICATIONS:**

The estimated annual cost of the audit would be no more than \$8,000 per year.

**ALTERNATIVES:**

1. The Commission can renew the contract with BDO Canada LLP covering the 2019-2023 fiscal year.
2. Give notice to BDO Canada LLP and issue a new RFP for the upcoming years.

**ATTACHMENTS:**

N/A

**RECOMMENDATION:**

That the Commission renew the contract with BDO Canada LLP of Red Deer, Alberta and appoint as the Commission's external financial auditors for the 2019-2023 fiscal years.

# Request for Payment – Town of Blackfalds

---

*Date: April 1<sup>st</sup>, 2019*

*Prepared by Matthew Goudy, CAO*

*Presented by Matthew Goudy, CAO*

## **PURPOSE:**

To request Board direction regarding legal costs incurred by a member in the review of Membership, Supply of Services, and Lease Agreements.

## **EXECUTIVE SUMMARY:**

The Town of Blackfalds incurred approximately \$13,000 in legal bills, reviewing the NRDRWWSC's Membership Agreement, Supply of Services Agreement, and Lease Agreement. The Town has requested the Commission consider payment for 50% of these costs.

## **ISSUE ANALYSIS:**

Following the Boards motions endorsing the various agreements, the Town of Blackfalds engaged a legal review of the proposed agreements. Total costs were \$13,317.98. The Town has submitted an invoice to the Commission for 50% of these costs (\$6,658.99). The review resulted in meaningful changes to the Lease Agreement between the Commission and the Town, and minor changes to the Membership and Supply of Services Agreements.

## **RECOMMENDATION:**

That the Commission approve the expenditure of \$6,658.99 from line item 05-2-48-23200 (Legal Fees), to cover the invoice submitted by the Town of Blackfalds.

## **FINANCIAL IMPLICATIONS:**

The Commissions' budget includes \$1,000 for general legal fees. This expenditure would exceed the budget. Funds can be reallocated from other areas, such as parts and repairs, to cover the unbudgeted expense, if approved by the Board.

## **ALTERNATIVES:**

The Commission may choose to:

- A. Approve payment of the invoice received from the Town of Blackfalds.
- B. Approve payment of an alternate amount.

C. Direct Administration in an alternate fashion.

**ATTACHMENTS:**

Town of Blackfalds Invoice IVC041252



Town of Blackfalds  
 PO Box 220  
 5018 Waghorn Street  
 Blackfalds Alberta T0M 0J0

INVOICE	IVC041252
Type	
Date	31/12/2018
Page	1

Bill to:

City of Lacombe  
 5432-56 Ave  
 Lacombe AB T4L 1E9



Purchase Order ID	Customer ID	Salesperson ID			DELIVERY	Net 30
NRDWWSC	TOWN06					
Quantity	Item Number	Description	U Of M	Discount	Unit Price	Ext. Price
0.5000	BROWNLEE LLP #472075		Each	\$0.000	\$4,971.910	\$2,485.96
0.5000	BROWNLEE LLP #473427		Each	\$0.000	\$2,022.980	\$1,011.49
0.5000	BROWNLEE LLP #470392		Each	\$0.000	\$6,323.080	\$3,161.54
		PL CODE				
		DESCRIP				
		AUTHORIZATION				

GST# 108125154

Data being collected on this form is under the authority of Section 33 (c) of  
 The Alberta Freedom of Information and Protection of Privacy Act (FOIP)  
 All questions should be directed to the Town of Blackfalds FOIP Coordinator  
 at 403-885-6248 or foip@blackfalds.com

Subtotal	\$6,658.99
Misc	\$0.00
Tax	\$0.00
Freight	\$0.00
Trade Discount	\$0.00
<b>Total</b>	<b>\$6,658.99</b>

# Lacombe Lift Station Pump Update

---

*Date: May 15<sup>th</sup>, 2019*

*Prepared by: Jordan Thompson*

*Presented by: Jordan Thompson*

## **PURPOSE:**

To provide the Commission with an update on the Lacombe lift station pump issue.

## **BACKGROUND:**

At the Commission's regular meeting on December 10<sup>th</sup> Administration and Stantec reported the critical failure of 2 of the 3 pumps at the Lacombe lift station. The impellers in both pumps were found to be unsecure. Initially this caused poor pump efficiency but escalated to cause significant internal damage to pump components before they were taken out of service. A coordinated investigation by Stantec, Chandos, TDH (pump supplier), and Sulzer (pump manufacturer) was underway to determine the root cause of the impeller failure and to take action to eliminate the risk of it happening again.

The Commission subsequently directed Administration to *"produce options and costs to address the current pump issues"*.

An electrical issue with the motors of one pump in Lacombe and another in Blackfalds are also being investigated. Over the course of this investigation the transport company shipping the pumps to the manufacturers plant caused significant damaged the pumps. The pumps require major repairs before they can be commissioned back into service. This is covered in more detail in Stantec's Technical Memo #18.

## **ACTION/RECOMMENDATION:**

THAT Commission accept this report as information.

## **ISSUE ANALYSIS:**

Attached is Stantec's Technical Memorandum #18: Pump Operations outlining the coordinated investigation efforts and resulting recommendations to date.

## **Investigation Summary to Date - Vibrations:**

The two failed pumps are back in operation at the Lacombe lift station after being repaired by Sulzer at no cost to the Commission. At this point the coordinated investigation remains ongoing however Sulzer points to excessive vibrations stressing the impeller components as the likely cause of the impeller failure in both pumps. The following steps have been taken to date to narrow down the source of the vibration issue however it remains inconclusive:

- Potential issues related to incorrect wiring were investigated and have been ruled out;

- Sulzer indicated that the pumps were originally inspected before leaving their factory and again inspected after Sulzer's repair. In both instances, Sulzer says, the pumps were found to meet their quality control standards – the bolts and locking washers were installed correctly;
- The concrete pump bases were found to be smaller than dictated by the design requirements so Chandos enlarged the bases to adhere to the engineer's specifications;
- Vibrations were found to be more prevalent when the pumps operated at 40Hz and 60Hz but less prevalent at 50Hz. However, the transmission system operates optimally with the pumps set at 40hz and Sulzer has provided written confirmation that this speed is acceptable. The pumps have been set to normally operate at 40Hz and to not exceed 50Hz at any time so as to eliminate vibrations during start-up (speeds up to 60Hz can occur during the first minute of pump start-up);
- Recent detailed flow modelling of the lift station process by Stantec revealed that when one pump is running, a specific parameter called the "swirl angle" exceeds industry standards but is within Sulzer's maximum tolerance (modelled to be 7°, industry standard is 5°, Sulzer maximum is 8°).
- Investigation on the pipe supports is ongoing.

Unfortunately, the source of the vibration issue has not yet been determined. However, at this point vibrations in the Lacombe lift station pump and piping appear significantly reduced although it still more noticeable than the Blackfalds lift station. All three pumps in Lacombe and Blackfalds have been inspected by Sulzer and verified by Stantec to have been installed to their design specifications.

### **Next steps:**

#### **1. Significantly reduce the risk of impeller failure in the Lacombe lift station.**

In Technical Memo #18, Stantec recommends an additional pump inspection protocol for the operators to help identify potential impeller issues well before failure. Our operators will execute the additional inspection protocol as recommended.

#### **2. Measure the vibrations of the Lacombe pumps.**

Stantec recommends the operators, over time, verify vibration levels at the pump are within the allowable tolerance. This requires the Commission to purchase handheld vibration monitoring equipment, permanent vibration monitoring equipment or contract this to a qualified 3<sup>rd</sup> party. Since the handheld equipment can be used in both lift stations and our operators are trained in its use, it has been purchased through the construction contract.

#### **3. Reduce downtime in the event of impeller failure.**

Through the construction contract, a spare hydraulic repair kit has been purchased. The main components of the hydraulic repair kit are long lead items including:

- an impeller,

- wear plate and
- impeller bolt/locking hardware.

Having these on hand will reduce pump downtime in the event of impeller failure. The Lacombe impellor can, in an emergency, also be used in a Blackfalds pump until a Blackfalds specific impeller arrives on site (although it will be less efficient).

#### 4. Request extended pump warranty

The current comprehensive warranty coverage from Chandos expires February 23, 2020. Sulzer’s pump manufacturer warranty continues through to 2023 but the coverage is significantly reduced after 2020. Stantec has formally requested Sulzer provide a full coverage warranty through to 2023. Sulzer has not approved nor denied the request but has indicated they want to ensure the pump vibrations are within tolerance before considering it.

#### 5. If vibrations are found to be higher than the allowable tolerance.

If the operators’ vibration measurements are higher than the allowable tolerance, Stantec has identified an alteration that could be made to the adjacent pump piping to reduce vibration levels at the pump:

- the installation of new pipe supports in addition to the current steel pipe supports, and

#### Investigation Summary to Date – Motor Failure:

The windings in the motors of one pump in Lacombe (102 – the pump that did not have impeller issues) and one pump in Blackfalds (101) failed and the pumps are not operable. The cause is suspected to be from a voltage spike not from the outside power source. Further, the pumps were significantly damaged during their transport to a Sulzer repair facility in Edmonton. While the repair cost for the damage caused by the transportation company will not be born by the Commission, Sulzer has not yet confirmed the repair of the motor will be covered under warranty. Stantec’s is continuing to investigate the root cause of the motor failure.

Stantec has presented pricing to replace the 2 failed pumps with new Sulzer pumps. However due to the 6-8 month delivery timeline for new pumps, Administration does not recommend this option.

#### FINANCIAL IMPLICATIONS:

At this point no additional pump repair costs have been incurred by the Commission and construction costs remain under budget.

	Cost	Comment
Handheld Vibration Monitoring Equipment	\$3,500	Already purchased through construction contract

Hydraulic Repair Kit	\$12,000	Already purchased through construction contract
Pipe Alterations	\$20,000	TBD pending vibration measurement
Replacement of 2 failed pump due to motor failure	\$110,000	Not recommended

**ALTERNATIVES:**

The Commission may choose to:

- A. Accept this report as information.
- B. Direct Administration as to how it wishes to proceed.

**ATTACHMENTS:**

Technical Memorandum #18 – Pump Operations R2

---

To:	Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP. NRDRWWSC	From:	Joel Sawatzky, P.Eng. Hoa Nguyen, P.Eng. Stantec
File:	113929319-07	Date:	May 14, 2019

---

**Reference: NRDRWWSC – Tech Memo #18: Pump Operations**

This Tech Memo summarizes the concerns found with the Sulzer pumps on the NRDRWWSC Lacombe Lift Station since commissioning of the facility, the actions taken to date, and the recommended next steps.

**BACKGROUND**

On July 13, 2018 Stantec reviewed a reported concern with pump RSP-101 in the Lacombe Lift Station. The pump was not completing its pump cycle, causing the PLC to shut it down and use the lag pump to finish the pump cycle. Stantec then engaged Chandos (the Lift Station General Contractor) to perform troubleshooting onsite starting on July 15, 2018.

On August 10, 2018 Stantec, Chandos, Tait (Chandos' Electrical Subcontractor) and the NRDRWWSC Operators were onsite to review this issue. During the review of RSP-101, it was also noticed that pump RSP-103 was not performing as per design. After reviewing the pumping trends, it was discovered that, beginning August 6, 2018, the discharge flow from pump RSP-103 was slowly decreasing.

On the morning of August 7, RSP-103's discharge performance began to decline until the pump could no longer discharge enough flow to open the downstream check valve, which occurred early in the morning of August 9.

A second concern surfaced in February 2019 when one pump from each of Lacombe and Blackfalds stopped working due to a motor fault. This memo will also summarize the analysis and findings for this concern.

**INVESTIGATION AND ANALYSIS INTO THE CAUSE OF THE PUMP FAILURES AND EXCESSIVE VIBRATIONS:****Pump 103 Repair:**

On August 14, 2018 representatives of Chandos, 3-Phase (the VFD/MCC Supplier), TDH (the Pump Supplier), Schendel (the Mechanical Subcontractor) and Tait were onsite to fix pump RSP-101 by replacing the relay and tightening a few noted loose cables. Pump RSP-103 was removed from the pump base in order to inspect the impeller. It was discovered that the impeller had dropped, and the impeller bolt was missing (and had most likely loosened and pumped down the line). The continuous operation of the pump with a dropped impeller is also likely to have caused a noted crack in the impeller shaft. Pump RSP-103 was lifted to the main floor of the Lift Station for Sulzer to pick up and bring to Sulzer's facility in Edmonton for repairs.

Once RSP-103 was repaired in the factory, the pump was delivered to site. The pump was reinstalled on October 29, 2018 and brought back into service on November 7 with TDH onsite to review the installation and the pump startup.

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 2 of 16

**Reference: NRDRWWSC – Tech Memo #18: Pump Operations**

On November 3, it was discovered that pump RSP-101 was experiencing diminishing flows similar to what had been previously observed with RSP-103. NRDRWWSC operators then turned off the pump, removing it from service

### **Pump 101 Repair:**

TDH and Scona (TDH's electrical contractor) were onsite on November 7, 2018 and discovered that RSP-101's impeller fell, similar to what had previously occurred with RSP-103. In this instance though, the impeller bolt sheared off instead of loosening and falling out. Sulzer decided it was best to take the pump to their facility in Edmonton for full inspection and repair instead of just replacing the impeller and bolts on-site. At their facility, Sulzer would be able to provide a full inspection of the impeller shaft for defects. Sulzer concluded that it was best to completely rebuild Pump RSP-101, which included a replacement of the volute, wear plate, mechanical seals, bearings and all O-rings.

Prior to failure, the run times for the various Lacombe Lift Station pumps were:

- RSP-101 = 578 hours
- RSP-102 = 833 hours (note that RSP-102's run time continued to operate. The run time was recorded when RSP-103 was re-commissioned)
- RSP-103 = 390 hours

On November 23, 2018 Sulzer, TDH, Stantec and the NRDRWWSC Operators measured vibrations from Pump RSP-102 and RSP-103 in Lacombe and RSP-101 in Blackfalds. These results were compared to subsequent test results to identify the effectiveness of mitigation measures taken.

RSP-101 in Lacombe Lift Station was re-installed on January 16, 2019 and the bump test was completed on January 17, 2019 and the pump brought back into operation.

### **December 2018 Sulzer Report**

Sulzer submitted a report on December 13, 2018, identifying possible causes for the damage to the impellers to drop. These items included:

1. Dimensions of the pump bases: The dimensions of the pump bases were measured to be different from the IFC drawings, and those installed at the Blackfalds Lift Station.
2. Poor concrete finish on the pump bases: From the surface, it can be seen that there were cracks, holes and gaps on the concrete of the pump bases.
3. Excessive vibrations: The vibrations for Pump RSP-101 and RSP-102 were higher than the factory vibration testing, and higher than observed in the pumps at the Blackfalds Lift Station. Note that the factory vibration testing is done under controlled conditions in a factory environment. The pump is anchored and completely submerged, with the vibration test point at the top of the pump (motor). As such, we expect to see higher vibrations in the field, and in a dry mount condition such as the Lacombe and Blackfalds Lift Stations.
4. Suction pipe reducer and suction elbow: The suction reducer is installed adjacent to the pump, and in Sulzer's opinion, the pump elbow should be an extra-long radius elbow. Stantec has conducted a

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 3 of 16

**Reference: NRDRWWSC – Tech Memo #18: Pump Operations**

Computation Fluid Dynamics (CFD) model of the designed piping configuration and has concluded that the reducer and suction elbow configuration is appropriate for the design flows and is not likely the primary cause of the excessive vibrations.

Further discussion of the noted possible causes is included here.

### **Concrete Pump Bases and Concrete Finish**

During construction, Stantec documented that the forms for the concrete pump bases needed to be revised to meet the IFC design drawings. Unfortunately, this was not completed by the contractor on-site at the time.

Since the pump bases were installed smaller than noted in the Construction drawings, Clarification 016 was provided to Chandos to improve all the concrete bases onsite. This clarification was sent to Chandos on December 13, 2018. The requirements to modify the existing pump bases included dowelling into the existing concrete base and roughing up the concrete. During Stantec's review of the preparation and rebar inspection, it was confirmed that the cracks, holes and gaps were superficial. The concrete underneath did not pose a concern for the structure of the bases.

During the modifications of the pump bases, it was required that one pump always be operating with a second pump on standby. Sulzer recommended preserving Lacombe Lift Station's Pump RSP-102 as this was the only pump that had the original factory components to compare with the findings from RSP-101 and RSP-103. Stantec went onsite to reprogram the Lacombe Lift Station pumps to keep one pump as the 'Lead' pump, while the other pump RSP-102 was set as the 'Lag' pump.

Following the direction from Stantec, Chandos and their subcontractors increased the size of the concrete bases. The work on all the concrete pump base modifications at the Lacombe Lift Station were completed on February 25, 2019.

### **CFD Modeling**

As noted previously, Stantec's CFD modeling concluded that the designed piping configuration would not cause excessive vibrations due to the flow angle coming into the pumps. Moving the reducers further upstream would be a design optimization that could be completed which might slightly improve the flow dynamics for this station when one pump was running at full speed, however further investigation was recommended prior to completing this modification. The swirl angle with one pump running was found to be slightly above industry standard but still lower than what the manufacturer regards as "high swirl angles,". With two pumps running the velocities and resulting swirl angle were lower and well within industry standards. Due to this, it was found that there shouldn't be a concern that the reducer location would cause the pump vibrations that were witnessed at high speeds. Regardless, the programming of the Lacombe lift station was adjusted so that a single pump in operation will run at a lower speed, to a maximum of 50 Hz to limit the excessive vibrations seen at higher speeds. This change does not impact the design pumping capacity of the lift station as the programming will still allow two pumps to run full speed.

The CFD model analysis is attached for reference.

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 4 of 16

**Reference: NRDRWWSC – Tech Memo #18: Pump Operations**

### **January 28 Site Visit and Follow-Up**

On January 28, 2019, a pump vibration and cavitation inspection were conducted by representatives from Sulzer, TDH, Stantec and the NRDRWWSC Pumps RSP-102 and RSP-103 in the Lacombe LS were lifted to review the impellers and bolts. The bolts for these two pumps were removed, inspected and, as a precautionary measure, replaced with a new bolt and lock washer. There were no concerns with the bolts and lock washers on RSP-102 and 103. The bolts were replaced to ensure that no future issues with the impeller bolts are linked back to the old pump bases.

Similarly, the pump RSP-102 in the Blackfalds Lift Station was lifted and the bolt there was removed, inspected and replaced as well. Again, we saw no concerns with this bolt and lock washer. We decided to review the bolt and lock washer in Blackfalds as we want to verify a control test on a completely different facility. With the bolt removed, it was deemed more appropriate to replace the bolt and lock washer as we had it available.

From inspections, we noted no cavitation on any of the impellers in Blackfalds or Lacombe Lift Stations and Sulzer confirmed this finding on-site. Further, we noted no defects or damage with the impeller bolts that were removed.

Vibration testing was completed during this January 28, 2019 site visit by Sulzer and TDH through the operational ranges of 40-45-50-55-60Hz. While the vibrations were reduced with the new Lacombe Lift Station concrete pump bases between 40 and 50Hz, however the pumps did not perform as well under the 55-60Hz ranges as originally noted. It must be noted however that at this time, the improved base for RSP-103 had not been completed, and that measured vibrations decreased near the concrete bases for the other two pumps, suggesting that the enlarged concrete bases had a slight positive effect on the vibrations. Conversely, the Blackfalds Lift Station pumps continued to perform well under all the operational ranges.

### **March 2019 Sulzer Report**

Sulzer provided a power point format report on March 20, 2019, which indicated, in their opinion, the pumps were likely not the cause of the excessive vibration. Sulzer pointed to a couple items with the piping arrangement and supports at the station that could be improved to help lower the vibrations, and they are as follows:

- A direct suction pipe to the pump with no common header;
- Additional support of the inflow pipe on concrete stands
- A long radius elbow coming into the pumps (note that this elbow was supplied by Sulzer, was determined to be a medium radius elbow, and the CFD modeling did not indicate a problem with the elbow).
- Inflow cone under the suction bell end in the wet well

While the pipe arrangement could be optimized as identified by Sulzer, the design will not allow for single suction pipes to each pump as there are 3 duty pumps and 2 wet wells and this would limit the operational flexibility of the lift station. Furthermore, the CFD model completed by Stantec indicates that smaller optimization improvements along with the investigation of leveling the pumps (discussed below) may be the solution to lower the vibrations.

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 5 of 16

Reference: NRDRWWSC – Tech Memo #18: Pump Operations

### **April Stantec Site Inspections**

Don Munro was onsite on April 25 to review the pumps and piping alignment. During Don's inspection of the system, he noticed that the metal pump stands may not be completely level and the pipes may not align completely straight into the pump's elbow. We are working with the Contractor to confirm the metal pump stand and piping alignment to verify if it meets Sulzer's tolerances. Following confirmation of the tolerances by Sulzer, Chandos will provide a 3D scan of the pump bases and work with millwrights to confirm the exact pump stand alignment to verify if they meet the tolerances.

Subsequently, Dr. Fangbiao Lin and Liang Liu were onsite at the Lacombe LS on May 1 to review the hydraulics of the system. They noted that hydraulically we do not think that the pipe configuration would cause the vibration concerns witnessed in the Lacombe Lift Station. Observations on-site were that the vibrations on the suction piping were significantly less than the vibrations on the discharge piping. As the current pipe supports are one combined support for the two pipes, it was recommended to separate the single support and provide an independent support for the discharge pipe. In addition, it was recommended to install three additional pipe supports, one on the suction pipe and two on the discharge pipe to further stabilize the pipes.

### **Warning Signs for Possible Failures**

There are many indicators that can foreshadow a future failure of the pumps. This following table outlines some of these indicators, along with preemptive inspections and mitigation measures that can be taken.

<b>Failure Type</b>	<b>Possible Indicators</b>	<b>Recommended Repair / Troubleshooting</b>
Impeller Settling	<p>The pump will produce less flow the further the impeller drops from the pump.</p> <p>It is not recommended to continue to use the pump should the flow from one pump continuously decrease. Should the pump continue to run, the shaft might crack.</p>	<p>If the pump discharge flow is regressing, the impeller may be dropping. The impeller, bolt and lock nut can be replaced onsite.</p> <p>Depending on the length of time after impeller has dropped, the shaft may need to be replaced. The pump will need to be repaired at a designated Sulzer facility.</p>
Cavitation (not witnessed onsite as of yet)	<p>Should cavitation occur, loud knocking sounds can be heard from the pump, similar to what one might expect from large boulders being banged around in the pump. The sound should get progressively louder as cavitation gets worse.</p> <p>The pump may also vibrate violently.</p>	<p>Cavitation is caused by air bubbles collapsing on the impeller surface. Should cavitation occur, pitting can be seen on the impellers.</p> <p>Replacement of the impeller and wear plate may be required. Changes in operations may also be required, example, changing the pumping speed.</p>

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 6 of 16

**Reference:** NRDRWWSC – Tech Memo #18: Pump Operations

## **PUMP MOTOR FAILURE**

Blackfalds Lift Station pump RSP-101 produced an overcurrent fault on February 1. The Operators tried to reset the fault and start the pump, but the same fault reoccurred. 3-Phase Power Systems was onsite to review the VFD electrical data on February 8, 2019 and was able to pull the power data from the VFD. However, they were not able to pinpoint the cause of the overcurrent fault at this site visit.

Subsequently, Lacombe Lift Station had the same overcurrent issue on RSP-102 and the issue was noted to the Contractor on March 6, 2019. On March 12, 2019, 3-Phase Power Systems came out to confirm if the issues were similar in nature to the Blackfalds fault. Additionally, they attempted to run the pumps backwards in case something was lodged in the impeller, however the pump failed to rotate backwards and Schendel was engaged to lift the pump to verify if there was anything stuck in the impellers. It was that there was no clog in the pumps and the impellers moved freely.

TDH and Sulzer then wanted to verify the existing electrical conditions onsite prior to removing the pump from the station. Two sets of electrical tests were conducted, and it was determined that the pumps needed to be brought to a facility for further troubleshooting.

On April 15, 2019 the pumps from Lacombe and Blackfalds were removed from site and shipped to Edmonton to an approved repair facility for analysis. As the delivery company did not make it to the Continental Group's facility in Edmonton prior to 4pm, they decided to store the pumps in their facility. While the delivery company tried to remove the pumps off the truck bed, one pump fell on the other and both pumps fell off the truck. We're still awaiting the incident report from the delivery company; however it was determined that extensive repairs were required to both pumps including the cooling jacket, lifting lug, volute, wear plate and bearings.

At this point in time, it had been unofficially determined that the overcurrent fault issue caused by a motor failure. The windings of the pumps were burnt and had a ~25mm hole in them, which it believed to be from voltage spikes. The investigation and analysis are currently ongoing, with Continental Group and Stantec performing a site visit on May 14 to review the condition of the other pumps. We will provide updated information when known.

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 7 of 16

**Reference:** NRDRWWSC – Tech Memo #18: Pump Operations

## **Recommended Next Steps**

There are two options to move forward with the two pumps that had a motor failure and fell off the truck:

1. Repair Two Original Pumps – At this time it is unknown if the motor failure is covered under warranty, however Stantec is working with TDH, Sulzer, Continental and 3-Phase Power Systems to verify the cause and confirm that the costs would be covered under warranty.
  - The order of magnitude cost for the repairs due to motor failure and truck incident are \$90,000 for Blackfalds and \$100,000 for Lacombe.
  - The timeline to repair the pumps would be 6-8 weeks from the approval to proceed.
  - Once repaired, the warranty on these pumps would be 1-year full parts and labour from Continental Group.
2. Order Two New Pumps - The other alternative is to order two new pumps with the total costs being offset by the pending warranty repair of the pumps.
  - The order of magnitude cost to purchase and install new pumps is as follows:
    - i. Blackfalds = \$150,000 less the \$90,000 for repair = \$60,000
    - ii. Lacombe = \$140,000 less the \$100,000 for repair = \$40,000

\*\*These costs include \$6,000 for a value-add built-in vibration monitor

\*\* These costs DO NOT include installation, which is approximated at \$10,000
  - Therefore, the total cost to the Commission to purchase two new pumps, provided the warranty claim is approved, would be in the order of \$110,000.
  - The timeline to order and install the new pumps would be 6-8 months from the approval to proceed.
  - The new pumps would come with Sulzer's standard prorated 5 year warranty. There is an option for the Commission to purchase a full 5 year parts and labour warranty at an additional cost.

## **Back-up Plan for Lacombe Duty Pumps**

With the Lacombe pump potentially being out of service for 2-8 months, it is a concern if another pump in Lacombe were to fail leaving only one duty pump in the lift station. To prepare for such a scenario, we have investigated the opportunity of using a pump from the Blackfalds LS and mount it onto the metal pump stand in Lacombe and this has been confirmed to be a valid option in an emergency situation.

A second option is that TDH / Sulzer has 8" pumps that can be installed in Lacombe with some piping modifications. This is a fall back plan and we don't anticipate needing this option.

Reference: NRDRWWSC – Tech Memo #18: Pump Operations

## RECOMMENDATIONS ON PATH FORWARD

### 1. Pump Operations and Speeds Settings

The control narrative developed for the Blackfalds and Lacombe Lift Stations had the pumps start running at full speed (60 Hz) and then gradually slow down to the normal operating speed set at 65% (39 Hz) and 68% (41 Hz) respectively for Blackfalds and Lacombe. Through the investigation and analysis of the impellers and vibration, significantly less vibrations occurred at 83% (50 Hz) than at 100% (60 Hz). Additionally there was slightly less vibrations running at 80% (48 Hz) when compared to less than 45 Hz. Therefore the pump programming was modified to run at a maximum speed of 80% (48 Hz) then turned down to 67% (40 Hz) through the pump cycle in both Blackfalds and at a constant 80% (48 Hz) in Lacombe.

The pumps are currently operating as follows. Blackfalds pumps are set as per the control narrative, and it is recommended for these settings to remain in Lacombe until further investigation is carried out.

1. Blackfalds LS Pumps – Initial start at 80% (48 Hz) then lowered to 67% (40 Hz) through the pump cycle.
2. Lacombe LS Pumps – A constant running speed of 80% (48 Hz) with one pump running, and 100% (60 Hz) with two pumps running.

**Note: It is currently not recommended to run one pump in Lacombe higher than 83% (50 Hz). If required, a second pump would kick on and with two pumps running, there is no expected issue with running both pumps at 100% (60 Hz) as the velocities in both lines won't be high enough to cause vibrations significantly beyond those observed in factory testing.**

### 2. Additional Vibration Monitoring / Inspections at Lacombe LS

It is recommended to preform periodic vibration monitoring of the pumps at the Lacombe LS to verify if the vibration is worsening over time. The following vibration and inspection schedule is recommended to be performed by the Commission Operators, with Stantec to support as required:

Date	Activity	
	Vibration monitoring of all 3 duty pumps at the 12 points completed by Sulzer	Pull all 3 duty pumps and check the impeller, impeller bolt and re-torque as needed
July 2019	✓	✓
November 2019	✓	
February 2020 (FAC is July 31, 2020)	✓	✓
January 2021 - 2025	Every year for 5 years	

**Reference: NRDRWWSC – Tech Memo #18: Pump Operations**

Should the vibrations increase through the duration of these tests, a further investigation may be required. Sulzer’s permanent real-time vibration sensor can be installed on the pumps, but Sulzer recommended that the cost benefit of this option would not be practical, as the sensor would only monitor the vibration on top of the pump, not at various points on the pump assembly and base.

There are multiple hand-held vibration testing kits available. TDH recommended a handheld vibration meter with capital cost of approximately \$3,500, could be sourced locally and left at the stations for the end user to monitor vibrations. A more sensitive vibration sensor could be acquired, but for the purpose intended, we do not recommend proceeding with the more expensive equipment. The handheld vibration meter was purchased and awaiting delivery to site.

Other options, if desired in the future, are as follows:

- Install Sulzer’s stock vibration sensors – This would include removing the pump and shipping it to the factory to remove the assembly, install the sensor, reassemble the pump and ship it back to site for installation. Approximate cost is \$20,000 per pump.
- Install continuous externally mounted vibration monitoring and connect the trends to SCADA - This would allow pump shut down at extreme vibrations and monitoring of trends over time. TDH is currently scoping out options for remote monitoring of the pumps but indicated that depending on the option of simple or complete monitoring, it could range from \$3,500-\$20,000 for all 3 pumps.

**3. Spare Parts for Lacombe LS**

Currently there are spare parts onsite for a seal repair / rebuild, however no spare impeller or wear plate, both of which were replaced when the bolt let go and the impeller dropped. Due to this, it is recommended to procure at least one, preferably two hydraulic repair kits which consist of an impeller, wear plate and new bolt. If additional impellers and wear plates are required in the future, they are approximately 6-10 weeks for delivery. Should the shaft break or inspection of the shaft be warranted due to vibrations or lower flows, the pump will need to be brought to Sulzer’s facility for further investigation.

We also confirmed with Sulzer that the Impellers are the same for both Lacombe and Blackfalds with the exception of the trim. Therefore, the impellers could be used at the Blackfalds LS in an emergency but would produce slightly less flow (~10-20%) than the current Blackfalds impellers. The wear plates and bolts are the same at both Lacombe and Blackfalds and can be used interchangeably.

<b>Blackfalds LS</b>	<b>Lacombe LS</b>
<u>Currently Provided Spare Parts</u>	<u>Currently Provided Spare Parts</u>
One (1) repair kit for the submersible pump;	One (1) repair kit for the submersible pump;
One (1) repair kit for the sump pump;	One (1) repair kit for the emergency pump;
	One (1) repair kit for the sump pump;
<b><u>Recommended Additional Spare Parts</u></b>	<b><u>Recommended Additional Spare Parts</u></b>
The impeller for Lacombe is slightly smaller than Blackfalds. It is recommended to use the Lacombe hydraulic repair kit if needed.	<b>One (1) hydraulic repair kit for the submersible pumps - \$12,000</b>

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 10 of 16

**Reference: NRDRWWSC – Tech Memo #18: Pump Operations**

The existing repair kits are comprised of:

- All o-rings for the pump
- All mechanical seals
- All bearings
- Other hardware that needs to be replaced when taking apart the pump, including some screws and washers.

The new hydraulic repair kit is comprised of:

- Impeller
- Wear plate
- Impeller bolt with locking hardware

#### **4. Extended Pump Warranty**

We have formally requested that an extended warranty be provided by Sulzer for the pumps at both the Blackfalds and Lacombe lift stations.

TDH indicated that for them to approach the Sulzer factory with a request of a warranty extension, the vibration needs to be reduced. With the current vibration, the factory would currently reject the request.

Once the vibrations are lowered, there are three (3) possibilities that would occur:

1. Rejection of warranty extension;
2. Approval of extended warranty with no costs associated; or,
3. Approval of extended warranty with costs associated.

With this, there is currently no guarantee that an extended warranty will be provided by Sulzer.

The costs for a full 5-year full municipal warranty, based on information provided during the pump selection process, would cost roughly \$21,500 per unit, or \$64,500 for the 3 pumps in Lacombe.

Attached is the full 2-year with a 5-year pro-rated warranty provided with the Sulzer pumps. The start-up date for Lacombe was completed on February 23, 2018.

#### **Pipe Optimization at Lacombe LS**

Sulzer has recommended possible pipe and pipe support modifications to possibly further reduce the pump vibrations. These optimization improvements could provide incremental improvements to the observed vibrations, and we have reviewed various options noted above, and from the site visit by our senior process engineer Liang Liu, and our senior hydraulic modeler Dr. Fangbiao Lin, it was observed that the discharge pipe in Lacombe vibrates a lot more than the suction pipe, and together with the Sulzer recommendation for additional pipe supports, it was determined to proceed with the following enhancements:

- Remove the common pipe support on the suction and discharge pipes and have it be an independent support on the discharge pipe.
- Add an additional three metal pipe supports, one on the suction pipe and two on the discharge pipe.

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 11 of 16

**Reference: NRDRWWSC – Tech Memo #18: Pump Operations**

We have requested pricing from the Contractor to complete these modifications and although we have not received a formal quote yet, the order of magnitude cost for the enhancements is \$20,000 for the three duty pumps.

We would suggest that the other piping improvements noted in the March 19 Sulzer report only be undertaken following additional vibration measurements.

## **6. Pump Motor Failure - Repair versus New Pumps**

There are two options to move forward with the two pumps that had a motor failure and fell off the truck:

### 1. Repair Two Original Pumps

- The order of magnitude cost for the repairs due to motor failure and truck incident are \$90,000 for Blackfalds and \$100,000 for Lacombe.
- The timeline to repair the pumps would be 6-8 weeks from the approval to proceed.
- Once repaired, the warranty on these pumps would be 1-year full parts and labour from Continental Group.

### 2. Order Two New Pumps

- The order of magnitude cost to purchase and install new pumps is as follows:
  - i. Blackfalds = \$150,000 less the \$90,000 for repair = \$60,000 + \$5,000 for install
  - ii. Lacombe = \$140,000 less the \$100,000 for repair = \$40,000 + \$5,000 for install
- The timeline to order and install the new pumps would be 6-8 months from the approval to proceed.
- The new pumps would come with Sulzer's standard prorated 5 year warranty. There is an option for the Commission to purchase a full 5 year parts and labour warranty at an additional cost.

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 12 of 16

**Reference:** NRDRWWSC – Tech Memo #18: Pump Operations

## CONCLUSIONS

### Blackfalds Lift Station

With the site review for vibrations and inspection of the impellers, there were no concerns with the pump vibrations at the Blackfalds Lift Station. There was no excessive vibration though the pump ranges and no cavitation witnessed on the impellers or suction elbows.

### Lacombe Lift Station

The Lacombe Lift Station pumps were still found to have higher than anticipated vibrations even after the concrete pump bases were poured, though no vibration measurements have been collected since the new base for RSP-103 was completed. Though we are confident that the design of the suction piping configuration is appropriate for the design flows and the installed pumps, enhancements to the pipe supports are recommended to stabilize the pipes and in turn possibly lessen the pump vibrations. It is recommended to continue monitoring the vibrations of the pumps as well as check the impellers periodically for any excessive wear or cavitation prior to FAC prior to proceeding with any such optimizations, as such, no cavitation has been observed on the impellers and suction pipe elbow.

### Pump Motor Failure

We will continue to work with Chandos and TDH to draw conclusions on the motor failures and we will provide updates as more information is known.

We trust that this memo outlines the history of the Lacombe Lift Station pumps and provides recommended next steps to ensure that the NRDRWWSC has confidence in the pumps to provide reliable operation for many years into the future.

Sincerely,

**Stantec Consulting Ltd.**

**Joel Sawatzky**, P.Eng.  
Project Manager  
Phone: 403-341-3320  
Joel.sawatzky@stantec.com

**Hoa Nguyen** P.Eng.  
Resident Engineer  
Phone: 403 356 3282  
Hoa.Nguyen@stantec.com

Attachments: Sulzer December 2018 Repot  
Stantec CFD Model Results  
TDH Spare Parts Quote  
Sulzer Pump Warranty

c. Todd Simenson, Liang Liu – Stantec

Design with community in mind

nh\d\cd1044-f06\work\_group\1139\active\113929319\07\_reports\_studies\tech memo's\18\_techmemo#18-pump\_operations\mem\_nrdnwwsc\_techmemo#18\_pump\_operations\_rev3.docx

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 13 of 16

**Reference:** NRDRWWSC – Tech Memo #18: Pump Operations

Sulzer Report – December 2018

DRAFT

December 13, 2018

**Sulzer Pumps**  
Sulzer Germany  
Pützchens Chaussee 202  
53229 Bonn  
Germany  
Phone +49 228 608791-0  
[www.sulzer.com](http://www.sulzer.com)

*Unit* Water Business Unit  
*Handled by* -/  
*Phone direct* +49228 608703-405  
*E-mail direct* [oliver.guiglieminetti@sulzer.com](mailto:oliver.guiglieminetti@sulzer.com)  
*Date* 14 December 2018

Attention: Joel Sawatzky, Stantec Consulting Ltd.  
Liang Liu, Stantec Consulting Ltd.

**Reference: Lacombe Pumping Station and Blackfalds Pumping Station**

Dear Joel and Dear Liang,

With response to the problems in Lacombe Pumping Station and Blackfalds Pumping Station (XFP 306M-CB2 PE2800/4.60 and XFP306M-CB2 PE3350/4), Sulzer has reviewed the design and installation of the submersible pump dry pit configuration.

**Phenomenon in Lacombe Pumping Station:**

Pump #101, 102 and 103: When pumps run, a sound like “kicking” noise can be heard.

Pump #103: Impeller fell off in August after running for 390 hours. Pump was inspected and repaired by Sulzer Service Center in Edmonton. Pump was returned to service in September.

Pump #101: Impeller fell off in November after running for 578 hours. Pump was sent to Sulzer Service Center in Edmonton. Pump will be repaired and returned in next 1-2 weeks.

## Investigation at site

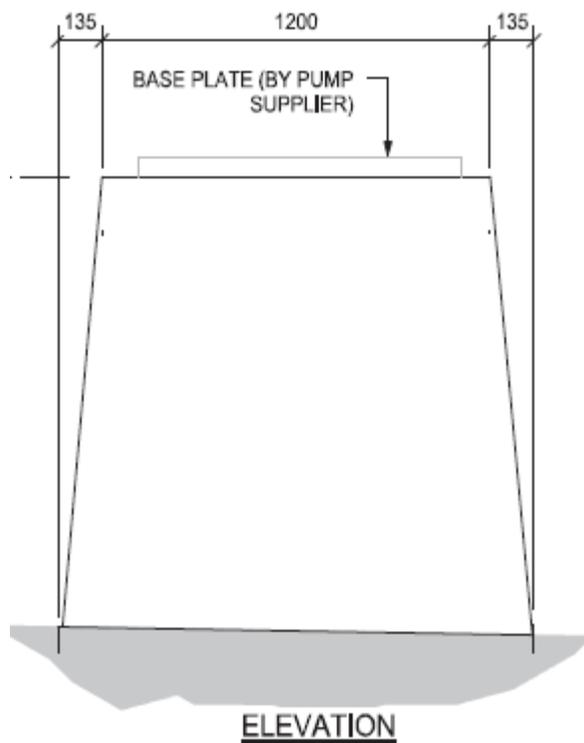
During a site visit on November 23, Sulzer reviewed the layout of the station, measured the dimensions of the bases, and measured the vibration using a Wilcoxon PVM 100 portable vibration meter.

Below are what we found:

- 1. Dimension of bases:** We found the bases were not built as per Stantec drawing.

Stantec drawing:

- 58" length at the base vs Actual on site is 42"
- 48" top across length vs Actual on site is 42"



Drawing from Stantec



Actual base

**2. Poor finished Concrete bases:** The bases show many cracks and holes.

Below are pictures taken from the site:



The concrete pouring is visible in Lacombe vs in Blackfalds. Below are pictures taken from different stations during construction stage.



## Lacombe PS

The fixing of the steel bars of the plinth appears to be not sufficient to become “one unit” with the concrete floor. This is paramount so that any kind of created forces and torques can be absorbed by the building and hence Pump vibration gets then reduced.

We recommend to fix/glue the plinth using chemical dowels of the type: M24 rods and HILTI HIT RE. Per each plinth 8x should be used and drilled inclined into the plinth.



## Blackfalds PS

- 3. Excessive Vibration:** All pumps are tested at the factory, conformity with ISO10816-7 standard. However, both #102 and #103 pump site vibration measurements have exceeded the factory data.

Below is the one of the vibration Test Certificates from the factory. AT 1120m<sup>3</sup>/h, Velocity RMS value is 3.45mm/s.



## Vibration Test Certificate

**Sulzer Pumps**  
 Sulzer Pump Solutions (Kunshan)  
 Co., Ltd  
 No.8 Chenfeng Road West,  
 Kunshan, Jiangsu Province,  
 China  
 Phone +86(512) 3660 6388  
 Fax +86(512) 3660 6307  
 www.sulzer.com

P/N 80500104-CNM

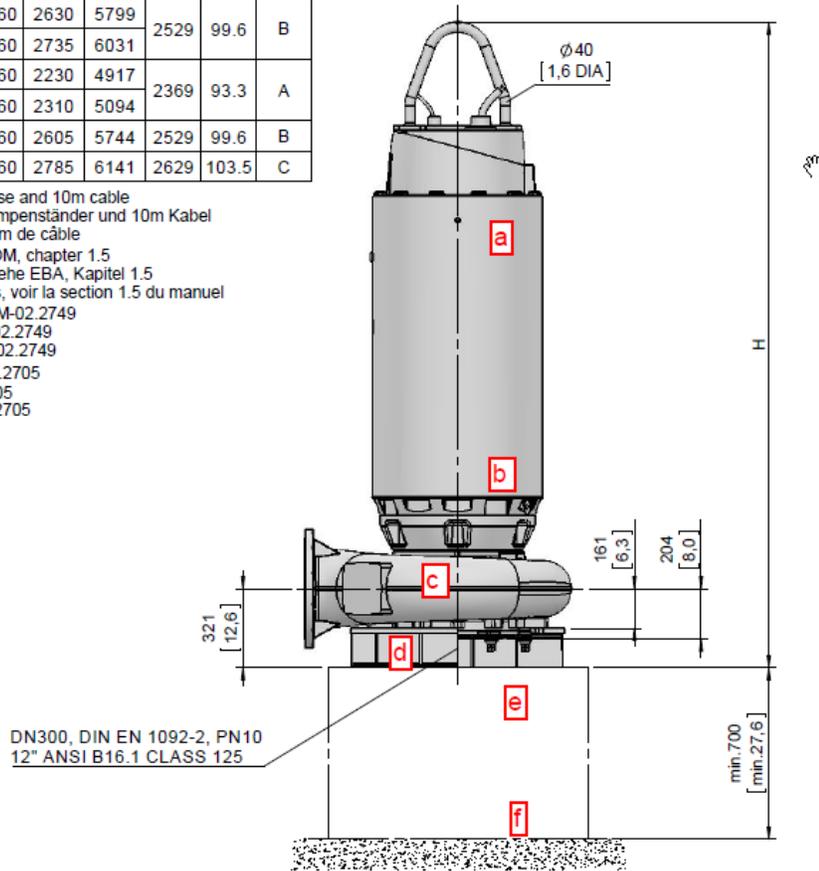
Product Type:	XFP306M-CB2-PE2800/4-FM																																					
Item Number	AXL9AT31CRL3417																																					
Customer Order Number	4501194906																																					
Customer Reference	S01303																																					
Serial Number	300063231																																					
SPKAN Order Number	388904/20																																					
<table border="1"> <thead> <tr> <th colspan="3">Vibration Test Record:</th> </tr> <tr> <th>No.</th> <th>Flow (m<sup>3</sup>/h)</th> <th>Velocity RMS (mm/s)</th> </tr> </thead> <tbody> <tr><td>1</td><td>267.08</td><td>10.51</td></tr> <tr><td>2</td><td>444.02</td><td>8.98</td></tr> <tr><td>3</td><td>632.02</td><td>7.11</td></tr> <tr><td>4</td><td>806.40</td><td>6.42</td></tr> <tr><td>5</td><td>951.34</td><td>5.15</td></tr> <tr><td>6</td><td>1120.18</td><td>3.45</td></tr> <tr><td>7</td><td>1303.13</td><td>3.36</td></tr> <tr><td>8</td><td>1462.03</td><td>3.08</td></tr> <tr><td>9</td><td>1660.79</td><td>2.74</td></tr> <tr><td>10</td><td>1813.75</td><td>2.8</td></tr> </tbody> </table>			Vibration Test Record:			No.	Flow (m <sup>3</sup> /h)	Velocity RMS (mm/s)	1	267.08	10.51	2	444.02	8.98	3	632.02	7.11	4	806.40	6.42	5	951.34	5.15	6	1120.18	3.45	7	1303.13	3.36	8	1462.03	3.08	9	1660.79	2.74	10	1813.75	2.8
Vibration Test Record:																																						
No.	Flow (m <sup>3</sup> /h)	Velocity RMS (mm/s)																																				
1	267.08	10.51																																				
2	444.02	8.98																																				
3	632.02	7.11																																				
4	806.40	6.42																																				
5	951.34	5.15																																				
6	1120.18	3.45																																				
7	1303.13	3.36																																				
8	1462.03	3.08																																				
9	1660.79	2.74																																				
10	1813.75	2.8																																				
<table border="1"> <thead> <tr> <th colspan="2">Vibration Curve:</th> </tr> </thead> <tbody> <tr> <td colspan="2"> </td> </tr> </tbody> </table>			Vibration Curve:																																			
Vibration Curve:																																						
Duty point: Flow 684 m <sup>3</sup> /h, Head 72 m Conformity with ISO 10816-7 Annex A B/C																																						

When we measure the vibration at site, the position of the sensor has been at various positions.

- A = Top of Motor
- B = Bottom of Motor
- C = Volute
- D = Sulzer Stand
- E = Top of Concrete
- F = Bottom of Concrete

PE 1850/4-M-60	2290	5049	2309	93.3	A
PE 2200/4-M-60	2630	5799	2529	99.6	B
PE 2800/4-M-60	2735	6031			
PE 1250/6-M-60	2230	4917	2369	93.3	A
PE 1500/6-M-60	2310	5094			
PE 1850/6-M-60	2605	5744	2529	99.6	B
PE 2200/6-M-60	2785	6141	2629	103.5	C

is pump, skirt base and 10m cable  
 altet Pumpe, Pumpenständer und 10m Kabel  
 coulisseau et 10m de câble  
 ble length see IOM, chapter 1.5  
 de Kabellänge siehe EBA, Kapitel 1.5  
 eurs supérieures, voir la section 1.5 du manuel  
 ails acc. to drw. M-02.2749  
 ls nach Blatt M-02.2749  
 les cf. dessin M-02.2749  
 cc. to drw. M-02.2705  
 h Plan M-02.2705  
 n schéma M-02.2705



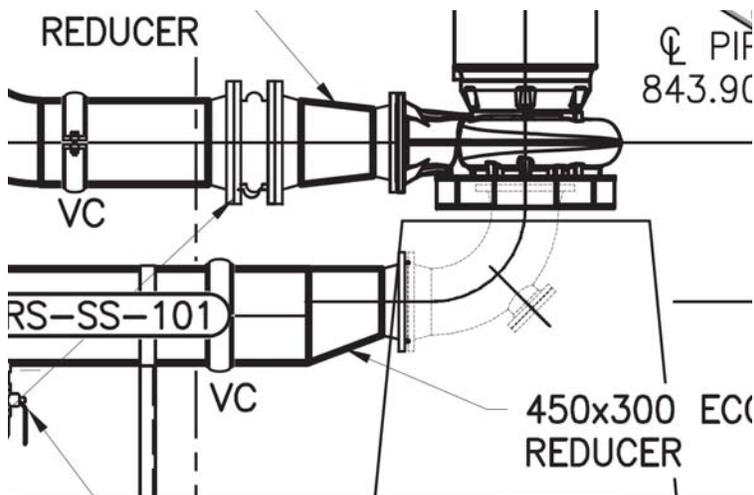
Actual measurement on pump #103, at 1152m<sup>3</sup>/h, the Velocity RMS value is 10.668mm/s (point A), 4.826mm/s (point B) and 12.7mm/s (point C).

Lacombe Data Collection				
60Hz - Pump 103 - 320 l/s @ 544 KPA				
Point on Unit	G	IPS	MM/S	Mil
A	1.19	0.42	10.668	6.8
B	1.4	0.19	4.826	2.1
C	3	0.5	12.7	6.2
D	1.8	0.34	8.636	4.8
E	0.55	0.36	9.144	5
F	0.23	0.04	1.016	0.9

Actual measurement on pump #102, at 1116m<sup>3</sup>/h, the Velocity RMS value is 7.112mm/s (point A), 4.318mm/s (point B) and 4.826mm/s (point C).

Lacombe Data Collection				
60Hz - Pump 102 - 310 L/s -@ 530 KPA				
Point on Unit	G	IPS	MM/S	Mil
A	1.5	0.28	7.112	3
B	1.99	0.17	4.318	2
C	3.05	0.19	4.826	1.9
D	1.55	0.15	3.81	2.5
E	0.52	0.32	8.128	3.4
F	0.26	0.07	1.778	0.4

- 4. Suction pipe reducer and suction elbow:** The suction pipe reducer (450 x 300mm) right before the 90 degree suction elbow (300 x 300mm) leads to a high flow speed and flow separation creating non-uniform inflow into the impeller.

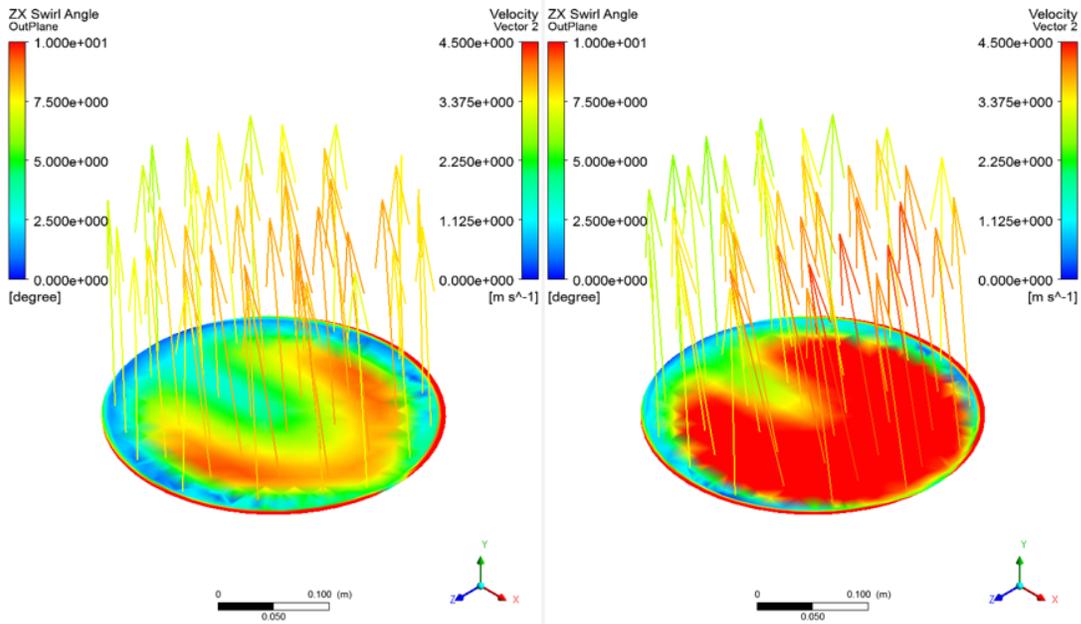


As a CFD study in another similar installation, a short radial elbow can create uneven flow (in RED).

### CFD Swirl Angle and Velocity

■ Left : max 10° (red | swirl angle)

Right: max 10° (red)



Left: Long Radius

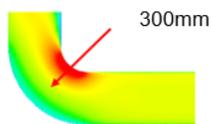
Right: Short Radius

CFD analysis: Inlet pipe DN300 11/13/2018| slide 29

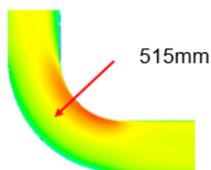
Velocity and Angle at suction flange of the pump | at impeller

Left: Long Radius Elbow

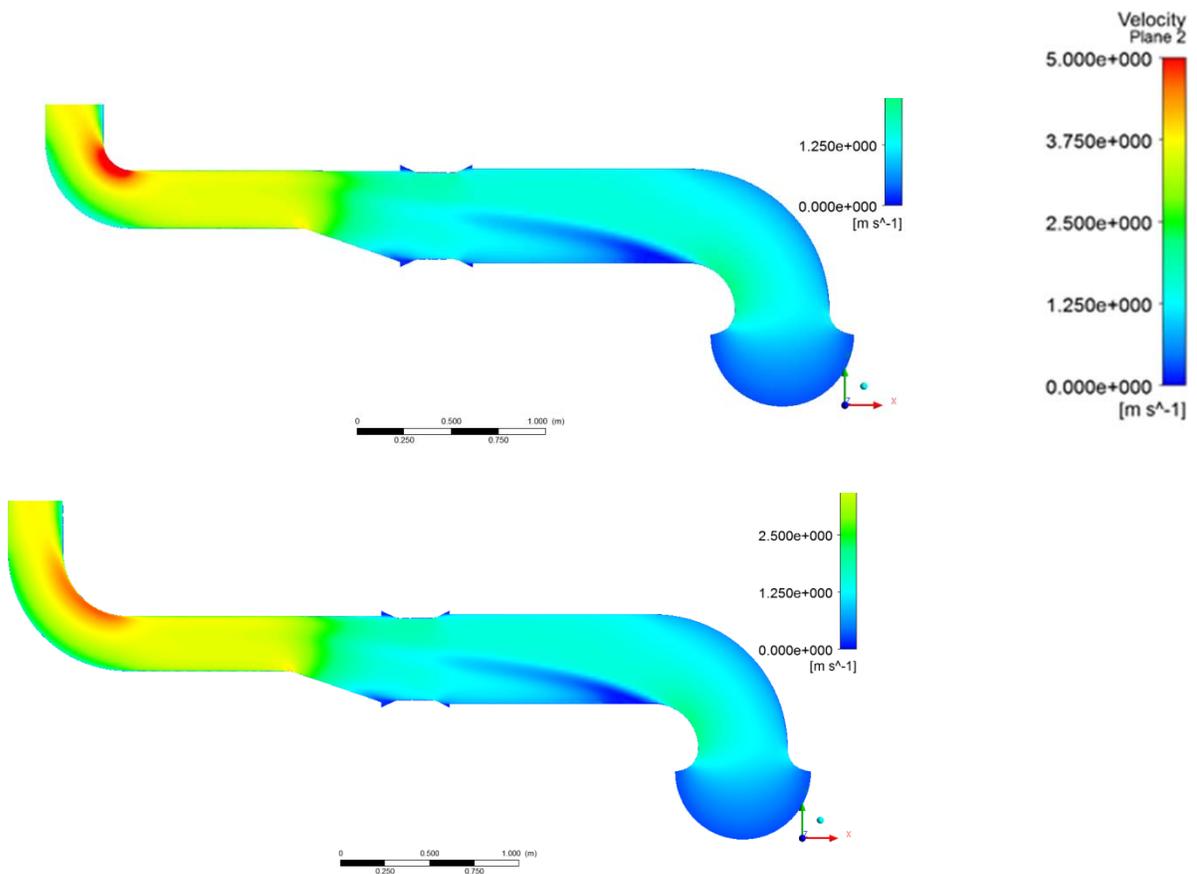
Right: Short one



Short Radius



Long Radius



## Recommendations:

1. The most suitable and logical way to proceed in ensuring a mitigation of the reported vibration is to ensure a strong fixing of the individual components such as volute, steel frame and plinth.

The concrete plinth has been identified as the first point of investigation. It is visible that the plinth is vibrating as it appears to have a loose connection to the floor. A rigid mechanical connection of the pump to the floor ensures that the forces and torques can be led via the steel-frame, via the plinth finally to floor and system vibration is mitigated.

2. All bolts between the steel frame and the the plinth and all bolts between the steel frame and the pump´s volute needs to be checked for their recommended torque setting.
3. The torque setting of the impellers should be double checked due to the recent reported vibration.
4. An inspection on pump impeller and volute on pump #102 to identify the cavitation.

5. Solution A: A suction pipe reducer (450 x 400mm) plus a 90 degree suction elbow (400 x 300mm) is recommended to eliminate potential vibration and recirculation cavitation.

This for part load recirculation vortices at lower flow (very left of BEP). Also, to avoid too high swirl angle ( $> 8^\circ$  at 80% at suction plane) and an uneven velocity distribution ( $> \pm 10\%$  of  $v_{\text{mean}}$  at 80% at suction plane) at higher flows  $> 4 \dots 5$  m/s.

Or

6. Solution B: Move the existing reducer (450 x 300mm) away from the suction elbow (keep minimum 3 times of the pipe diameter from the suction elbow) to minimize the influence created by high flow speed and flow separation. Solution B will require less site modification. However, Solution A will improve the performance more significant than Solution B.

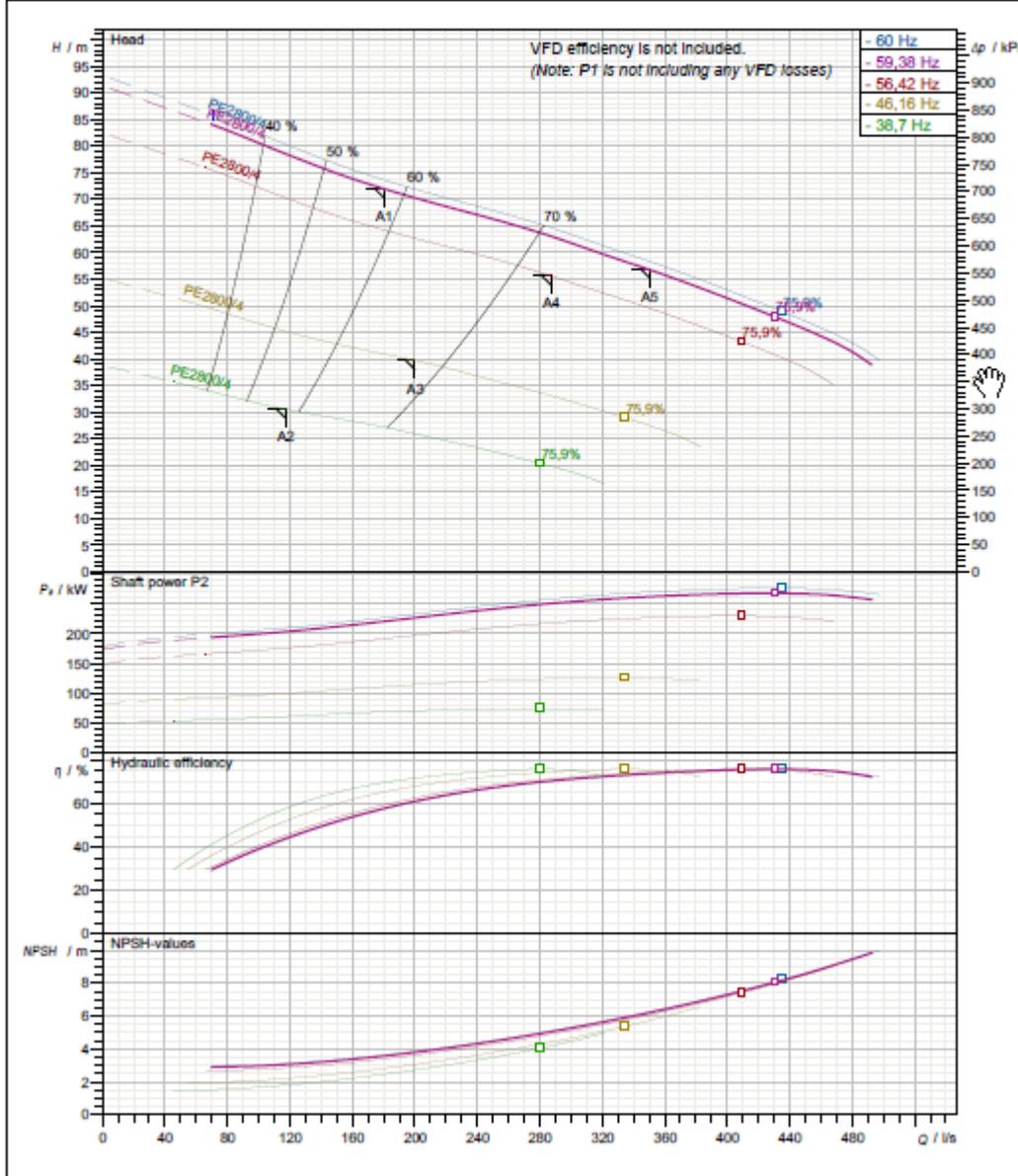
7. Below is the current operating duty points:

Pump 101	Flow (L/sec)	Pressure (kPa)
40 Hz	117	300
50 Hz	200	450
60 Hz	287	544

Pump 102	Flow (L/sec)	Pressure (kPa)
40 Hz	115	300
50 Hz	200	450
60 Hz	300	548

If possible, adjust the minimum speed from 39HZ to 48HZ to allow the pump to run at A3 which is closer to BEP (Best Efficiency Point). The sound that is heard are part load recirculation vortices that extend into the suction pipe and create a "kicking" noise at the volute, which sounds similar to cavitation and is part of reasons for vibration.

Curve number		<b>Pump performance curves</b>			<b>XFP 306M-CB2 60 HZ</b>		<b>SULZER</b>		
Reference curve XFP 306M-CB2 60 HZ									
				Discharge DN300	Frequency 60 Hz				
Density 998,3 kg/m <sup>3</sup>	Viscosity 1,005 mm <sup>2</sup> /s	Testnorm ISO 9906: 2012, HI 11.6/14.6 Gr 2B		Rated speed 1774 1/min		Date 2018-11-07			
Flow 180 l/s	Head 72 m	Rated power 221 kW	Power input 230 kW	Hydraulic efficiency 57,8 %		NPSH 3,57 m			



Impeller size 437 mm	N <sup>o</sup> of vanes 2	Impeller Contrablock Plus impeller	Solid size 105 x 120 mm	Revision
-------------------------	------------------------------	---------------------------------------	----------------------------	----------

Sulzer reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software. Spaix® 4, Version 4.3.9 - 2018/05/22 (Build 407)  
Data version June 2018

## Phenomenon in Blackfalds Pumping Station:

Pump #101, 102, 103 and 104: Because of the same layout as Lacombe PS, the potential vibration and cavitation exist. Also because of the proper concrete work, we did not observe the excessive vibration as in Lacombe. However, a “kicking” noise at volute can be heard.

Recommendations:

1. The torque setting of the impellers should be double checked due to the recent reported vibration at Lacombe.
2. An inspection on pump impeller and volute on ALL pump to identify the cavitation.
3. Solution A: A suction pipe reducer (450 x 400mm) plus a 90 degree suction elbow (400 x 300mm) is recommended to eliminate potential vibration and recirculation cavitation.

Or

4. Solution B: Move the existing reducer (450 x 300mm) away from the suction elbow (keep minimum 3 times of the pipe diameter from the suction elbow) to minimize the influence created by high flow speed and flow separation. Solution B will require less site modification. However, Solution A will improve the performance more significant than Solution B.

I trust the above proposal is satisfactory and actions will be taken to proceed immediately.

Yours sincerely

Oliver Guglielminetti  
SULZER Pumps Wastewater Germany GmbH

Sulzer Pump Solutions Germany GmbH  
Schneidmöhler Str. 30-36  
D-53797 Lohmar  
Tel. Int. +49.2246.900-0  
Fax +49.2246.900-200  
www.sulzer.com

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

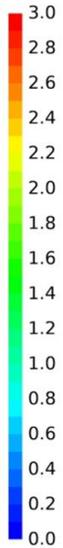
Page 14 of 16

**Reference:** NRDRWWSC – Tech Memo #18: Pump Operations

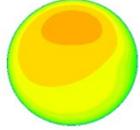
Stantec CFD Model Results

DRAFT

Velocity (m/s)  
(For Sections 1 and 2)



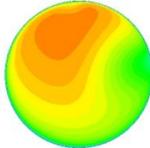
Section 4  
Swirl Angle: 1.51°  
Vmax/Vavg = 1.07  
Vmin/Vavg = 0.94



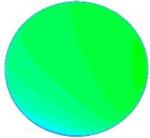
Section 3



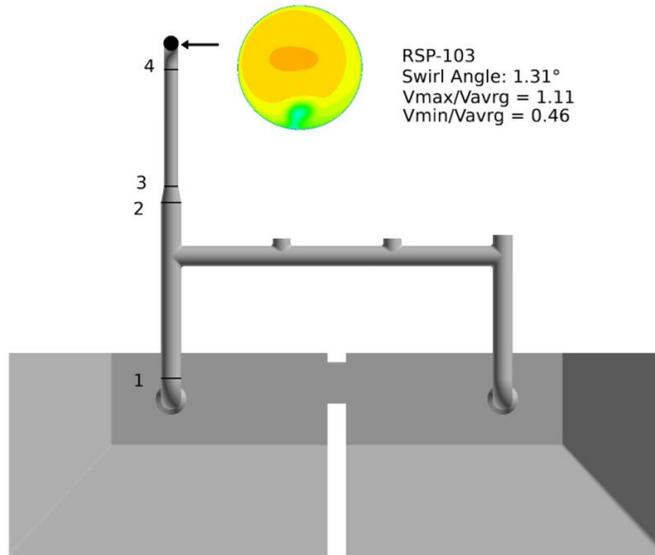
Section 2



Section 1



Velocity (m/s)  
(For Sections 3, 4 and RSP-103 Entrance)



Velocity Contours at Key Sections

Case No. Mod 1  
RSP-103 Flow: 320 l/s  
Reducers Moved Upstream

NRDRWSC Lacombe Regional Lift Station

# CFD Modeling of Suction Piping

Dr. Fangbiao Lin, 1/28/2019

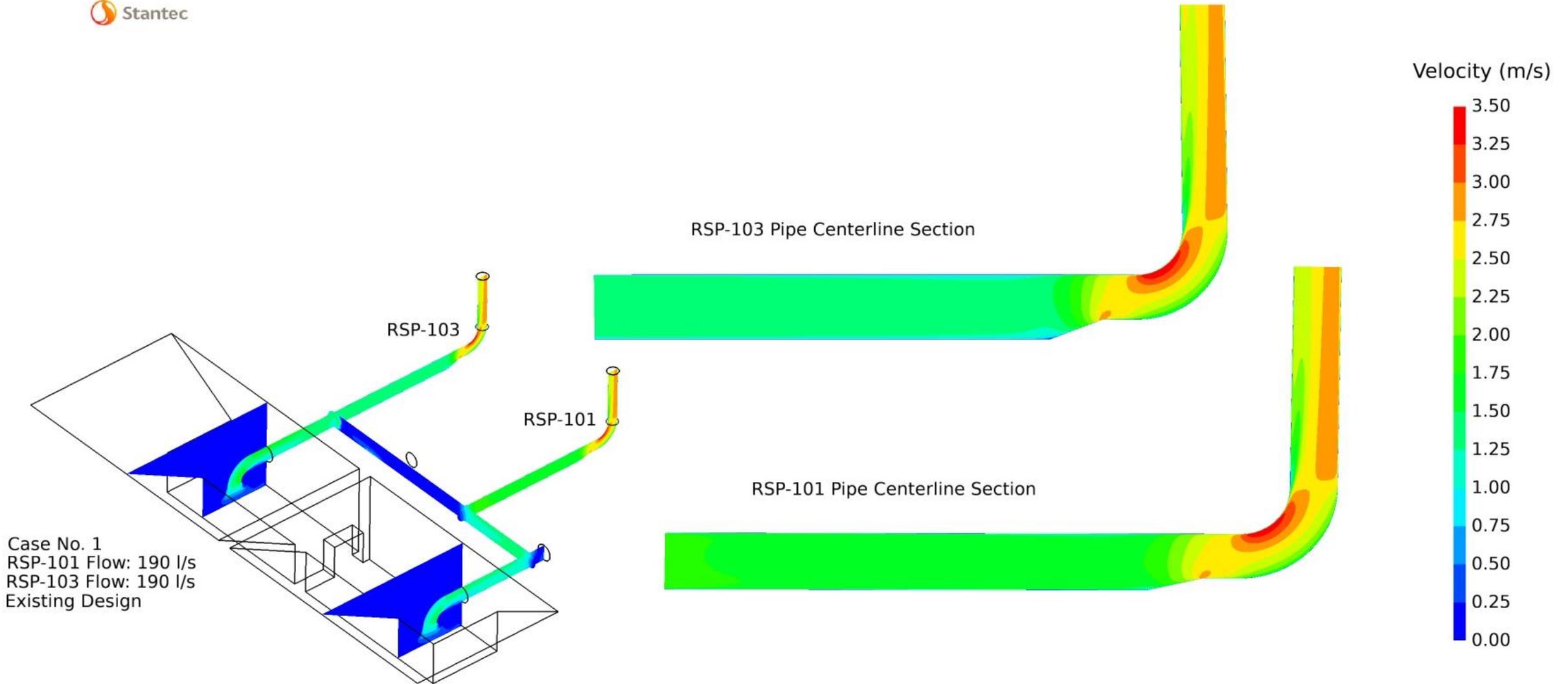
# Outline

- Study Objectives
- Results
- Conclusions
- Recommendations / Next Steps

# Objectives

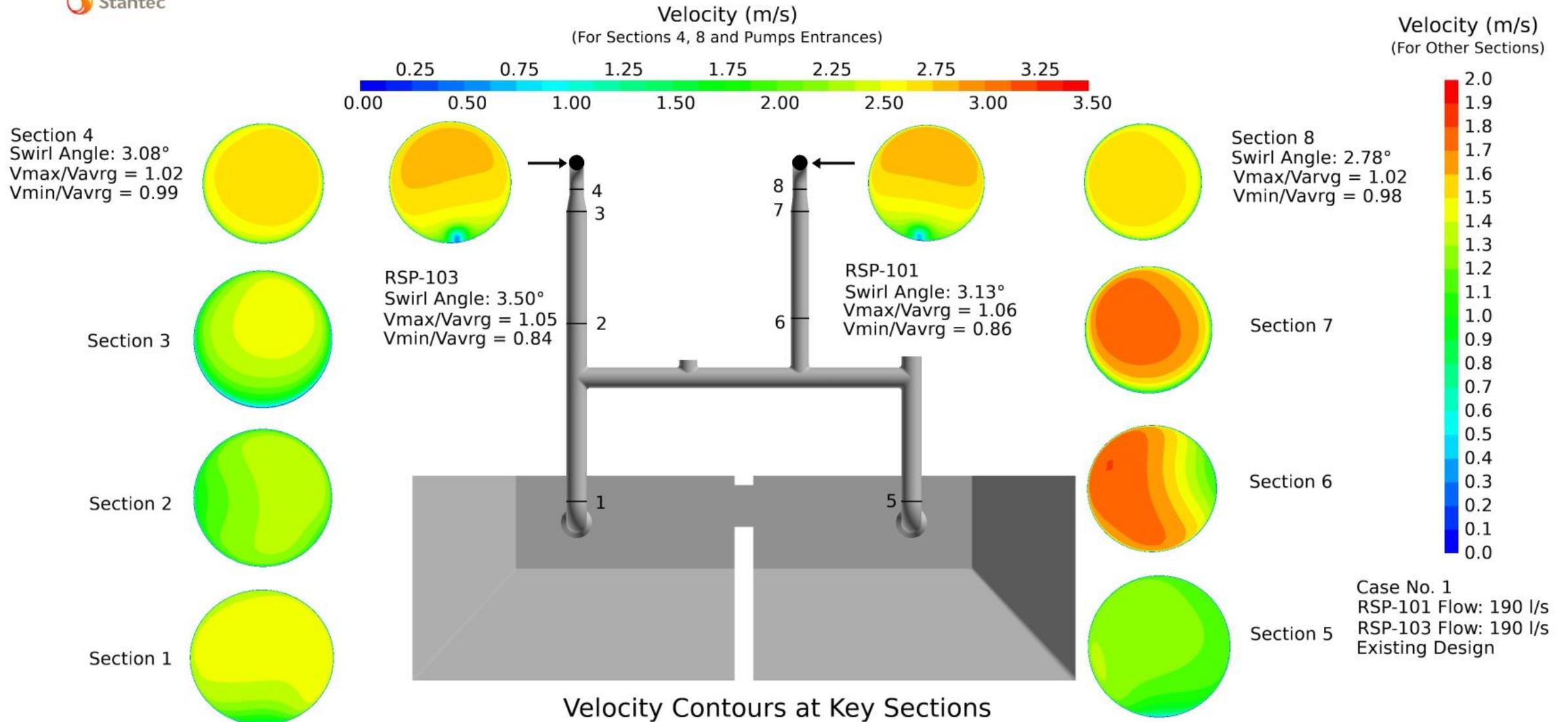
- Predict flow patterns and hydraulic conditions at the suction piping and pump entrances.
- Develop/evaluate possible modifications to minimize pump vibration.

# Case No. 1 – Existing, Two Pumps Running

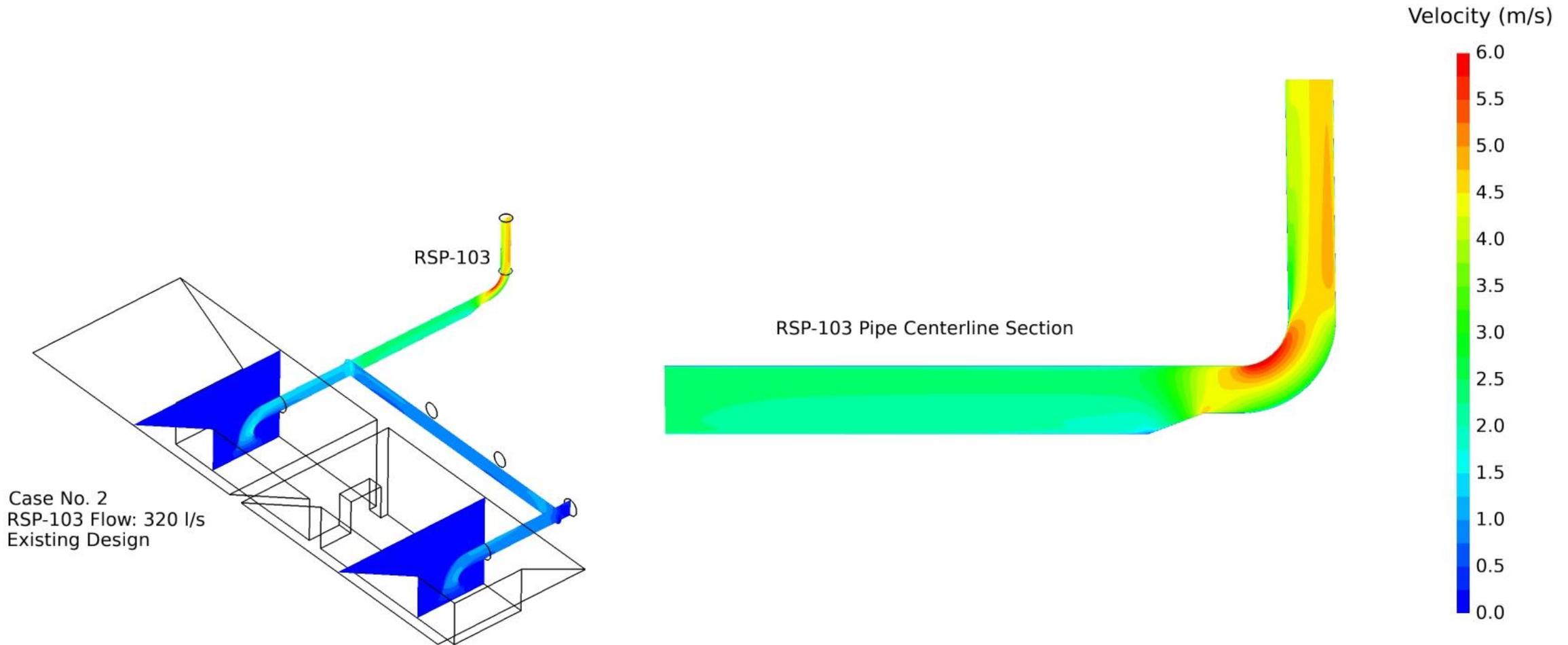


Velocity Contours on Pipes Centerlines

# Case No. 1 – Existing, Two Pumps Running

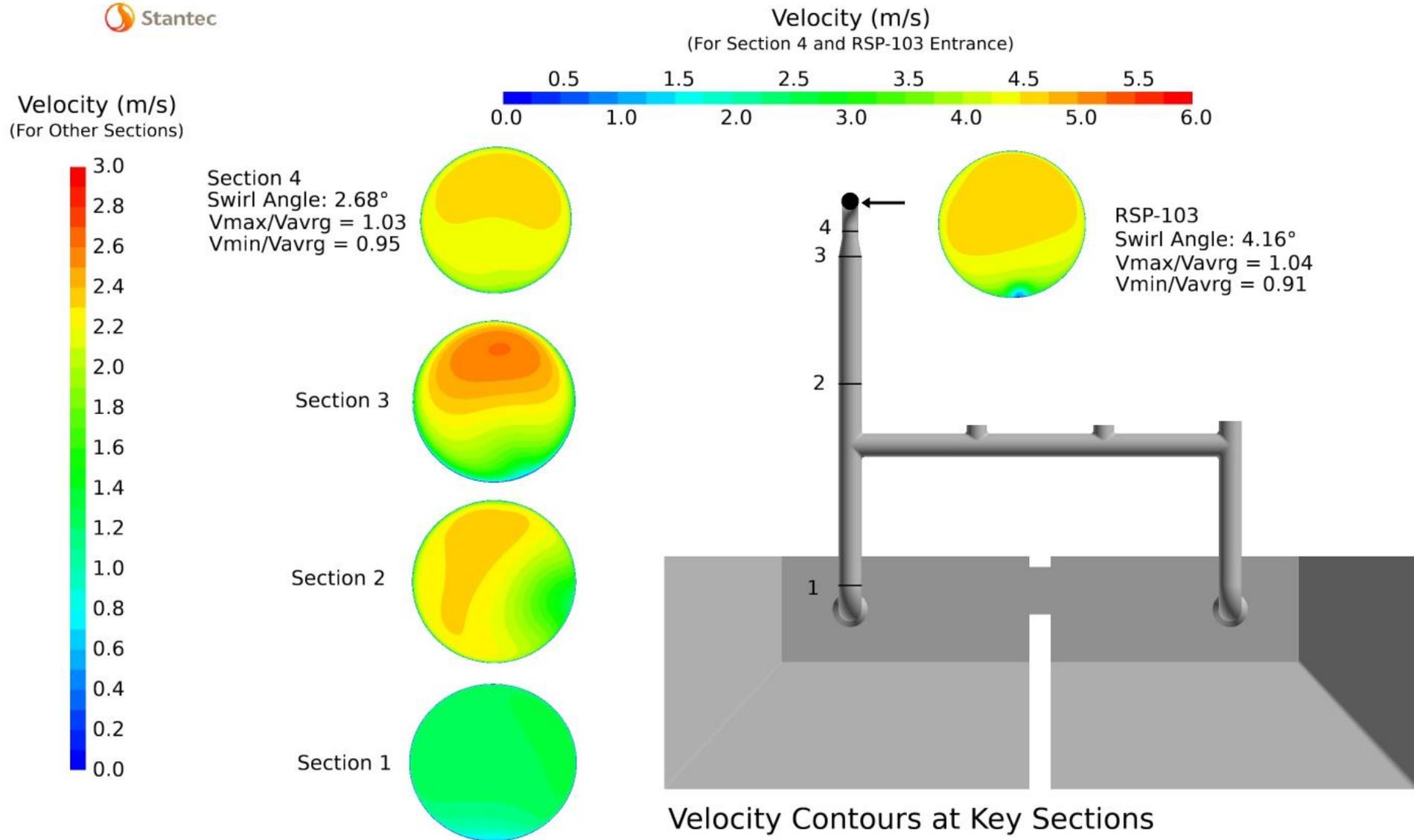


# Case No. 2 – Existing, RSP-103 Running



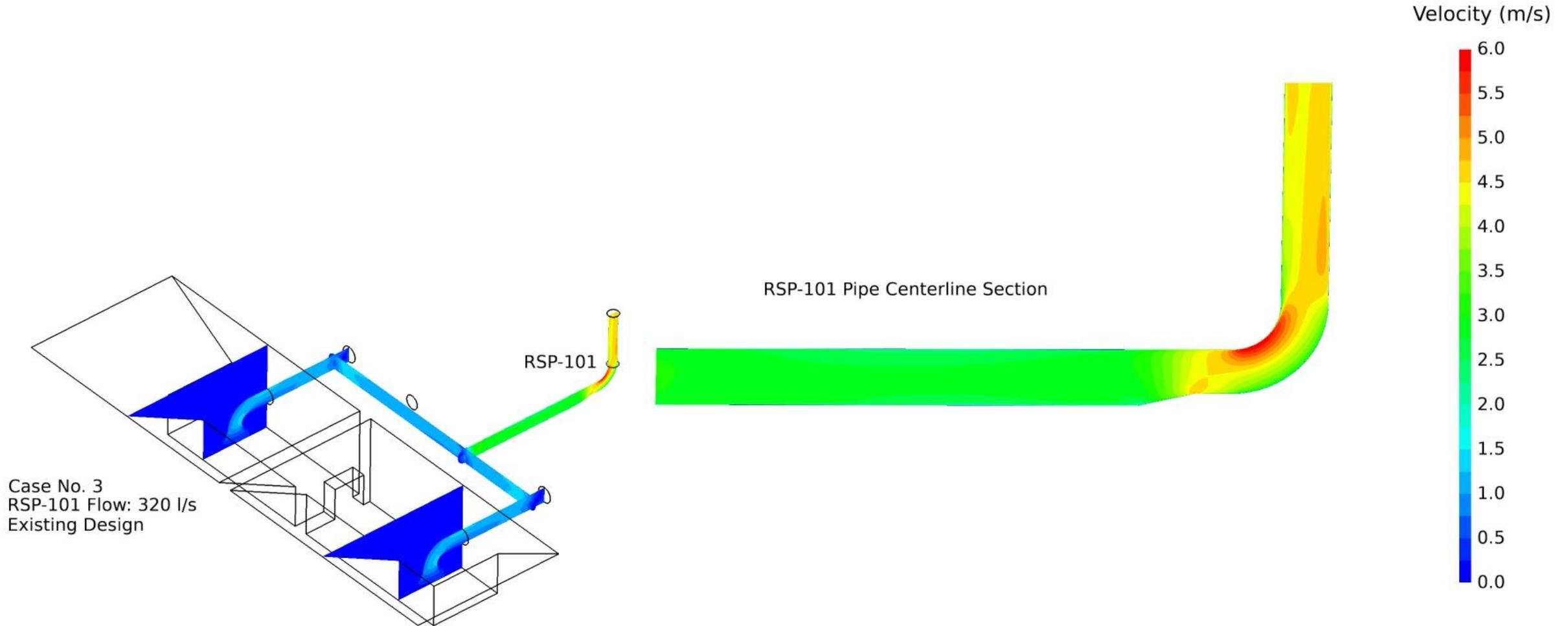
Velocity Contours on Pipes Centerlines

# Case No. 2 – Existing, RSP-103 Running



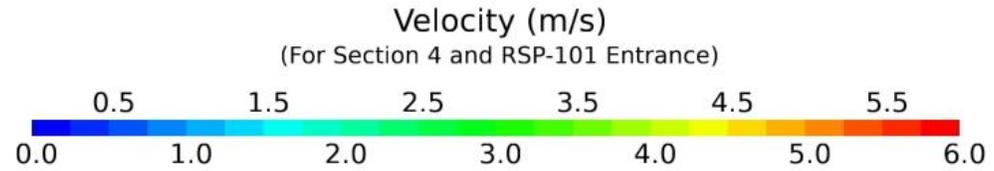
Case No. 2  
RSP-103 Flow: 320 l/s  
Existing Design

# Case No. 3 – Existing, RSP-101 Running

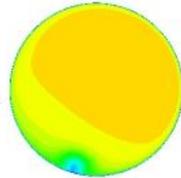


Velocity Contours on Pipes Centerlines

# Case No. 3 – Existing, RSP-101 Running



RSP-101  
Swirl Angle: 7.00°  
 $V_{max}/V_{avg} = 1.04$   
 $V_{min}/V_{avg} = 0.94$

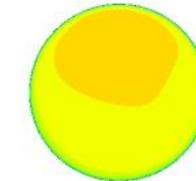


4

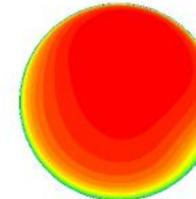
3

2

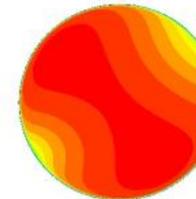
1



Section 4  
Swirl Angle: 6.81°  
 $V_{max}/V_{avg} = 1.02$   
 $V_{min}/V_{avg} = 0.99$



Section 3

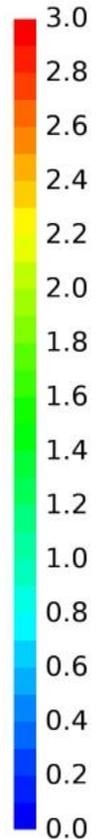


Section 2



Section 1

Velocity (m/s)  
(For Other Sections)



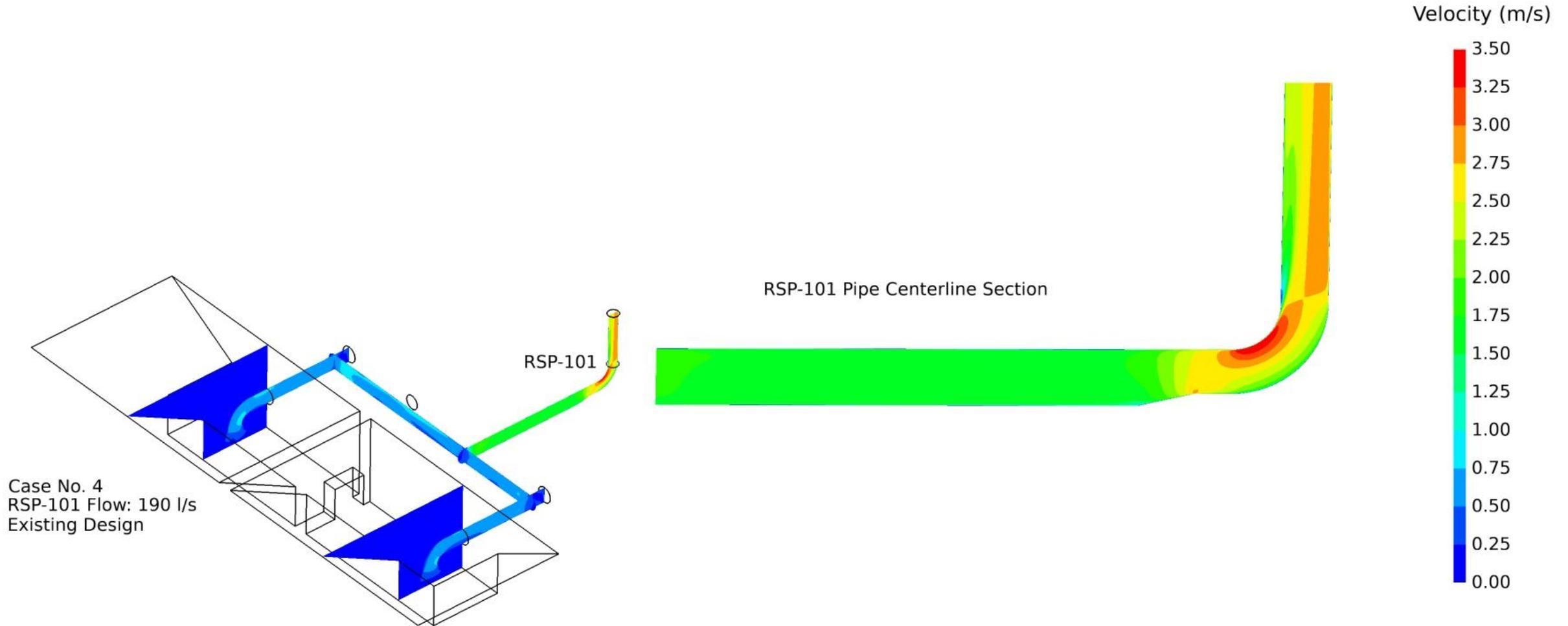
Excessive swirl angles!

Case No. 3  
RSP-101 Flow: 320 l/s  
Existing Design



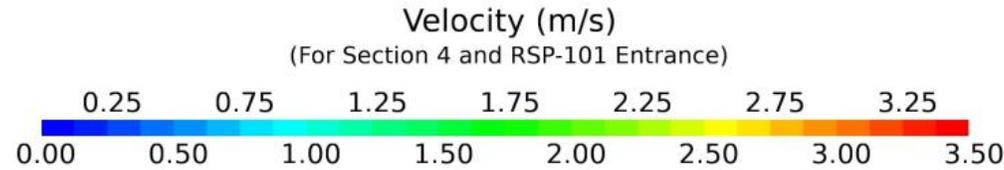
Velocity Contours at Key Sections

# Case No. 4 – Existing, RSP-101 Running

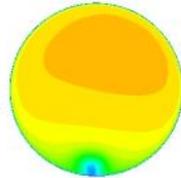


Velocity Contours on Pipes Centerlines

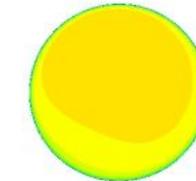
# Case No. 4 – Existing, RSP-101 Running



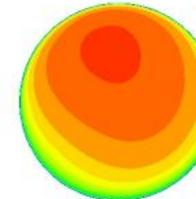
RSP-101  
Swirl Angle: 1.45°  
 $V_{max}/V_{avg} = 1.06$   
 $V_{min}/V_{avg} = 0.82$



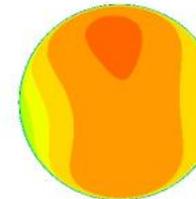
4  
3  
2



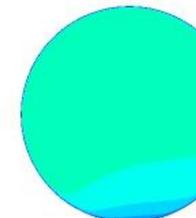
Section 4  
Swirl Angle: 1.39°  
 $V_{max}/V_{avg} = 1.01$   
 $V_{min}/V_{avg} = 0.99$



Section 3

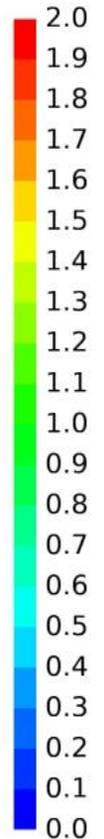


Section 2



Section 1

Velocity (m/s)  
(For Other Sections)



Excessive swirl angles!

Case No. 4  
RSP-101 Flow: 190 l/s  
Existing Design



Velocity Contours at Key Sections

# Conclusions

- Case 1 - Existing design with 2 pumps running at 50 Hz which is the 25 year peak design flow rate of 380 l/s is well within industry standard parameters.
- Case 2 - Existing design with RSP-103 running at 60 Hz (full speed) is well within industry standard parameters, and will satisfy the current design flow requirements.
- Case 3 - Existing design with RSP-101 running at 60 Hz (full speed) is above industry standard parameter for swirl angle, which could cause excessive pump vibrations, but often doesn't have any impacts.
- Case 4 - Existing design with RSP-101 pump running at 45 - 50 Hz is well within industry standard parameters, and will satisfy the current design flow requirements.

# Recommendations / Next Steps

1. Complete concrete pump base enlargements.
2. Check the impeller balancing - Sulzer to test one pump with a perfectly balanced impeller from the factory and report the vibration differences.
3. The pump VFD speed is to be programmed to run between 45 and 50 Hz with one pump running to limit the velocity and swirl angle through the Sulzer supplied elbow. One pump running will still meet current design flows for the vast majority of the time.
  - To allow RSP 101 and 102 to run at 60 Hz a flow conditioner could be installed in the suction piping.

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 15 of 16

**Reference:** NRDRWWSC – Tech Memo #18: Pump Operations

TDH Spare Part Quote

DRAFT



Date:	Feb 12, 2019
TDH Quote Reference:	Lacombe / Blackfalds

**Proposal Details:**

Attention:	NWRWWC – Lacombe / Blackfalds Lift Stations
Project Name:	Spare Parts
Prepared By:	TDH Fluid Systems – Damian Stachura

**Equipment Details:**

Section	Quantity	Description	Price:
	1	Sulzer XFP 306M Impeller – Used in Blackfalds / Lacombe <ul style="list-style-type: none"> <li>c/w mounting hardware, bolt, lockwashers</li> </ul>	\$6,625.15 each
	1	Sulzer XFP 306M Adjustable Bottom Pate	\$4,716.38 each
	1	Sulzer XFP PE6 Repair Kit – NG2 Seals	\$9,750.00 each
	1	Monitoring Services – Vibration <ul style="list-style-type: none"> <li>Test vibration on site through 40-60hz at 9 points on the unit</li> <li>This would be a full day of service required</li> <li>Report generated at the end</li> </ul>	\$1,750.00 / trip

**Terms and Conditions:**

- FCA: TDH Edmonton
- GST: Extra
- Terms: Net 30
- Delivery: 3-5 weeks ARO

May 14, 2019

Matthew Goudy, P.Eng. Jordan Thompson, CET., PMP.

Page 16 of 16

**Reference:** NRDRWWSC – Tech Memo #18: Pump Operations

Sulzer Pump Warranty

DRAFT



# Warranty

## FIVE YEAR PRO-RATED MUNICIPAL PUMP WARRANTY XFP, AFP, AFL & VUP SERIES PUMPS STANDARD & EXPLOSION PROOF PERMANENT TYPE INSTALLATION\*

Manufacturer warrants the above referenced series of ABS brand pumps ("Products") to be free from defects in workmanship and materials as follows:

If used in a permanent municipal application, the warranty period shall expire five (5) years from date of initial installation, provided if start up does not occur within six (6) months after date of shipment from Manufacturer, the warranty period shall expire five (5) years after the date of shipment from Manufacturer. This warranty is contingent upon purchaser's or end user's payment of the applicable percentage of the list price (list price minus covered %) of the following parts in effect at time of replacement.

Description	WARRANTY COVERAGE		
	Months 0-24	Months 25-42	Months 43-60
Rotor, Stator, & Shaft	100%	50%	25%
Mechanical Seals	100%	50%	25%
Impeller	100%	50%	25%
Pump Housing	100%	50%	25%
Bearings	100%	50%	25%
Installation Accessories	100%	0%	0%
Labor	100%	0%	0%

If used in any non-municipal application, the warranty period shall expire on the earliest of the below dates:

- i) one (1) year from date of installation of the Products; or
- ii) eighteen (18) months from date of shipment of the Products from Manufacturer.

Products or parts thereof that are replaced or repaired under warranty during the original warranty period, shall be covered under this warranty until the expiration of the original warranty period or ninety (90) days from the date of such replacement or repair, whichever is later. In any event, such extended warranty period shall not exceed ninety (90) days after the expiration of the original warranty period.

The warranties stated above are contingent upon start-up of the equipment on site by an authorized Manufacturer's representative, as verified by receipt of start-up reports completed and signed by an authorized Manufacturer's representative.

If during the warranty period, any Products fail to meet the requirements set out in this warranty, the purchaser or end user shall give written notification to Manufacturer stating the reasons therefor. Upon receipt of prior written authorization from Manufacturer, Products shall be transported to Manufacturer's authorized service center, prepaid, at purchaser or end-user's cost. Manufacturer's sole obligation shall be to repair, modify or replace Products or parts thereof, at Manufacturer's sole option. Products repaired under this warranty will be returned with freight prepaid. Products must be repaired by an authorized Manufacturer repair center for warranty coverage to be considered. Explosion Proof or other Agency Approved pumps must be repaired at a Manufacturer's authorized service center in order to retain the agency's approval rating.

All protection features (such as moisture sensors, bearing monitors, and thermal overloads) incorporated in the Products must be connected and operable for warranty coverage. This warranty is valid only if Manufacturer supplied or authorized alarm monitoring components, cables and control components/panels are used.

This warranty shall not apply to any Products or parts thereof which have been (i) subjected to misuse, misapplication, accident, alteration, neglect, failure to act in a timely manner to address alarms/warnings, or physical damage; (ii) installed, operated, and/or maintained in a manner which is contrary to Manufacturer's written instructions as it pertains to installation, operation and maintenance of the Products, including but without limitation to being operated without being connected to monitoring devices supplied with specific products for protection; (iii) used in an application or for pumping liquids other than the use for which it is intended as specified in Manufacturer's product literature; (iv) damaged due to a defective power supply, improper electrical protection, faulty repair, ordinary wear and tear, corrosion, erosion or chemical attack, an act of God, an act of war or by an act of terrorism; (v) damaged resulting from the use of accessory equipment not sold by Manufacturer or not approved by Manufacturer for use in connection with Manufacturer's products; or (vi) repaired or altered without Manufacturer's written consent.

This warranty does not cover costs for standard and/or scheduled maintenance that is performed, nor does it cover Manufacturer's parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship is determined by Manufacturer. Wear Parts are defined as cutters, cutting plates, seals, bearings, impellers, agitators, diffusers, wear rings (stationary or rotating), volutes (when used in an abrasive environment), oil, grease, cooling fluids and/or any items deemed necessary to perform and meet the requirements of normal maintenance on all Manufacturer equipment.

Manufacturer shall not be liable for any special, indirect, consequential, or punitive damages, or profit loss of any kind. Major components not manufactured by the Manufacturer are covered by the original manufacturer's warranty in lieu of this warranty. In addition to any other special, indirect or consequential damages referenced above, Manufacturer shall not be responsible for travel expenses, rented (replacement) equipment, pump removal fees, installation fees, outside contractors fees, or unauthorized repair shop expenses.

This warranty shall extend only to the initial end user.

**ALL OTHER WARRANTIES, CONDITIONS AND REPRESENTATIONS, EXPRESSED OR IMPLIED BY STATUTE, COMMON LAW OR OTHERWISE, IN RELATION TO THE SUPPLY OF THE PRODUCTS INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED TO THE EXTENT PERMITTED BY LAW.**

\*This warranty is applicable to Products supplied by Sulzer Pump Solutions (US) Inc. or Sulzer Pumps Wastewater Canada, Inc. for installation in the U.S.A. or Canada, unless specifically indicated otherwise in writing by Manufacturer.



# North Red Deer Regional Wastewater Services Commission

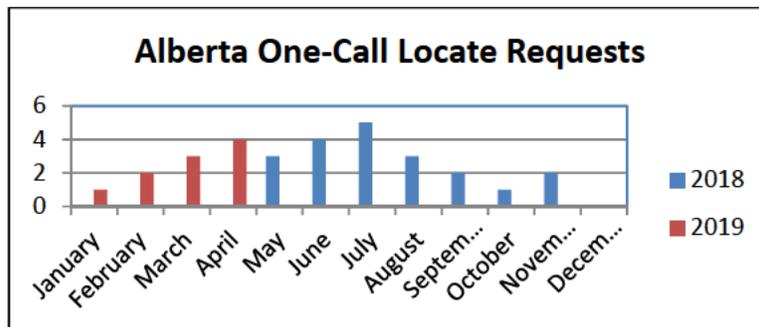
5432-56 Avenue, Lacombe AB T4L1E9 Tel: (403)782-1254 Fax: (403)782-5655 mgoudy@lacombe.ca

## CITY OF LACOMBE MANAGEMENT SERVICES OPERATIONAL MONTHLY REPORT MAY 21<sup>ST</sup>, 2019

Since the last update provided to Commission members on April 8<sup>th</sup>, the City of Lacombe Management Services has:

### GENERAL INFORMATION

Alberta One-Call Locate Requests:



Alberta One-Call Locate Requests 2019 to date 10

- Second round of onsite training has been completed with most suppliers (CES, TDH, Envent, Mequipco, Chandos, Alpha, Kohler, Evoqua). Biorem was unavailable and will be scheduled to complete training in the coming weeks.

### EQUALIZATION STORAGE

Lacombe:

- Contractor is land applying remaining effluent to three area farmers. Once emptied the landscaping can be completed.

### BLACKFALDS:

- Aqua Clear onsite land applying effluent.
- Landscaping including tree planting and fence to be installed.

### SITE RESPONSE

#### Blackfalds:

General:

- TDH / Alpha, 3-Phase, Stantec, Sulzer troubleshooting Pump 101 'Overcurrent' alarm and pump failure to operate.



# North Red Deer Regional Wastewater Services Commission

5432-56 Avenue, Lacombe AB T4L1E9 Tel: (403)782-1254 Fax: (403)782-5655 mgoudy@lacombe.ca

- 3 Phase still looking into the one of the two harmonic filters for cause of failure.

## **Lacombe:**

General:

- TDH / Alpha, 3-Phase, Stantec, Sulzer troubleshooting Pump 101 'Overcurrent' alarm and pump failure to operate.

## **Odour Management Facility:**

General:

- Operations has begun monitoring h2s levels at the OMF manhole and downstream towards the stop-block chamber. These reading will be shared with Red Deer WW Treatment plant.
- External stairs to biofilter and carbon tank are installed, Alpha has a few deficiencies to address to enable full use of the structure. i.e.

If you have any questions or comments regarding the operations described above, please do not hesitate to contact me.

Regards,



Chris Huston

Operations Supervisor



**Engineer's Report  
May 13, 2019  
North Red Deer Regional Wastewater Services  
Commission  
(NRDRWWSC)**

**Submitted to: North Red Deer Regional Wastewater Services Commission  
Matt Goudy, P.Eng. – CAO  
Jordan Thompson, CET, PMP – Assistant CAO**

**Submitted by: Stantec Consulting Ltd. - Red Deer  
Per: Todd Simenson, P.Eng.  
Joel Sawatzky, P.Eng.**

**FILE 113929319**

**1. Construction Progress**

- a. The construction of the regional system is complete. Remaining work pertains to small clean-up of seasonal deficiencies at the three facilities and completion of the equalization storage facilities.
- b. The Construction Completion Certificates (CCCs) have been approved for Contracts 1, 3, 5, and 6. Contract 2 CCC will be issued once the stairs are complete. While Contract 4 CCC will be issued once the lagoon work is completed this year. O&M Manuals and Plan of Record drawings are complete and submitted for all Contracts 1 through 6.

## 2. Equalization Storage Completion

### a. Blackfalds

- Blackfalds Lagoon desludging is complete.
- The remaining work including shaping the berms, planting trees, installing black soil and riprap the inlet pipes will be completed by June 15.

### b. Lacombe

- Desludging in Lacombe has just begun on the last 2 cells and is scheduled to be completed by May 31.
- Half the lagoon cell interconnecting pipes were installed last winter and the Contractor will finish off the other half once the sludge is removed. Once the pipes are installed, black dirt will be placed on the berms and then seeded. The last step would be to riprap the pipe ends.
- Total completion of the Lacombe equalization storage is schedule for June 30.

## 3. Deficiency Clean-up

### a. General

- Operators had their 6-months' training completed last week by the contractors and suppliers with a few exceptions including Biorem, Envent and the camera security system. This training will be scheduled on a separate date later in May or June.

### b. OMF

- The Biofilter access stairs are nearly complete but still require the removable handrails and pad.
- Currently awaiting on engineering stamped drawings for the modified removable rails from galvanized steel to aluminum, as the weight of the steel prevent the Operators from removing the handrails.
- The leaking dampers on the fans still requires to be replaced.

### c. Blackfalds

- The perimeter fencing and final site gravels will be completed in the next month.
- One pump is in the shop for repair of the windings which overheated. The cause and warranty repair confirmation are still under investigation, however at this time it is believed to be from voltage spikes between the VDF and pumps (not

from the incoming power source). There are multiple barriers in place to prevent this from happening so a thorough investigation is taking place to determine the cause.

- While the pumps were being delivered to Continental Group, the shipping company dropped both pumps off the truck. We are currently working with TDH and Sulzer to confirm costs of repairs to compare it with costs of a new pump.

d. Lacombe

- One pump is in the shop for repair of the windings which overheated. The cause and warranty repair confirmation are still under investigation, however at this time it is believed to be from voltage spikes between the VDF and pumps (not from the incoming power source). There are multiple barriers in place to prevent this from happening so a thorough investigation is taking place to determine the cause.
- While the pumps were being delivered to Continental Group, the shipping company dropped both pumps off the truck. We are currently working with TDH and Sulzer to confirm costs of repairs to compare it with costs of a new pump.
- Vibrations in the Lacombe Lift Station pumps continue to be a concern, though vibrations measured at the connections to the pump bases have lessened slightly. We have investigated this in detail over the last number of months and a Technical Memo has been developed to outline the analysis, findings, and recommended next steps.

e. Pipeline

- There is minor work required to improve the drainage on Bill Brannen's land and Hamm Construction is engaged and working on this.

#### **4. Summary of Project Balance – Engineering, Construction, and Land**

*Reference update from Justin de Bresser. If needed, the summary of project balance will be updated later in May to provide an update at the next meeting.*

## 5. Reference Photos:

Contract 2: OMF



Figure 1: The Odour Management Facility – construction of Biofilter stairs

Contract 2:



Figure 2: The Odour Management Facility – construction of carbon filter stairs

Contract 2:



Figure 3: The Odour Management Facility – TDH training with Operators

Contract 4:



Figure 4: Blackfalds Regional Lift Station – onsite electrical testing of Blackfalds RSP-102

Contract 4:



Figure 5: Blackfalds Lagoon – Aqua Clear removing sludge from Cell 3

Contract 4:



Figure 6: Lacombe Lagoon – Lambourne is setting up to desludge Cell 3 and will move to Cell 8 after

Contract 6:



Figure 7: Lacombe Regional Lift Station – no signs of cavitation on RSP-102's elbow.