BID FORM

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

PROJECT: **New Nanofiltration Membranes for Reverses Osmosis Plants 1 and 2** Date: 03/11/2019

BIDDER: Aerex Industries, Inc.

THIS BID IS SUBMITTED TO:

Wellington
Clerk's Office
12300 Forest Hill Boulevard
Wellington, FL 33414

OR Through the Village of Wellington's bid portal

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 120 days after the posting of the recommended award. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within 15 days after the date of OWNER'S Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

   (a) BIDDER has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

Date March 5, 2019	Addenda Number One
Date March 7, 2019	Addenda Number Two
Date	Addenda Number

   (b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, Work, Site, locality, and all local conditions, Laws, and Regulations that in any manner may affect cost, progress, performance, or furnishing of the Work.

   (c) BIDDER has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions which, if any, are attached to the Contract Documents, and accepts the determination as set forth in the Bidding Documents of the extent of the technical data contained in such reports and drawings upon which BIDDER is entitled to rely.

   (d) BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work as BIDDER considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, and no additional examinations, investigations, explorations, tests, reports or similar information or data are or will be required by BIDDER for such purposes.

   (e) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.

(f) BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents.

(g) BIDDER has given OWNER written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER.

(h) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

4. BIDDER agrees to perform all the Work described in Contract Documents, subject to adjustments as provided therein, for the Prices BIDDER provides on the Schedule of Values.

5. BIDDER declares it understands that the unit quantities shown on the Bid Form Unit Price Schedule are approximate only and not guaranteed and are subject to either increase or decrease; and that should the quantities of any of the items of Work be increased, the BIDDER agrees to do the additional Work at the unit prices set out herein, and should the quantities be decreased, BIDDER also understands that final payment shall be made on actual quantities completed at the unit prices, and shall make no claims for anticipated profits for any decrease in the quantities.

6. The BIDDER further declares its understands the OWNER may elect to construct only a portion of the Work covered by these Documents and BIDDER agrees to perform that portion of the Work for which BIDDER is awarded a Contract at the unit prices quoted herein.

7. BIDDER agrees that the Work:

   The Contract will have a substantial completion date after the date when the Contract Time commences to run and as outlined below. The work will be completed and ready for substantial and final payment as outlined below:

Delivery of Membranes:	Train 6 – Within 45 calendar days from Notice Train 7- Within 60 calendar days from Notice Trains 2-5- Within 90 calendar days from Notice
Final Completion:	550 calendar days from Notice to Proceed

   BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

8. The following documents are attached to and made a condition of this Bid:

   (a) Required Bid security in the form of Bid Bond.
   (b) Schedule of Values.
   (c) List other documents as pertinent.

9. Communications concerning this Bid shall be telephoned or addressed to:

   Name: Montroe Hopkins
   Address: 3504 Industrial 27th St., Fort Pierce, FL 34946

   Phone No.: 772-448-5818 Fax: 772-467-2608

10. BIDDER'S Florida Contractor's License No. CGC1507464

11. BIDDER covenants that it is qualified to do business in the State of Florida and has attached evidence of BIDDER'S qualification to do business in the State of Florida, or if not attached, BIDDER covenants to obtain such evidence within five days of request by OWNER to provide evidence.

If BIDDER is

An Individual

Name N/A (SEAL)

Signature: _____

Doing business as _____

Business Address: _____

_____

Phone Number: _____ Fax Number _____

A Partnership

Firm's Name N/A (SEAL)

General Partner Signature: _____

Business Address: _____

_____

Phone Number: _____ Fax Number _____

A Corporation

Corporation's Name Aerex Industries, Inc. (SEAL)

State of Incorporation Florida

Authorized Person: Thomas. A. Donnick, Jr.

Title: President

Signature: _____

Attest: Frederick McTaggart (Secretary)

Signature: _____

Business Address: 3504 Industrial 27th St., Fort Pierce, FL 34946

_____

Phone Number: 772-448-5800 Fax Number 772-467-2608

BID BOND/SECURITY

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

KNOW ALL MEN BY THESE PRESENTS, that we Aerex Industries, Inc.

as Principal, hereinafter called the Principal, and Travelers Casualty and Surety Company of America

a corporation duly organized under the laws of the State of Connecticut as Surety, hereinafter called the Surety, are held and firmly bound unto Wellington, Purchasing Dept., 12300 Forest Hill Boulevard, Wellington, FL 33414

as Obligee, hereinafter called the Obligee, in the sum of Ten Percent (10%) of amount bid for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has submitted a bid for **ITB 201902 - New Nanofiltration Membranes for Reverses Osmosis Plants 1 and 2.**

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed March 11, 2019

Witnesses:

Donna L. Summerfield

Aerex Industries, Inc.
Seal

By:

Travelers Casualty and Surety Company of America
Seal

Jacki Mainous

Jacki Mainous, Witness

By:
Jorge L. Bracamonte, Attorney-In-Fact &
Florida Licensed Resident Agent
Inquiries: (321) 800-6594

TRAVELERS

Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Jorge L. Bracamonte** of **ORLANDO**, **Florida**, their true and lawful Attorney-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **3rd** day of **February, 2017.**

State of Connecticut

City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the **3rd** day of **February, 2017**, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June, 2021**

Marie C. Tetreault, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this **11th** day of **March**, **2019**

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney-in-Fact and the details of the bond to which the power is attached.

Schedule of values based on using Dow NF90-400/34i Membrane Elements

SCHEDULE OF VALUES

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

Item No.	Item Description Base Bid Items:	Unit	Quantity	Unit Price	Value
1	Delivery to the Water Plant site, FOB, nanofiltration membrane elements as described in these specifications, including all components called for herein, and including three 8"X40" spacers	EA	1,119	$410.00	$458,790.00
2	Installation, testing and other requirements of these specifications not included in Item 1 above for Train 6 for a complete and operational installation	LS	1	$42,800.00	$42,800.00
3	Site presence, coordination, assistance to Owner, Engineer, Contractor, Installing Contractor, and other requirements of these specifications not included in Item 1 above for Trains 2-5, 6, 7 for a complete and operational installation	LS	1	$107,410.00	$107,410.00
4	Allowance for unforeseen conditions including replacement membrane vessel parts and components. Used at the sole discretion of the Owner and requiring written approval by the Owner.	LS	1	$20,000.00	$20,000.
5	Fixed Membrane Element Replacement Cost For Prorating during Warranty Period as described in the Specifications	EA	1	$410.00	$N/A

Six hundred and twenty nine thousand dollars.

Total Bid Price (Item Nos. 1-5) $629,000.00

BIDDER/CONTRACTOR understands and agrees that this is a Lump Sum Contract and that successful contractor shall prepare and submit a detailed Schedule of Values to Wellington for approval prior to first payment application.

Schedule of values based on using Hydranautics ESNA1-LF-LD Membrane Elements

SCHEDULE OF VALUES

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

Item No.	Item Description Base Bid Items:	Unit	Quantity	Unit Price	Value
1	Delivery to the Water Plant site, FOB, nanofiltration membrane elements as described in these specifications, including all components called for herein, and including three 8"X40" spacers	EA	1,119	$ 451.00	$504,669.00
2	Installation, testing and other requirements of these specifications not included in Item 1 above for Train 6 for a complete and operational installation	LS	1	$ 44,822.00	$ 44,822.00
3	Site presence, coordination, assistance to Owner, Engineer, Contractor, Installing Contractor, and other requirements of these specifications not included in Item 1 above for Trains 2-5, 6, 7 for a complete and operational installation	LS	1	$ 112,509.00	$ 112,509.00
4	Allowance for unforeseen conditions including replacement membrane vessel parts and components. Used at the sole discretion of the Owner and requiring written approval by the Owner.	LS	1	$20,000.00	$20,000.
5	Fixed Membrane Element Replacement Cost For Prorating during Warranty Period as described in the Specifications	EA	1	$ 452.00	$ N/A

Six hundred and eigthty two thousand dollars.

Total Bid Price (Item Nos. 1-5) $682,000.00

BIDDER/CONTRACTOR understands and agrees that this is a Lump Sum Contract and that successful contractor shall prepare and submit a detailed Schedule of Values to Wellington for approval prior to first payment application.

SCHEDULE OF SUBCONTRACTORS

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

Discipline	Subcontractor	Address City, ST, Zip	License Number
None			

Address of Subcontractor may be considered in accordance with Wellington's Local Preference Policy

SCHEDULE OF EQUIPMENT AND MATERIALS

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

Item	Manufacturer	Description
Membrane Elements	Dow	NF90-400/34i
Membrane Elements	Hydranautics	ESNA1-LF-LD
PV End Adapters & Shims	CodeLine	N/A

SWORN STATEMENT UNDER SECTION 287.133(3)(a), FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to Village of Wellington
[print name of the public entity]
by Thomas A. Donnick, Jr., President
[print individual's name and title]
for Aerex Industries, Inc.
[print name of entity submitting sworn statement]

whose business address is 3504 Industrial 27th St., Fort Pierce, FL 34946

and (if applicable) its Federal Employer Identification Number (FEIN) is 65-0258708

(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____.)

2. I understand that a "public entity crime" as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for goods or services or any contract for the construction or repair of a public building or public work, to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:

   1. A predecessor or successor of a person convicted of a public entity crime; or
   2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a "person" as defined in Paragraph 287.133(1)(e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. [Please indicate which statement applies.]

__X__ Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____ The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. [attach a copy of the final order]

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES FOR CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

_____
[signature]

March 11, 2019
[date]

STATE OF Florida

COUNTY OF St. Lucie

Subscribed and Sworn to (or affirmed) before me on March 11, 2019 [date] by

Thomas A. Donnick, Jr [name]. He/she is personally known to me or has presented

_____ as identification.
[type of identification]

Donna L. Summerfield
[Notary's Signature and Seal]

Donna Summerfield, GG079581
Print Notary Name and Commission No.

Form PUR 7068 (Rev. 04/10/91)
M/R 03/06/92

DONNA L. SUMMERFIELD
Notary Public – State of Florida
Commission # GG 079581
My Comm. Expires May 18, 2021
Bonded through National Notary Assn.

DRUG FREE WORKPLACE

(FAILURE TO COMPLETE THIS FORM MAY RESULT IN THE BID BEING DECLARED NON-RESPONSIVE)

Preference may be given to businesses with drug-free workplace programs. Whenever two or more Bids which are equal with respect to price, quality, and service are received by the Owner for the procurement of commodities or contractual services, a Bid received from a business that certifies that it has implemented a drug-free workplace program may be given preference in the award process. Established procedures for processing tie Bids will be followed if none of the tied vendors have a drug-free workplace program. In order to have a drug-free workplace program, a business must attest to the following:

1. We publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2. We inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

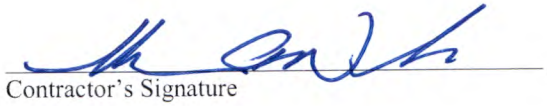
3. We give each employee engaged in providing the commodities or contractual services that are under Bid a copy of the statement specified in subsection (1).

4. We, in the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under Bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

5. We impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.

6. We make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.



Contractor's Signature

QUESTIONNAIRE

The following Questionnaire shall be completed and submitted in Envelope with the Bid. By submission of this Bid, Bidder guarantees the truth and accuracy of all statements and answers herein contained.

1. How many years has your organization been in business? 28 years

2. What is the last project of this nature that you have completed?

City of Vero Beach Water Treatment Plant - 772-978-5235

3. Have you ever failed to complete work awarded to you? If so, where and why?

No.

4. List the following information concerning all contracts OR projects in progress and past as of the date of submission of this bid. (List any Federal, State, City or local municipalities/government contracts or project information if any relevant in scope with this solicitation).

Information provided in (section 4) is for reference purposes and may be contacted for verification.

Name of Term Contract OR Project	Owner	Contact (Person) Name & Title	Contact Email Address & Phone Number	Contact Business Address
Vero Beach WTP	Vero Beach, FL.	Jeffrey Howard Plant Manager	jhoward@covb.org 772-978-5235	2515 Airport N. Drive Vero Beach
Town of Davie WTP	Davie, FL	Renuka Bajnath Asst. Director	Renuka_Bajnath@davie-fl.gov 954-327-3768	7351 SW 30 St, Davie
Seacoast WTP	Palm Beach Gardens, FL	Rim Bishop Director	rbishop@sua.com 561-627-2900	4200 Hood Road Palm Beach Gardens
Lake Worth WTP	Lake Worth, FL.	Tim Sloan Plant Manager	tsloan@lakeworth.org 561-586-1708	301 College St. Lake Worth
City of Miramar WTP	Miramar, FL	Keith Clark Supervisor	KClark@ci.miramar.fl.us> 954-438-1228	2600 SW 66th Terrace, Miramar

5. Has the bidder or his or her representative inspected the proposed project and does the Bidder have a complete plan for its performance?

Yes

6. Will you subcontract any part of this work? If so, give details including a list of each subcontractor(s) that will perform work in excess of the percent (10%) of the contract amount and the work that will be performed by each subcontractor(s).

Subcontractor	Work to be Performed
None	

7. What equipment do you own that is available for the work? Ladders & Scaffolding

8. What equipment will you purchase for the proposed work? None

9. What equipment will you rent for the proposed work? Forklift

10. State the name of your proposed project manager and give details of his or her qualifications and experience in managing similar jobs.

Montroe Hopkins has 31 years of experience in managing similar projects.

11. State the true, exact, correct and complete name of the partnership, corporation, or trade name under which you do business and the address of the place of business. (If a corporation, state the name of the president and secretary. If a partnership, state the names of all partners. If a trade name, state the names of the individuals who do businesses under the trade name.

12. The correct name of the Bidder is Aerex Industries, Inc.

13. The partnership is a ☐ Sole Proprietorship, ☐ Partnership, or ☒ Corporation or ☐ Other Type of Entity _____ (Fill In).

14. The address of principal place of business is 3504 Industrial 27th St., Fort Pierce, FL 34946

15. The names of the Corporate Officers, or Partners, or Individuals doing business under a trade name, are as follows:

Thomas A. Donnick, Jr., Frederick W. McTaggart, David W. Sasnett and Jason P. Carlson

16. List all organizations which were predecessors to Bidder or in which the principals or officers of the Bidder were principals or officers.

None

17. List and describe all bankruptcy petitions (Voluntary or Involuntary) which have been filed by or against the Bidder, its parent or subsidiaries or predecessor organizations during the past five (5) years. Include in the description the disposition of each such petition.

Not Applicable

18. List and describe all successful Performance or Payment Bond claims made to your surety(ies) during the last five (5) years. The list and descriptions should include claims against the bond of the Bidder and its predecessor organization(s).

None

19. List all claims, arbitrations, administrative hearings and lawsuits brought by or against the Bidder or its predecessor organization(s) during the last five (5) years. The list shall include all case names; case, arbitration, or hearing identification numbers; the name of the project over which the dispute arose; and a description of the subject matter of the dispute.

None

20. List and describe all criminal proceedings or hearings concerning business related offenses in which the Bidder, its principals or officers or predecessor organization (s) were defendants.

None

21. Has the Bidder, its principals, officers, or predecessor organization(s) been debarred or suspended from bidding by any government during the last five (5) years? If yes, provide details.

No.

22. List and disclose any and all business relations with any members of Wellington Council.

None

T2-QHE

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 3/5/2019

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must have **ADDITIONAL INSURED** provisions or be endorsed. If **SUBROGATION IS WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Commercial Lines USI Insurance Services LLC 2601 South Bayshore Drive, Suite 1600 Coconut Grove, FL 33133	PHONE (A/C, No, Ext): 888-572-2412	FAX (A/C, No):
	E-MAIL ADDRESS: certs@trinet.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Indemnity Insurance Company of North America	43575
INSURED TriNet HR II-A, Inc. RE: Aerex Industries, Inc. PO Box 241448 Charlotte, NC 28224	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** 13987509 **REVISION NUMBER:** See below

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	☐ CLAIMS-MADE ☐ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	☐ POLICY ☐ PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG	$
	OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☐ HIRED AUTOS ONLY ☐ NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	☐ UMBRELLA LIAB ☐ OCCUR						EACH OCCURRENCE	$
	☐ EXCESS LIAB ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DED ☐ RETENTION $							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N: N If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		WLRC66051031	3/1/2019	3/1/2020	X PER STATUTE ☐ OTH-ER	
							E.L. EACH ACCIDENT	$ 2,000,000
							E.L. DISEASE - EA EMPLOYEE	$ 2,000,000
							E.L. DISEASE - POLICY LIMIT	$ 2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Workers' Compensation is limited to worksite employees of Aerex Industries, Inc. through a co-employment contract with TriNet HR II-A, Inc.

CERTIFICATE HOLDER

Village of Wellington
12300 Forest Hill Blvd.
Att:Clerk's Office
Wellington, FL 33414

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Jeanne Brandon

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 3/5/2019

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Mary Campbell
Vero Insurance Inc, a Marsh & McLennan Agency LLC Company 3339 Cardinal Dr Vero Beach FL 32963	PHONE (A/C, No, Ext): 772-231-2022 FAX (A/C, No): 772-231-7444 E-MAIL ADDRESS: mary@veroinsurance.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Admiral Insurance Company	24856
INSURER B : Travelers Casualty Ins Co of America	19046
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED	AEREXINDUS
Aerex Industries, Inc 3504 Industrial 27th Street Fort Pierce FL 34946	

COVERAGES **CERTIFICATE NUMBER:** 1522171115 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			CA00003088301	5/28/2018	5/28/2019	EACH OCCURRENCE	$ 1,000,000
	X CLAIMS-MADE ☐ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 300,000
	X 5,000						MED EXP (Any one person)	$ 10,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	☐ POLICY X PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	☐ OTHER:							$
B	**AUTOMOBILE LIABILITY**			BA0L063507	5/28/2018	5/28/2019	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☐ HIRED AUTOS ONLY ☐ NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
A	☐ **UMBRELLA LIAB** X OCCUR			GX00000137701	5/28/2018	5/28/2019	EACH OCCURRENCE	$ 5,000,000
	X **EXCESS LIAB** ☐ CLAIMS-MADE						AGGREGATE	$ 5,000,000
	☐ DED ☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N						☐ PER STATUTE ☐ OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? ☐ **(Mandatory in NH)**	N / A					E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

Village of Wellington
Clerk's Office
12300 Forest Hill Blvd
Wellington FL 33414

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

RICK SCOTT, GOVERNOR

JONATHAN ZACHEM, SECRETARY

Florida dbpr

STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

CONSTRUCTION INDUSTRY LICENSING BOARD

THE GENERAL CONTRACTOR HEREIN IS CERTIFIED UNDER THE
PROVISIONS OF CHAPTER 489, FLORIDA STATUTES

CARLSON, JASON PAUL

AEREX INDUSTRIES INC
3504 INDUSTRIAL 27TH STREET
FORT PIERCE FL 34946

LICENSE NUMBER: CGC1507464

EXPIRATION DATE: AUGUST 31, 2020

Always verify licenses online at MyFloridaLicense.com

Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.

WELLINGTON LOCAL PREFERENCE

APPLICATION TO BE CONSIDERED A LOCAL BUSINESS IN ACCORDANCE WITH VILLAGE OF WELLINGTON FLORIDA'S LOCAL PREFERENCE POLICY

Wellington gives preference to local businesses in certain purchasing situations as set forth in Chapter 9 of Wellington's Purchasing and Procurement Manual. In order to be considered a local business, entitled to be given preference, the business must make application with Wellington and meet one of the following criteria as such is more fully set forth in Chapter 9, of Wellington's Purchasing and Procurement Manual:

Chapter 9, LOCAL PREFERENCE

Western Communities Local Business - For the purpose of determining a "Western Communities local business" a vendor must have a principal permanent business location and headquarters within Wellington of Wellington, Florida or west of the Florida Turnpike to the Palm Beach County western boundary line as depicted in Exhibit "A" hereto. This applies to all entity formations, including, but not limited to, limited liability companies, partnerships, limited partnerships and the like or sole proprietors. Further, the entity or sole proprietor must provide that it, he or she has been domiciled and headquartered in the jurisdictional boundaries of the Western Communities for at least six months prior to the solicitation. Post Office boxes will not be considered a permanent business location within the Western Communities. Home business offices shall be considered as a business location if it otherwise meets the requirements herein. In order to be eligible for such local preference the vendor shall have a local business tax receipt pursuant to the County's and/or municipalities' Code of Ordinances, having jurisdiction over the location of the business, unless otherwise exempt therefrom. Further, the vendor must be properly licensed and authorized by law to provide the goods, services or professional services to the extent applicable and the location of the business must be properly zoned in order for the vendor to conduct its business.

Palm Beach County local business - For the purpose of determining a "Palm Beach County local business" a vendor must have a principal permanent business location and headquarters within Palm Beach County, Florida. This applies to all entity formations, including, but not limited to, limited liability companies, partnerships, limited partnerships and the like or sole proprietors. Further, the entity or sole proprietor must provide that it, he or she has been headquartered and domiciled in the jurisdictional boundaries of Palm Beach County, Florida for at least six months prior to the solicitation. Post Office boxes will not be considered a permanent business location within Palm Beach County, Florida. Home business offices shall be considered as a business location if it otherwise meets the requirements herein. In order to be eligible for such local preference the vendor shall have a local business tax receipt pursuant to the Palm Beach County Code of Ordinances as amended from time to time, unless otherwise exempt there from. Further, the vendor must be properly licensed and authorized by law to provide the goods, services or professional services to the extent applicable and the location of the business must be properly zoned in order for the vendor to conduct its business.

Subcontractor utilization - In competitive bid situations, a business may also qualify as either a Palm Beach County or Western Community local business if they are utilizing subcontractors to perform the work or materialmen to supply the job and more than fifty (50%) percent of their proposed bid price will be paid to subcontractors and or materialmen who qualify, under the above standards, as Palm Beach County and or Western Community local businesses.

Please check the box below indicating which preference category your business is applying for:

☐ Western Communities Local Business

☐ Palm Beach County Local Business

☐ Subcontractor Utilization

1. The name of the business is: N/A

2. The address of the business is: N/A

3. How long has the business been located at its current address: N/A

4. If the business has relocated within the last six months, please provide the answers to questions 1-3 for the previous location: N/A

5. The previous name of the business is: N/A

6. The previous address of the business is: N/A

7. How long was this business at the previous location: N/A

8. If the business is attempting to qualify under the subcontractor utilization provision, please provide a breakdown of the subcontractors who would qualify for either the Palm Beach County or Western Community, business classification, the requisite information, provide their responses to the above 1 - 7 questions and for each of the subcontractors, indicate the amount that they are proposed to be compensated at under the bid price. N/A

9. The business as a local business tax receipt from: (1) Palm Beach County ☐ (2) the following municipality: N/A (3) located in unincorporated Palm Beach County: ☐

10. Please provide a copy of Local Business Tax Receipts from Palm Beach County and the applicable municipality are attached. N/A

11. Please provide a Certificate of Good Standing indicating the formation or domestication of the entity in and for the State of Florida is attached. N/A

12. Please provide copies of licenses if applicable from the State of Florida authorizing the business to provide the good services or professional services contemplated in the bid documents. N/A

By signing below, I hereby certify that under penalty of perjury I believe my business qualifies as a Palm Beach County, Western Community or subcontractor utilization business in accordance with Wellington's Local Preference Policy and that I have submitted current and accurate information and documents relating to my qualifications. I further acknowledge and agree that any fraudulent or duplicitous information submitted in furtherance of this application will be grounds for disqualification from bidding on this project and doing business with Wellington in the future.

Applicants Federal Tax ID Number - N/A Applicants Business Address _____

Signature of Authorized Representative of Corporation, Partnership, or other business entity:

Print Name: Thomas A. Donnick, Jr.

Title: President

Date: March 11, 2019

CITY OF: Florida

COUNTY OF: St. Lucie

SUBSCRIBED AND SWORN TO (or affirmed) before me on this 11th day of March, 2019, by Thomas A. Donnick, Jr. He She is personally known to me or has presented

_____ as identification.

Donna L. Summerfield
(Signature of Notary)

Donna L. Summerfield
(Print or Stamp Name of Notary)

Notary Public Florida
(State)

DONNA L. SUMMERFIELD
Notary Public – State of Florida
Commission # GG 079581
My Comm. Expires May 18, 2021
Bonded through National Notary Assn.

Notary Seal

Signature of Individual if Sole Proprietor:

N/A

Print Name: _____

Date: _____

CITY OF: _____

COUNTY OF: _____

SUBSCRIBED AND SWORN TO (or affirmed) before me on this ____ day of _____, 201__, by _____. He/She is personally known to me or has presented

_____ as identification.

_____
(Signature of Notary)

_____
(Print or Stamp Name of Notary)

Notary Public _____
(State)

Notary Seal

CONFLICT OF INTEREST STATEMENT

This Proposal/Agreement (whichever is applicable) is subject to the conflict of interest provisions of the policies and Code of Ordinances of WELLINGTON, the Palm Beach County Code of Ethics, and the Florida Statutes. During the term of this Agreement and any renewals or extensions thereof, the VENDOR shall disclose to WELLINGTON any possible conflicts of interests. The VENDOR's duty to disclose is of a continuing nature and any conflict of interest shall be immediately brought to the attention of WELLINGTON. The terms below shall be defined in accordance with the policies and Code of Ordinances of WELLINGTON, the Palm Beach County Code of Ethics, and Ch. 112, Part III, Florida Statutes.

CHECK ALL THAT APPLY.

[X] To the best of our knowledge, the undersigned business has no potential conflict of interest for this Agreement due to any other clients, contracts, or property interests.

[X] To the best of our knowledge, the undersigned business has no employment or other contractual relationship with any WELLINGTON employee, elected official or appointed official.

[X] To the best of our knowledge, the undersigned business has no officer, director, partner or proprietor that is a WELLINGTON purchasing agent, other employee, elected official or appointed official. The term "purchasing agent", "elected official" or "appointed official", as used in this paragraph, shall include the respective individual's spouse or child, as defined in Ch. 112, Part III, Florida Statutes.

[X] To the best of our knowledge, no WELLINGTON employee, elected official or appointed official has a material or ownership interest (5% ownership) in our business. The term "employee", "elected official" and "appointed official", as used in this paragraph, shall include such respective individual's relatives and household members as described and defined in the Palm Beach County Code of Ethics.

[X] To the best of our knowledge, the undersigned business has no current clients that are presently subject to the jurisdiction of WELLINGTON's Planning, Zoning and Building Department.

CONFLICT:

[ ] The undersigned business, by attachment to this form, submits information which may be a potential conflict of interest due to any of the above listed reasons or otherwise.

THE UNDERSIGNED UNDERSTANDS AND AGREES THAT THE FAILURE TO CHECK THE APPROPRIATE BLOCKS ABOVE OR TO ATTACH THE DOCUMENTATION OF ANY POSSIBLE CONFLICTS OF INTEREST MAY RESULT IN DISQUALIFICATION OF YOUR BID PROPOSAL OR IN THE IMMEDIATE CANCELLATION OF YOUR AGREEMENT, WHICHEVER IS APPLICABLE.

Aerex Industries, Inc.
COMPANY NAME

AUTHORIZED SIGNATURE

Thomas A. Donnick, Jr.
NAME (PRINT OR TYPE)

President
TITLE

NON-COLLUSION AFFIDAVIT

State of Florida

County of St. Lucie

Being duly sworn deposes and says:

That he/she is an officer of the parties making the forgoing bid submittal, that such bid submittal is genuine and not collusive or sham, that said Bidder has not colluded, conspired, connived or agreed, directly or indirectly with any bidder or person, to put in a sham bid or to retrain from bidding and has not in any manner, directly, or indirectly, sought by agreement of collusion or communication or conference with any person, to fix the price of affiant or any other bidder, or to fix any overhead, profit of cost element of said price, or that of any other bidder, or to secure any advantage against the authority, of any person interested in the proposed contract and that all statements in said bid is true.

Aerex Industries, Inc.
Name of Bidder

Thomas A. Donnick, Jr.
Print name of designated signatory

Signature

President
Title

On this 11th day of March, 2019, before me appeared Thomas A. Donnik Jr personally known to me to be the person described in and who executed this Affidavit and acknowledged that (she/he) signed the name freely and voluntarily for the uses and purposes therein described.
In witness thereof, I have hereunto set my hand and affixed seal the day and year last written above.

DONNA L. SUMMERFIELD
Notary Public – State of Florida
Commission # GG 079581
My Comm. Expires May 18, 2021
Bonded through National Notary Assn.

(Affix Seal Here)

Donna L. Summerfield
Signature

Notary Public in and for the State of Florida

Donna L. Summerfield
(Name Printed)

Residing at Indian River County

My commission expires 05/18/2021

ITB 201902
Title: New Nanofiltration Membranes for Reverses Osmosis Plants 1 and 2
Opening Date: March 11, 2019 at 2:00pm
Addendum Date: March 5, 2019

ADDENDUM NO. ONE

PURPOSE: The purpose of this Addendum/NOTICE is to make changes, additions, deletions, revisions, and clarifications to the (ITB) Invitation to Bid documents for the New Nanofiltration Membranes for Reverses Osmosis Plants 1 and 2. Bidder shall review the Addendum/NOTICE work and requirements in detail and incorporate any effects the Addendum/NOTICE may have in their proposal price.

1. **Question: In review of the Technical Specification section 11251, A; it appears that the owner would like a bid using both membrane element suppliers. Should the bidder provide a "Schedule of Values" document for each or will the owner modify the existing "Schedule of Values" document to include both?**

   Response: Please use the Schedule of Values provided and fill out separately for each membrane manufacturer.

2. **Question: In review of the Technical Specification section 11251, C; trains 2, 3, 4, 5 & 7 are configured in a 18:9 array and train 6 in a 36:16 array. By our count we will remove and 1,122 elements and provide 3 spares listed in 11251, E, 4; for a total element count of 1,125. If correct, the quantity listed on the schedule of values document is incorrect.**

   Response: The count is 1,125. Please see revised Schedule of Values attached.

3. **Question: Technical Specification section 11251, D; refers to Harn RO Systems as the Installing Contractor and Weiss Construction as the General Contractor. Please advise.**

   Response: Weiss is the General Contractor on the Renewal and Replacement Contract. Harn is a subcontractor to Weiss and is the OEM under that Contract. Owner is seeking an OEM that we will contract with directly to supply and load all membranes in Trains 2-5,6 and 7.

4. **Question: In regards to this project, is there estimated budget established? Also, is there an approximate start date for when work will begin?**

   Response: Opinion of cost is $660,000. Anticipate the first delivery of membranes within 4 months.

5. **Clarification: The awarded contractor is required to provide a minimum of 90 calendar days notice to the Membrane Supplier of required delivery for less than 400 membranes and 120 calendar days for more than 400 membranes. Membranes for Train 7 and Train 6 are anticipated to be delivered between April 1, 2019 and June 30, 2019. Membranes for Trains 2-5 are anticipated to be delivered between June 1 and November 2019.**

ACKNOWLEDGEMENT: Bidder must acknowledge receipt of any and all Addenda in the space provided on the Bidder Submittal Form. Failure to do so may result in rejection of the Proposal. All requirements of the proposal documents remain unchanged except as cited herein.

Signature of Bidder Acknowledging Receipt of
Addendum No. (1) One to be attached in front of Bid

ITB 201902
Title: New Nanofiltration Membranes for Reverses Osmosis Plants 1 and 2
Opening Date: March 11, 2019 at 2:00pm
Addendum Date: March 7, 2019

ADDENDUM NO. TWO

PURPOSE: The purpose of this Addendum/NOTICE is to make changes, additions, deletions, revisions, and clarifications to the (ITB) Invitation to Bid documents for the New Nanofiltration Membranes for Reverses Osmosis Plants 1 and 2. Bidder shall review the Addendum/NOTICE work and requirements in detail and incorporate any effects the Addendum/NOTICE may have in their proposal price.

1. **Question: We are being told by one of the membrane element suppliers that the specifications are incorrect with the array for train 7. They have revised their projections from the 18:9 array specified to an 18:8 array. Please confirm**
   Response: Train 7 array will be 18:8 and not 18:9.

2. **Question: Please confirm that Trains 6&7 can be performance tested at the same time and that Trains 2-5 can be performance tested at the same time.**
   Response: All trains will be performance tested individually

3. **Question: Will bacteriological testing be a requirement of this project and if so, prior to performance testing? We do not see it mentioned in the specifications.**
   Response: The Membrane Supplier/OEM is responsible for all bacteriological testing requirements for Train 6 including necessary temporary piping to send the permeate to the concentrate system. Bacteriological testing for Trains 7,2-5 are the responsibility of the Owner's General Contractor and not the Membrane Supplier/OEM.

4. **Question: Please advise whether the owner or contractor will be responsible for trash dumpsters to dispose of the membrane elements being removed as well as debris from the new elements.**
   Response: The owner will be responsible.

5. **Question: Clarification: Addendum #1 changed the membrane count from 1119 to 1125. It is our understanding that the original count was correct. The initial membrane array for Train 7 that we are supplying is an 18:8 array not an 18:9 as described in the bid specification. Using an 18:8 array makes the total number of membranes required 1119.**
   Response: This is correct and modifies Addendum One. The correct number of membranes is 1,119 and Train 7 array is 18:8. Change Section 12251 on Page 13100-1, 1.01 C, last sentence from the current "18:9" to read "18:8". Please use the original Schedule of Values in the bid document.

6. **Question: Per section 11251, 1.02, B, 3, of the technical specifications, membrane element manufactures or models not listed in this specifications will not be accepted. Hydranautics has provided a proposal using the specified ESNA1-LF-LD membrane element but warns that it does not meet the specified permeate quality requirements. They have also provide an alternate proposal using their ESPA4LD membrane element which they claim is a lower priced option and will meet the performance requirements. Please advise.**

Response: This is a high rejection RO element and not suited for this application. Replace Table 1 - Water Quality, in Section 12251 on Page 13100-5, 1.02 A as shown below.

Component	*Current Feed Analysis, mg/l*	*Future Feed Analysis, mg/l*	*Permeate Quality*
Calcium	*142*	*163*	*13*
Magnesium	*19*	*22*	*2*
Sodium	*143*	*163*	*63*
Potassium	*0*	*0*	*0*
Barium	*0.02*	*0.02*	*0.003*
Strontium	*1.7*	*1.9*	*0.20*
Iron, Fe^{++}			-
Bicarbonate	*427*	*490*	*94*
Chloride	*218*	*250*	*77*
Sulfate	*83*	*95*	*5*
Silica, as SiO_2	*15*	*17*	*5*
TDS	*1048*	*1203*	*246*
Temperature, °F	*79*	*79*	*79*
pH	*7.0*	*7.0*	*7.0*

ACKNOWLEDGEMENT: Bidder must acknowledge receipt of any and all Addenda in the space provided on the Bidder Submittal Form. Failure to do so may result in rejection of the Proposal. All requirements of the proposal documents remain unchanged except as cited herein.

Signature of Bidder Acknowledging Receipt of
Addendum No. (2) Two to be attached in front of Bid

FILMTEC Membranes

FILMTEC™ Reverse Osmosis / Nanofiltration Element(s) Five-Year Prorated Limited Element Warranty

LIMITED WARRANTIES

FilmTec Corporation ("hereinafter FilmTec") provides limited warranties covering the materials, workmanship and performance of its spiral-wound FILMTEC™ reverse osmosis / nanofiltration elements[1,2] ("Element(s)"), when installed, operated and maintained by Customer in accordance with the terms and conditions set forth in the Warranty and in accordance with FilmTec's published documentation*. FilmTec has permitted the supplier ("Supplier") of the Elements, to assign this warranty to the Customer, but the Customer sole remedy under this warranty shall be against the supplying entity and not against FilmTec, unless FilmTec is the supplying entity. By accepting this warranty, the Customer agrees to the terms set forth in this warranty. Supplier includes either FilmTec in the event that FilmTec is the supplier of Elements or an affiliate of FilmTec that is the supplier of Elements.

[1] Elements used in food or dairy applications, and sulfate removal are not covered by this warranty.
[2] Nanofiltration elements shall be tested on magnesium sulfate when determining salt passage.

Limited Materials and Workmanship Warranty ("Workmanship Warranty")

Supplier warrants that the Element(s) are free from defects in materials and workmanship which might prevent the Element(s) to be installed, operated and maintained in accordance with FilmTec's published literature. This Workmanship Warranty shall be effective during the period beginning on the date of delivery of the Elements and ending twelve (12) months after the date of delivery. This Workmanship Warranty shall be deemed void if Customer does not install, operate and maintain the Element(s) in accordance with the requirements set forth in the warranty and in FilmTec's published specifications or fails to inform the Supplier of the defect within thirty (30) days from the date on which the defect is noticed or could have been noticed by Customer. Supplier's obligation under this Workmanship Warranty is limited to the repair or, at Supplier's discretion, replacement of any Element(s), which is determined by Supplier (as applicable) in its sole discretion, after examination, to be defective under this provision.

* FilmTec published literature and specifications mentioned in this Five-Year Prorated Limited Element Warranty include but are not limited to the FilmTec Technical Manual (Form No. 609-00071-0416), FilmTec Tech Facts (storage and shipping of new FILMTEC elements - Form No. 609-02103-0611, star-up of RO/NF installations - Form No. 609-02077-1208, Biofouling prevention - Form No. 609-02032-1004, Cleaning recommendations - Form No. 609-23010-0605, Form No.609-02090-611 and Form No. 609-02091-1005, Scaling prevention - Form No. 609-02019-1004, Form No. 609-02018-1004, Form No. 609-02020-1004) and Product Specifications.

Limited Initial Performance Warranty ("Initial Performance Warranty")

Supplier warrants that, after stabilization, the Element(s) will meet the initial minimum permeate flow and salt rejection under standard test conditions set forth in the specifications in Attachment A, until the first to occur of

(a) the first thirty (30) days after the first day of Customer's initial installation and use of any such Element(s) in Customer's system

(b) six (6) months after date of delivery of any such Element(s) to carrier at shipping point. This Initial Performance Warranty shall be deemed void if Customer does not notify Supplier in writing of the Element(s) failure within 30 days after the first day of operation.

Supplier's sole obligation under this Initial Performance Warranty is expressly limited to the repair or, at Supplier's discretion, replacement of any Element(s) that Supplier determines to be in breach of this Initial Performance Warranty upon Supplier's inspection. Failure or refusal to disclose to Supplier the use and operating parameters of Elements in the event of failure of performance shall render the Initial Performance Warranties null and void.

Prorated Performance Limited Warranty ("5Yr Performance Warranty")

Supplier warrants the performance of its elements for FIVE (5) YEARS from whichever of the following events occurs first:

ELEMENT SHIPPED WET

a. First use in system;
b. Three (3) months following date of shipment from Minneapolis to a location in the United States, Puerto Rico, Canada, and Mexico; or
c. Six (6) months following date of shipment to any other destination.

ELEMENTS SHIPPED DRY

a. First use in system;
b. Twelve (12) months following date of shipment.

Supplier warrants that the Element(s) will: (i) have a permeate flow of at least sixty percent (60%) of the average permeate flow specified in Attachment A; and (ii) have a maximum salt passage rate of no more than 1.45 x of the maximum salt passage rate specified in Attachment A. Please note that FilmTec's Proprietary Software (ROSA, WAVE) calculates the salt passage based on the stabilized salt rejection and not based on the minimum salt rejection or maximum salt passage.

If Supplier determines that the claims are valid, Supplier's sole obligation under this system performance warranty is expressly limited to, at Supplier's discretion, credit 1/60 of the original purchase price of the element for each unused month of the warranty period toward the purchase of a replacement element at the current prevailing price.

Conditions Voiding the initial performance warranty and the Five-Year Limited Performance Warranty

The FIVE (5) year limited performance warranty and the limited initial performance warranty described above shall be null and void if any of the following conditions are not met:

i) Customer does not record and maintain, according to Supplier instructions, the operational data according to Attachment B

ii) Customer fails to provide Supplier with the operational data upon request

iii) Customer does not install, operate and maintain the Element(s) in accordance with the specifications set forth in this warranty or in accordance with good engineering practices.

iv) Customer fails to meet any of the following conditions pertaining to any Element(s) and the system in which any Element(s) is used:

a. The design parameters (array, recovery, etc.) plus instrumentation and other components of the system in which the Element(s) are employed shall be consistent with sound engineering practice. Customer will allow Supplier to review the system design upon Supplier's request.
b. Feedwater temperature must be less than 113°F (45°C) unless otherwise stated in the product data sheet of the element(s) (attachment A) or in this warranty document.
c. Feedwater SDI (15 min., 30 psi) must be less than 5.0.
d. Feedwater must not contain any colloidal sulphur.
e. Feedwater must not contain any oxidizing agents including, without limitation, chlorine, ozone or permanganate.
f. The Element(s) must not be exposed to pressure greater than 1,200 psi for seawater Element(s)s, 600 psi for brackish water Element(s)s and 300 psi for tap water Element(s)s, unless otherwise stated in the product specification or unless otherwise indicated in this warranty document.
g. Backpressure (where permeate static pressure exceeds reject static pressure) must not exceed 5 psi at any time.
h. Sequestrants (and other chemicals used in the system) must be compatible with the Element(s).
i. The Element(s) must not be exposed to a pH of less than 2.0 or more than 11.0 during continuous operation, or a pH of less than 1.0 or more than 13.0 during cleaning unless otherwise indicated in the product specifications or in this warranty document. If pH adjustment is required, chemicals that are compatible with the Element(s) must be used.
j. The Element(s) must be operationally protected against excessive hydraulic changes including, without limitation, water hammer, and rapid pressure swings.
k. The Element(s) must be maintained in a clean condition and must not be contaminated by particulate matter, colloidal or precipitated solids, or biological growth; if scaling or fouling should occur, or normalized Element(s) flow decline of 10 percent, cleaning procedures must be employed in accordance with the procedures published in a literature piece entitled "Cleaning Procedures for FILMTEC FT30 Element(s)" (Form No. 609-23010-403QRP).
l. The system design, operating and maintenance procedures must contain adequate provisions to ensure against contamination by particulate matter, colloidal or precipitated solids, or biological growth.
m. There must not be scaling caused by failure of the chemical dosing system or ineffective scale- control practices. (e.g., Ca, Ba, or Sr salts).
n. The brine-soluble silica must be less than 150 mg/l at 25°C.

o. There must not be damage caused by chemical compounds (e.g. surfactants, solvents, soluble oils, free oils, lipids, and high molecular weight natural polymers).
p. Element(s) must only be cleaned with compatible chemicals and must not be cleaned with nonionic or cationic surfactants, or any other chemical that is not compatible with the Element(s).
q. Customer is responsible for providing the user with adequate system operating and maintenance manuals, operator and supervisor training; and ensuring user's ability to properly perform cleaning and other performance restoration and diagnostic procedures.
r. Customer is responsible for ensuring that frequent, adequate system and subsystem performance data are normalized and routinely recorded in a systematic format regularly reviewed. Customer will make this data available to Supplier on a reasonable basis in the event a claim is made against Supplier pursuant to the performance warranty.
s. Element(s) must be stored in accordance with FilmTec's published guidelines and specifications.
t. Permeate and concentrate obtained from the first hour of operation must be discharged.
u. Field preservation and cleaning of Element(s) must be done in accordance with FilmTec's published guidelines, provided to Customer by Supplier.
v. Element(s) must be stored in accordance with FilmTec's published guidelines.
w. Customer must keep Element(s) moist at all times after initial wetting.
x. Supplier will have the final decision on Element(s) replacement, or repair necessary to maintain output quality and quantity.
y. Customer's failure or refusal to disclose to Supplier the use and operating parameters of Elements in the event of failure of performance shall render this Performance Warranty null and void.
z. Failure of the customer to notify Supplier in writing of the Element(s) failure within 30 days after first non-compliance with performance standards set forth herein.

In addition all the foregoing warranties do not cover and shall be null and void if any of the following conditions are not met:

a) If Customer is not current on all payments due to Supplier, then this warranty is null and void.
b) Accidental and/or external caused damages and damages caused by improper use are excluded from these warranties. Accidental and/or external caused damages and damages caused by improper use are damages caused by but not limited to operation and/or exposure of Element(s) to conditions, outside the instructions and conditions listed in FilmTec's product datasheets and specifications and in this warranty document. If there is any dispute with respect to the above, the Customer should provide evidence to Supplier.
c) Expendable parts and components (e.g. o-rings) are specifically outside of this warranty
d) Damage or malfunction arising from repairs, replacement(s) or substitution(s) not specifically authorized by Supplier are specifically outside of this warranty.
e) Any defects or faults caused by, or resulting from, inaccurate or incomplete operating process information / process operating parameters, or work performed by the Customer or its authorized representative, are specifically excluded from these warranties.

f) If Customer does not furnish adequate and competent operating, supervisory and maintenance staff, and necessary laboratory facilities with test equipment and personnel, then this warranty is null and void.
g) Supplier understands that the Element(s) will be used as a part of a larger water or wastewater treatment process. Supplier must be given the opportunity, with a reasonable notice, to review engineering documents and attend testing and commissioning activities of all aspects of the water or wastewater treatment process which may affect membrane lifetime and performance, or this warranty is null and void. Neither a review of the engineering documents nor attendance of testing or commissioning nor the declining of the opportunity constitutes any responsibility for any aspect of the system.
h) In the case where the Customer and user are separate parties, the Customer has sole and exclusive responsibility for making the user aware of its responsibility under the conditions of these warranties. Failure of the Customer to meet its respective obligations set forth in this Limited Warranty may invalidate these warranties.

Exclusive Remedy & Limitation of Liability

1. Customer's exclusive remedy for any breach of any warranty set forth above is expressly limited to and shall be fully discharged by, at Supplier discretion, Supplier repairing a defective element or, at Suppliers discretion, replacing same at the then selling price not including freight, duty and taxes.
2. LIABILITY FOR CONSEQUENTIAL, PUNITIVE, SPECIAL, EXEMPLARY OR INCIDENTAL DAMAGES IS EXCLUDED AND CUSTOMER ASSUMES ALL RISKS AND LIABILITIES RESULTING FROM THE USE OF THE ELEMENTS IN CONTRAVENTION OF THIS WARRANTY
3. Prior to issuing any refund or shipping any replacement of Element(s), Supplier reserves the right to test the alleged defective Element(s) and systems on user's or Customer's premises, or to request Customer to perform such inspections or tests and forward the results thereof to Supplier.
4. If Element(s) failure is determined by Supplier to be from any cause other than breach of warranty as set forth above, Customer shall pay to Supplier a fee of US$1,000.00 per day, plus direct travel expenses incurred by Supplier's employees, in connection with any inspection and testing of such Element(s) and system on user's or Customer's premises.
5. Elements shipped to Supplier for warranty examination must be shipped freight prepaid. Elements examined as part of a warranty claim which are found to be performing as warranted will be returned to the Customer freight collect.
6. Failure or refusal by Customer to fully disclose to Supplier the use and operating parameters for the Element(s) as set forth in Attachment B, Mandatory Measurement and Recording of Operating Parameters, shall render all warranties other than that covering materials and workmanship null and void
7. Warranty of replacement Element(s) will be limited to the duration of this limited warranty.

Warranty Claim and Notice Procedures

Before returning any Element(s) to Supplier for warranty examination, Supplier must be contacted to obtain a service request number. Any Element(s) shipped to Supplier's facility without return documentation will be returned to shipper unopened, freight collected.

The following procedure shall be followed to determine warranty protection:

1. Customer shall send a written notice to Supplier within thirty (30) days of problem occurrence or the claim is waived.
2. Customer shall submit all relevant operating data requested by the Supplier.
3. Supplier will be provided a reasonable time to review the data and make initial recommendations in writing for further evaluation of the claim.
4. Customer will make all reasonable efforts to execute and implement the Supplier's recommendations and collect, record and submit all relevant data resulting from these recommendations.
5. In the event Supplier's initial recommendations do not address and solve the issues of the performance, the Customer will grant Supplier access to the system and a reasonable time to perform testing and evaluation of Element(s) conditions and performance.
6. In the event Supplier's recommendations address and solve the issues of the performance, the claim shall immediately be withdrawn and disposed.
7. In the case the Customer decides not to follow Supplier's recommendations then the performance claim will be withdrawn and disposed.

8. Any defective Element(s) shall be returned to the Supplier at the Customer expense if so requested by the Supplier in accordance to Supplier's return procedures.

Important Reminders

1. Formaldehyde is not recommended as preservation liquid and is not supported as a preservative for drinking water applications. The Element(s) must be in use for at least 24 hours of continuous operation before formaldehyde is used as a biocide. If such Element(s) are exposed to formaldehyde before this period, a severe loss in flux may result.

2. The use of Element(s) in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

Attachments

Attachment A, Element(s) Specifications

Attachment B, Mandatory Measurement and Recording of Operating Parameters

DOW FILMTEC™
Membranes
Contact Dow Water & Process Solutions:

North America:	1-800-447-4369
Latin America:	(+55) 11-5188-9222
Europe:	+800-3-694-6367
Italy:	+800-783-825
South Africa:	+0800 99 5078
Pacific:	+800 7776 7776
China:	+400 880 0780

http://www.dowwaterandprocess.com

Governing Law
This limited warranty agreement shall be governed by and constructed in accordance with the laws of the State of Michigan, including the Uniform Commercial Code as in effect in Michigan, without regard to conflict of laws provisions.

Non-assignment
The rights and duties under this limited warranty agreement are not assignable or transferable by either party without the other's written consent, except that Customer hereby consents to FilmTec's/Supplier's potential future assignment of some or all of Supplier's obligations hereunder to any affiliate of Supplier without further notice to Customer.

READ, UNDERSTOOD ANDAGREED

SUPPLYING ENTITY	Customer
By: _____	By: _____
Name: _____	Name: _____
Title: _____	Title: _____
Date: _____	Date: _____

Attachment A

FilmTec Corporation's Published Data Sheet Specifications

Product Data Sheet

DOW FILMTEC™ NF90-400/34i Element

Description

Ideal for: utility managers and operators looking for a technology that delivers high quality permeate water while removing specific contaminants such as salts, nitrates, iron, and organic compounds.

The DOW FILMTEC™ NF90-400/34i Element:

- Delivers high productivity and cleanability due to its high active area and widest cleaning pH range (1-13) tolerance
- Offers a nanofiltration technology that selectively removes these components, color and operates at low operating pressures
- Including iLEC™ interlocking end caps, reducing system operating costs and the risk of o-ring leaks that can cause poor water quality

Product Type

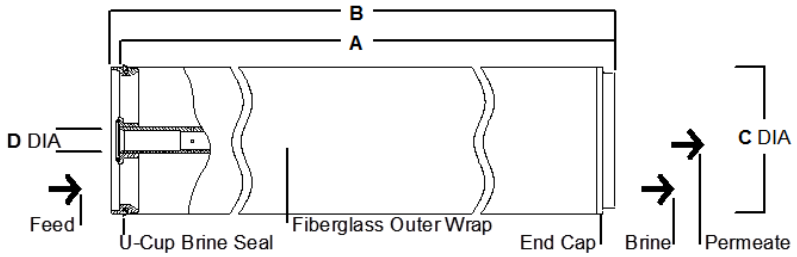
Spiral-wound element with polyamide thin-film composite membrane

Product Specifications

DOW FILMTEC™ Element	Active Area (ft^2)	Active Area (m^2)	Feed Spacer Thickness (mil)	Permeate Flow Rate (GPD)	Permeate Flow Rate (m^3/d)	Minimum Salt Rejection (%)
NF90-400/34i	400	37	34-LDP	10,000	38	98.7%

1. Permeate flow and salt passage based on the following test conditions: 2,000 mg/l $MgSO_4$, 70 psi (4.8 bar), 77°F (25°C) and 15% recovery.
2. Flow rates for individual elements may vary but will be no more than ±15%.
3. Stabilized salt rejection is generally achieved within 24-48 hours of continuous use; depending upon feedwater characteristics and operating conditions.
4. Sales specifications may vary as design revisions take place.
5. Active area guaranteed ± 3%. Active area as stated by Dow Water & Process Solutions is not comparable to nominal membrane area often stated by some manufacturers. Measurement method described in Form No. 609-00434.

Element Dimensions



DOW FILMTEC™ Element	A (in.)	A (mm)	B (in.)	B (mm)	C (in.)	C (mm)	D (in.)	D (mm)
NF90-400/34i	40.0	1,016	40.5	1,029	7.9	201	1.125 ID	29 ID

1. Refer to Dow Water & Process Solutions Design Guidelines for multiple-element applications. 1 inch = 25.4 mm
2. Element to fit nominal 8-inch (203-mm) I.D. pressure vessel.
3. Individual elements with *iLEC* endcaps measure 40.5 inches (1,029 mm) in length (B). The net length (A) of the elements when connected is 40.0 inches (1,016 mm).

Form No. 609-50106, Rev. 3
February 2018

Operating and Cleaning Limits

Maximum Operating Temperature [a]	113°F (45°C)
Maximum Operating Pressure	600 psig (41 bar)
Maximum Element Pressure Drop	15 psig (1.0 bar)
pH Range, Continuous Operation [a]	2 – 11
pH Range, Short-Term Cleaning (30 min.) [b]	1 – 13
Maximum Feed Silt Density Index (SDI)	SDI 5
Free Chlorine Tolerance [c]	< 0.1 ppm

[a] Maximum temperature for continuous operation above pH 10 is 95°F (35°C).

[b] Refer to Cleaning Guidelines in specification sheet 609-23010.

[c] Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty, Dow Water & Process Solutions recommends removing residual free chlorine by pretreatment prior to membrane exposure. Please refer to technical bulletin "Dechlorinating Feedwater" for more information.

Additional Important Information

Before use or storage, review these additional resources for important information:

- Usage Guidelines for DOW FILMTEC™ 8" Elements
- System Operation: Initial Start-Up
- Permeate obtained from first hour of operation should be discarded

Regulatory Note

These membranes may be subject to drinking water application restrictions in some countries; please check the application status before use and sale.

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products—from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support.

DOW FILMTEC™ Membranes
Contact Dow Water & Process Solutions:

North America:	1-800-447-4369
Latin America:	(+55) 11-5188-9222
Europe:	+800-3-694-6367
Italy:	+800-783-825
South Africa:	+0800 99 5078
Pacific:	+800 7776 7776
China:	+400 889-0789

http://www.dowwaterandprocess.com

Notice: The use of this product in and of itself does not necessarily guarantee the removal of cysts and pathogens from water. Effective cyst and pathogen reduction is dependent on the complete system design and on the operation and maintenance of the system.

Form No. 609-50106, Rev. 3
February 2018

Attachment B

FILMTEC Membranes

Mandatory Measurement and Recording of Operating Parameters

From the effective date of the Initial Performance Warranty and 5Yr Performance Warranty the following items shall be accurately recorded by continuous on-line recording equipment, and/or by manual measurement and recording at least once per operator shift, for each train:

(a) Continuous on-line recording

i) Raw and acidified feedwater pH value
ii) Conductivity of feedwater and permeate
iii) Feedwater residual chlorine concentration.
iv) Feedwater pressure.
v) Combined total permeate flow rate and conductivity.
vi) Acid dosing rate (if used).
vii) Antiscalant dosing rate.
viii) Feedwater temperature.
ix) Permeate Pressure
x) Differential pressure between feed and concentrate (dp)

If the system consists of more than one stage or more than one pass, in addition to the parameters listed above, the following parameters will be required as well for each individual stage of every pass:

xi) Feed Pressure, Permeate pressure and dp.
xii) Feed and permeate conductivity
xiii) Feed and permeate flow

(b) Manual measurement / lab testing and recording at least one (1) time per day

i) All items of continuous recording listed above.
ii) Feed water Silt Density Index, SDI (15min, 30psi).
iii) Recovery rate.
iv) Train flow balance (total feed, concentrate and permeate).
v) Train mass balance (total feed, concentrate and permeate).
vi) Train chloride ion balance (total feed, concentrate and permeate).

(c) laboratory measurement and recording at least once per month

i) total dissolved solids of feedwater, brine and permeate
ii) complete feedwater analysis for the constituents listed in the water analysis.

(d) calibration check of all sensors of continuous recording shall be done at least once per month.

Customer shall document and maintain the data in a systematic and presentable format, and shall make the data available to Supplier at Supplier's request.

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

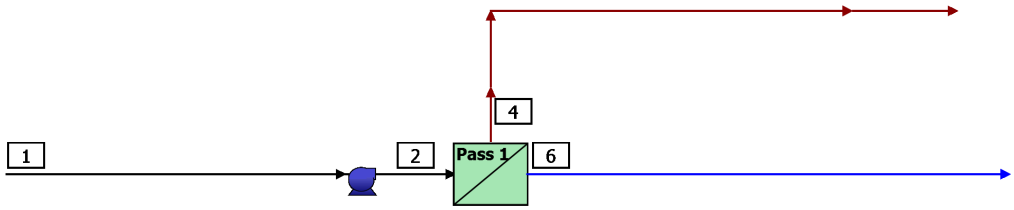
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO1
Case Name:	TR 2-5 - Start-up
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 08, 2019
Project Notes:	
Case #:	1 of: 6
Case Notes:	Case 1
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	816.9	1,050	0.0
2	Net Feed to Pass 1	816.7	1,050	81.0
4	Total Concentrate from Pass 1	122.6	6,332	68.7
6	Net Product from RO System	694.3	113.1	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	816.9	Net Product =	694.3		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		162
Total Active Area	(ft^2)	64800
Feed Flow per Pass	(gpm)	816.7
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	81.0
Flow Factor		1.00
Permeate Flow per Pass	(gpm)	694.3
Pass Average flux	(gfd)	15.4
Permeate TDS[a]	(mg/L)	113.1
Pass Recovery		85.0 %
Average NDP	(psi)	36.5
Specific Energy	(kWh/kgal)	0.87
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	816.7	0.00	81.0	0.0	293.0	73.6	7.4	523.8	17.5	21.0	70.35
2	NF90-400/34i	9	6	293.0	0.00	73.6	0.0	122.6	68.7	4.9	170.5	11.4	9.0	244.7

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	370.1	808.8	15.95	54.48	25.41
Mg^{+2}	19.00	51.50	119.0	0.82	2.91	1.33
Ca^{+2}	142.0	385.3	891.2	5.92	21.21	9.68
Sr^{+2}	1.70	4.61	10.67	0.07	0.25	0.12
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	4.14	24.11	0.00	0.01	0.00
HCO_3^-	427.0	1,147	2,610	20.83	74.03	33.88
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	565.8	1,236	24.43	83.36	38.89
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	228.8	539.6	1.44	5.23	2.37
SiO_2	15.00	40.25	91.70	0.88	3.22	1.45
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.98	60.29	50.56	53.67	51.34
TDS[a]	1,050	2,798	6,332	70.35	244.7	113.1
pH	7.0	7.4	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	13.0	45.4	81.0	1,050	39.5	5.88	21.2	38.81
1	2	NF90-400/34i	13.8	39.5	79.0	1,201	34.0	5.47	19.7	47.65
1	3	NF90-400/34i	14.9	34.0	77.4	1,386	29.0	5.07	18.2	59.31
1	4	NF90-400/34i	16.1	29.0	76.1	1,617	24.3	4.67	16.8	75.14
1	5	NF90-400/34i	17.5	24.3	75.0	1,913	20.1	4.24	15.3	97.62
1	6	NF90-400/34i	18.8	20.1	74.2	2,297	16.3	3.77	13.6	130.7
2	1	NF90-400/34i	14.0	32.6	73.6	2,798	28.0	4.55	16.4	127.7
2	2	NF90-400/34i	14.1	28.0	72.3	3,230	24.1	3.96	14.3	165.1
2	3	NF90-400/34i	14.1	24.1	71.3	3,734	20.7	3.39	12.2	216.4
2	4	NF90-400/34i	13.7	20.7	70.4	4,308	17.8	2.83	10.2	286.9
2	5	NF90-400/34i	13.1	17.8	69.7	4,945	15.5	2.33	8.4	382.7
2	6	NF90-400/34i	12.2	15.5	69.2	5,628	13.6	1.88	6.8	511.2

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,332
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,610
CO_2 (mg/l)	50.34	60.29
CO_3^{-2} (mg/L)	0.48	24.11
$CaSO_4$ (% saturation)	2.3	37.6
$BaSO_4$ (% saturation)	41.1	442.3
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	72.1
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	122.6	0.0000	0.00	0.00
Total Non-product Feed Water Cost	122.6		0.00	0.00
Waste Water Disposal				
Pass 1	122.6	0.0000	0.00	0.00
Total Waste Water Disposal	122.6		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	36.1
Energy	(kWh/d)	865.2
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	77.9
Specific Energy	(kWh/kgal)	0.87

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	816.73	36.05	865.15	77.86
Pass 1 Total Electrical Cost		36.05	865.15	77.86

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	77.9
Specific Water Cost	($/kgal)	0.078

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

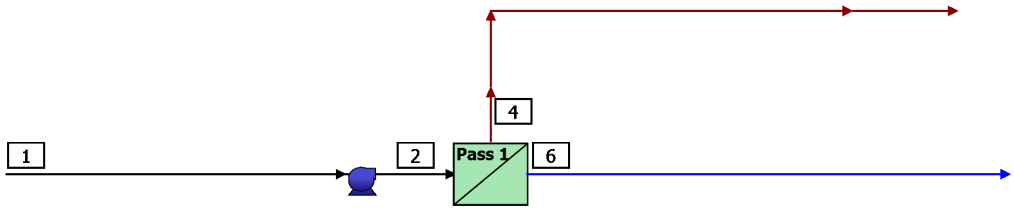
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO1
Case Name:	TR 2-5 - end of Yr 1
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 08, 2019
Project Notes:	
Case #:	2 of: 6
Case Notes:	Case 2
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	816.9	1,050	0.0
2	Net Feed to Pass 1	816.7	1,050	82.7
4	Total Concentrate from Pass 1	122.6	6,334	70.3
6	Net Product from RO System	694.3	112.6	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	816.9	Net Product =	694.3		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		162
Total Active Area	(ft^2)	64800
Feed Flow per Pass	(gpm)	816.7
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	82.7
Flow Factor		0.95
Permeate Flow per Pass	(gpm)	694.3
Pass Average flux	(gfd)	15.4
Permeate TDS[a]	(mg/L)	112.6
Pass Recovery		85.0 %
Average NDP	(psi)	38.2
Specific Energy	(kWh/kgal)	0.88
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	816.7	0.00	82.7	0.0	295.5	75.2	7.5	521.4	17.4	21.0	70.19
2	NF90-400/34i	9	6	295.5	0.00	75.2	0.0	122.6	70.3	4.9	172.9	11.5	9.0	240.8

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	367.3	809.3	15.92	53.62	25.31
Mg^{+2}	19.00	51.09	119.1	0.82	2.86	1.33
Ca^{+2}	142.0	382.2	891.4	5.91	20.86	9.63
Sr^{+2}	1.70	4.58	10.67	0.07	0.25	0.12
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	4.07	24.11	0.00	0.01	0.00
HCO_3^-	427.0	1,138	2,611	20.78	72.82	33.72
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	561.4	1,237	24.38	82.04	38.74
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	227.0	539.6	1.43	5.14	2.36
SiO_2	15.00	39.93	91.73	0.88	3.17	1.45
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.95	60.30	50.56	53.64	51.33
TDS[a]	1,050	2,776	6,334	70.19	240.8	112.6
pH	7.0	7.4	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.8	45.4	82.7	1,050	39.6	5.80	20.9	39.12
1	2	NF90-400/34i	13.7	39.6	80.7	1,198	34.2	5.41	19.5	47.83
1	3	NF90-400/34i	14.7	34.2	79.1	1,380	29.1	5.03	18.1	59.25
1	4	NF90-400/34i	16.0	29.1	77.7	1,608	24.5	4.66	16.8	74.75
1	5	NF90-400/34i	17.4	24.5	76.7	1,900	20.2	4.25	15.3	96.61
1	6	NF90-400/34i	18.8	20.2	75.8	2,279	16.4	3.81	13.7	128.8
2	1	NF90-400/34i	13.8	32.8	75.2	2,776	28.3	4.54	16.4	126.5
2	2	NF90-400/34i	14.1	28.3	73.9	3,201	24.3	3.99	14.4	162.6
2	3	NF90-400/34i	14.1	24.3	72.9	3,698	20.9	3.43	12.4	212.0
2	4	NF90-400/34i	13.9	20.9	72.0	4,270	18.0	2.90	10.4	279.9
2	5	NF90-400/34i	13.3	18.0	71.3	4,911	15.6	2.40	8.6	372.7
2	6	NF90-400/34i	12.5	15.6	70.8	5,606	13.6	1.95	7.0	497.4

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,334
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,611
CO_2 (mg/l)	50.34	60.30
CO_3^{-2} (mg/L)	0.48	24.11
$CaSO_4$ (% saturation)	2.3	37.6
$BaSO_4$ (% saturation)	41.1	442.3
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	72.1
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	122.6	0.0000	0.00	0.00
Total Non-product Feed Water Cost	122.6		0.00	0.00
Waste Water Disposal				
Pass 1	122.6	0.0000	0.00	0.00
Total Waste Water Disposal	122.6		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	36.8
Energy	(kWh/d)	883.1
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	79.5
Specific Energy	(kWh/kgal)	0.88

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	816.72	36.79	883.05	79.47
Pass 1 Total Electrical Cost		36.79	883.05	79.47

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	79.5
Specific Water Cost	($/kgal)	0.080

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

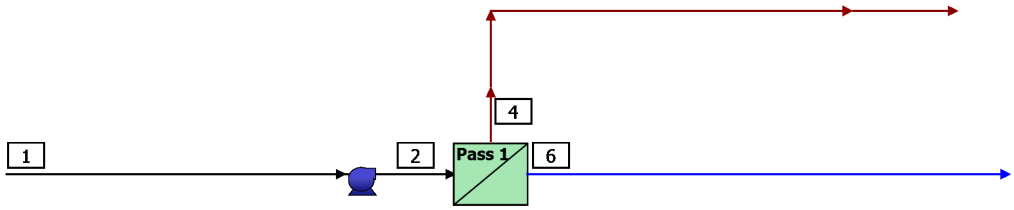
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO1
Case Name:	TR 2-5 - end of Yr 2
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 08, 2019
Project Notes:	
Case #:	3 of: 6
Case Notes:	Case 3
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	817.1	1,050	0.0
2	Net Feed to Pass 1	816.9	1,050	84.5
4	Total Concentrate from Pass 1	122.7	6,335	72.1
6	Net Product from RO System	694.4	112.1	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	817.1	Net Product =	694.4		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		162
Total Active Area	(ft^2)	64800
Feed Flow per Pass	(gpm)	816.9
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	84.5
Flow Factor		0.90
Permeate Flow per Pass	(gpm)	694.4
Pass Average flux	(gfd)	15.4
Permeate TDS[a]	(mg/L)	112.1
Pass Recovery		85.0 %
Average NDP	(psi)	40.2
Specific Energy	(kWh/kgal)	0.90
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	816.9	0.00	84.5	0.0	298.0	77.0	7.5	519.0	17.3	21.0	70.02
2	NF90-400/34i	9	6	298.0	0.00	77.0	0.0	122.7	72.1	5.0	175.4	11.7	9.0	236.8

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	364.4	809.7	15.89	52.76	25.20
Mg^{+2}	19.00	50.68	119.1	0.82	2.81	1.32
Ca^{+2}	142.0	379.1	891.4	5.89	20.51	9.59
Sr^{+2}	1.70	4.54	10.67	0.07	0.25	0.11
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	4.00	24.11	0.00	0.01	0.00
HCO_3^-	427.0	1,129	2,611	20.72	71.60	33.55
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	557.1	1,238	24.32	80.72	38.57
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	225.1	539.5	1.43	5.06	2.34
SiO_2	15.00	39.61	91.74	0.87	3.11	1.44
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.91	60.31	50.55	53.60	51.33
TDS[a]	1,050	2,754	6,335	70.02	236.8	112.1
pH	7.0	7.4	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.6	45.4	84.5	1,050	39.7	5.72	20.6	39.44
1	2	NF90-400/34i	13.5	39.7	82.6	1,196	34.3	5.36	19.3	47.98
1	3	NF90-400/34i	14.6	34.3	80.9	1,375	29.3	5.00	18.0	59.20
1	4	NF90-400/34i	15.9	29.3	79.6	1,599	24.7	4.64	16.7	74.34
1	5	NF90-400/34i	17.3	24.7	78.5	1,886	20.4	4.27	15.4	95.61
1	6	NF90-400/34i	18.8	20.4	77.7	2,260	16.6	3.84	13.8	126.9
2	1	NF90-400/34i	13.7	33.1	77.0	2,754	28.6	4.54	16.4	125.3
2	2	NF90-400/34i	14.0	28.6	75.7	3,171	24.6	4.01	14.5	160.2
2	3	NF90-400/34i	14.2	24.6	74.7	3,661	21.1	3.48	12.5	207.6
2	4	NF90-400/34i	14.1	21.1	73.8	4,230	18.1	2.96	10.7	273.0
2	5	NF90-400/34i	13.6	18.1	73.1	4,875	15.7	2.47	8.9	362.5
2	6	NF90-400/34i	12.9	15.7	72.5	5,584	13.6	2.02	7.3	484.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,335
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,611
CO_2 (mg/l)	50.34	60.31
CO_3^{-2} (mg/L)	0.48	24.11
$CaSO_4$ (% saturation)	2.3	37.6
$BaSO_4$ (% saturation)	41.1	442.1
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	72.1
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	122.7	0.0000	0.00	0.00
Total Non-product Feed Water Cost	122.7		0.00	0.00
Waste Water Disposal				
Pass 1	122.7	0.0000	0.00	0.00
Total Waste Water Disposal	122.7		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	37.6
Energy	(kWh/d)	903.4
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	81.3
Specific Energy	(kWh/kgal)	0.90

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	816.91	37.64	903.36	81.30
Pass 1 Total Electrical Cost		37.64	903.36	81.30

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	81.3
Specific Water Cost	($/kgal)	0.081

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

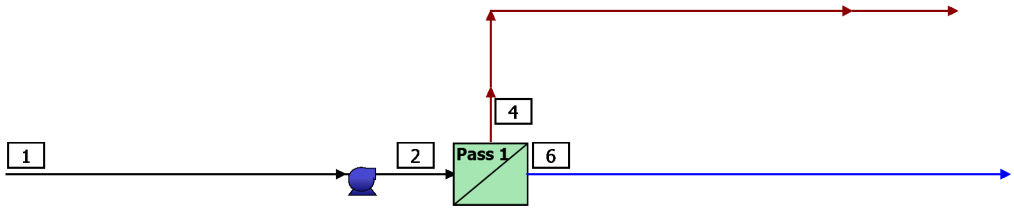
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO1
Case Name:	TR 2-5 - end of Yr 3
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 08, 2019
Project Notes:	
Case #:	4 of: 6
Case Notes:	Case 4
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	817.1	1,050	0.0
2	Net Feed to Pass 1	816.9	1,050	86.6
4	Total Concentrate from Pass 1	122.7	6,338	74.1
6	Net Product from RO System	694.4	111.6	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	817.1	Net Product =	694.4		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		162
Total Active Area	(ft^2)	64800
Feed Flow per Pass	(gpm)	816.9
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	86.6
Flow Factor		0.85
Permeate Flow per Pass	(gpm)	694.4
Pass Average flux	(gfd)	15.4
Permeate TDS[a]	(mg/L)	111.6
Pass Recovery		85.0 %
Average NDP	(psi)	42.3
Specific Energy	(kWh/kgal)	0.93
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	816.9	0.00	86.6	0.0	300.6	79.1	7.6	516.5	17.2	21.0	69.86
2	NF90-400/34i	9	6	300.6	0.00	79.1	0.0	122.7	74.1	5.0	177.9	11.9	9.0	232.9

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	361.5	810.3	15.85	51.90	25.09
Mg^{+2}	19.00	50.26	119.1	0.81	2.76	1.31
Ca^{+2}	142.0	376.0	891.7	5.88	20.17	9.54
Sr^{+2}	1.70	4.50	10.67	0.07	0.24	0.11
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	3.93	24.13	0.00	0.01	0.00
HCO_3^-	427.0	1,120	2,612	20.67	70.40	33.39
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	552.6	1,239	24.27	79.41	38.40
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	223.2	539.5	1.42	4.97	2.33
SiO_2	15.00	39.28	91.79	0.87	3.06	1.43
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.88	60.32	50.55	53.57	51.33
TDS[a]	1,050	2,732	6,338	69.86	232.9	111.6
pH	7.0	7.3	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.4	45.4	86.6	1,050	39.7	5.64	20.3	39.77
1	2	NF90-400/34i	13.3	39.7	84.7	1,194	34.4	5.30	19.1	48.18
1	3	NF90-400/34i	14.4	34.4	83.0	1,370	29.5	4.97	17.9	59.14
1	4	NF90-400/34i	15.7	29.5	81.7	1,590	24.8	4.63	16.7	73.93
1	5	NF90-400/34i	17.2	24.8	80.6	1,873	20.6	4.28	15.4	94.64
1	6	NF90-400/34i	18.8	20.6	79.7	2,242	16.7	3.87	13.9	125.0
2	1	NF90-400/34i	13.6	33.4	79.1	2,731	28.9	4.54	16.3	124.2
2	2	NF90-400/34i	14.0	28.9	77.8	3,140	24.8	4.04	14.5	157.8
2	3	NF90-400/34i	14.2	24.8	76.7	3,624	21.3	3.53	12.7	203.4
2	4	NF90-400/34i	14.2	21.3	75.8	4,190	18.3	3.03	10.9	266.1
2	5	NF90-400/34i	13.9	18.3	75.1	4,839	15.7	2.54	9.2	352.7
2	6	NF90-400/34i	13.3	15.7	74.5	5,562	13.6	2.09	7.5	470.7

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,338
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,612
CO_2 (mg/l)	50.34	60.32
CO_3^{-2} (mg/L)	0.48	24.13
$CaSO_4$ (% saturation)	2.3	37.6
$BaSO_4$ (% saturation)	41.1	442.2
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	72.2
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	122.7	0.0000	0.00	0.00
Total Non-product Feed Water Cost	122.7		0.00	0.00
Waste Water Disposal				
Pass 1	122.7	0.0000	0.00	0.00
Total Waste Water Disposal	122.7		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	38.6
Energy	(kWh/d)	925.9
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	83.3
Specific Energy	(kWh/kgal)	0.93

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	816.90	38.58	925.91	83.33
Pass 1 Total Electrical Cost		38.58	925.91	83.33

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	83.3
Specific Water Cost	($/kgal)	0.083

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

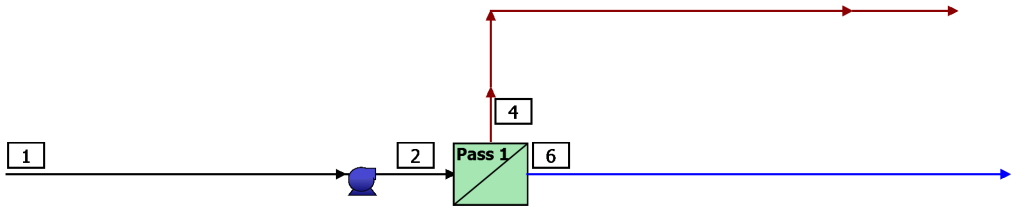
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO1
Case Name:	TR 2-5 - end of Yr 4
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 08, 2019
Project Notes:	
Case #:	5 of: 6
Case Notes:	Case 5
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	817.2	1,050	0.0
2	Net Feed to Pass 1	816.9	1,050	89.0
4	Total Concentrate from Pass 1	122.7	6,340	76.4
6	Net Product from RO System	694.4	111.1	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	817.2	Net Product =	694.4		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		162
Total Active Area	(ft^2)	64800
Feed Flow per Pass	(gpm)	816.9
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	89.0
Flow Factor		0.80
Permeate Flow per Pass	(gpm)	694.4
Pass Average flux	(gfd)	15.4
Permeate TDS[a]	(mg/L)	111.1
Pass Recovery		85.0 %
Average NDP	(psi)	44.7
Specific Energy	(kWh/kgal)	0.95
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	816.9	0.00	89.0	0.0	303.2	81.4	7.6	513.8	17.1	21.0	69.71
2	NF90-400/34i	9	6	303.2	0.00	81.4	0.0	122.7	76.4	5.1	180.5	12.0	9.0	229.0

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	358.6	810.9	15.82	51.03	24.98
Mg^{+2}	19.00	49.83	119.1	0.81	2.72	1.31
Ca^{+2}	142.0	372.8	891.8	5.86	19.82	9.49
Sr^{+2}	1.70	4.46	10.68	0.07	0.24	0.11
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	3.85	24.14	0.00	0.01	0.00
HCO_3^-	427.0	1,111	2,612	20.62	69.18	33.23
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	548.1	1,239	24.23	78.08	38.23
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	221.3	539.5	1.42	4.88	2.32
SiO_2	15.00	38.95	91.82	0.87	3.00	1.42
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.85	60.33	50.54	53.53	51.33
TDS[a]	1,050	2,709	6,340	69.71	229.0	111.1
pH	7.0	7.3	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.3	45.4	89.0	1,050	39.8	5.56	20.0	40.12
1	2	NF90-400/34i	13.2	39.8	87.1	1,191	34.6	5.24	18.9	48.38
1	3	NF90-400/34i	14.3	34.6	85.4	1,364	29.7	4.93	17.8	59.12
1	4	NF90-400/34i	15.6	29.7	84.1	1,581	25.0	4.62	16.6	73.53
1	5	NF90-400/34i	17.1	25.0	83.0	1,859	20.8	4.29	15.4	93.65
1	6	NF90-400/34i	18.8	20.8	82.1	2,223	16.8	3.90	14.1	123.2
2	1	NF90-400/34i	13.5	33.7	81.4	2,709	29.2	4.53	16.3	123.0
2	2	NF90-400/34i	13.9	29.2	80.1	3,110	25.1	4.06	14.6	155.3
2	3	NF90-400/34i	14.3	25.1	79.0	3,586	21.5	3.58	12.9	199.1
2	4	NF90-400/34i	14.4	21.5	78.1	4,149	18.4	3.10	11.2	259.3
2	5	NF90-400/34i	14.2	18.4	77.4	4,801	15.8	2.62	9.4	342.6
2	6	NF90-400/34i	13.7	15.8	76.8	5,537	13.6	2.17	7.8	457.2

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,340
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,612
CO_2 (mg/l)	50.34	60.33
CO_3^{-2} (mg/L)	0.48	24.14
$CaSO_4$ (% saturation)	2.3	37.6
$BaSO_4$ (% saturation)	41.1	442.1
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	72.2
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	122.7	0.0000	0.00	0.00
Total Non-product Feed Water Cost	122.7		0.00	0.00
Waste Water Disposal				
Pass 1	122.7	0.0000	0.00	0.00
Total Waste Water Disposal	122.7		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	39.7
Energy	(kWh/d)	951.5
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	85.6
Specific Energy	(kWh/kgal)	0.95

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	816.91	39.65	951.53	85.64
Pass 1 Total Electrical Cost		39.65	951.53	85.64

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	85.6
Specific Water Cost	($/kgal)	0.086

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

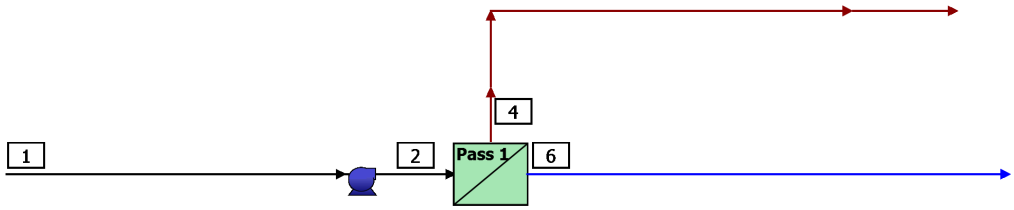
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO1
Case Name:	TR 2-5 - end of Yr 5
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 08, 2019
Project Notes:	
Case #:	6 of: 6
Case Notes:	Case 6
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	816.9	1,050	0.0
2	Net Feed to Pass 1	816.7	1,050	91.8
4	Total Concentrate from Pass 1	122.6	6,347	79.0
6	Net Product from RO System	694.3	110.6	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	816.9	Net Product =	694.3		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		162
Total Active Area	(ft^2)	64800
Feed Flow per Pass	(gpm)	816.7
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	91.8
Flow Factor		0.75
Permeate Flow per Pass	(gpm)	694.3
Pass Average flux	(gfd)	15.4
Permeate TDS[a]	(mg/L)	110.6
Pass Recovery		85.0 %
Average NDP	(psi)	47.5
Specific Energy	(kWh/kgal)	0.98
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	816.7	0.00	91.8	0.0	305.7	84.1	7.6	511.1	17.0	21.0	69.58
2	NF90-400/34i	9	6	305.7	0.00	84.1	0.0	122.6	79.0	5.1	183.2	12.2	9.0	225.2

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	355.7	812.0	15.80	50.20	24.87
Mg^{+2}	19.00	49.42	119.2	0.81	2.67	1.30
Ca^{+2}	142.0	369.7	892.7	5.85	19.49	9.45
Sr^{+2}	1.70	4.43	10.69	0.07	0.23	0.11
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	3.79	24.19	0.00	0.01	0.00
HCO_3^-	427.0	1,102	2,615	20.57	68.04	33.08
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	543.8	1,241	24.19	76.81	38.07
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	219.4	540.0	1.42	4.80	2.31
SiO_2	15.00	38.63	91.92	0.87	2.95	1.42
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.82	60.37	50.54	53.50	51.33
TDS[a]	1,050	2,687	6,347	69.58	225.2	110.6
pH	7.0	7.3	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.1	45.4	91.8	1,050	39.9	5.48	19.7	40.49
1	2	NF90-400/34i	13.0	39.9	89.8	1,189	34.7	5.18	18.7	48.60
1	3	NF90-400/34i	14.1	34.7	88.1	1,359	29.8	4.90	17.6	59.08
1	4	NF90-400/34i	15.4	29.8	86.8	1,572	25.2	4.60	16.6	73.17
1	5	NF90-400/34i	17.0	25.2	85.7	1,846	20.9	4.29	15.5	92.76
1	6	NF90-400/34i	18.8	20.9	84.8	2,205	17.0	3.93	14.2	121.5
2	1	NF90-400/34i	13.3	34.0	84.1	2,687	29.4	4.53	16.3	121.9
2	2	NF90-400/34i	13.9	29.4	82.8	3,080	25.4	4.08	14.7	153.0
2	3	NF90-400/34i	14.3	25.4	81.7	3,550	21.7	3.63	13.1	195.1
2	4	NF90-400/34i	14.6	21.7	80.8	4,109	18.6	3.17	11.4	252.8
2	5	NF90-400/34i	14.5	18.6	80.1	4,764	15.9	2.70	9.7	333.2
2	6	NF90-400/34i	14.2	15.9	79.5	5,515	13.6	2.25	8.1	444.4

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,347
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,615
CO_2 (mg/l)	50.34	60.36
CO_3^{-2} (mg/L)	0.48	24.19
$CaSO_4$ (% saturation)	2.3	37.6
$BaSO_4$ (% saturation)	41.1	442.5
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	72.3
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	122.6	0.0000	0.00	0.00
Total Non-product Feed Water Cost	122.6		0.00	0.00
Waste Water Disposal				
Pass 1	122.6	0.0000	0.00	0.00
Total Waste Water Disposal	122.6		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	40.9
Energy	(kWh/d)	980.5
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	88.2
Specific Energy	(kWh/kgal)	0.98

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	816.70	40.85	980.49	88.24
Pass 1 Total Electrical Cost		40.85	980.49	88.24

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	88.2
Specific Water Cost	($/kgal)	0.088

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

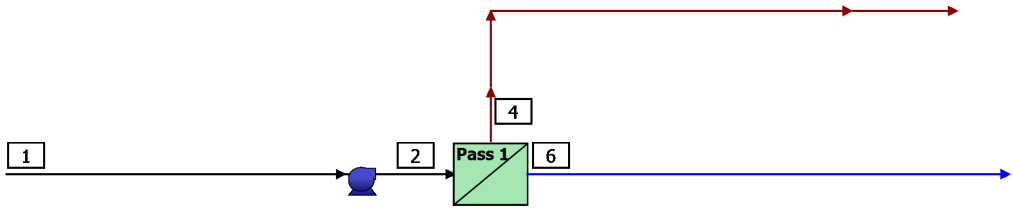
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2 Tr6
Case Name:	Start-up
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	February 22, 2019
Project Notes:	
Case #:	1 of: 6
Case Notes:	Case 1
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	1,471	1,050	0.0
2	Net Feed to Pass 1	1,470	1,050	70.4
4	Total Concentrate from Pass 1	220.8	6,257	60.3
6	Net Product from RO System	1,250	126.1	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	1,471	Net Product =	1,250		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		312
Total Active Area	(ft^2)	124800
Feed Flow per Pass	(gpm)	1,470
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	70.4
Flow Factor		1.00
Permeate Flow per Pass	(gpm)	1,250
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	126.1
Pass Recovery		85.0 %
Average NDP	(psi)	33.9
Specific Energy	(kWh/kgal)	0.75
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	36	6	1,470	0.00	70.4	0.0	424.7	64.4	5.9	1,046	17.4	9.0	79.85
2	NF90-400/34i	16	6	424.7	0.00	64.4	0.0	220.8	60.3	4.1	203.9	7.6	9.0	363.4

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	450.9	793.1	17.99	80.29	28.16
Mg^{+2}	19.00	63.47	118.1	0.94	4.33	1.50
Ca^{+2}	142.0	475.0	884.2	6.79	31.84	10.88
Sr^{+2}	1.70	5.69	10.59	0.08	0.38	0.13
Ba^{+2}	0.02	0.07	0.12	0.00	0.00	0.00
CO_3^{-2}	0.48	6.48	23.67	0.00	0.03	0.00
HCO_3^-	427.0	1,410	2,587	23.84	110.9	38.03
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	689.2	1,212	27.55	122.8	43.09
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	283.3	537.7	1.66	7.89	2.68
SiO_2	15.00	49.50	90.64	0.99	4.94	1.64
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	53.06	60.05	50.67	54.59	51.32
TDS[a]	1,050	3,434	6,257	79.85	363.4	126.1
pH	7.0	7.4	7.6	5.8	6.4	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

Design Warning		Limit	Value	Pass	Stage	Element	Product
Concentrate Flow Rate < Minimum Limit	(gpm)	13.0	11.8	1	1	6	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	19.4	1	1	4	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	21.3	1	1	5	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	22.8	1	1	6	NF90-400/34i

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	14.7	40.8	70.4	1,050	34.8	6.02	21.7	39.22
1	2	NF90-400/34i	16.1	34.8	68.7	1,225	29.2	5.59	20.1	49.43
1	3	NF90-400/34i	17.6	29.2	67.3	1,449	24.1	5.15	18.6	63.76
1	4	NF90-400/34i	19.4	24.1	66.3	1,745	19.4	4.67	16.8	84.88
1	5	NF90-400/34i	21.3	19.4	65.5	2,145	15.3	4.12	14.9	117.7
1	6	NF90-400/34i	22.8	15.3	64.9	2,691	11.8	3.49	12.6	171.2
2	1	NF90-400/34i	11.8	26.5	64.4	3,434	23.4	3.12	11.2	206.4
2	2	NF90-400/34i	11.4	23.4	63.5	3,863	20.8	2.66	9.6	263.1
2	3	NF90-400/34i	10.8	20.8	62.6	4,323	18.5	2.24	8.1	336.1
2	4	NF90-400/34i	10.1	18.5	61.9	4,804	16.7	1.87	6.7	429.1
2	5	NF90-400/34i	9.3	16.7	61.3	5,294	15.1	1.56	5.6	544.4
2	6	NF90-400/34i	8.6	15.1	60.8	5,782	13.8	1.29	4.7	683.1

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.29
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,257
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,587
CO_2 (mg/l)	50.34	60.05
CO_3^{-2} (mg/L)	0.48	23.67
$CaSO_4$ (% saturation)	2.3	37.4
$BaSO_4$ (% saturation)	41.1	441.5
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.3
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	220.8	0.0000	0.00	0.00
Total Non-product Feed Water Cost	220.8		0.00	0.00
Waste Water Disposal				
Pass 1	220.8	0.0000	0.00	0.00
Total Waste Water Disposal	220.8		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	56.4
Energy	(kWh/d)	1,353
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	121.8
Specific Energy	(kWh/kgal)	0.75

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	1,470.24	56.39	1,353.37	121.80
Pass 1 Total Electrical Cost		56.39	1,353.37	121.80

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	121.8
Specific Water Cost	($/kgal)	0.068

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

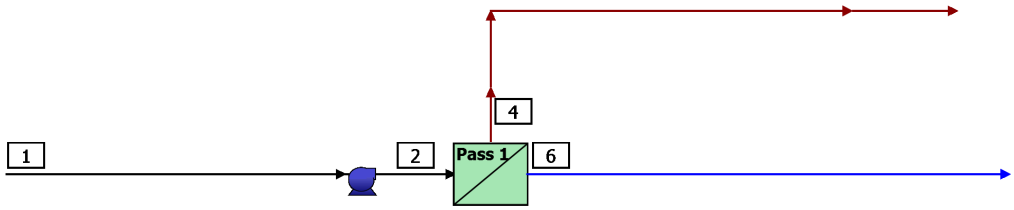
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2 Tr6
Case Name:	end of Yr 1
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	February 22, 2019
Project Notes:	
Case #:	2 of: 6
Case Notes:	Case 2
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	1,471	1,050	0.0
2	Net Feed to Pass 1	1,471	1,050	71.9
4	Total Concentrate from Pass 1	220.9	6,261	61.7
6	Net Product from RO System	1,250	125.3	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	1,471	Net Product =	1,250		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		312
Total Active Area	(ft^2)	124800
Feed Flow per Pass	(gpm)	1,471
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	71.9
Flow Factor		0.95
Permeate Flow per Pass	(gpm)	1,250
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	125.3
Pass Recovery		85.0 %
Average NDP	(psi)	35.5
Specific Energy	(kWh/kgal)	0.77
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	36	6	1,471	0.00	71.9	0.0	431.3	65.9	6.0	1,040	17.3	9.0	79.40
2	NF90-400/34i	16	6	431.3	0.00	65.9	0.0	220.9	61.7	4.2	210.4	7.9	9.0	352.0

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	444.6	793.9	17.90	77.84	27.99
Mg^{+2}	19.00	62.54	118.1	0.94	4.19	1.48
Ca^{+2}	142.0	468.1	884.6	6.75	30.80	10.80
Sr^{+2}	1.70	5.60	10.59	0.08	0.37	0.13
Ba^{+2}	0.02	0.07	0.12	0.00	0.00	0.00
CO_3^{-2}	0.48	6.28	23.69	0.00	0.02	0.00
HCO_3^-	427.0	1,390	2,588	23.69	107.3	37.75
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	679.6	1,213	27.40	119.1	42.84
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	279.1	537.7	1.65	7.62	2.66
SiO_2	15.00	48.79	90.70	0.99	4.77	1.62
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	52.97	60.07	50.66	54.53	51.32
TDS[a]	1,050	3,385	6,261	79.40	352.0	125.3
pH	7.0	7.4	7.6	5.8	6.4	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

Design Warning		Limit	Value	Pass	Stage	Element	Product
Concentrate Flow Rate < Minimum Limit	(gpm)	13.0	12.0	1	1	6	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	19.2	1	1	4	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	21.1	1	1	5	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	22.8	1	1	6	NF90-400/34i

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	14.5	40.9	71.9	1,050	34.9	5.92	21.3	39.59
1	2	NF90-400/34i	15.8	34.9	70.2	1,221	29.4	5.52	19.9	49.61
1	3	NF90-400/34i	17.4	29.4	68.8	1,441	24.3	5.11	18.4	63.59
1	4	NF90-400/34i	19.2	24.3	67.8	1,730	19.7	4.66	16.8	84.05
1	5	NF90-400/34i	21.1	19.7	66.9	2,119	15.5	4.14	14.9	115.6
1	6	NF90-400/34i	22.8	15.5	66.3	2,653	12.0	3.53	12.7	167.0
2	1	NF90-400/34i	11.8	27.0	65.9	3,384	23.8	3.18	11.4	200.5
2	2	NF90-400/34i	11.5	23.8	64.9	3,809	21.1	2.73	9.8	254.3
2	3	NF90-400/34i	11.0	21.1	64.1	4,269	18.7	2.32	8.4	323.9
2	4	NF90-400/34i	10.4	18.7	63.3	4,756	16.8	1.95	7.0	412.9
2	5	NF90-400/34i	9.7	16.8	62.7	5,258	15.2	1.62	5.9	523.9
2	6	NF90-400/34i	8.9	15.2	62.2	5,763	13.8	1.35	4.9	659.1

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.29
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,261
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,588
CO_2 (mg/l)	50.34	60.07
CO_3^{-2} (mg/L)	0.48	23.69
$CaSO_4$ (% saturation)	2.3	37.4
$BaSO_4$ (% saturation)	41.1	441.5
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.3
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	220.9	0.0000	0.00	0.00
Total Non-product Feed Water Cost	220.9		0.00	0.00
Waste Water Disposal				
Pass 1	220.9	0.0000	0.00	0.00
Total Waste Water Disposal	220.9		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	57.6
Energy	(kWh/d)	1,383
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	124.4
Specific Energy	(kWh/kgal)	0.77

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	1,470.54	57.61	1,382.69	124.44
Pass 1 Total Electrical Cost		57.61	1,382.69	124.44

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	124.4
Specific Water Cost	($/kgal)	0.069

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

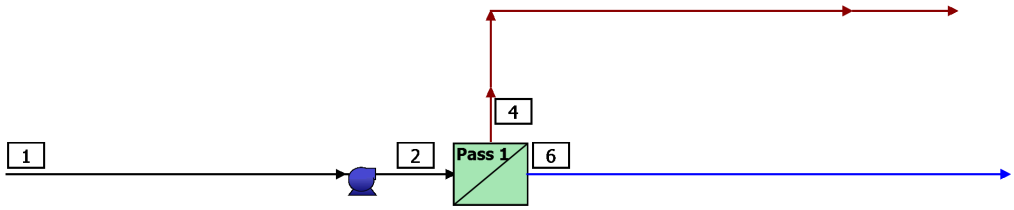
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2 Tr6
Case Name:	end of Yr 2
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	February 22, 2019
Project Notes:	
Case #:	3 of: 6
Case Notes:	Case 3
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	1,471	1,050	0.0
2	Net Feed to Pass 1	1,470	1,050	73.6
4	Total Concentrate from Pass 1	220.6	6,272	63.3
6	Net Product from RO System	1,250	124.5	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	1,471	Net Product =	1,250		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		312
Total Active Area	(ft^2)	124800
Feed Flow per Pass	(gpm)	1,470
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	73.6
Flow Factor		0.90
Permeate Flow per Pass	(gpm)	1,250
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	124.5
Pass Recovery		85.0 %
Average NDP	(psi)	37.3
Specific Energy	(kWh/kgal)	0.79
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	36	6	1,470	0.00	73.6	0.0	437.7	67.5	6.0	1,033	17.2	9.0	78.99
2	NF90-400/34i	16	6	437.7	0.00	67.5	0.0	220.6	63.3	4.2	217.1	8.1	9.0	341.2

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	438.4	795.5	17.81	75.51	27.84
Mg^{+2}	19.00	61.64	118.3	0.93	4.06	1.47
Ca^{+2}	142.0	461.3	885.8	6.71	29.82	10.72
Sr^{+2}	1.70	5.52	10.60	0.08	0.36	0.13
Ba^{+2}	0.02	0.07	0.12	0.00	0.00	0.00
CO_3^{-2}	0.48	6.09	23.76	0.00	0.02	0.00
HCO_3^-	427.0	1,370	2,592	23.56	103.9	37.50
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	670.2	1,216	27.27	115.5	42.60
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	275.0	538.4	1.64	7.38	2.64
SiO_2	15.00	48.08	90.86	0.98	4.61	1.61
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	52.88	60.10	50.65	54.45	51.32
TDS[a]	1,050	3,336	6,272	78.99	341.2	124.5
pH	7.0	7.4	7.6	5.8	6.4	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

Design Warning		Limit	Value	Pass	Stage	Element	Product
Concentrate Flow Rate < Minimum Limit	(gpm)	13.0	12.2	1	1	6	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	20.9	1	1	5	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	22.7	1	1	6	NF90-400/34i

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	14.3	40.8	73.6	1,050	35.0	5.82	21.0	39.98
1	2	NF90-400/34i	15.5	35.0	71.9	1,218	29.6	5.44	19.6	49.81
1	3	NF90-400/34i	17.1	29.6	70.5	1,432	24.5	5.06	18.2	63.46
1	4	NF90-400/34i	18.9	24.5	69.4	1,714	19.9	4.64	16.7	83.29
1	5	NF90-400/34i	20.9	19.9	68.6	2,094	15.7	4.15	15.0	113.7
1	6	NF90-400/34i	22.7	15.7	68.0	2,616	12.2	3.58	12.9	163.0
2	1	NF90-400/34i	11.8	27.4	67.5	3,336	24.1	3.23	11.6	194.9
2	2	NF90-400/34i	11.6	24.1	66.5	3,756	21.3	2.80	10.1	246.0
2	3	NF90-400/34i	11.2	21.3	65.7	4,216	18.9	2.40	8.6	312.2
2	4	NF90-400/34i	10.7	18.9	64.9	4,709	16.9	2.03	7.3	397.1
2	5	NF90-400/34i	10.0	16.9	64.3	5,224	15.2	1.70	6.1	504.5
2	6	NF90-400/34i	9.3	15.2	63.8	5,749	13.8	1.42	5.1	636.3

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.29
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,272
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,592
CO_2 (mg/l)	50.34	60.10
CO_3^{-2} (mg/L)	0.48	23.76
$CaSO_4$ (% saturation)	2.3	37.5
$BaSO_4$ (% saturation)	41.1	442.1
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.4
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	220.6	0.0000	0.00	0.00
Total Non-product Feed Water Cost	220.6		0.00	0.00
Waste Water Disposal				
Pass 1	220.6	0.0000	0.00	0.00
Total Waste Water Disposal	220.6		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	59.0
Energy	(kWh/d)	1,415
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	127.3
Specific Energy	(kWh/kgal)	0.79

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	1,470.23	58.96	1,414.93	127.34
Pass 1 Total Electrical Cost		58.96	1,414.93	127.34

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	127.3
Specific Water Cost	($/kgal)	0.071

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

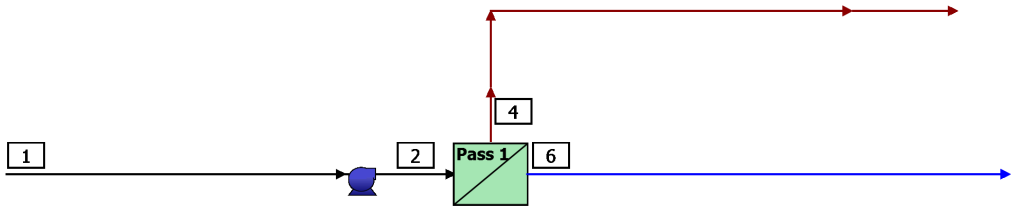
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2 Tr6
Case Name:	end of Yr 3
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	February 22, 2019
Project Notes:	
Case #:	4 of: 6
Case Notes:	Case 4
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	1,471	1,050	0.0
2	Net Feed to Pass 1	1,470	1,050	75.5
4	Total Concentrate from Pass 1	220.7	6,273	65.1
6	Net Product from RO System	1,250	123.6	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	1,471	Net Product =	1,250		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		312
Total Active Area	(ft^2)	124800
Feed Flow per Pass	(gpm)	1,470
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	75.5
Flow Factor		0.85
Permeate Flow per Pass	(gpm)	1,250
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	123.6
Pass Recovery		85.0 %
Average NDP	(psi)	39.3
Specific Energy	(kWh/kgal)	0.81
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	36	6	1,470	0.00	75.5	0.0	444.9	69.4	6.1	1,026	17.1	9.0	78.56
2	NF90-400/34i	16	6	444.9	0.00	69.4	0.0	220.7	65.1	4.3	224.2	8.4	9.0	329.9

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	431.8	796.1	17.72	73.07	27.65
Mg^{+2}	19.00	60.67	118.3	0.93	3.92	1.46
Ca^{+2}	142.0	454.0	885.8	6.67	28.80	10.64
Sr^{+2}	1.70	5.43	10.60	0.08	0.34	0.13
Ba^{+2}	0.02	0.06	0.12	0.00	0.00	0.00
CO_3^{-2}	0.48	5.88	23.76	0.00	0.02	0.00
HCO_3^-	427.0	1,349	2,592	23.42	100.4	37.21
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	660.0	1,217	27.14	111.8	42.32
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	270.6	538.2	1.63	7.12	2.61
SiO_2	15.00	47.33	90.87	0.98	4.45	1.60
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	52.79	60.10	50.64	54.38	51.32
TDS[a]	1,050	3,285	6,273	78.56	329.9	123.6
pH	7.0	7.4	7.6	5.8	6.4	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

Design Warning		Limit	Value	Pass	Stage	Element	Product
Concentrate Flow Rate < Minimum Limit	(gpm)	13.0	12.4	1	1	6	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	20.7	1	1	5	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	22.7	1	1	6	NF90-400/34i

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	14.0	40.8	75.5	1,050	35.1	5.71	20.6	40.40
1	2	NF90-400/34i	15.3	35.1	73.8	1,214	29.8	5.36	19.3	50.04
1	3	NF90-400/34i	16.8	29.8	72.4	1,424	24.8	5.00	18.0	63.34
1	4	NF90-400/34i	18.7	24.8	71.3	1,698	20.2	4.62	16.6	82.50
1	5	NF90-400/34i	20.7	20.2	70.5	2,068	16.0	4.17	15.0	111.8
1	6	NF90-400/34i	22.7	16.0	69.8	2,577	12.4	3.62	13.0	158.9
2	1	NF90-400/34i	11.8	27.8	69.4	3,284	24.5	3.29	11.8	189.3
2	2	NF90-400/34i	11.7	24.5	68.3	3,698	21.7	2.87	10.4	237.6
2	3	NF90-400/34i	11.5	21.7	67.5	4,157	19.2	2.48	8.9	300.2
2	4	NF90-400/34i	11.0	19.2	66.7	4,654	17.1	2.11	7.6	381.1
2	5	NF90-400/34i	10.4	17.1	66.1	5,180	15.3	1.78	6.4	483.9
2	6	NF90-400/34i	9.7	15.3	65.5	5,724	13.8	1.49	5.4	611.9

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.29
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,273
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,592
CO_2 (mg/l)	50.34	60.10
CO_3^{-2} (mg/L)	0.48	23.76
$CaSO_4$ (% saturation)	2.3	37.5
$BaSO_4$ (% saturation)	41.1	441.8
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.4
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	220.7	0.0000	0.00	0.00
Total Non-product Feed Water Cost	220.7		0.00	0.00
Waste Water Disposal				
Pass 1	220.7	0.0000	0.00	0.00
Total Waste Water Disposal	220.7		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	60.5
Energy	(kWh/d)	1,451
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	130.6
Specific Energy	(kWh/kgal)	0.81

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	1,470.22	60.46	1,451.14	130.60
Pass 1 Total Electrical Cost		60.46	1,451.14	130.60

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	130.6
Specific Water Cost	($/kgal)	0.073

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

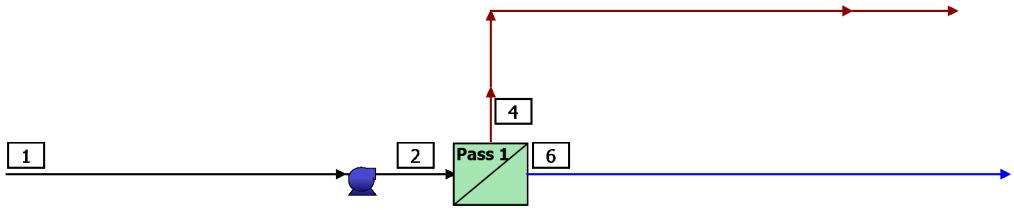
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2 Tr6
Case Name:	end of Yr 4
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	February 22, 2019
Project Notes:	
Case #:	5 of: 6
Case Notes:	Case 5
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	1,471	1,050	0.0
2	Net Feed to Pass 1	1,471	1,050	77.6
4	Total Concentrate from Pass 1	220.9	6,274	67.1
6	Net Product from RO System	1,250	122.7	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	1,471	Net Product =	1,250		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		312
Total Active Area	(ft^2)	124800
Feed Flow per Pass	(gpm)	1,471
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	77.6
Flow Factor		0.80
Permeate Flow per Pass	(gpm)	1,250
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	122.7
Pass Recovery		85.0 %
Average NDP	(psi)	41.6
Specific Energy	(kWh/kgal)	0.83
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	36	6	1,471	0.00	77.6	0.0	452.6	71.5	6.1	1,018	17.0	9.0	78.13
2	NF90-400/34i	16	6	452.6	0.00	71.5	0.0	220.9	67.1	4.4	231.8	8.7	9.0	318.6

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	425.0	796.7	17.63	70.63	27.46
Mg^{+2}	19.00	59.67	118.3	0.92	3.79	1.45
Ca^{+2}	142.0	446.5	885.7	6.63	27.79	10.55
Sr^{+2}	1.70	5.35	10.60	0.08	0.33	0.13
Ba^{+2}	0.02	0.06	0.12	0.00	0.00	0.00
CO_3^{-2}	0.48	5.68	23.76	0.00	0.02	0.00
HCO_3^-	427.0	1,327	2,592	23.27	96.84	36.90
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	649.7	1,218	27.00	108.1	42.03
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	266.1	538.0	1.62	6.86	2.59
SiO_2	15.00	46.55	90.89	0.97	4.29	1.59
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	52.69	60.11	50.64	54.30	51.32
TDS[a]	1,050	3,232	6,274	78.13	318.6	122.7
pH	7.0	7.4	7.6	5.8	6.4	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

Design Warning		Limit	Value	Pass	Stage	Element	Product
Concentrate Flow Rate < Minimum Limit	(gpm)	13.0	12.6	1	1	6	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	20.5	1	1	5	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	22.6	1	1	6	NF90-400/34i

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	13.7	40.9	77.6	1,050	35.2	5.61	20.2	40.83
1	2	NF90-400/34i	15.0	35.2	75.9	1,211	30.0	5.28	19.0	50.28
1	3	NF90-400/34i	16.5	30.0	74.5	1,415	25.0	4.95	17.8	63.22
1	4	NF90-400/34i	18.4	25.0	73.4	1,683	20.4	4.59	16.5	81.78
1	5	NF90-400/34i	20.5	20.4	72.6	2,042	16.2	4.17	15.0	109.9
1	6	NF90-400/34i	22.6	16.2	71.9	2,538	12.6	3.67	13.2	154.9
2	1	NF90-400/34i	11.8	28.3	71.5	3,232	24.9	3.35	12.0	183.6
2	2	NF90-400/34i	11.8	24.9	70.4	3,639	22.0	2.95	10.6	229.3
2	3	NF90-400/34i	11.7	22.0	69.5	4,095	19.4	2.56	9.2	288.4
2	4	NF90-400/34i	11.3	19.4	68.8	4,595	17.2	2.20	7.9	365.1
2	5	NF90-400/34i	10.8	17.2	68.1	5,133	15.4	1.86	6.7	463.3
2	6	NF90-400/34i	10.2	15.4	67.6	5,697	13.8	1.57	5.6	587.1

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.29
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,274
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,592
CO_2 (mg/l)	50.34	60.11
CO_3^{-2} (mg/L)	0.48	23.76
$CaSO_4$ (% saturation)	2.3	37.5
$BaSO_4$ (% saturation)	41.1	441.6
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.4
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	220.9	0.0000	0.00	0.00
Total Non-product Feed Water Cost	220.9		0.00	0.00
Waste Water Disposal				
Pass 1	220.9	0.0000	0.00	0.00
Total Waste Water Disposal	220.9		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	62.2
Energy	(kWh/d)	1,493
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	134.4
Specific Energy	(kWh/kgal)	0.83

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	1,470.51	62.21	1,493.03	134.37
Pass 1 Total Electrical Cost		62.21	1,493.03	134.37

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	134.4
Specific Water Cost	($/kgal)	0.075

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

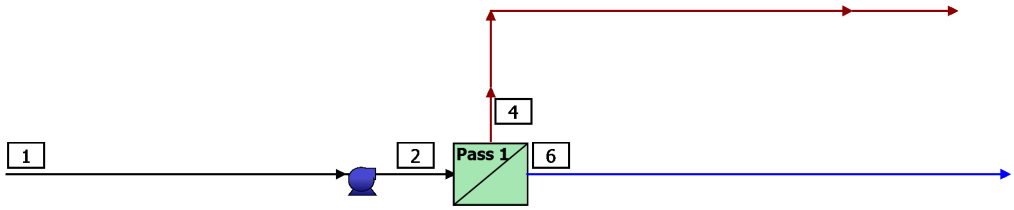
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2 Tr6
Case Name:	end of Yr 5
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	February 22, 2019
Project Notes:	
Case #:	6 of: 6
Case Notes:	Case 6
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	1,471	1,050	0.0
2	Net Feed to Pass 1	1,471	1,050	80.1
4	Total Concentrate from Pass 1	220.9	6,280	69.4
6	Net Product from RO System	1,250	121.8	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	1,471	Net Product =	1,250		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		312
Total Active Area	(ft^2)	124800
Feed Flow per Pass	(gpm)	1,471
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	80.1
Flow Factor		0.75
Permeate Flow per Pass	(gpm)	1,250
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	121.8
Pass Recovery		85.0 %
Average NDP	(psi)	44.2
Specific Energy	(kWh/kgal)	0.86
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	36	6	1,471	0.00	80.1	0.0	460.4	73.9	6.2	1,010	16.8	9.0	77.72
2	NF90-400/34i	16	6	460.4	0.00	73.9	0.0	220.9	69.4	4.5	239.6	9.0	9.0	307.8

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	418.3	797.8	17.55	68.28	27.27
Mg^{+2}	19.00	58.69	118.4	0.91	3.66	1.44
Ca^{+2}	142.0	439.2	886.3	6.59	26.81	10.46
Sr^{+2}	1.70	5.26	10.61	0.08	0.32	0.13
Ba^{+2}	0.02	0.06	0.12	0.00	0.00	0.00
CO_3^{-2}	0.48	5.48	23.80	0.00	0.02	0.00
HCO_3^-	427.0	1,305	2,594	23.14	93.46	36.60
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	639.4	1,219	26.87	104.5	41.74
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	261.6	538.1	1.61	6.62	2.57
SiO_2	15.00	45.80	90.97	0.97	4.13	1.57
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	52.60	60.13	50.62	54.23	51.32
TDS[a]	1,050	3,179	6,280	77.72	307.8	121.8
pH	7.0	7.4	7.6	5.8	6.4	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

Design Warning		Limit	Value	Pass	Stage	Element	Product
Concentrate Flow Rate < Minimum Limit	(gpm)	13.0	12.8	1	1	6	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	20.2	1	1	5	NF90-400/34i
Element Recovery > Maximum Limit	(%)	19.0	22.5	1	1	6	NF90-400/34i

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	13.5	40.9	80.1	1,050	35.3	5.51	19.8	41.28
1	2	NF90-400/34i	14.7	35.3	78.4	1,207	30.1	5.21	18.7	50.53
1	3	NF90-400/34i	16.3	30.1	77.0	1,407	25.2	4.90	17.6	63.13
1	4	NF90-400/34i	18.1	25.2	75.9	1,667	20.7	4.57	16.4	81.08
1	5	NF90-400/34i	20.2	20.7	75.0	2,017	16.5	4.18	15.1	108.0
1	6	NF90-400/34i	22.5	16.5	74.4	2,500	12.8	3.71	13.4	151.1
2	1	NF90-400/34i	11.8	28.8	73.9	3,179	25.4	3.40	12.2	178.2
2	2	NF90-400/34i	11.9	25.4	72.8	3,580	22.4	3.02	10.9	221.3
2	3	NF90-400/34i	11.9	22.4	71.9	4,033	19.7	2.65	9.5	277.1
2	4	NF90-400/34i	11.6	19.7	71.1	4,537	17.4	2.29	8.3	349.7
2	5	NF90-400/34i	11.2	17.4	70.5	5,086	15.5	1.96	7.0	443.5
2	6	NF90-400/34i	10.7	15.5	69.9	5,671	13.8	1.65	5.9	562.8

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.29
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,280
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,594
CO_2 (mg/l)	50.34	60.13
CO_3^{-2} (mg/L)	0.48	23.80
$CaSO_4$ (% saturation)	2.3	37.5
$BaSO_4$ (% saturation)	41.1	441.7
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.5
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	220.9	0.0000	0.00	0.00
Total Non-product Feed Water Cost	220.9		0.00	0.00
Waste Water Disposal				
Pass 1	220.9	0.0000	0.00	0.00
Total Waste Water Disposal	220.9		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	64.2
Energy	(kWh/d)	1,541
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	138.7
Specific Energy	(kWh/kgal)	0.86

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	1,470.55	64.20	1,540.82	138.67
Pass 1 Total Electrical Cost		64.20	1,540.82	138.67

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	138.7
Specific Water Cost	($/kgal)	0.077

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

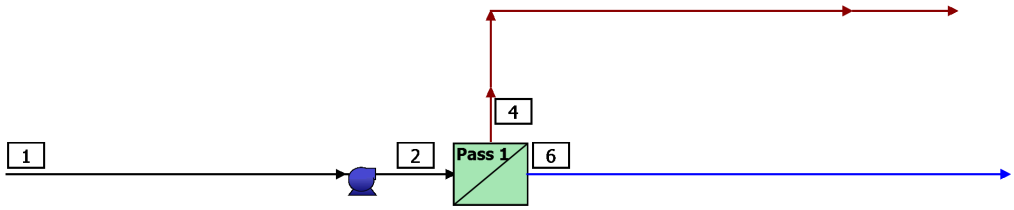
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2
Case Name:	TR 7 - Start-up
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 07, 2019
Project Notes:	
Case #:	1 of: 6
Case Notes:	Case 1
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	735.5	1,050	0.0
2	Net Feed to Pass 1	735.3	1,050	79.4
4	Total Concentrate from Pass 1	110.5	6,304	68.1
6	Net Product from RO System	625.0	117.6	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	735.5	Net Product =	625.0		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		156
Total Active Area	(ft^2)	62400
Feed Flow per Pass	(gpm)	735.3
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	79.4
Flow Factor		1.00
Permeate Flow per Pass	(gpm)	625.0
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	117.6
Pass Recovery		85.0 %
Average NDP	(psi)	34
Specific Energy	(kWh/kgal)	0.85
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	735.3	0.00	79.4	0.0	259.2	73.0	6.4	476.2	15.9	24.0	76.71
2	NF90-400/34i	8	6	259.2	0.00	73.0	0.0	110.5	68.1	4.9	148.7	11.2	9.0	248.7

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	373.9	802.8	17.38	55.28	26.40
Mg^{+2}	19.00	52.28	118.7	0.89	2.96	1.39
Ca^{+2}	142.0	391.1	888.5	6.47	21.61	10.08
Sr^{+2}	1.70	4.68	10.64	0.08	0.26	0.12
Ba^{+2}	0.02	0.06	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	4.27	23.93	0.00	0.01	0.00
HCO_3^-	427.0	1,164	2,601	22.74	75.40	35.25
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	571.5	1,227	26.61	84.57	40.40
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	232.7	538.7	1.57	5.34	2.47
SiO_2	15.00	40.80	91.31	0.96	3.29	1.52
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	52.04	60.21	50.57	53.72	51.33
TDS[a]	1,050	2,836	6,304	76.71	248.7	117.6
pH	7.0	7.4	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	13.2	40.9	79.4	1,050	35.4	5.41	19.5	41.74
1	2	NF90-400/34i	14.1	35.4	77.7	1,204	30.4	5.01	18.1	51.48
1	3	NF90-400/34i	15.2	30.4	76.3	1,393	25.8	4.63	16.7	64.44
1	4	NF90-400/34i	16.4	25.8	75.1	1,632	21.6	4.24	15.3	82.26
1	5	NF90-400/34i	17.7	21.6	74.2	1,935	17.8	3.82	13.7	107.7
1	6	NF90-400/34i	18.9	17.8	73.5	2,328	14.4	3.35	12.1	145.5
2	1	NF90-400/34i	13.8	32.4	73.0	2,836	27.9	4.46	16.1	130.9
2	2	NF90-400/34i	13.9	27.9	71.7	3,266	24.1	3.88	14.0	168.9
2	3	NF90-400/34i	13.8	24.1	70.7	3,765	20.7	3.32	12.0	220.7
2	4	NF90-400/34i	13.4	20.7	69.9	4,331	18.0	2.78	10.0	291.5
2	5	NF90-400/34i	12.8	18.0	69.2	4,954	15.7	2.29	8.2	387.0
2	6	NF90-400/34i	11.9	15.7	68.6	5,620	13.8	1.86	6.7	514.1

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.29
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,304
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,601
CO_2 (mg/l)	50.34	60.21
CO_3^{-2} (mg/L)	0.48	23.93
$CaSO_4$ (% saturation)	2.3	37.5
$BaSO_4$ (% saturation)	41.1	441.9
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.8
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	110.5	0.0000	0.00	0.00
Total Non-product Feed Water Cost	110.5		0.00	0.00
Waste Water Disposal				
Pass 1	110.5	0.0000	0.00	0.00
Total Waste Water Disposal	110.5		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	31.8
Energy	(kWh/d)	763.5
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	68.7
Specific Energy	(kWh/kgal)	0.85

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	735.28	31.81	763.46	68.71
Pass 1 Total Electrical Cost		31.81	763.46	68.71

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	68.7
Specific Water Cost	($/kgal)	0.076

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

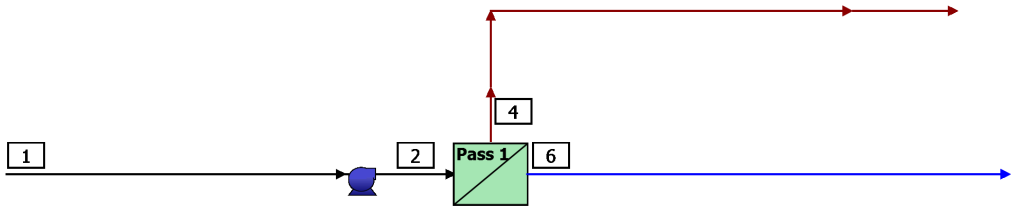
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2
Case Name:	TR 7 - end of Yr 1
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 07, 2019
Project Notes:	
Case #:	2 of: 6
Case Notes:	Case 2
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	735.5	1,050	0.0
2	Net Feed to Pass 1	735.3	1,050	80.9
4	Total Concentrate from Pass 1	110.5	6,306	69.6
6	Net Product from RO System	625.0	117.2	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	735.5	Net Product =	625.0		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		156
Total Active Area	(ft^2)	62400
Feed Flow per Pass	(gpm)	735.3
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	80.9
Flow Factor		0.95
Permeate Flow per Pass	(gpm)	625.0
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	117.2
Pass Recovery		85.0 %
Average NDP	(psi)	35.6
Specific Energy	(kWh/kgal)	0.87
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	735.3	0.00	80.9	0.0	260.8	74.5	6.4	474.5	15.8	24.0	76.53
2	NF90-400/34i	8	6	260.8	0.00	74.5	0.0	110.5	69.6	4.9	150.4	11.3	9.0	245.5

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	371.7	803.4	17.34	54.57	26.30
Mg^{+2}	19.00	51.95	118.7	0.89	2.92	1.38
Ca^{+2}	142.0	388.6	888.8	6.46	21.32	10.03
Sr^{+2}	1.70	4.65	10.64	0.08	0.26	0.12
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	4.21	23.95	0.00	0.01	0.00
HCO_3^-	427.0	1,157	2,602	22.68	74.39	35.11
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	568.1	1,228	26.55	83.50	40.26
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	231.2	538.8	1.57	5.26	2.46
SiO_2	15.00	40.55	91.34	0.96	3.24	1.51
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	52.01	60.22	50.56	53.69	51.33
TDS[a]	1,050	2,818	6,306	76.53	245.5	117.2
pH	7.0	7.4	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	13.1	40.9	80.9	1,050	35.5	5.34	19.2	42.06
1	2	NF90-400/34i	14.0	35.5	79.2	1,201	30.6	4.97	17.9	51.64
1	3	NF90-400/34i	15.1	30.6	77.8	1,388	26.0	4.60	16.6	64.36
1	4	NF90-400/34i	16.3	26.0	76.7	1,623	21.7	4.23	15.2	81.75
1	5	NF90-400/34i	17.7	21.7	75.8	1,923	17.9	3.83	13.8	106.6
1	6	NF90-400/34i	19.0	17.9	75.1	2,312	14.5	3.39	12.2	143.4
2	1	NF90-400/34i	13.7	32.6	74.5	2,818	28.2	4.45	16.0	130.1
2	2	NF90-400/34i	13.9	28.2	73.2	3,242	24.3	3.90	14.0	167.0
2	3	NF90-400/34i	13.8	24.3	72.2	3,735	20.9	3.36	12.1	217.0
2	4	NF90-400/34i	13.6	20.9	71.4	4,298	18.1	2.83	10.2	285.3
2	5	NF90-400/34i	13.0	18.1	70.7	4,925	15.7	2.35	8.5	378.0
2	6	NF90-400/34i	12.2	15.7	70.1	5,601	13.8	1.92	6.9	501.6

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.29
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,306
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,602
CO_2 (mg/l)	50.34	60.22
CO_3^{-2} (mg/L)	0.48	23.95
$CaSO_4$ (% saturation)	2.3	37.5
$BaSO_4$ (% saturation)	41.1	441.9
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.8
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	110.5	0.0000	0.00	0.00
Total Non-product Feed Water Cost	110.5		0.00	0.00
Waste Water Disposal				
Pass 1	110.5	0.0000	0.00	0.00
Total Waste Water Disposal	110.5		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	32.4
Energy	(kWh/d)	778.5
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	70.1
Specific Energy	(kWh/kgal)	0.87

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	735.28	32.44	778.45	70.06
Pass 1 Total Electrical Cost		32.44	778.45	70.06

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	70.1
Specific Water Cost	($/kgal)	0.078

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

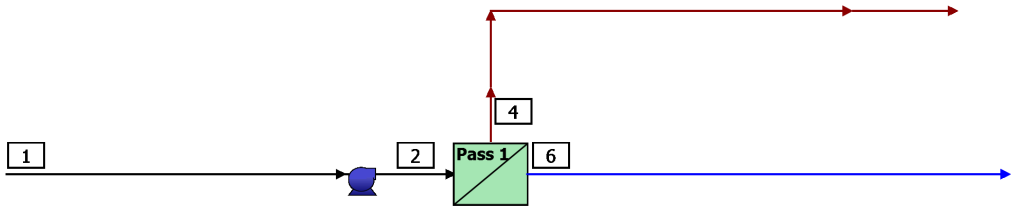
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2
Case Name:	TR 7 - end of Yr 2
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 07, 2019
Project Notes:	
Case #:	3 of: 6
Case Notes:	Case 3
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	735.5	1,050	0.0
2	Net Feed to Pass 1	735.3	1,050	83.3
4	Total Concentrate from Pass 1	110.5	6,311	71.8
6	Net Product from RO System	625.0	116.3	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	735.5	Net Product =	625.0		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		156
Total Active Area	(ft^2)	62400
Feed Flow per Pass	(gpm)	735.3
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	83.3
Flow Factor		0.90
Permeate Flow per Pass	(gpm)	625.0
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	116.3
Pass Recovery		85.0 %
Average NDP	(psi)	37.4
Specific Energy	(kWh/kgal)	0.89
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	735.3	0.00	83.3	0.0	265.5	76.8	6.5	469.8	15.7	25.0	76.26
2	NF90-400/34i	8	6	265.5	0.00	76.8	0.0	110.5	71.8	5.0	155.1	11.6	9.0	237.5

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	365.5	804.5	17.29	52.81	26.11
Mg^{+2}	19.00	51.06	118.8	0.89	2.82	1.37
Ca^{+2}	142.0	381.9	889.2	6.43	20.61	9.95
Sr^{+2}	1.70	4.57	10.65	0.08	0.25	0.12
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	4.06	23.97	0.00	0.01	0.00
HCO_3^-	427.0	1,137	2,604	22.59	71.93	34.82
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	558.7	1,230	26.47	80.81	39.95
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	227.1	538.9	1.56	5.09	2.43
SiO_2	15.00	39.85	91.41	0.96	3.13	1.50
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.94	60.25	50.56	53.62	51.33
TDS[a]	1,050	2,770	6,311	76.26	237.5	116.3
pH	7.0	7.4	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.8	40.9	83.3	1,050	35.6	5.23	18.8	42.57
1	2	NF90-400/34i	13.7	35.6	81.6	1,198	30.7	4.88	17.6	51.97
1	3	NF90-400/34i	14.8	30.7	80.2	1,380	26.2	4.55	16.4	64.36
1	4	NF90-400/34i	16.0	26.2	79.0	1,608	22.0	4.20	15.1	81.20
1	5	NF90-400/34i	17.4	22.0	78.1	1,900	18.2	3.83	13.8	105.1
1	6	NF90-400/34i	18.8	18.2	77.4	2,277	14.8	3.41	12.3	140.3
2	1	NF90-400/34i	13.6	33.2	76.8	2,770	28.7	4.51	16.3	126.3
2	2	NF90-400/34i	13.9	28.7	75.5	3,185	24.7	3.99	14.4	161.3
2	3	NF90-400/34i	14.0	24.7	74.5	3,672	21.2	3.47	12.5	208.5
2	4	NF90-400/34i	13.9	21.2	73.6	4,236	18.3	2.95	10.6	273.5
2	5	NF90-400/34i	13.5	18.3	72.9	4,873	15.8	2.46	8.9	362.2
2	6	NF90-400/34i	12.7	15.8	72.3	5,572	13.8	2.01	7.3	482.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,311
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,604
CO_2 (mg/l)	50.34	60.25
CO_3^{-2} (mg/L)	0.48	23.97
$CaSO_4$ (% saturation)	2.3	37.5
$BaSO_4$ (% saturation)	41.1	441.9
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.9
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	110.5	0.0000	0.00	0.00
Total Non-product Feed Water Cost	110.5		0.00	0.00
Waste Water Disposal				
Pass 1	110.5	0.0000	0.00	0.00
Total Waste Water Disposal	110.5		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	33.4
Energy	(kWh/d)	801.3
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	72.1
Specific Energy	(kWh/kgal)	0.89

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	735.28	33.39	801.27	72.11
Pass 1 Total Electrical Cost		33.39	801.27	72.11

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	72.1
Specific Water Cost	($/kgal)	0.080

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

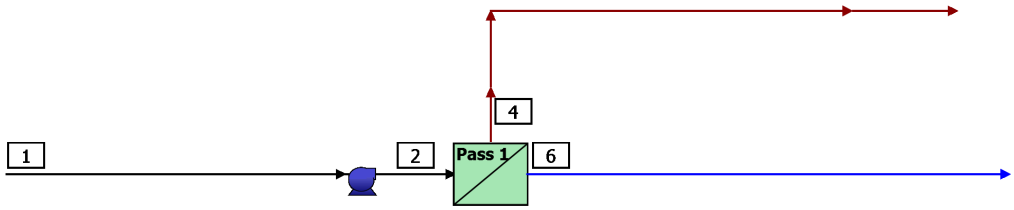
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2
Case Name:	TR 7 - end of Yr 3
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 07, 2019
Project Notes:	
Case #:	4 of: 6
Case Notes:	Case 4
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	735.5	1,050	0.0
2	Net Feed to Pass 1	735.3	1,050	85.3
4	Total Concentrate from Pass 1	110.5	6,314	73.7
6	Net Product from RO System	625.0	115.8	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	735.5	Net Product =	625.0		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		156
Total Active Area	(ft^2)	62400
Feed Flow per Pass	(gpm)	735.3
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	85.3
Flow Factor		0.85
Permeate Flow per Pass	(gpm)	625.0
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	115.8
Pass Recovery		85.0 %
Average NDP	(psi)	39.4
Specific Energy	(kWh/kgal)	0.91
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	735.3	0.00	85.3	0.0	267.2	78.8	6.5	468.2	15.6	25.0	76.11
2	NF90-400/34i	8	6	267.2	0.00	78.8	0.0	110.5	73.7	5.1	156.8	11.8	9.0	234.5

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	363.4	805.0	17.26	52.16	26.01
Mg^{+2}	19.00	50.75	118.8	0.89	2.79	1.36
Ca^{+2}	142.0	379.7	889.5	6.41	20.35	9.91
Sr^{+2}	1.70	4.55	10.65	0.08	0.24	0.12
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	4.01	23.99	0.00	0.01	0.00
HCO_3^-	427.0	1,131	2,604	22.54	71.01	34.68
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	555.5	1,230	26.42	79.81	39.81
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	225.8	539.0	1.55	5.02	2.42
SiO_2	15.00	39.62	91.46	0.96	3.08	1.49
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.92	60.26	50.56	53.60	51.32
TDS[a]	1,050	2,754	6,314	76.11	234.5	115.8
pH	7.0	7.4	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.6	40.9	85.3	1,050	35.7	5.16	18.6	42.91
1	2	NF90-400/34i	13.6	35.7	83.6	1,196	30.9	4.84	17.4	52.13
1	3	NF90-400/34i	14.7	30.9	82.1	1,375	26.3	4.52	16.3	64.29
1	4	NF90-400/34i	15.9	26.3	81.0	1,600	22.1	4.20	15.1	80.78
1	5	NF90-400/34i	17.4	22.1	80.0	1,888	18.3	3.84	13.8	104.0
1	6	NF90-400/34i	18.8	18.3	79.3	2,262	14.8	3.45	12.4	138.3
2	1	NF90-400/34i	13.5	33.4	78.8	2,754	28.9	4.49	16.2	125.8
2	2	NF90-400/34i	13.8	28.9	77.4	3,162	24.9	4.00	14.4	159.5
2	3	NF90-400/34i	14.1	24.9	76.4	3,642	21.4	3.50	12.6	205.2
2	4	NF90-400/34i	14.0	21.4	75.5	4,202	18.4	3.00	10.8	267.8
2	5	NF90-400/34i	13.7	18.4	74.8	4,842	15.9	2.52	9.1	353.7
2	6	NF90-400/34i	13.1	15.9	74.2	5,552	13.8	2.08	7.5	470.2

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,314
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,604
CO_2 (mg/l)	50.34	60.26
CO_3^{-2} (mg/L)	0.48	23.99
$CaSO_4$ (% saturation)	2.3	37.5
$BaSO_4$ (% saturation)	41.1	442.0
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	71.9
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	110.5	0.0000	0.00	0.00
Total Non-product Feed Water Cost	110.5		0.00	0.00
Waste Water Disposal				
Pass 1	110.5	0.0000	0.00	0.00
Total Waste Water Disposal	110.5		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	34.2
Energy	(kWh/d)	820.2
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	73.8
Specific Energy	(kWh/kgal)	0.91

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	735.27	34.17	820.17	73.82
Pass 1 Total Electrical Cost		34.17	820.17	73.82

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	73.8
Specific Water Cost	($/kgal)	0.082

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

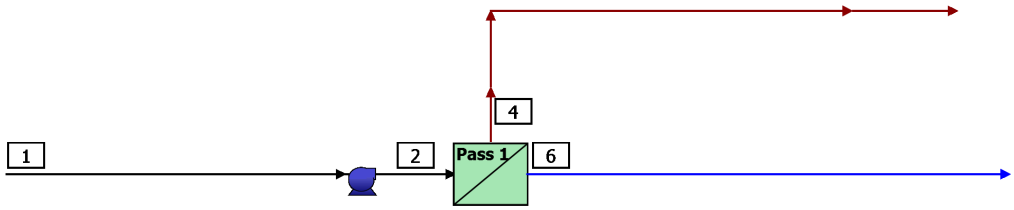
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2
Case Name:	TR 7 - end of Yr 4
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 07, 2019
Project Notes:	
Case #:	5 of: 6
Case Notes:	Case 5
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	735.3	1,050	0.0
2	Net Feed to Pass 1	735.1	1,050	87.5
4	Total Concentrate from Pass 1	110.3	6,321	75.9
6	Net Product from RO System	624.9	115.4	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	735.3	Net Product =	624.9		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		156
Total Active Area	(ft^2)	62400
Feed Flow per Pass	(gpm)	735.1
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	87.5
Flow Factor		0.80
Permeate Flow per Pass	(gpm)	624.9
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	115.4
Pass Recovery		85.0 %
Average NDP	(psi)	41.6
Specific Energy	(kWh/kgal)	0.94
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	735.1	0.00	87.5	0.0	268.7	81.0	6.6	466.5	15.6	25.0	75.97
2	NF90-400/34i	8	6	268.7	0.00	81.0	0.0	110.3	75.9	5.1	158.4	11.9	9.0	231.7

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	361.4	806.1	17.23	51.55	25.93
Mg^{+2}	19.00	50.46	118.9	0.88	2.76	1.36
Ca^{+2}	142.0	377.5	890.4	6.40	20.10	9.87
Sr^{+2}	1.70	4.52	10.66	0.08	0.24	0.12
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	3.96	24.04	0.00	0.01	0.00
HCO_3^-	427.0	1,124	2,607	22.49	70.14	34.56
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	552.4	1,232	26.38	78.88	39.68
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	224.4	539.4	1.55	4.96	2.42
SiO_2	15.00	39.39	91.56	0.96	3.04	1.48
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.90	60.28	50.55	53.57	51.32
TDS[a]	1,050	2,738	6,321	75.97	231.7	115.4
pH	7.0	7.3	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.5	40.8	87.5	1,050	35.7	5.10	18.3	43.26
1	2	NF90-400/34i	13.4	35.7	85.8	1,194	31.0	4.79	17.3	52.34
1	3	NF90-400/34i	14.5	31.0	84.4	1,370	26.5	4.50	16.2	64.23
1	4	NF90-400/34i	15.8	26.5	83.2	1,592	22.3	4.19	15.1	80.34
1	5	NF90-400/34i	17.3	22.3	82.3	1,876	18.4	3.86	13.9	103.0
1	6	NF90-400/34i	18.9	18.4	81.5	2,247	14.9	3.48	12.5	136.4
2	1	NF90-400/34i	13.3	33.6	81.0	2,738	29.1	4.47	16.1	125.3
2	2	NF90-400/34i	13.8	29.1	79.6	3,139	25.1	4.01	14.4	158.0
2	3	NF90-400/34i	14.1	25.1	78.6	3,613	21.6	3.53	12.7	202.1
2	4	NF90-400/34i	14.2	21.6	77.7	4,170	18.5	3.06	11.0	262.4
2	5	NF90-400/34i	14.0	18.5	76.9	4,813	15.9	2.59	9.3	345.4
2	6	NF90-400/34i	13.5	15.9	76.3	5,535	13.8	2.14	7.7	459.1

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,321
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,607
CO_2 (mg/l)	50.34	60.28
CO_3^{-2} (mg/L)	0.48	24.04
$CaSO_4$ (% saturation)	2.3	37.6
$BaSO_4$ (% saturation)	41.1	442.4
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	72.0
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	110.3	0.0000	0.00	0.00
Total Non-product Feed Water Cost	110.3		0.00	0.00
Waste Water Disposal				
Pass 1	110.3	0.0000	0.00	0.00
Total Waste Water Disposal	110.3		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	35.1
Energy	(kWh/d)	841.4
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	75.7
Specific Energy	(kWh/kgal)	0.94

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	735.09	35.06	841.42	75.73
Pass 1 Total Electrical Cost		35.06	841.42	75.73

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	75.7
Specific Water Cost	($/kgal)	0.084

WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.64.643

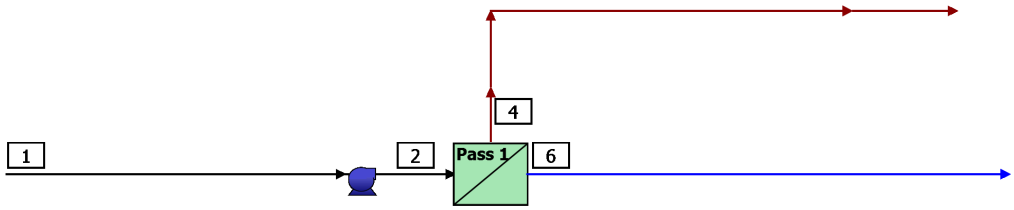
Calculation Engine Version: 01.10.26.03

Database Version: 12.5

Project Name:	Wellington - RO2
Case Name:	TR 7 - end of Yr 5
Customer:	
Prepared by:	Steven Coker
Company:	DW&PS
Country:	
Date Created:	March 07, 2019
Project Notes:	
Case #:	6 of: 6
Case Notes:	Case 6
Keywords:	

RO Detailed Report

RO System Flow Diagram



#	Description	Flow (gpm)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	735.3	1,050	0.0
2	Net Feed to Pass 1	735.1	1,050	90.0
4	Total Concentrate from Pass 1	110.4	6,321	78.3
6	Net Product from RO System	624.9	114.9	9.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	85.0 %
System Flow Rate	(gpm)	Net Feed =	735.3	Net Product =	624.9		

Pass		Pass 1
Stream Name		Current
Water Type		Well Water (SDI < 3)
Number of Elements		156
Total Active Area	(ft^2)	62400
Feed Flow per Pass	(gpm)	735.1
Feed TDS[a]	(mg/L)	1,050
Feed Pressure	(psi)	90.0
Flow Factor		0.75
Permeate Flow per Pass	(gpm)	624.9
Pass Average flux	(gfd)	14.4
Permeate TDS[a]	(mg/L)	114.9
Pass Recovery		85.0 %
Average NDP	(psi)	44.2
Specific Energy	(kWh/kgal)	0.96
Temperature	(°F)	79.0
pH		7.0
Chemical Dose		
RO System Recovery		85.0 %
Net RO System Recovery		85.0%

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
			PV	(gpm)	(gpm)	(psi)	(psi)	(gpm)	(psi)	(psi)	(gpm)	(gfd)	(psi)	(mg/L)
1	NF90-400/34i	18	6	735.1	0.00	90.0	0.0	270.5	83.5	6.6	464.7	15.5	25.0	75.81
2	NF90-400/34i	8	6	270.5	0.00	83.5	0.0	110.4	78.3	5.1	160.2	12.0	9.0	228.5

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)						
	Feed	Concentrate		Permeate		
		Stage1	Stage2	Stage1	Stage2	Total
NH_4^+	0.00	0.00	0.00	0.00	0.00	0.00
K^+	0.00	0.00	0.00	0.00	0.00	0.00
Na^+	143.0	359.1	806.3	17.20	50.85	25.82
Mg^{+2}	19.00	50.13	118.9	0.88	2.72	1.35
Ca^{+2}	142.0	375.0	890.2	6.39	19.82	9.83
Sr^{+2}	1.70	4.49	10.66	0.08	0.24	0.12
Ba^{+2}	0.02	0.05	0.13	0.00	0.00	0.00
CO_3^{-2}	0.48	3.90	24.03	0.00	0.01	0.00
HCO_3^-	427.0	1,117	2,607	22.44	69.16	34.40
NO_3^-	0.00	0.00	0.00	0.00	0.00	0.00
Cl^-	218.6	549.0	1,232	26.33	77.81	39.52
F^-	0.00	0.00	0.00	0.00	0.00	0.00
SO_4^{-2}	83.00	222.9	539.2	1.55	4.89	2.40
SiO_2	15.00	39.13	91.55	0.95	3.00	1.48
Boron	0.00	0.00	0.00	0.00	0.00	0.00
CO_2	50.34	51.87	60.29	50.55	53.55	51.32
TDS[a]	1,050	2,721	6,321	75.81	228.5	114.9
pH	7.0	7.3	7.6	5.8	6.3	6.0

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (gpm)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (gpm)	Perm Flow (gpm)	Perm Flux (gfd)	Perm TDS (mg/L)
1	1	NF90-400/34i	12.3	40.8	90.0	1,050	35.8	5.03	18.1	43.63
1	2	NF90-400/34i	13.3	35.8	88.3	1,191	31.1	4.75	17.1	52.54
1	3	NF90-400/34i	14.4	31.1	86.9	1,365	26.6	4.47	16.1	64.18
1	4	NF90-400/34i	15.7	26.6	85.7	1,583	22.4	4.18	15.1	79.89
1	5	NF90-400/34i	17.3	22.4	84.8	1,864	18.6	3.87	13.9	101.9
1	6	NF90-400/34i	19.0	18.6	84.0	2,231	15.0	3.52	12.7	134.5
2	1	NF90-400/34i	13.2	33.8	83.5	2,721	29.4	4.45	16.0	124.7
2	2	NF90-400/34i	13.7	29.4	82.1	3,113	25.4	4.02	14.5	156.2
2	3	NF90-400/34i	14.1	25.4	81.0	3,580	21.8	3.57	12.9	198.7
2	4	NF90-400/34i	14.3	21.8	80.1	4,133	18.7	3.11	11.2	256.6
2	5	NF90-400/34i	14.2	18.7	79.4	4,777	16.0	2.66	9.6	336.7
2	6	NF90-400/34i	13.9	16.0	78.8	5,510	13.8	2.22	8.0	446.8

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Solubility Warnings

Warning	Pass No
Langelier Saturation Index > 0	1
$BaSO_4$ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1st Pass Conc
pH	7.0	7.6
Langelier Saturation Index	0.20	2.30
Stiff & Davis Stability Index	0.56	1.98
TDS[a] (mg/l)	1,050	6,321
Ionic Strength (molal)	0.02	0.12
HCO_3^- (mg/L)	427.0	2,607
CO_2 (mg/l)	50.34	60.29
CO_3^{-2} (mg/L)	0.48	24.03
$CaSO_4$ (% saturation)	2.3	37.6
$BaSO_4$ (% saturation)	41.1	442.2
$SrSO_4$ (% saturation)	2.2	18.3
CaF_2 (% saturation)	0.00	0.00
SiO_2 (% saturation)	11.8	72.0
$Mg(OH)_2$ (% saturation)	0.00	0.02

Footnotes:

[a]Total Dissolved Solids includes ions, SiO_2 and $B(OH)_3$. It does not include NH_3 and CO_2

RO Utility and Chemical Costs

Service Water

	Flow Rate (gpm)	Unit Cost ($/kgal)	Hourly Cost ($/h)	Daily Cost ($/d)
Non-Product Feed Water				
Pass 1	110.4	0.0000	0.00	0.00
Total Non-product Feed Water Cost	110.4		0.00	0.00
Waste Water Disposal				
Pass 1	110.4	0.0000	0.00	0.00
Total Waste Water Disposal	110.4		0.00	0.00
Total Service Water Cost				0.00

Electricity

Peak Power	(kW)	36.1
Energy	(kWh/d)	865.9
Electricity Unit Cost	($/kWh)	0.0900
Electricity Cost	($/d)	77.9
Specific Energy	(kWh/kgal)	0.96

Pump	Flow Rate (gpm)	Power (kW)	Energy (kWh/d)	Cost ($/d)
Pass 1				
Feed	735.08	36.08	865.85	77.93
Pass 1 Total Electrical Cost		36.08	865.85	77.93

Chemical

Chemical	Unit Cost ($/kg)	Dose (mg/L)	Volume (L/d)	Cost ($/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	($/d)	77.9
Specific Water Cost	($/kgal)	0.087

Hydranautics RO/NF Limited System Performance Warranty: Prorated Replacement
Project Name: Village of Wellington FL
Buyer: Aerex
Date: March 7, 2019

This Limited Integrated Membrane System Performance Warranty is provided to **Harn** (the "Buyer") and is made by HYDRANAUTICS ("Hydranautics"), a California corporation, in connection with the Buyer's purchase of Hydranautics product(s) and the component parts thereof, as more fully described and defined in that certain sales contract ("Contract") of even date herewith. This Warranty is made and executed by Hydranautics and the Buyer as of the date set forth hereinbelow, and is effective as of the date of execution by the last to sign of the parties hereto (the "Effective Date"), subject to the terms, conditions and limitations set forth herein.

I. ACRONYMS AND DEFINITIONS

The following acronyms as used herein shall mean:

ASTM:	ATSM International
AWWA:	American Water Works Association
Feedwater:	The flow entering the pressure vessels that contain Covered Product
NTU:	Nephelometric Turbidity Units
RO:	Reverse Osmosis
NF:	Nanofiltration
$SDI_{(15)}$:	Silt Density Index, fifteen $_{(15)}$ minute test with Millipore AAWP pads
TDS:	Total Dissolved Solids as measured using the American Water Works Association ("AWWA") standard methods
TSB:	Technical Service Bulletin. TSBs referenced in this Warranty may be viewed and downloaded at http://www.membranes.com. TSBs specifically incorporated into this Warranty by reference are attached hereto as Attachment "B."

II. ACKNOWLEDGEMENTS OF BUYER

By executing and accepting this Warranty, Buyer acknowledges to Hydranautics the following:

A. Buyer understands and agrees that it is Buyer's sole responsibility to ensure that the RO system in which Covered Product is installed, is capable of being operated in a manner that satisfies the: (i) Feedwater Quality; (ii) Operating; and (iii) Design Conditions as set forth herein;

B. Buyer has read and understands the terms, conditions, and limitations of this Warranty;

C. Buyer has read and understands the Technical Service Bulletins ("TSBs") attached hereto as Attachment "B," and will comply with the procedures, recommendations and good use practices described therein. Buyer agrees to conform with all reasonable diligence to the requirements set forth in TSBs 105, 107, 108 and 118, and hereby acknowledges that in the event that Buyer's failure to reasonably comply with the requirements and recommendations set forth therein cause damage to Covered Product(s), to the extent that Covered Product(s) performance is permanently impaired or operational life is substantially shortened; then Hydranautics will be relieved of its obligations to perform the remedies set forth herein and this Warranty will be voided.

D. Buyer understands that this Warranty is ***not*** effective unless an authorized representative of both Hydranautics and Buyer have affixed their respective signatures in the place provided below, signifying their mutual acceptance of the provisions, terms, conditions and limitations of this Warranty.

Buyer's Initials _____

Hydranautics Corporate Headquarters: 401 Jones Road, Oceanside, CA 92058, USA.
Toll Free: 1-800-CPA-PURE **Phone:** +760-901-2500 **Fax:** +760-901-2578 **Email:** info@hydranautics.com **Website:** www.membranes.com

III. LIMITED WARRANTY ON WORKMANSHIP AND MATERIALS

Hydranautics warrants Covered Product as free from defects in workmanship and materials for a period not to exceed **twelve (12) months** months from the date of delivery to Buyer; provided however, that Covered Product are used and maintained in accordance with this Warranty. Covered Product which are not free from defects, will be repaired or replaced, at Hydranautics sole option, in accordance with the provisions of this Warranty.

IV. LIMITED PERFORMANCE WARRANTY

Hydranautics warrants Covered Product shall produce the permeate output and the permeate quality as set forth in Attachment "A," subject to the terms, conditions and limitations of this Limited Performance Warranty (the "Warranty").

V. WARRANTY TERM

This Warranty shall commence on whichever of the following events occurs first: (i) Beneficial Use (by train); or (ii) six (6) months following last delivery; or (iii) plant acceptance whichever occurs first; and shall **terminate sixty (60) months** following commencement (the "Warranty Term"). Buyer shall record the date of the warranty start date as set forth in this Article V., maintain such records, and make such records available to Hydranautics in the event of a warranty claim. For purposes of this Article V., the above terms shall have the following meaning:

A. "Beneficial Use" means – The Owner is being enriched from the installed RO membrane elements by operating the plant or individual trains in which the membrane elements are installed for the purpose producing water and where the water produced is being sold or otherwise produced or consumed for the benefit of either the Buyer or the Owner, whether within specification or not.

B. "six (6) months following last delivery" means – six months following the last date of delivery to Buyer under the delivery terms (Incoterms) set forth in the main purchase contract, as evidenced by the shipping documents.

C. "plant acceptance" means – the date on which the plant or system in which Covered Product are installed successfully completed acceptance testing and the Buyer received or the Owner issued a written acceptance certificate.

VI. WARRANTY TERMS AND CONDITIONS

This Warranty is expressly conditioned on Buyer's compliance with the following terms and conditions.

A. FEEDWATER QUALITY CONDITIONS

Feedwater quality shall be measured after all pre-treatment chemicals have been added and following cartridge filtration.

1) Turbidity must be below the value specified in Attachment A.
2) Feedwater $SDI_{(15)}$must be below the value specified in Attachment A.
3) Covered Product whose performance is impared due to scale formation are not covered under this Warranty.
4) Feedwater temperature shall not exceed 113°F (45°C).
5) The feedwater shall contain no oil or grease. Total hydrocarbons shall be below 100 ppb.
6) Feedwater shall contain no chlorine, hypochlorous, hypochlorite ion or other oxidizing agents.

B. RECORDS

As a condition precedent for enforcement of Hydranautics' obligations under this warranty, Buyer agrees to maintain records in accordance with the following requirements, hereinafter collectively "Records":

1) Buyer shall maintain records of SDI measurements at a frequency of not less than three (3) measurements per day while Covered Product is in operation for the term of this Warranty. SDI pads should be maintained for three (3) months for reference and shall be made available to Hydranautics on request in the event a warranty claim is filed. Turbidity records shall be continuous for the term of this Warranty.

2) Buyer shall enter one (1) set of operating data, per operating train, per day, into the Hydranautics' RO Data Normalization Program, which may be downloaded at http://www.membranes.com. Data may be entered on working days only, however, data must be entered for each day of operation. Buyer agrees to enter all data and information required by RODataincluding, but not necessarily limited to: feed water temperature, feed water pH, feed water conductivity, permeate conductivity, concentrate flow, permeate flow, feed pressure, permate pressure, concentrate pressure, feed water SDI and feed water turbidity.

3) Additionally, Buyer shall maintain a daily operations log for the system or trains, in the event the system is not operated at full capacity, in which Covered Products are installed and operating. The operations log shall record any and all plant operational events, including but not limited to: (i) system or train start-up dates and times; (ii) system or train shut-down dates and times; (iii) changes in the type, brand or concentration of chemicals used; (iv) the dates when Covered Products were cleaned as well as the type and brand of cleaning chemicals used and the procedures employed.

4) Additionally, Buyer shall maintain records showing the serial number of each RO Covered Product and the location and position of each Covered Product in the pressure tubes. If RO Covered Products are installed in the system by a party other than the Buyer, it is the Buyer's responsibility to obtain the loading records from the party loading Covered Products.

5) Upon reasonable advance notice, Buyer agrees to grant Hydranautics' employees access to the system and the operating records required herein at any time during normal business hours. Hydranautics' representative(s) shall be notified of any membrane cleanings and replacement element loading within a reasonable timeframe. An up-to-date copy of the data disc(s) produced by the Data Normalization Program, or other plant operating data, shall be provided to Hydranautics upon request. An up-to-date copy of the data disc(s) produced by Hydranautics' RO Data Normalization Program shall be sent to Hydranautics with seven (7) business days of request.

C. OTHER WARRANTY CONDITIONS

As a condition precedent for the enforcement of this Warranty, Buyer acknowledges and agrees to the following provisions:

1) Hydranautics shall have the right to review the system design, operating instructions, and the operation of Covered Products, including pre-treatment and cleaning procedures and chemicals used to validate Buyer's compliance with the terms and conditions of this Warranty.

2) This Warranty shall not be assigned or transferred by the Buyer without the prior written consent of Hydranautics, such consent to not be unreasonably withheld.

Buyer's failure to strictly adhere to the express conditions set forth in Article VI, Warranty Terms and Conditions, will void this Warranty.

VII. ENFORCEMENT OF WARRANTY

A. In the event that Covered Product fails to perform to warranted values, Buyer shall notify Hydranautics within ten (10) days of the discovery of such failure by contacting a local Hydranautics representative.

B. Upon request, Buyer shall forward to Hydranautics the Records required by paragraph VI.B, within seven (7) business days of receipt of such request. Buyer's failure to provide Hydranautics with Records will prohibit Hydranautics from validating Buyer's warranty claim. In such event, Hydranautics shall be relieved of all of its obligations under this Warranty.

C. If the performance issue cannot be resolved during the site visit or over the telephone, Hydranautics

may request Buyer to return Covered Product(s) for performance evaluation, under TSB 116 Returned Goods Authorization, to validate Buyer's warranty claim and to confirm that the conditions of this Warranty have been satisfied. Except as may otherwise be specifically required under the terms set forth in this Warranty, Buyer shall enforce the Warranty in accordance with the procedures set forth in TSB 116, Returned Goods Autorization. Failure to comply with the procedures set forth in TSB 116 shall relieve Hydranautics of its obligations to perform under this Warranty.

D. Buyer is solely responsible for all packing and shipment costs and risk of loss for all Covered Product shipped by Buyer to Hydranautics. Hydranautics is solely responsible for all packing and shipments costs and risk of loss for Covered Product shipped to Buyer until delivery to Buyer's facility.

VIII. BUYER'S EXCLUSIVE REMEDY

The sole obligation of Hydranautics and the sole and exclusive remedy of Buyer is limited to and is fully discharged by Hydranautics repairing or replacing Covered Product; or adding new Covered Product to achieve Warranted Performance, subject to the limitation that Hydranautics is only responsible for a replacement or repair value based on the terms provided in Attachment A, Section V.

IX. LIMITATIONS ON HYDRANAUTICS LIABILITY

Hydranautics' total liability under this Warranty shall not exceed the replacement value, based on the pro-rata balance of the unrealized warranty term, of one set of membrane elements per train; excluding any Covered Product or portions thereof that are replaced due to defects in material or workmanship. Covered Product, or portions thereof, that are replaced due to defects in material or workmanship will be covered as new Covered Product, although all warranty obligations will expire at the end of the Warranty Term, as set forth herein, including any remaining term of the workmanship and material warranty.

IN NO EVENT SHALL HYDRANAUTICS BE LIABLE FOR PROSPECTIVE PROFITS OR SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOST TIME, LOST PROFITS, LOST SALES, OPERATING COSTS, PLANT DOWNTIME, OR DAMAGES RESULTING FROM DELAYED SHIPMENT OR MAILING, OR THIRD PARTY CLAIMS, ARISING FROM A WARRANTY CLAIM, SALE OF A COVERED PRODUCT, OR FOR ANY DELAY OR FAILURE TO PERFORM DUE TO CAUSES BEYOND ITS REASONABLE CONTROL, INCLUDING, BUT NOT LIMITED TO, ACTS OF GOD, STRIKES, RIOTS, ACTS OF WAR, EPIDEMICS, FAILURE OF SUPPLIERS TO PERFORM, GOVERNMENTAL REGULATIONS, POWER FAILURES, EARTHQUAKES, OR OTHER DISASTERS), OR FROM ANY BREACH OF WARRANTY OR CONTRACT BY HYDRANAUTICS IN CONNECTION WITH AN WARRANTY CLAIM OR THE SALE OF A COVERED PRODUCT TO BUYER, EVEN IF HYDRANAUTICS HAS BEEN PREVIOUSLY ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. HYDRANAUTICS' TOTAL LIABILITY, WHETHER IN CONTRACT OR TORT OR OTHERWISE, ARISING OUT OF ITS SALE OF COVERED PRODUCT, OR ANY WARRANTY CLAIM SHALL NOT EXCEED THE REPLACEMENT VALUE OF ONE SET OF COVERED PRODUCT PER TRAIN, EXCLUDING ANY COVERED PRODUCT OR PORTIONS THEREOF THAT ARE REPLACED DUE TO DEFECTS IN MATERIAL OR WORKMANSHIP.

X. WARRANTY DISCLAIMERS

THIS WARRANTY SUPERSEDES AND REPLACES ANY PREVIOUS WARRANTY MADE OR OFFERED TO THE BUYER BY HYDRANAUTICS, EXCEPT FOR THOSE SET FORTH IN THE CONTRACT FOR SALE TO WHICH THIS LIMITED SYSTEM PERFORMANCE WARRANTY IS ATTACHED. HYDRANAUTICS DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ANY GOODS PURCHASED BY YOU FROM HYDRANAUTICS. BUYER ASSUMES ALL RISKS AND LIABILITIES RESULTING FROM THE USE OF ANY COVERED PRODUCT DELIVERED HEREUNDER. EXCEPT AS SPECIFICALLY SET FORTH HEREIN, NO WARRANTY IS MADE FOR THE FITNESS OF ANY COVERED PRODUCT FOR ANY PARTICULAR PURPOSE.

XI. MISCELLANEOUS

A. Unless otherwise provided for in this Warranty, no agent, employee, or representative of Hydranautics has any authority to bind Hydranautics to any other affirmation, representation, or warranty concerning Covered Products. Unless an affirmation, representation or warranty is specifically included in this Warranty, it shall not be enforceable by Buyer.

B. To the extent that ANY term set forth in this Warranty is in conflict with any other agreement between the parties, the terms of this Warranty shall control, particularly regarding, but not limited to, the Limitations on Hydranautics Liability set forth in Section IX hereof.

C. This Warranty shall be governed by and construed according to the laws of California, USA.

The EFFECTIVE DATE OF THIS WARRANTY shall be the latest date of execution by the last to sign of the parties hereto.

FOR HYDRANAUTICS:	**FOR BUYER:**
Signature:	Signature:
Name: Craig R. Bartels, PhD	Name:
Title: Vice President – Technology	Title:
Date:	Date:

Attachment "A" to
HYDRANAUTICS RO/NF LIMITED SYSTEM PERFORMANCE WARRANTY
Project Name: Village of Wellington FL
Buyer: Harn
Date: March 7, 2019

I. WARRANTED PERFORMANCE

The following parameters, and *only the following parameters*, are guaranteed under this Warranty.

PARAMETER	WARRANTED VALUE
a. Permeate Output (Capacity):	**1.0 mgd per train 2-3-4-5 for total of 4.0 mgd**
	1.8 mgd for train 6
	0.9 mgd for train 7
b. Permeate Quality (current feed):	
TDS	**< 246 mg/l as sum of the ions**
Calcium	**< 13 mg/l**
Magnesium	**< 2 mg/l**
Sodium	**< 63 mg/l**
Barium	**< 0.003 mg/l**
Strontium	**< 0.20 mg/l**
Bicarbonate	**< 94 mg/l**
Chloride	**< 77 mg/l**
Sulfate	**< 5 mg/l**
Silica as SiO2	**< 5 mg/l**

II. DESIGN CONDITIONS

Warranted Performance as defined in Section I. is expressly conditioned on Covered Product being operated under the Design Conditions provided below. Buyer understands and hereby agrees that operation of Covered Product under conditions other than the Design Conditions will result in performance that is different from Warranted Performance and that such different result does not indicate a defect in Covered Product.

The Current Design Conditions are:

a.	Current design feedwater ion concentrations are as follows:								
Calcium	Ca^{2+}	**142**	mg/l		Bicarbonate Alk	HCO_3^-	**427**	mg/l
Magnesium	Mg^{2+}	**19**	mg/l		Carbonate	CO_3^{2-}	**0.35**	mg/l
Sodium	Na^+	**143**	mg/l		Sulfate	SO_4^{2-}	**83**	mg/l
Potassium	K^+	**0**	mg/l		Chloride	CL^-	**218**	mg/l
Barium	Ba^{2+}	**0.02**	mg/l		Silica	SiO_2	**15**	mg/l
Strontium	Sr^{2+}	**1.7**	mg/l					

b.	Feedwater TDS	**1049** mg/l Total Dissolved Solids as Sum of Ions
c.	Feedwater pH	**7.0** pH Units
d.	Feedwater Temperature Range	**26.1C 79F**

III. SYSTEM DESCRIPTION

Each train of the reverse osmosis system consists of:

Trains 2-3-4-5:

a.	**18** Pressure Vessels, each Pressure Vessel houses **6** membrane elements – First Stage
b.	**9** Pressure Vessels, each Pressure Vessel houses **6** membrane elements – Second Stage

Train 6:

a.	**36** Pressure Vessels, each Pressure Vessel houses **6** membrane elements – First Stage
b.	**16** Pressure Vessels, each Pressure Vessel houses **6** membrane elements – Second Stage

Train 7:

a.	**18** Pressure Vessels, each Pressure Vessel houses **6** membrane elements – First Stage
b.	**8** Pressure Vessels, each Pressure Vessel houses **6** membrane elements – Second Stage

Model and Total number of Covered Product Installed:

Membrane Model	Total Quantity
ESNA1-LF-LD	**1116 plus 3 spare= 1119 total**

IV. OPERATING PARAMETERS

A. The system and single train element flux rate shall not exceed the design value at any time during RO operation.

B. Maximum recovery shall not exceed **85** % in the first pass.

C. Pressure drop across a pressure vessel shall never exceed 60 psig (4.1bar).

D. **Feedwater $SDI_{(15)}$ shall be maintained at less than or equal to 3.0 $SDI_{(15)}$ 95% of the time and maximum of 4.0.**

E. **Feedwater Turbidity shall be maintained at less than or equal to 0.2 NTU 95% of the time and maximum of 0.3 NTU.**

F. The applied operating pressure shall at no time exceed the maximum pressure rating of the Covered Product as set forth in TSB105.

G. The membrane element shall not, at any time, be exposed to permeate back pressure (where permeate static pressure exceeds feed static pressure) including during shut-down, greater than 0.35 bar (5 psig.)

H. At no time shall Covered Product be subjected to pressurization/depressurization at a rate greater than zero point seven (0.7) bar (10 psig) per second.

I. Covered Product which experience structural or mechanical damaged as a result of Buyer's failure to meet these operating conditions are not covered under this warranty.

V. BUYER'S EXCLUSIVE REMEDY

The sole obligation of Hydranautics (and the sole and exclusive remedy of Buyer) is limited to and is fully discharged by Hydranautics repairing or replacing existing Covered Product, or portions thereof, or adding new Covered Product, to achieve Warranted Performance. Hydranautics obligation to repair, replace or add is subject to the limitation that Hydranautics is only responsible for replacement on a pro rata adjusted basis; meaning that Buyer shall be required to pay an amount equal to the amount of the then current selling price multiplied by a factor equal to the number of completed months of the Warranty Period which have elapsed since the Warranty Start Date, divided by the total number of months of the Warranty Period. For example, if the Warranty Term is thirty-six (36) months and the Buyer seeks enforcement of the Warranty in the sixth (6^{th}) month, the Buyer shall be responsible for replacement valued at up to 16.66% of the then-current price of Covered Product and Hydranautics shall be responsible for the remaining balance. The decision to repair or replace Covered Product or any portion thereof shall be made by Hydranautics in its sole and absolute discretion.

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	91.8	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	0.0	years
Specific energy	0.97	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	46.1	psi	Fouling factor	1.00	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Boost	Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	515.3	45.4	16.8	17.2	10.8	21.3	1.2	24	0	80.9	109.9	ESNA1-LF-LD	108	18 x 6M
1-2	179.8	33.5	13.5	12	6.7	17.1	1.16	9	0	74.2	387.5	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	31.780	1140.5	2719.6
Ca	142.00	142.00	10.425	374.1	892.2
Mg	19.00	19.00	1.395	50.1	119.4
Na	143.00	143.00	46.391	338.0	694.0
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.172	4.4	10.4
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.005	2.7	17.9
HCO3	427.00	427.00	59.948	1091.8	2523.5
SO4	83.00	83.00	3.698	221.1	535.1
Cl	218.00	218.00	56.658	531.2	1138.1
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.223	37.3	82.2
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**181.92**	**2650.79**	**6012.82**
pH	**7.00**	**7.00**	**6.18**	**7.38**	**7.71**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	445	10000
SiO2 saturation, %	12	12	61	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1443.99	
Langelier saturation index	0.21	0.21	2.42	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	50.8	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	91.8	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	0.0	years
Specific energy	0.97	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	46.1	psi	Fouling factor	1.00	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

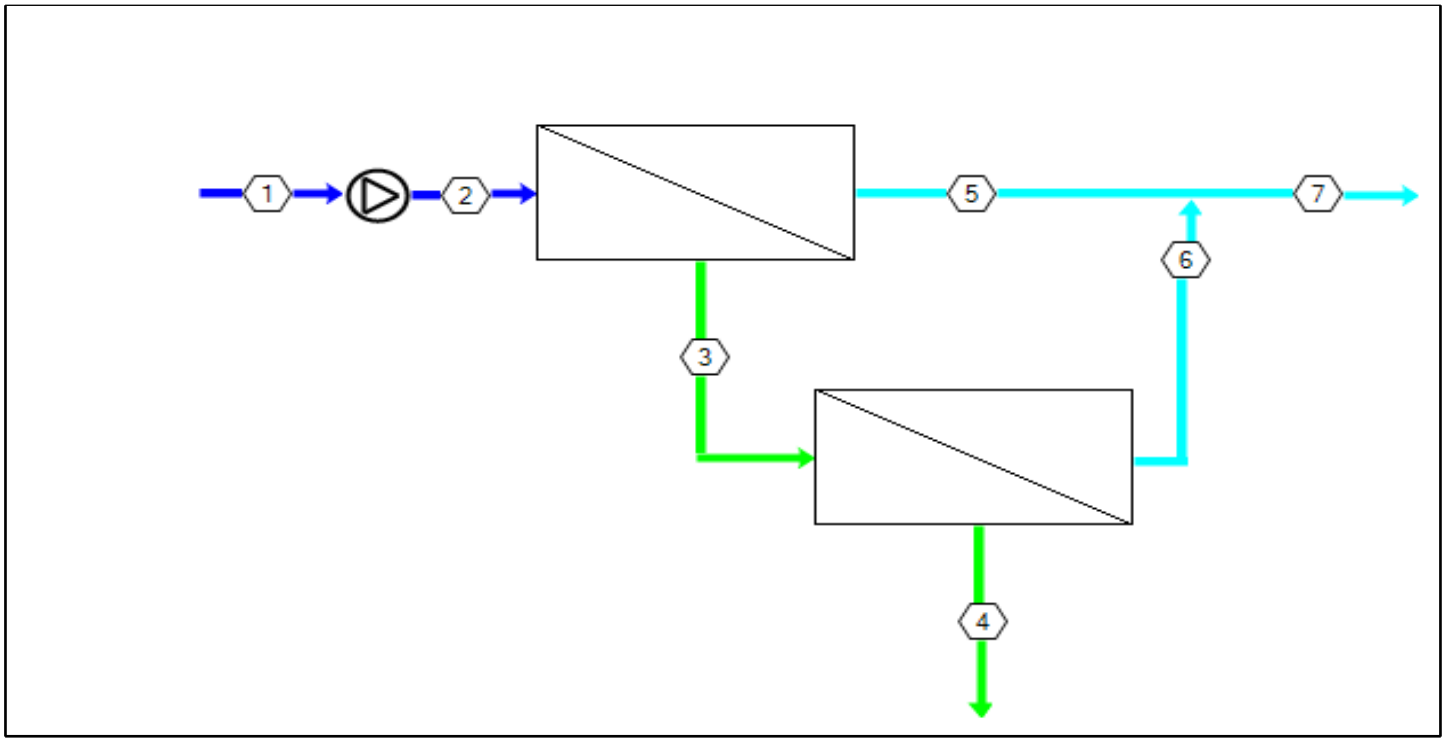
Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	515.3	45.4	16.8	17.2	10.8	21.3	1.2	24	0	80.9	109.9	ESNA1-LF-LD	108	18 x 6M
1-2	179.8	33.5	13.5	12	6.7	17.1	1.16	9	0	74.2	387.5	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	91.8	2.93	10.4	59.6	5.9	21.3	1.13	60.2	3.224	0.431	16.149	19.084
1-1	2	88.8	2.38	11.8	53.1	5.3	19	1.14	68.2	3.664	0.49	18.234	21.588
1-1	3	86.4	1.92	13.7	49.6	4.9	17.7	1.15	76.2	4.117	0.551	20.314	24.109
1-1	4	84.5	1.52	16	46.1	4.6	16.4	1.16	85.5	4.643	0.621	22.668	26.983
1-1	5	83	1.18	18.9	42.3	4.2	15.1	1.18	96.5	5.278	0.706	25.449	30.4
1-1	6	81.8	0.88	22.7	38.1	3.8	13.5	1.2	110	6.069	0.812	28.831	34.582
1-2	1	80.9	1.87	26.2	48.4	4.7	17.1	1.15	186.7	10.66	1.426	47.716	58.205
1-2	2	79.1	1.48	30.3	43.1	4.2	15.2	1.15	212.8	12.212	1.634	54.167	66.244
1-2	3	77.6	1.17	35	37.4	3.6	13.1	1.16	244.7	14.127	1.89	62	76.049
1-2	4	76.4	0.91	40.2	31.4	3	11	1.16	283.8	16.497	2.207	71.541	88.047
1-2	5	75.5	0.71	45.6	25.4	2.4	8.8	1.15	331.2	19.391	2.595	83.014	102.537
1-2	6	74.8	0.56	50.7	19.6	1.9	6.8	1.14	387.5	22.872	3.06	96.545	119.72

Permeate Throttling (Variable)

Project name Wellington-CurrentFeed-Tr2-5

Temperature : 79.0 °F Element age, P1 : 0.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	817	0	1049	7.00	1700
2	817	91.8	1049	7.00	1700
3	302	80.9	2651	7.38	3857
4	122	74.2	6013	7.71	8089
5	515	24.0	110	5.96	189
6	180	9.00	388	6.51	659
7	694	9.00	182	6.18	311

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	93.7	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	1.0	years
Specific energy	0.99	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	48.2	psi	Fouling factor	0.95	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	511.3	45.4	17	17	10.9	21	1.2	24	0	82.8	117	ESNA1-LF-LD	108	18 x 6M
1-2	183.8	34	13.5	12.3	6.9	17.1	1.16	9	0	75.9	396.1	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	33.586	1123.8	2709.4
Ca	142.00	142.00	11.018	368.7	888.8
Mg	19.00	19.00	1.474	49.3	118.9
Na	143.00	143.00	48.553	330.9	681.7
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.182	4.4	10.4
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.006	2.7	17.7
HCO3	427.00	427.00	63.075	1087.9	2508.8
SO4	83.00	83.00	3.904	218.0	534.0
Cl	218.00	218.00	59.348	521.2	1122.8
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.385	36.6	81.2
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**190.95**	**2619.76**	**5964.44**
pH	**7.00**	**7.00**	**6.20**	**7.38**	**7.71**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	444	10000
SiO2 saturation, %	12	12	60	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1434.37	
Langelier saturation index	0.21	0.21	2.41	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	50.3	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	93.7	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	1.0	years
Specific energy	0.99	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	48.2	psi	Fouling factor	0.95	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

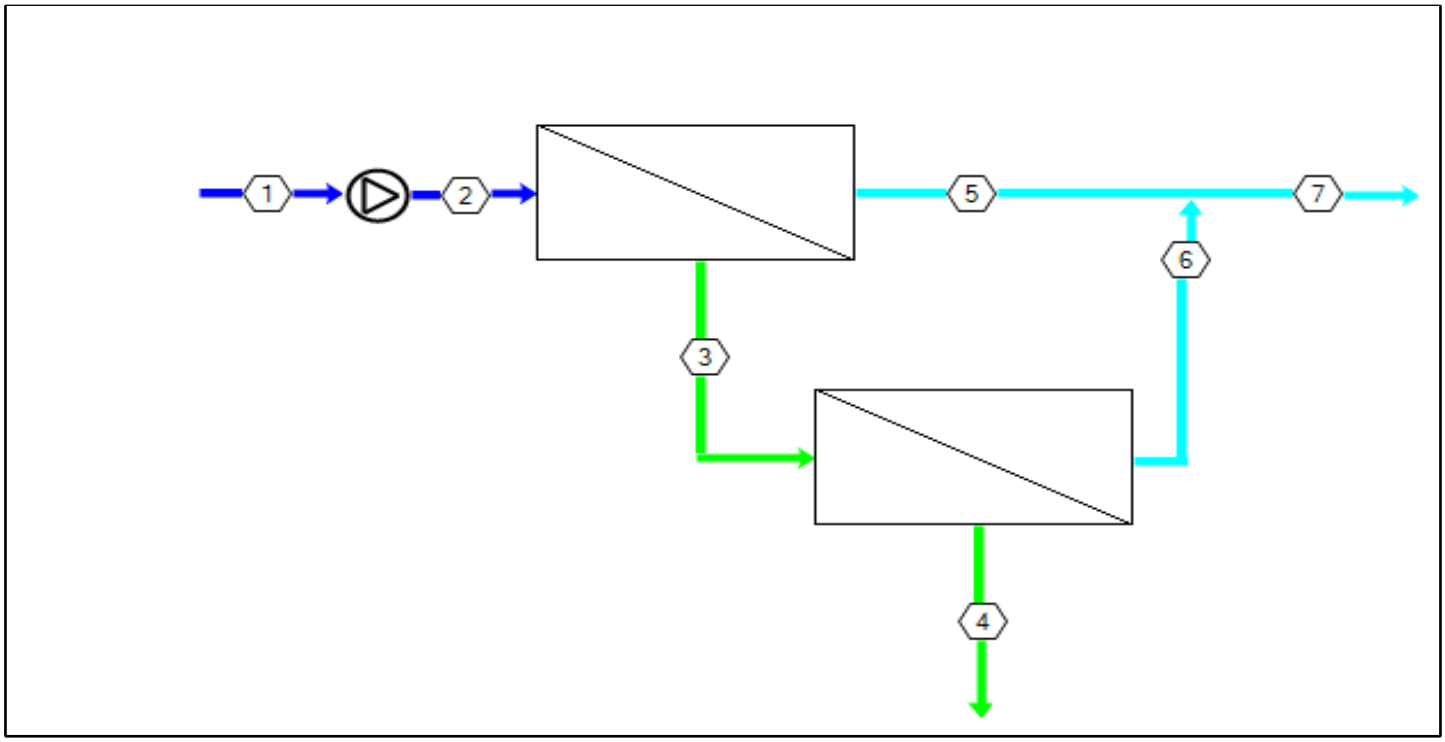
Pass - Stage	Perm. Flow	Flow / Vessel Feed	Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Boost	Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	511.3	45.4	17	17	10.9	21	1.2	24	0	82.8	117	ESNA1-LF-LD	108	18 x 6M
1-2	183.8	34	13.5	12.3	6.9	17.1	1.16	9	0	75.9	396.1	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	93.7	2.93	10.3	61.7	5.8	21	1.13	65.3	3.502	0.469	17.508	20.66
1-1	2	90.7	2.39	11.8	55.1	5.2	18.7	1.13	73.7	3.971	0.531	19.714	23.31
1-1	3	88.3	1.94	13.5	51.7	4.9	17.5	1.15	82.1	4.45	0.595	21.883	25.943
1-1	4	86.4	1.54	15.8	48.2	4.5	16.3	1.16	91.7	5.001	0.669	24.32	28.923
1-1	5	84.9	1.19	18.6	44.5	4.2	15.1	1.18	103.1	5.663	0.758	27.182	32.447
1-1	6	83.7	0.9	22.3	40.4	3.8	13.6	1.2	117	6.486	0.868	30.642	36.74
1-2	1	82.8	1.91	25.6	50.8	4.7	17.1	1.14	195.8	11.253	1.506	49.924	60.937
1-2	2	80.9	1.52	29.6	45.6	4.2	15.3	1.15	221.9	12.823	1.716	56.337	68.955
1-2	3	79.3	1.2	34.2	40.1	3.7	13.4	1.16	253.7	14.753	1.974	64.086	78.692
1-2	4	78.1	0.93	39.3	34.2	3.1	11.3	1.1	292.5	17.135	2.293	73.481	90.556
1-2	5	77.2	0.73	44.8	28.1	2.6	9.3	1.16	339.7	20.057	2.684	84.807	104.929
1-2	6	76.5	0.57	50.2	22.1	2	7.2	1.14	396.1	23.588	3.156	98.216	122.044

Permeate Throttling (Variable)

Project name Wellington-CurrentFeed-Tr2-5

Temperature : 79.0 °F Element age, P1 : 1.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	817	0	1049	7.00	1700
2	817	93.7	1049	7.00	1700
3	306	82.8	2620	7.38	3806
4	122	75.9	5964	7.71	8026
5	511	24.0	117	5.99	201
6	184	9.00	396	6.52	673
7	694	9.00	191	6.20	326

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	95.7	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	2.0	years
Specific energy	1.02	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	50.4	psi	Fouling factor	0.90	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Boost	Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	507.7	45.4	17.2	16.9	11	20.7	1.2	24	0	84.7	124	ESNA1-LF-LD	108	18 x 6M
1-2	187.4	34.4	13.5	12.5	7	17	1.16	9	0	77.7	404.5	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	35.376	1108.7	2699.0
Ca	142.00	142.00	11.605	363.7	885.4
Mg	19.00	19.00	1.553	48.7	118.5
Na	143.00	143.00	50.653	324.4	669.7
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.191	4.3	10.3
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.007	2.5	17.3
HCO3	427.00	427.00	66.148	1056.6	2484.8
SO4	83.00	83.00	4.108	215.2	532.8
Cl	218.00	218.00	61.968	511.9	1107.8
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.543	36.0	80.3
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**199.78**	**2563.51**	**5906.92**
pH	**7.00**	**7.00**	**6.22**	**7.37**	**7.71**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	444	10000
SiO2 saturation, %	12	12	59	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1419.81	
Langelier saturation index	0.21	0.21	2.40	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	49.7	

Permeate Throttling (Variable)

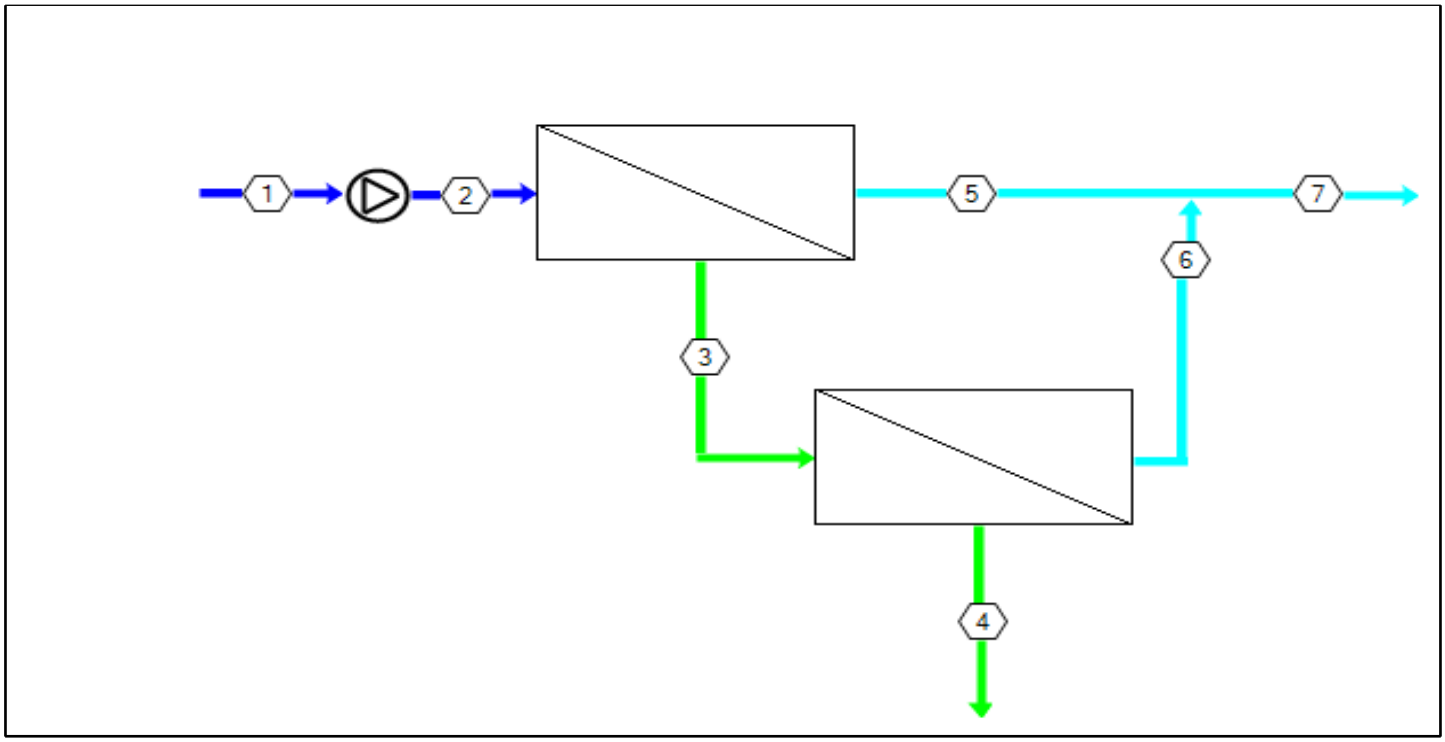
Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	95.7	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	2.0	years
Specific energy	1.02	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	50.4	psi	Fouling factor	0.90	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	507.7	45.4	17.2	16.9	11	20.7	1.2	24	0	84.7	124	ESNA1-LF-LD	108	18 x 6M
1-2	187.4	34.4	13.5	12.5	7	17	1.16	9	0	77.7	404.5	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	95.7	2.93	10.3	64	5.7	20.7	1.13	70.4	3.787	0.507	18.891	22.262
1-1	2	92.8	2.4	11.7	57.2	5.1	18.5	1.13	79.3	4.285	0.573	21.211	25.05
1-1	3	90.4	1.95	13.4	53.9	4.8	17.4	1.14	88.1	4.786	0.64	23.464	27.788
1-1	4	88.4	1.56	15.6	50.5	4.5	16.2	1.16	98	5.362	0.717	25.977	30.867
1-1	5	86.9	1.21	18.4	46.9	4.2	15.1	1.18	109.7	6.051	0.81	28.91	34.489
1-1	6	85.6	0.92	22	42.8	3.8	13.7	1.2	124	6.904	0.924	32.441	38.882
1-2	1	84.7	1.94	25.2	53.3	4.7	17	1.14	204.9	11.849	1.585	52.109	63.648
1-2	2	82.8	1.55	29	48.2	4.3	15.3	1.15	231.1	13.44	1.798	58.488	71.654
1-2	3	81.2	1.23	33.4	42.8	3.8	13.6	1.16	262.7	15.383	2.058	66.142	81.308
1-2	4	80	0.96	38.5	37	3.2	11.7	1.16	301.2	17.774	2.378	75.385	93.029
1-2	5	79.1	0.74	44.1	30.9	2.7	9.7	1.16	348.1	20.718	2.772	86.543	107.26
1-2	6	78.3	0.58	49.7	24.7	2.1	7.7	1.15	404.5	24.299	3.251	99.817	124.294

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 2.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	817	0	1049	7.00	1700
2	817	95.7	1049	7.00	1700
3	309	84.7	2564	7.37	3743
4	122	77.7	5907	7.71	7958
5	508	24.0	124	6.01	213
6	187	9.00	404	6.53	686
7	694	9.00	200	6.22	341

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	97.9	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	3.0	years
Specific energy	1.04	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	52.8	psi	Fouling factor	0.86	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	504.3	45.4	17.4	16.8	11	20.4	1.2	24	0	86.9	130.9	ESNA1-LF-LD	108	18 x 6M
1-2	190.7	34.7	13.5	12.7	7.1	17	1.16	9	0	79.7	412.8	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	37.158	1095.1	2688.7
Ca	142.00	142.00	12.190	359.3	882.0
Mg	19.00	19.00	1.631	48.1	118.0
Na	143.00	143.00	52.697	318.5	658.0
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.0	0.1
Sr	1.700	1.700	0.200	4.2	10.2
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.007	2.5	17.0
HCO3	427.00	427.00	69.181	1052.9	2470.2
SO4	83.00	83.00	4.311	212.7	531.6
Cl	218.00	218.00	64.525	503.5	1093.2
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.699	35.5	79.4
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**208.44**	**2537.25**	**5859.85**
pH	**7.00**	**7.00**	**6.24**	**7.37**	**7.71**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	443	10000
SiO2 saturation, %	12	12	59	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1410.21	
Langelier saturation index	0.21	0.21	2.40	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	49.3	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	97.9	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	3.0	years
Specific energy	1.04	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	52.8	psi	Fouling factor	0.86	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

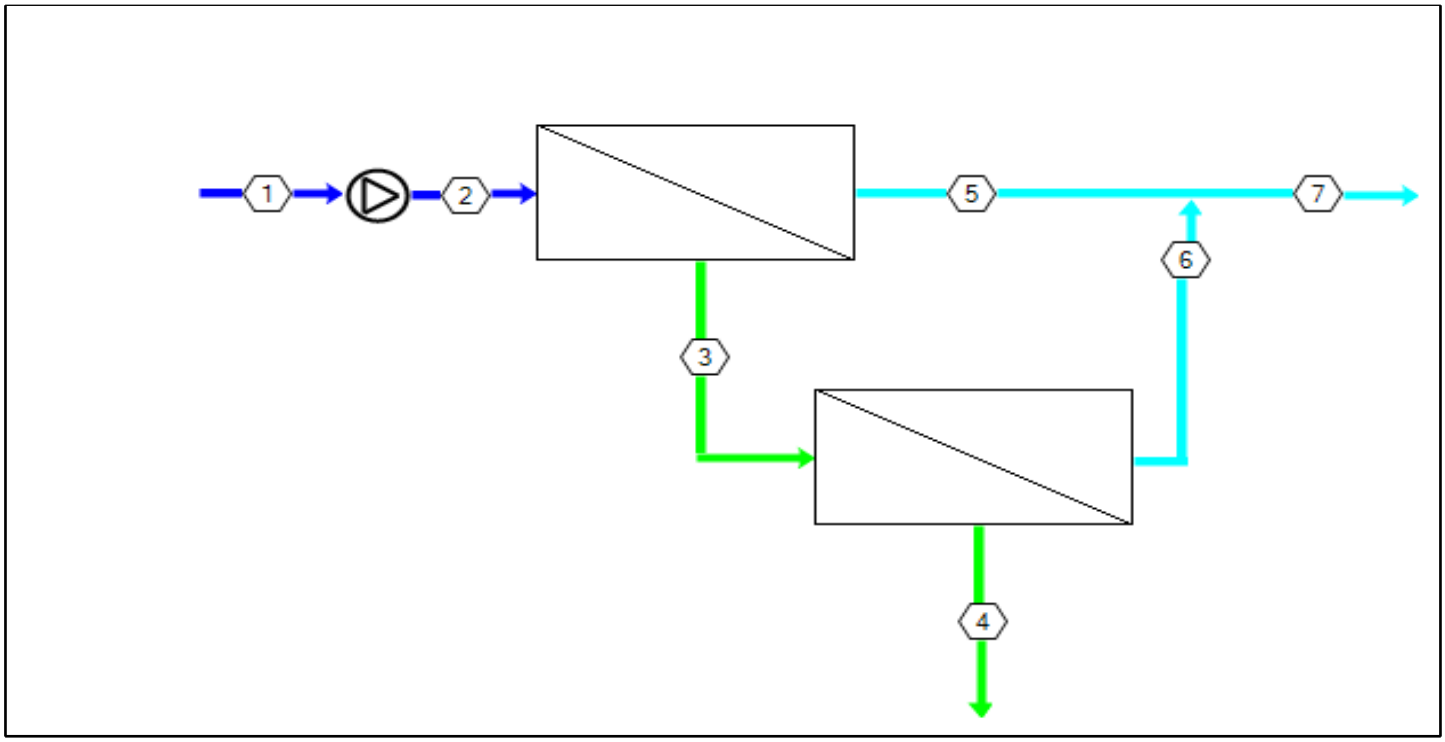
Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	504.3	45.4	17.4	16.8	11	20.4	1.2	24	0	86.9	130.9	ESNA1-LF-LD	108	18 x 6M
1-2	190.7	34.7	13.5	12.7	7.1	17	1.16	9	0	79.7	412.8	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	97.9	2.93	10.3	66.4	5.7	20.4	1.13	75.6	4.077	0.545	20.289	23.878
1-1	2	95	2.4	11.6	59.5	5.1	18.2	1.13	84.9	4.601	0.616	22.719	26.798
1-1	3	92.5	1.96	13.3	56.2	4.8	17.2	1.14	94	5.126	0.686	25.049	29.634
1-1	4	90.6	1.57	15.4	52.9	4.5	16.2	1.16	104.3	5.725	0.766	27.63	32.805
1-1	5	89	1.23	18.1	49.3	4.2	15.1	1.18	116.3	6.441	0.862	30.63	36.519
1-1	6	87.8	0.93	21.6	45.4	3.8	13.8	1.2	130.9	7.324	0.98	34.22	41.003
1-2	1	86.9	1.97	24.7	56	4.7	17	1.14	214	12.449	1.666	54.271	66.335
1-2	2	84.9	1.58	28.4	51	4.3	15.4	1.15	240.1	14.058	1.881	60.606	74.315
1-2	3	83.3	1.25	32.7	45.7	3.8	13.7	1.16	271.6	16.015	2.143	68.168	83.893
1-2	4	82	0.98	37.8	39.9	3.3	12	1.16	309.9	18.421	2.465	77.275	95.496
1-2	5	81.1	0.76	43.4	33.7	2.8	10.1	1.1	356.5	21.392	2.862	88.271	109.595
1-2	6	80.3	0.58	49.2	27.4	2.3	8.1	1.16	412.8	25.019	3.348	101.389	126.524

Permeate Throttling (Variable)

Project name Wellington-CurrentFeed-Tr2-5

Temperature : 79.0 °F Element age, P1 : 3.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	817	0	1049	7.00	1700
2	817	97.9	1049	7.00	1700
3	313	86.9	2537	7.37	3701
4	122	79.7	5860	7.71	7896
5	504	24.0	131	6.03	225
6	191	9.00	413	6.54	700
7	694	9.00	208	6.24	355

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	100.2	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	4.0	years
Specific energy	1.06	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	55.3	psi	Fouling factor	0.81	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	501.3	45.4	17.5	16.7	11.1	20.1	1.2	24	0	89.1	137.8	ESNA1-LF-LD	108	18 x 6M
1-2	193.8	35.1	13.5	12.9	7.2	16.9	1.17	9	0	81.9	420.9	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	38.923	1082.7	2678.5
Ca	142.00	142.00	12.768	355.2	878.7
Mg	19.00	19.00	1.708	47.5	117.6
Na	143.00	143.00	54.680	312.9	646.7
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.0	0.1
Sr	1.700	1.700	0.210	4.2	10.2
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.008	2.4	15.9
HCO3	427.00	427.00	72.161	1023.5	2390.5
SO4	83.00	83.00	4.511	210.5	530.4
Cl	218.00	218.00	67.017	495.7	1078.9
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.851	34.9	78.6
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**216.92**	**2486.93**	**5747.60**
pH	**7.00**	**7.00**	**6.26**	**7.35**	**7.69**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	444	10000
SiO2 saturation, %	12	12	58	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1366.46	
Langelier saturation index	0.21	0.21	2.37	2.5
Ionic strength	0.02	0.02	0.11	
Osmotic pressure, psi	9.1	9.1	48.3	

Permeate Throttling (Variable)

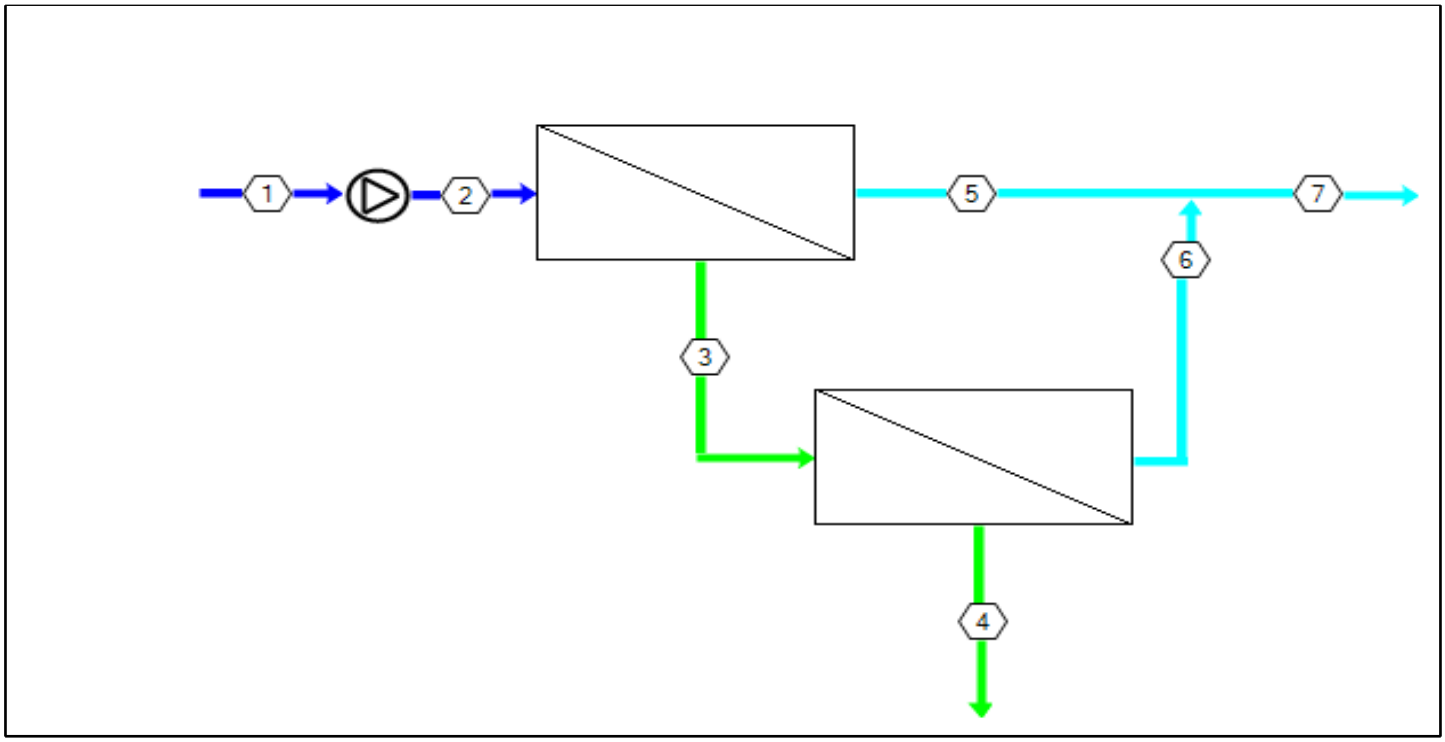
Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	100.2	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	4.0	years
Specific energy	1.06	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	55.3	psi	Fouling factor	0.81	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	501.3	45.4	17.5	16.7	11.1	20.1	1.2	24	0	89.1	137.8	ESNA1-LF-LD	108	18 x 6M
1-2	193.8	35.1	13.5	12.9	7.2	16.9	1.17	9	0	81.9	420.9	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	100.2	2.93	10.2	68.9	5.6	20.1	1.12	80.8	4.37	0.585	21.702	25.509
1-1	2	97.3	2.41	11.6	61.9	5	18	1.13	90.6	4.921	0.659	24.236	28.556
1-1	3	94.9	1.97	13.2	58.7	4.7	17.1	1.14	100	5.468	0.732	26.637	31.483
1-1	4	92.9	1.59	15.3	55.4	4.5	16.1	1.16	110.5	6.09	0.815	29.281	34.738
1-1	5	91.3	1.24	17.9	51.9	4.2	15.1	1.17	122.9	6.831	0.914	32.337	38.535
1-1	6	90.1	0.94	21.3	48	3.9	13.9	1.2	137.8	7.743	1.036	35.98	43.103
1-2	1	89.1	2	24.3	58.7	4.7	16.9	1.14	222.9	13.05	1.746	56.402	68.993
1-2	2	87.1	1.61	27.9	53.8	4.3	15.5	1.15	249.1	14.676	1.964	62.69	76.944
1-2	3	85.5	1.28	32.1	48.6	3.9	13.9	1.16	280.5	16.652	2.228	70.165	86.456
1-2	4	84.2	1	37.1	42.9	3.4	12.2	1.16	318.5	19.071	2.552	79.126	97.929
1-2	5	83.2	0.77	42.7	36.8	2.9	10.4	1.1	364.7	22.053	2.951	89.925	111.844
1-2	6	82.5	0.59	48.7	30.3	2.4	8.5	1.17	420.9	25.729	3.443	102.89	128.678

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 4.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	817	0	1049	7.00	1700
2	817	100	1049	7.00	1700
3	316	89.1	2487	7.35	3646
4	122	81.9	5748	7.69	7799
5	501	24.0	138	6.06	236
6	194	9.00	421	6.55	713
7	694	9.00	217	6.26	370

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr2-5				
Calculated by	wb		Permeate flow/train	1.000	mgd
HP Pump flow	816.67	gpm	Total product flow	4.00	mgd
Feed pressure	102.7	psi	Number of trains	4	
Feed temperature	26.1	°C(79.0°F)	Raw water flow/train	1.176	mgd
Feed water pH	7.00		Permeate recovery	85.00	%
Chem dose, mg/l, -	None		Element age	5.0	years
Specific energy	1.09	kwh/kgal	Flux decline %, per year	5.0	
Pass NDP	58.0	psi	Fouling factor	0.77	
Average flux rate	15.4	gfd	SP increase, per year	7.0	%
			Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Boost	Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	498.5	45.4	17.7	16.6	11.1	19.8	1.2	24	0	91.6	144.6	ESNA1-LF-LD	108	18 x 6M
1-2	196.5	35.4	13.6	13.1	7.4	16.9	1.17	9	0	84.2	429	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	40.677	1071.5	2668.2
Ca	142.00	142.00	13.344	351.5	875.3
Mg	19.00	19.00	1.785	47.0	117.1
Na	143.00	143.00	56.612	307.8	635.6
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.003	0.0	0.1
Sr	1.700	1.700	0.219	4.1	10.1
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.009	2.3	16.5
HCO3	427.00	427.00	75.101	1020.0	2434.9
SO4	83.00	83.00	4.711	208.5	529.2
Cl	218.00	218.00	69.450	488.5	1064.9
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	4.001	34.5	77.7
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**225.23**	**2464.29**	**5761.44**
pH	**7.00**	**7.00**	**6.28**	**7.35**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	442	10000
SiO2 saturation, %	12	12	58	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1387.76	
Langelier saturation index	0.21	0.21	2.38	2.5
Ionic strength	0.02	0.02	0.11	
Osmotic pressure, psi	9.1	9.1	48.3	

Permeate Throttling (Variable)

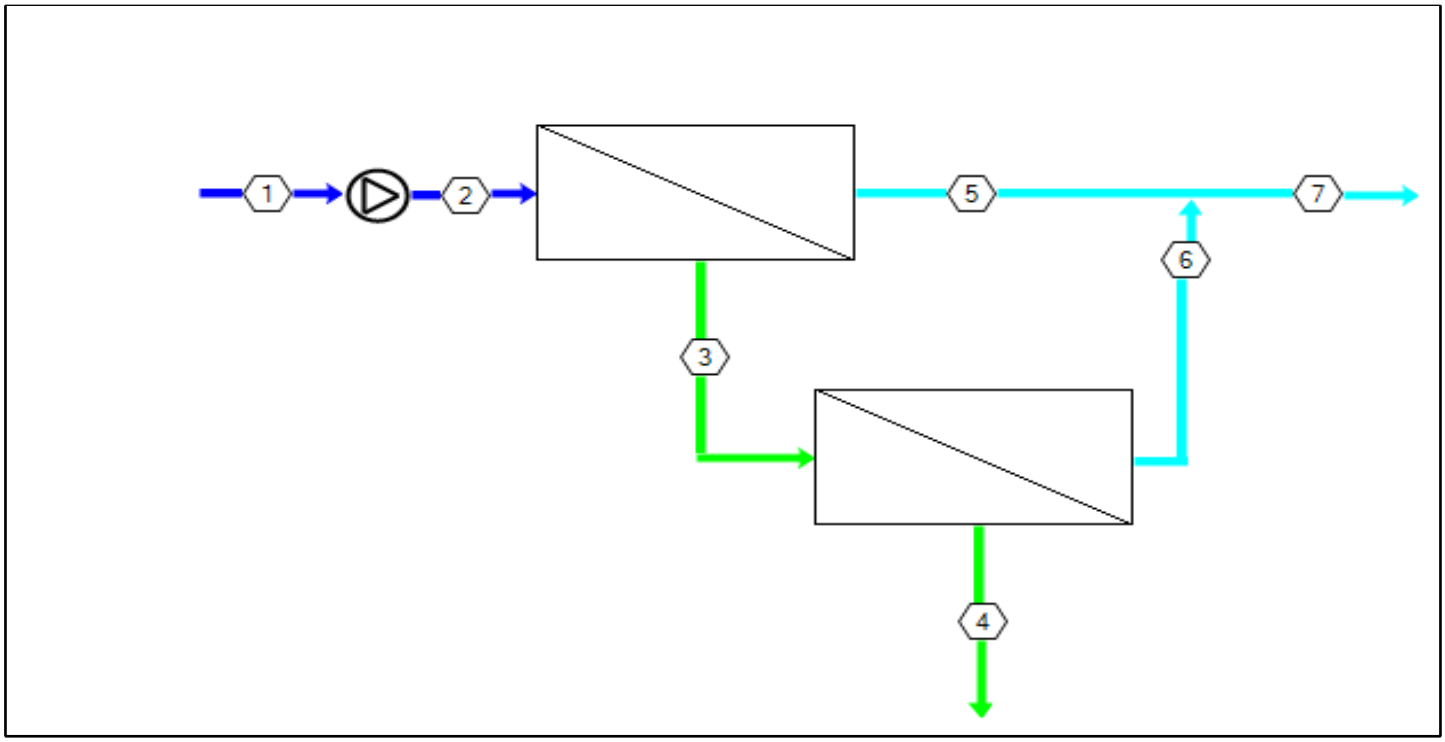
Project name	Wellington-CurrentFeed-Tr2-5		
Calculated by	wb	Permeate flow/train	1.000 mgd
HP Pump flow	816.67 gpm	Total product flow	4.00 mgd
Feed pressure	102.7 psi	Number of trains	4
Feed temperature	26.1 °C(79.0°F)	Raw water flow/train	1.176 mgd
Feed water pH	7.00	Permeate recovery	85.00 %
Chem dose, mg/l, -	None	Element age	5.0 years
Specific energy	1.09 kwh/kgal	Flux decline %, per year	5.0
Pass NDP	58.0 psi	Fouling factor	0.77
Average flux rate	15.4 gfd	SP increase, per year	7.0 %
		Inter-stage pipe loss	0.000 psi
		Feed type	Brackish Well Non-Fouling

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	498.5	45.4	17.7	16.6	11.1	19.8	1.2	24	0	91.6	144.6	ESNA1-LF-LD	108	18 x 6M
1-2	196.5	35.4	13.6	13.1	7.4	16.9	1.17	9	0	84.2	429	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	102.7	2.93	10.2	71.6	5.5	19.8	1.12	86.1	4.668	0.625	23.129	27.152
1-1	2	99.8	2.42	11.5	64.5	5	17.8	1.13	96.2	5.245	0.702	25.761	30.319
1-1	3	97.4	1.99	13.1	61.3	4.7	17	1.14	106	5.813	0.778	28.227	33.331
1-1	4	95.4	1.6	15.1	58.1	4.5	16	1.15	116.8	6.458	0.864	30.927	36.666
1-1	5	93.8	1.25	17.7	54.7	4.2	15.1	1.17	129.4	7.223	0.966	34.033	40.536
1-1	6	92.5	0.95	21.1	50.8	3.9	14	1.2	144.6	8.162	1.092	37.72	45.178
1-2	1	91.6	2.03	23.9	61.6	4.7	16.9	1.14	231.9	13.655	1.827	58.512	71.631
1-2	2	89.5	1.64	27.4	56.8	4.3	15.5	1.15	258	15.298	2.047	64.749	79.549
1-2	3	87.9	1.3	31.5	51.6	3.9	14	1.16	289.3	17.289	2.313	72.13	88.985
1-2	4	86.6	1.02	36.4	46.1	3.5	12.5	1.17	327	19.722	2.639	80.951	100.335
1-2	5	85.6	0.78	42.1	40	3	10.8	1.17	372.9	22.725	3.041	91.571	114.099
1-2	6	84.8	0.6	48.2	33.3	2.5	8.9	1.17	429	26.448	3.539	104.362	130.812

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 5.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	817	0	1049	7.00	1700
2	817	103	1049	7.00	1700
3	318	91.6	2464	7.35	3610
4	122	84.2	5761	7.70	7773
5	499	24.0	145	6.08	248
6	197	9.00	429	6.56	726
7	694	9.00	225	6.28	384

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	90.0	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	0.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.95	kwh/kgal	Fouling factor	1.00	
Pass NDP	42.6	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	929.4	40.8	15	15.5	9.3	19.4	1.2	28	0	80.7	121.7	ESNA1-LF-LD	216	36 x 6M
1-2	321.2	33.8	13.7	12	6.9	17.1	1.16	9	0	73.8	381.8	ESNA1-LF-LD	96	16 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	33.072	1141.0	2706.7
Ca	142.00	142.00	10.849	374.3	887.9
Mg	19.00	19.00	1.452	50.1	118.8
Na	143.00	143.00	48.039	333.8	683.2
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.179	4.4	10.4
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.006	2.7	16.9
HCO3	427.00	427.00	62.245	1085.3	2451.8
SO4	83.00	83.00	3.846	221.5	533.2
Cl	218.00	218.00	58.696	526.7	1124.2
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.343	37.1	81.3
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**188.66**	**2635.94**	**5907.66**
pH	**7.00**	**7.00**	**6.20**	**7.38**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	445	10000
SiO2 saturation, %	12	12	60	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1404.11	
Langelier saturation index	0.21	0.21	2.39	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	49.9	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb		Permeate flow/train	1.800	mgd
HP Pump flow	1470.83	gpm	Raw water flow/train	2.118	mgd
Feed pressure	90.0	psi	Permeate recovery	85.00	%
Feed temperature	26.1	°C(79.0°F)	Element age	0.0	years
Feed water pH	7.00		Flux decline %, per year	5.0	
Chem dose, mg/l, -	None		Fouling factor	1.00	
Specific energy	0.95	kwh/kgal	SP increase, per year	7.0	%
Pass NDP	42.6	psi	Inter-stage pipe loss	0.000	psi
Average flux rate	14.4	gfd			

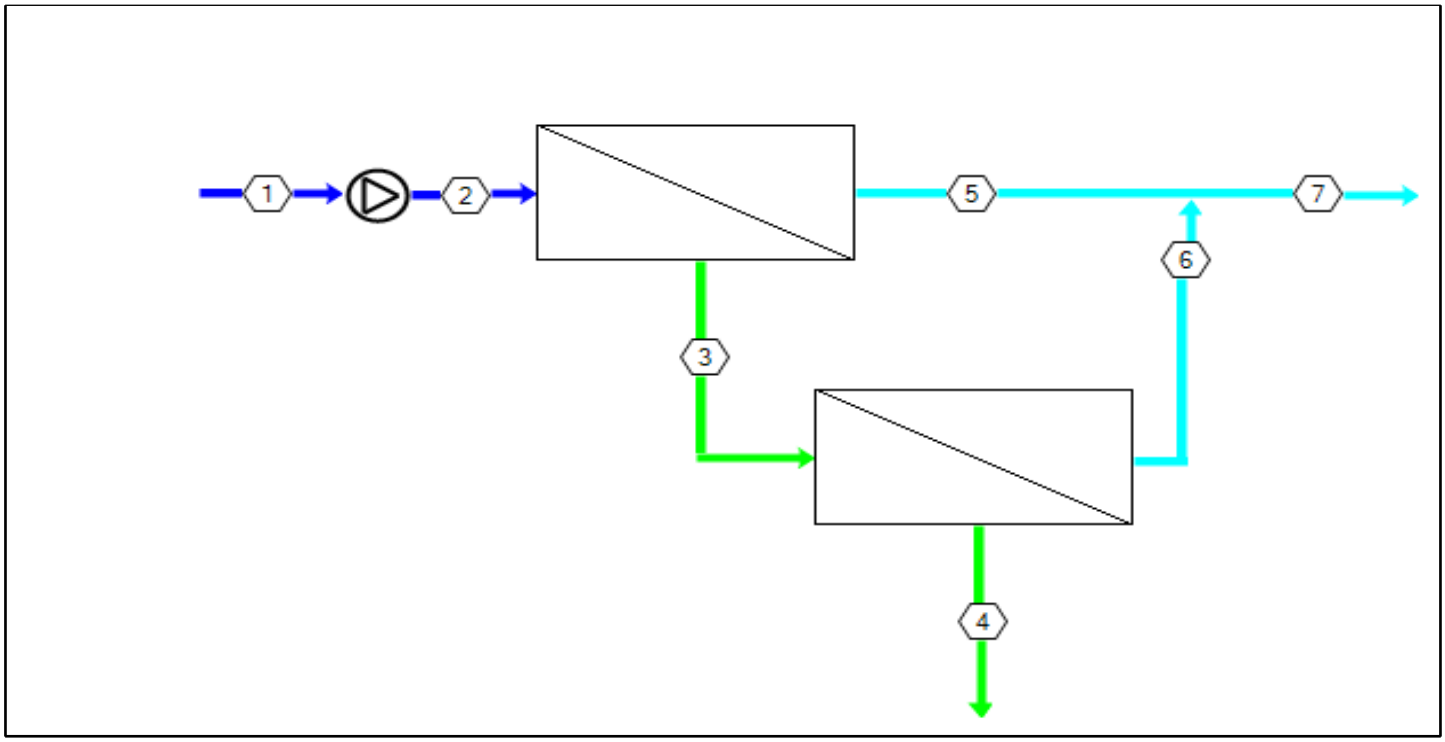
Feed type: Brackish Well Non-Fouling

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	929.4	40.8	15	15.5	9.3	19.4	1.2	28	0	80.7	121.7	ESNA1-LF-LD	216	36 x 6M
1-2	321.2	33.8	13.7	12	6.9	17.1	1.16	9	0	73.8	381.8	ESNA1-LF-LD	96	16 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	90	2.52	10.4	54.2	5.4	19.4	1.13	66.3	3.55	0.475	17.776	20.988
1-1	2	87.4	2.04	11.8	47.9	4.8	17.1	1.14	75.3	4.05	0.542	20.136	23.821
1-1	3	85.4	1.65	13.7	44.8	4.4	16	1.15	84.3	4.558	0.61	22.445	26.626
1-1	4	83.7	1.3	16	41.5	4.1	14.8	1.17	94.5	5.146	0.689	25.052	29.813
1-1	5	82.4	1	18.9	38	3.8	13.5	1.18	106.7	5.857	0.784	28.132	33.607
1-1	6	81.4	0.75	22.6	34	3.4	12.1	1.2	121.8	6.745	0.902	31.877	38.253
1-2	1	80.7	1.9	26	48.5	4.8	17.1	1.14	185	10.646	1.424	47.067	57.561
1-2	2	78.8	1.52	30	43.2	4.2	15.2	1.15	210.7	12.185	1.63	53.387	65.458
1-2	3	77.3	1.2	34.7	37.6	3.7	13.2	1.16	242	14.079	1.884	61.044	75.066
1-2	4	76.1	0.94	39.8	31.6	3.1	11	1.15	280.4	16.418	2.197	70.35	86.799
1-2	5	75.1	0.73	45.2	25.6	2.5	8.9	1.15	326.7	19.272	2.579	81.525	100.949
1-2	6	74.4	0.58	50.2	19.8	1.9	6.8	1.13	381.8	22.7	3.037	94.697	117.719

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 0.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	1471	0	1049	7.00	1700
2	1471	90.0	1049	7.00	1700
3	541	80.7	2636	7.38	3840
4	220	73.8	5908	7.70	7994
5	929	28.0	122	6.00	209
6	321	9.00	382	6.50	648
7	1250	9.00	189	6.20	322

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	91.7	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	1.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.97	kwh/kgal	Fouling factor	0.95	
Pass NDP	44.6	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	923.7	40.8	15.2	15.4	9.3	19.1	1.2	28	0	82.4	129.4	ESNA1-LF-LD	216	36 x 6M
1-2	327	34.2	13.7	12.3	7	17	1.15	9	0	75.4	392.2	ESNA1-LF-LD	96	16 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	34.996	1126.9	2695.9
Ca	142.00	142.00	11.480	369.7	884.4
Mg	19.00	19.00	1.536	49.5	118.3
Na	143.00	143.00	50.324	327.4	670.3
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.189	4.4	10.3
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.007	2.7	17.4
HCO3	427.00	427.00	65.565	1081.0	2493.0
SO4	83.00	83.00	4.065	218.9	532.0
Cl	218.00	218.00	61.542	517.6	1108.1
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.515	36.5	80.3
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**198.23**	**2607.59**	**5914.15**
pH	**7.00**	**7.00**	**6.22**	**7.38**	**7.71**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	443	10000
SiO2 saturation, %	12	12	59	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1423.46	
Langelier saturation index	0.21	0.21	2.41	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	49.8	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	91.7	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	1.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.97	kwh/kgal	Fouling factor	0.95	
Pass NDP	44.6	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi

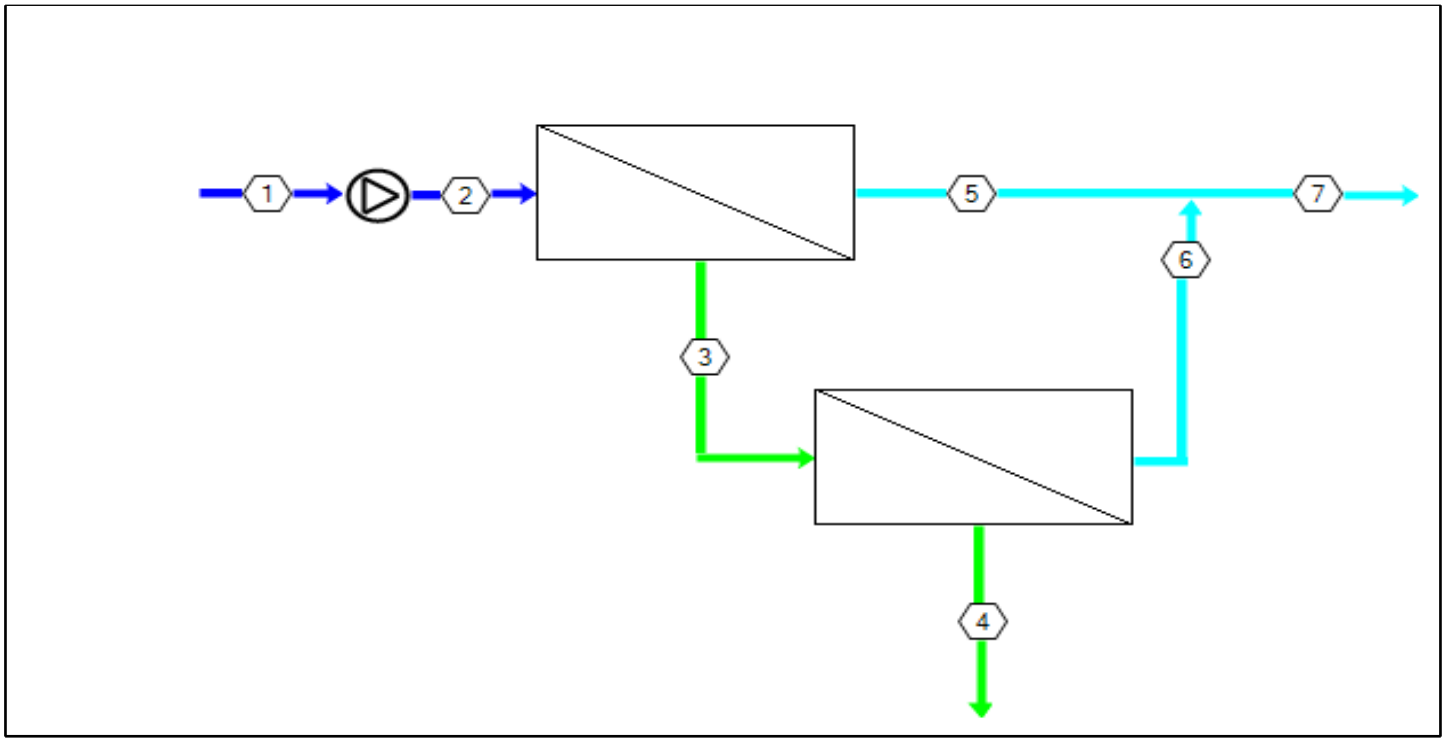
Feed type: Brackish Well Non-Fouling

Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	923.7	40.8	15.2	15.4	9.3	19.1	1.2	28	0	82.4	129.4	ESNA1-LF-LD	216	36 x 6M
1-2	327	34.2	13.7	12.3	7	17	1.15	9	0	75.4	392.2	ESNA1-LF-LD	96	16 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	91.7	2.52	10.3	56.2	5.3	19.1	1.13	71.7	3.855	0.516	19.254	22.7
1-1	2	89.2	2.05	11.8	49.8	4.7	16.9	1.13	81.3	4.387	0.587	21.748	25.696
1-1	3	87.1	1.66	13.5	46.7	4.4	15.9	1.15	90.7	4.922	0.659	24.154	28.62
1-1	4	85.5	1.32	15.8	43.5	4.1	14.7	1.16	101.3	5.537	0.741	26.847	31.922
1-1	5	84.2	1.02	18.6	40.1	3.8	13.6	1.18	113.9	6.28	0.84	30.011	35.829
1-1	6	83.1	0.76	22.3	36.2	3.4	12.2	1.2	129.4	7.204	0.964	33.84	40.596
1-2	1	82.4	1.94	25.5	50.7	4.7	17	1.14	195.1	11.3	1.512	49.478	60.559
1-2	2	80.4	1.55	29.4	45.6	4.2	15.2	1.15	220.9	12.866	1.721	55.793	68.477
1-2	3	78.9	1.22	33.9	40.1	3.7	13.4	1.15	252.3	14.787	1.979	63.406	78.069
1-2	4	77.7	0.96	39	34.2	3.2	11.4	1.1	290.5	17.151	2.295	72.612	89.727
1-2	5	76.7	0.75	44.4	28.2	2.6	9.3	1.15	336.9	20.045	2.682	83.686	103.82
1-2	6	76	0.59	49.6	22.2	2	7.3	1.14	392.2	23.536	3.149	96.779	120.577

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 1.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	1471	0	1049	7.00	1700
2	1471	91.7	1049	7.00	1700
3	547	82.4	2608	7.38	3794
4	220	75.4	5914	7.71	7960
5	924	28.0	129	6.03	222
6	327	9.00	392	6.51	665
7	1250	9.00	198	6.22	338

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	93.6	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	2.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.99	kwh/kgal	Fouling factor	0.90	
Pass NDP	46.7	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	918.4	40.8	15.3	15.3	9.4	18.8	1.2	28	0	84.2	137	ESNA1-LF-LD	216	36 x 6M
1-2	332.3	34.5	13.7	12.5	7.1	16.9	1.16	9	0	77.1	402.3	ESNA1-LF-LD	96	16 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	36.904	1114.0	2685.0
Ca	142.00	142.00	12.106	365.5	880.8
Mg	19.00	19.00	1.620	48.9	117.9
Na	143.00	143.00	52.544	321.3	657.6
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.199	4.3	10.2
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.007	2.5	16.2
HCO3	427.00	427.00	68.831	1049.7	2409.5
SO4	83.00	83.00	4.283	216.6	530.7
Cl	218.00	218.00	64.315	509.2	1092.3
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.683	35.9	79.4
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**207.59**	**2553.96**	**5794.76**
pH	**7.00**	**7.00**	**6.24**	**7.36**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	444	10000
SiO2 saturation, %	12	12	59	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1377.74	
Langelier saturation index	0.21	0.21	2.38	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	48.8	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	93.6	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	2.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.99	kwh/kgal	Fouling factor	0.90	
Pass NDP	46.7	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi

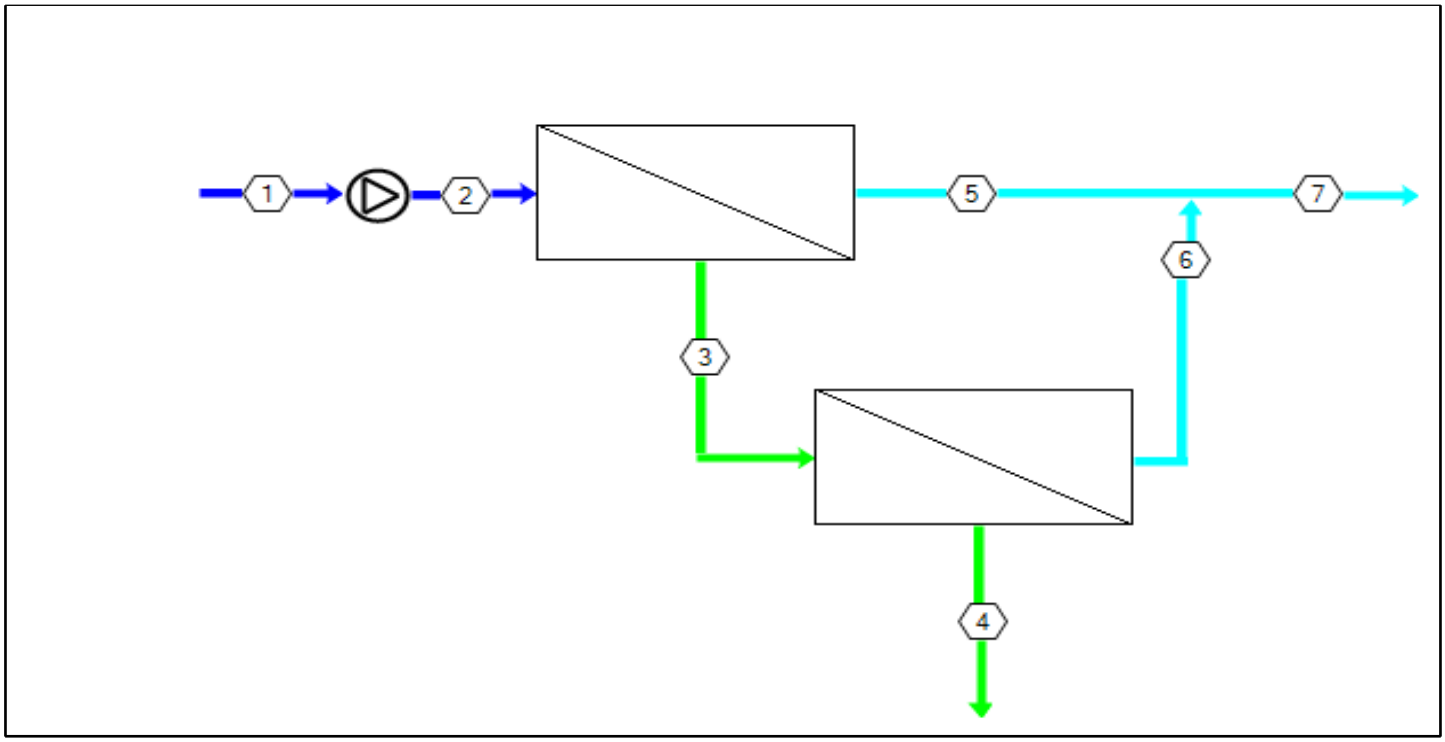
Feed type: Brackish Well Non-Fouling

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	918.4	40.8	15.3	15.3	9.4	18.8	1.2	28	0	84.2	137	ESNA1-LF-LD	216	36 x 6M
1-2	332.3	34.5	13.7	12.5	7.1	16.9	1.16	9	0	77.1	402.3	ESNA1-LF-LD	96	16 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	93.6	2.52	10.3	58.3	5.2	18.8	1.13	77.3	4.163	0.557	20.751	24.43
1-1	2	91.1	2.06	11.7	51.7	4.6	16.7	1.13	87.4	4.728	0.633	23.375	27.583
1-1	3	89	1.67	13.4	48.8	4.4	15.7	1.15	97.1	5.289	0.708	25.87	30.622
1-1	4	87.3	1.33	15.6	45.6	4.1	14.7	1.16	108.1	5.932	0.794	28.643	34.028
1-1	5	86	1.03	18.4	42.3	3.8	13.6	1.18	121.1	6.705	0.897	31.881	38.041
1-1	6	85	0.78	21.9	38.4	3.4	12.3	1.2	137	7.663	1.025	35.784	42.916
1-2	1	84.2	1.96	25.1	53.1	4.7	16.9	1.14	205.1	11.96	1.6	51.869	63.542
1-2	2	82.3	1.58	28.8	48	4.2	15.3	1.15	231	13.552	1.813	58.172	71.473
1-2	3	80.7	1.25	33.2	42.6	3.8	13.5	1.15	262.4	15.497	2.074	65.727	81.033
1-2	4	79.4	0.98	38.2	36.9	3.2	11.6	1.16	300.5	17.882	2.393	74.824	92.604
1-2	5	78.4	0.76	43.7	30.8	2.7	9.7	1.16	346.8	20.811	2.785	85.772	106.61
1-2	6	77.7	0.6	49.1	24.7	2.1	7.7	1.15	402.3	24.363	3.26	98.766	123.335

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 2.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	1471	0	1049	7.00	1700
2	1471	93.6	1049	7.00	1700
3	552	84.2	2554	7.36	3736
4	220	77.1	5795	7.70	7855
5	918	28.0	137	6.05	235
6	332	9.00	402	6.53	682
7	1250	9.00	208	6.24	354

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	95.6	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	3.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	1.02	kwh/kgal	Fouling factor	0.86	
Pass NDP	48.9	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	913.7	40.8	15.5	15.2	9.4	18.6	1.2	28	0	86.2	144.5	ESNA1-LF-LD	216	36 x 6M
1-2	336.9	34.8	13.7	12.6	7.2	16.8	1.16	9	0	78.9	412.3	ESNA1-LF-LD	96	16 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	38.806	1102.5	2674.1
Ca	142.00	142.00	12.730	361.7	877.2
Mg	19.00	19.00	1.703	48.4	117.4
Na	143.00	143.00	54.704	315.8	645.3
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.209	4.3	10.2
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.008	2.5	16.7
HCO3	427.00	427.00	72.056	1045.6	2451.1
SO4	83.00	83.00	4.499	214.5	529.5
Cl	218.00	218.00	67.023	501.5	1076.8
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.848	35.4	78.4
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**216.78**	**2529.73**	**5802.86**
pH	**7.00**	**7.00**	**6.26**	**7.36**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	442	10000
SiO2 saturation, %	12	12	58	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1397.41	
Langelier saturation index	0.21	0.21	2.39	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	48.7	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	95.6	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	3.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	1.02	kwh/kgal	Fouling factor	0.86	
Pass NDP	48.9	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi

Feed type: Brackish Well Non-Fouling

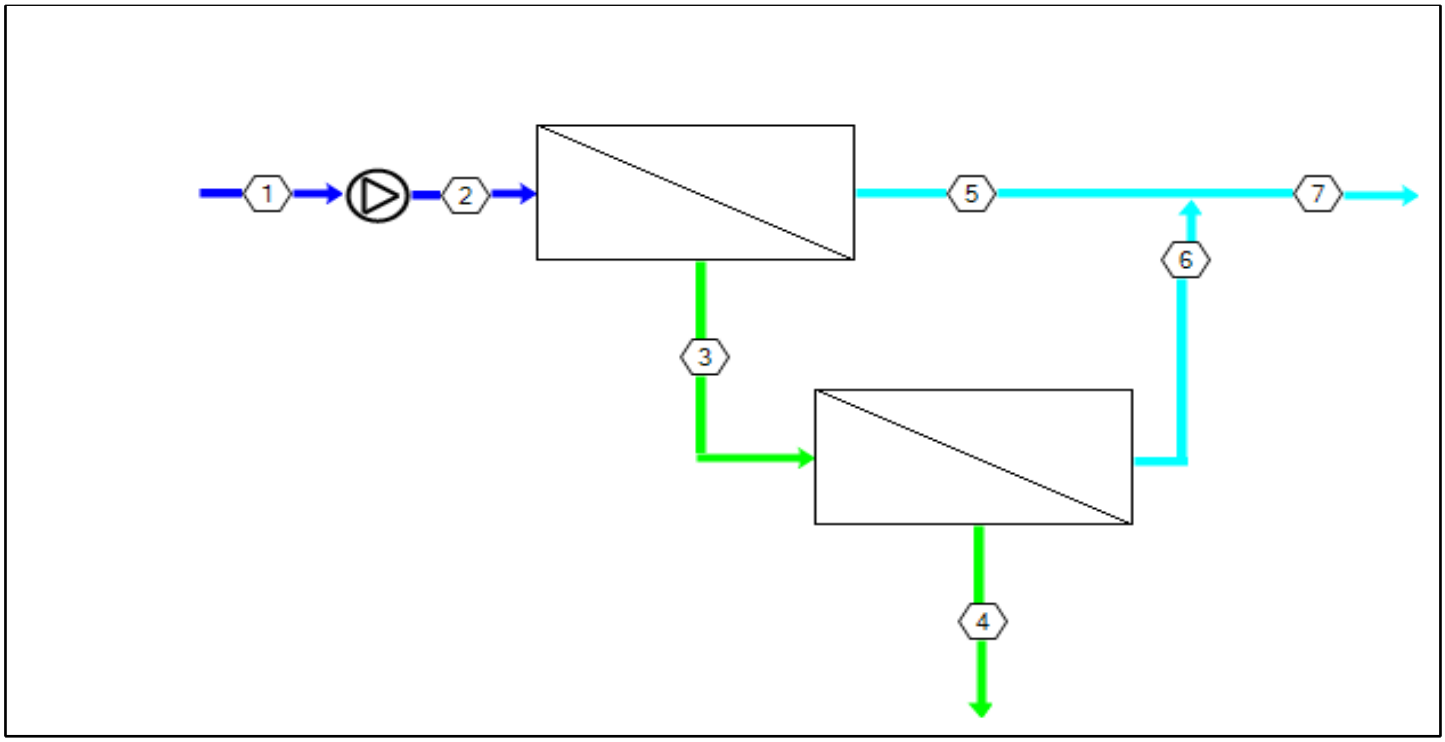
Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	913.7	40.8	15.5	15.2	9.4	18.6	1.2	28	0	86.2	144.5	ESNA1-LF-LD	216	36 x 6M
1-2	336.9	34.8	13.7	12.6	7.2	16.8	1.16	9	0	78.9	412.3	ESNA1-LF-LD	96	16 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	95.6	2.52	10.3	60.5	5.2	18.6	1.13	82.9	4.477	0.599	22.264	26.176
1-1	2	93.1	2.06	11.6	53.9	4.6	16.5	1.13	93.4	5.073	0.679	25.011	29.478
1-1	3	91	1.68	13.3	50.9	4.3	15.6	1.14	103.6	5.659	0.757	27.588	32.621
1-1	4	89.4	1.34	15.4	47.9	4.1	14.6	1.16	114.9	6.328	0.847	30.431	36.125
1-1	5	88	1.04	18.1	44.6	3.8	13.6	1.18	128.3	7.131	0.954	33.737	40.235
1-1	6	87	0.79	21.6	40.8	3.5	12.4	1.2	144.5	8.123	1.087	37.702	45.208
1-2	1	86.2	1.99	24.7	55.6	4.7	16.8	1.14	215.1	12.626	1.689	54.239	66.506
1-2	2	84.2	1.6	28.3	50.6	4.2	15.3	1.15	241.2	14.247	1.906	60.532	74.458
1-2	3	82.6	1.27	32.6	45.3	3.8	13.6	1.15	272.6	16.215	2.17	68.022	83.977
1-2	4	81.3	1	37.5	39.7	3.3	11.9	1.16	310.5	18.622	2.492	77.007	95.46
1-2	5	80.3	0.78	43	33.6	2.8	10	1.1	356.8	21.589	2.889	87.831	109.385
1-2	6	79.5	0.6	48.6	27.4	2.3	8.1	1.16	412.3	25.199	3.372	100.7	126.048

Permeate Throttling (Variable)

Project name Wellington-CurrentFeed-Tr6

Temperature : 79.0 °F Element age, P1 : 3.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	1471	0	1049	7.00	1700
2	1471	95.6	1049	7.00	1700
3	557	86.2	2530	7.36	3698
4	220	78.9	5803	7.70	7823
5	914	28.0	145	6.08	248
6	337	9.00	412	6.54	698
7	1250	9.00	217	6.26	369

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	97.8	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	4.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	1.04	kwh/kgal	Fouling factor	0.81	
Pass NDP	51.3	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	909.5	40.8	15.6	15.2	9.5	18.3	1.2	28	0	88.3	152	ESNA1-LF-LD	216	36 x 6M
1-2	341.2	35.1	13.7	12.8	7.3	16.8	1.16	9	0	80.9	422.1	ESNA1-LF-LD	96	16 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	40.697	1092.1	2663.6
Ca	142.00	142.00	13.350	358.2	873.8
Mg	19.00	19.00	1.786	47.9	116.9
Na	143.00	143.00	56.805	310.6	633.4
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.003	0.0	0.1
Sr	1.700	1.700	0.219	4.2	10.1
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.009	2.4	16.5
HCO3	427.00	427.00	75.234	1041.6	2435.0
SO4	83.00	83.00	4.714	212.7	528.3
Cl	218.00	218.00	69.667	494.4	1061.9
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	4.010	34.9	77.5
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**225.80**	**2507.10**	**5753.60**
pH	**7.00**	**7.00**	**6.28**	**7.36**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	441	10000
SiO2 saturation, %	12	12	57	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1386.94	
Langelier saturation index	0.21	0.21	2.38	2.5
Ionic strength	0.02	0.02	0.11	
Osmotic pressure, psi	9.1	9.1	48.3	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	97.8	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	4.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	1.04	kwh/kgal	Fouling factor	0.81	
Pass NDP	51.3	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi

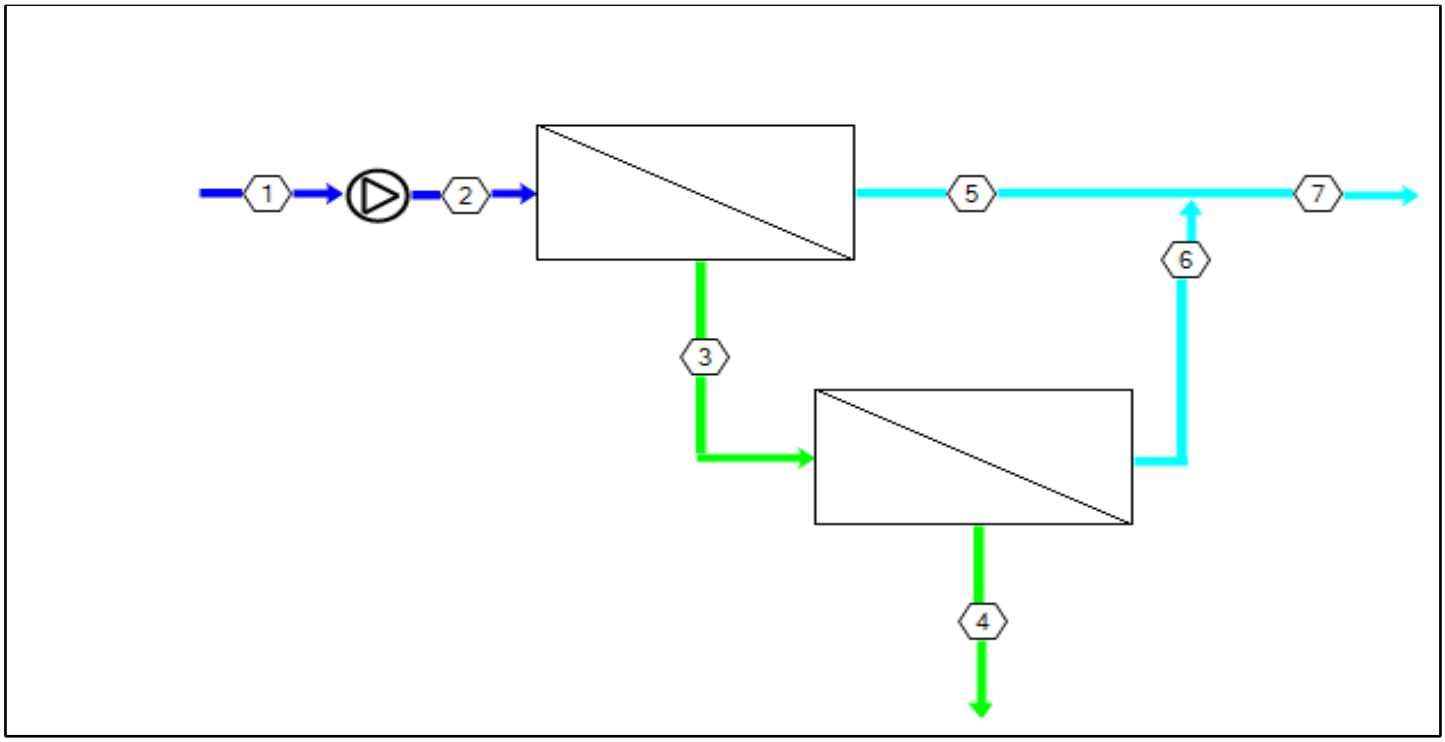
Feed type: Brackish Well Non-Fouling

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	909.5	40.8	15.6	15.2	9.5	18.3	1.2	28	0	88.3	152	ESNA1-LF-LD	216	36 x 6M
1-2	341.2	35.1	13.7	12.8	7.3	16.8	1.16	9	0	80.9	422.1	ESNA1-LF-LD	96	16 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	97.8	2.52	10.3	62.9	5.1	18.3	1.13	88.5	4.795	0.642	23.791	27.934
1-1	2	95.3	2.07	11.6	56.1	4.5	16.4	1.13	99.6	5.42	0.725	26.654	31.377
1-1	3	93.2	1.69	13.2	53.3	4.3	15.5	1.14	110	6.032	0.807	29.305	34.618
1-1	4	91.5	1.35	15.3	50.3	4.1	14.6	1.16	121.7	6.727	0.9	32.213	38.212
1-1	5	90.2	1.05	17.9	47	3.8	13.6	1.18	135.4	7.557	1.011	35.575	42.407
1-1	6	89.1	0.8	21.4	43.3	3.5	12.5	1.2	152	8.583	1.148	39.594	47.471
1-2	1	88.3	2.01	24.3	58.2	4.7	16.8	1.14	225	13.296	1.779	56.583	69.445
1-2	2	86.3	1.63	27.8	53.3	4.3	15.3	1.14	251.2	14.943	1.999	62.851	77.399
1-2	3	84.7	1.3	32	48.1	3.8	13.8	1.15	282.6	16.937	2.266	70.282	86.888
1-2	4	83.4	1.02	36.8	42.5	3.4	12.1	1.16	320.5	19.371	2.592	79.16	98.294
1-2	5	82.4	0.79	42.3	36.5	2.9	10.3	1.1	366.4	22.359	2.992	89.817	112.076
1-2	6	81.6	0.61	48.1	30.1	2.4	8.5	1.16	422.1	26.029	3.483	102.56	128.681

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 4.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	1471	0	1049	7.00	1700
2	1471	97.8	1049	7.00	1700
3	561	88.3	2507	7.36	3662
4	220	81.0	5754	7.70	7759
5	909	28.0	152	6.10	261
6	341	9.00	422	6.55	714
7	1250	9.00	226	6.28	385

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	100.1	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	5.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	1.06	kwh/kgal	Fouling factor	0.77	
Pass NDP	53.8	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	905.6	40.8	15.7	15.1	9.5	18.1	1.2	28	0	90.6	159.4	ESNA1-LF-LD	216	36 x 6M
1-2	345.1	35.3	13.7	12.9	7.4	16.7	1.17	9	0	83.1	431.7	ESNA1-LF-LD	96	16 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	42.574	1082.6	2652.9
Ca	142.00	142.00	13.966	355.1	870.3
Mg	19.00	19.00	1.869	47.5	116.4
Na	143.00	143.00	58.849	305.8	621.8
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.003	0.0	0.1
Sr	1.700	1.700	0.229	4.2	10.1
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.009	2.4	16.2
HCO3	427.00	427.00	78.366	1037.6	2419.0
SO4	83.00	83.00	4.927	211.0	527.1
Cl	218.00	218.00	72.247	487.8	1047.2
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	4.169	34.5	76.6
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**234.63**	**2485.95**	**5704.84**
pH	**7.00**	**7.00**	**6.29**	**7.36**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	441	10000
SiO2 saturation, %	12	12	57	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1376.48	
Langelier saturation index	0.21	0.21	2.38	2.5
Ionic strength	0.02	0.02	0.11	
Osmotic pressure, psi	9.1	9.1	47.8	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr6				
Calculated by	wb				
HP Pump flow	1470.83	gpm	Permeate flow/train	1.800	mgd
Feed pressure	100.1	psi	Raw water flow/train	2.118	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	5.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	1.06	kwh/kgal	Fouling factor	0.77	
Pass NDP	53.8	psi	SP increase, per year	7.0	%
Average flux rate	14.4	gfd	Inter-stage pipe loss	0.000	psi

Feed type: Brackish Well Non-Fouling

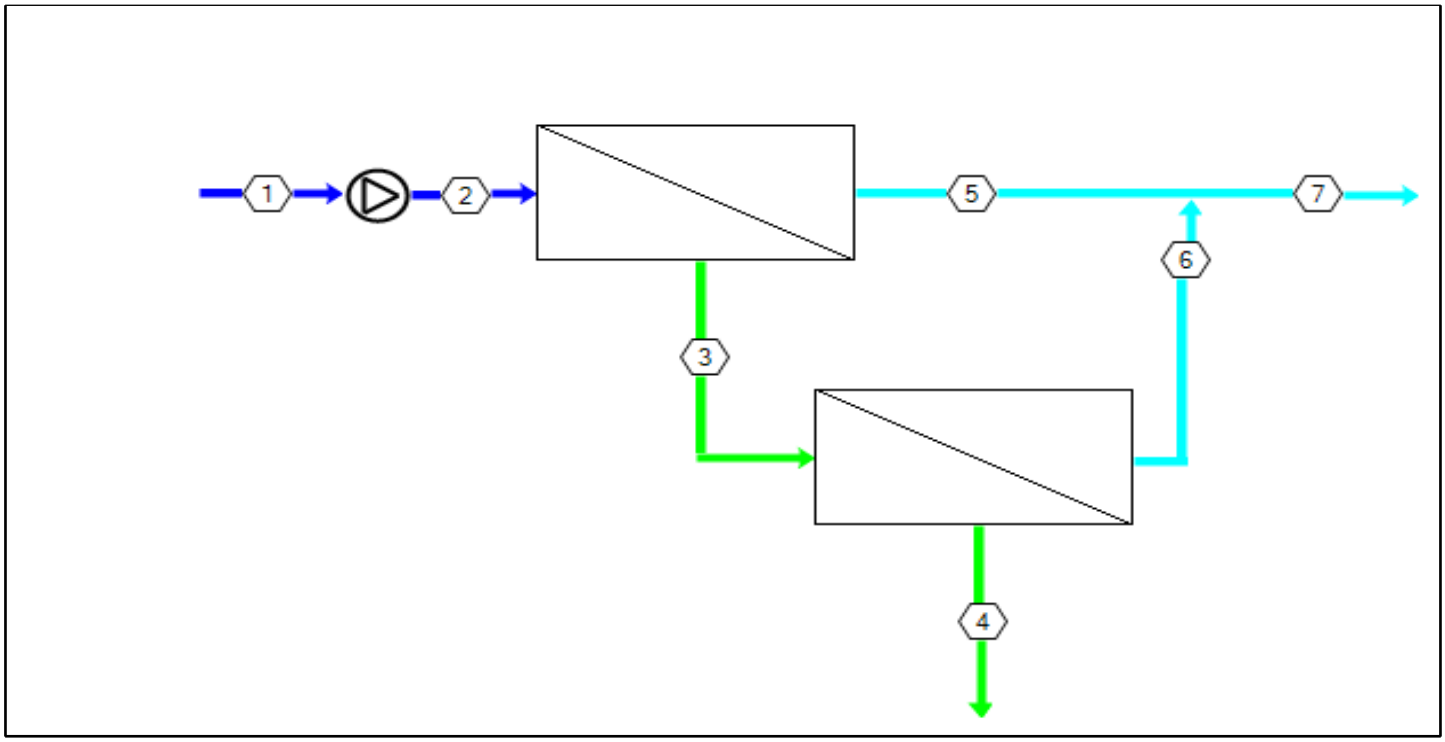
Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	905.6	40.8	15.7	15.1	9.5	18.1	1.2	28	0	90.6	159.4	ESNA1-LF-LD	216	36 x 6M
1-2	345.1	35.3	13.7	12.9	7.4	16.7	1.17	9	0	83.1	431.7	ESNA1-LF-LD	96	16 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	100.1	2.52	10.2	65.4	5	18.1	1.12	94.2	5.117	0.685	25.33	29.703
1-1	2	97.6	2.07	11.5	58.5	4.5	16.2	1.13	105.7	5.771	0.772	28.302	33.28
1-1	3	95.5	1.7	13.1	55.7	4.3	15.4	1.14	116.5	6.406	0.857	31.021	36.611
1-1	4	93.8	1.36	15.2	52.8	4	14.6	1.16	128.5	7.126	0.953	33.985	40.286
1-1	5	92.4	1.06	17.7	49.6	3.8	13.7	1.18	142.4	7.983	1.068	37.397	44.559
1-1	6	91.4	0.8	21.1	45.9	3.5	12.6	1.2	159.4	9.041	1.21	41.459	49.701
1-2	1	90.6	2.03	24	60.9	4.6	16.7	1.13	234.9	13.973	1.87	58.908	72.371
1-2	2	88.5	1.65	27.3	56.1	4.3	15.3	1.14	261.2	15.643	2.093	65.147	80.321
1-2	3	86.9	1.32	31.4	51	3.9	13.9	1.15	292.6	17.661	2.363	72.507	89.766
1-2	4	85.6	1.03	36.2	45.5	3.4	12.3	1.16	330.4	20.118	2.692	81.27	101.086
1-2	5	84.5	0.8	41.7	39.5	3	10.6	1.17	376.1	23.138	3.096	91.776	114.753
1-2	6	83.7	0.62	47.6	33	2.5	8.9	1.17	431.7	26.863	3.594	104.368	131.271

Permeate Throttling (Variable)

Project name Wellington-CurrentFeed-Tr6

Temperature : 79.0 °F Element age, P1 : 5.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	1471	0	1049	7.00	1700
2	1471	100	1049	7.00	1700
3	565	90.6	2486	7.36	3629
4	220	83.1	5705	7.70	7697
5	906	28.0	159	6.12	273
6	345	9.00	432	6.56	730
7	1250	9.00	235	6.29	399

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	85.7	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	0.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.91	kwh/kgal	Fouling factor	1.00	
Pass NDP	41.6	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	462.8	40.8	15.1	15.4	9.3	19.4	1.2	24	0	76.4	121.9	ESNA1-LF-LD	108	18 x 6M
1-2	162.6	30.3	12.2	10.8	5.8	15.7	1.16	9	0	70.6	422.6	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	35.280	1133.1	2695.4
Ca	142.00	142.00	11.573	371.7	884.2
Mg	19.00	19.00	1.549	49.7	118.3
Na	143.00	143.00	50.862	331.6	667.5
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.191	4.4	10.3
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.007	2.7	17.3
HCO3	427.00	427.00	66.174	1085.3	2488.8
SO4	83.00	83.00	4.099	219.9	532.0
Cl	218.00	218.00	62.187	523.3	1104.8
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.549	36.8	80.2
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**200.19**	**2625.49**	**5903.48**
pH	**7.00**	**7.00**	**6.22**	**7.38**	**7.71**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	443	10000
SiO2 saturation, %	12	12	59	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1421.16	
Langelier saturation index	0.21	0.21	2.41	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	49.7	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7		
Calculated by	wb	Permeate flow/train	0.900 mgd
HP Pump flow	735.42 gpm	Raw water flow/train	1.059 mgd
Feed pressure	85.7 psi	Permeate recovery	85.00 %
Feed temperature	26.1 °C(79.0°F)	Element age	0.0 years
Feed water pH	7.00	Flux decline %, per year	5.0
Chem dose, mg/l, -	None	Fouling factor	1.00
Specific energy	0.91 kwh/kgal	SP increase, per year	7.0 %
Pass NDP	41.6 psi	Inter-stage pipe loss	0.000 psi
Average flux rate	13.9 gfd		

Feed type: Brackish Well Non-Fouling

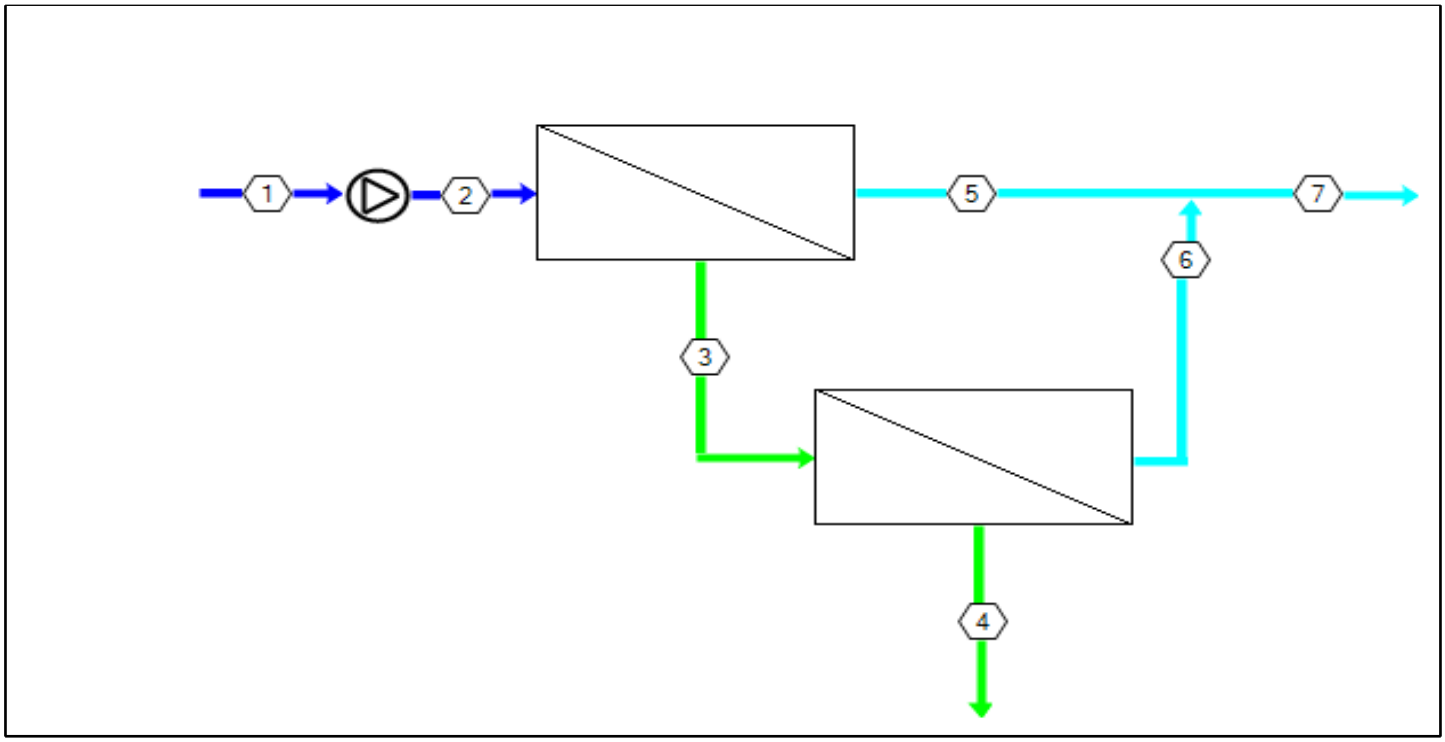
Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	462.8	40.8	15.1	15.4	9.3	19.4	1.2	24	0	76.4	121.9	ESNA1-LF-LD	108	18 x 6M
1-2	162.6	30.3	12.2	10.8	5.8	15.7	1.16	9	0	70.6	422.6	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	85.7	2.53	10.4	54.1	5.4	19.4	1.13	66.4	3.559	0.476	17.822	21.007
1-1	2	83.2	2.05	11.8	47.7	4.7	17.1	1.14	75.5	4.065	0.544	20.212	23.872
1-1	3	81.2	1.66	13.6	44.6	4.4	15.9	1.15	84.5	4.575	0.612	22.534	26.686
1-1	4	79.5	1.31	15.9	41.3	4.1	14.7	1.16	94.7	5.164	0.691	25.145	29.875
1-1	5	78.2	1.01	18.8	37.8	3.7	13.5	1.18	106.9	5.875	0.786	28.222	33.66
1-1	6	77.2	0.76	22.5	33.9	3.3	12	1.2	121.9	6.758	0.904	31.955	38.282
1-2	1	76.4	1.62	25.9	44.5	4.4	15.7	1.15	200.5	11.555	1.546	51.031	62.339
1-2	2	74.8	1.28	30	39.4	3.9	13.9	1.16	229.2	13.286	1.778	58.087	71.164
1-2	3	73.5	1	34.7	34	3.3	11.9	1.1	264.5	15.431	2.065	66.691	81.971
1-2	4	72.5	0.78	39.8	28.2	2.7	9.8	1.16	307.9	18.096	2.421	77.194	95.233
1-2	5	71.7	0.61	44.9	22.5	2.2	7.8	1.15	360.5	21.355	2.857	89.808	111.24
1-2	6	71.1	0.48	49.6	17.1	1.6	5.9	1.13	422.6	25.253	3.379	104.567	130.088

Permeate Throttling (Variable)

Project name Wellington-CurrentFeed-Tr7

Temperature : 79.0 °F Element age, P1 : 0.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	735	0	1049	7.00	1700
2	735	85.7	1049	7.00	1700
3	272	76.4	2625	7.38	3821
4	110	70.6	5903	7.71	7947
5	463	24.0	122	6.00	209
6	163	9.00	423	6.54	717
7	625	9.00	200	6.22	341

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	87.4	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	1.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.93	kwh/kgal	Fouling factor	0.95	
Pass NDP	43.4	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	459	40.8	15.4	15.3	9.4	19	1.2	24	0	78	129.7	ESNA1-LF-LD	108	18 x 6M
1-2	166.4	30.7	12.2	11.1	5.9	15.7	1.16	9	0	72.1	430.6	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	37.251	1115.3	2683.9
Ca	142.00	142.00	12.220	365.9	880.4
Mg	19.00	19.00	1.635	49.0	117.8
Na	143.00	143.00	53.154	324.1	654.4
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.201	4.3	10.2
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.007	2.5	16.2
HCO3	427.00	427.00	69.547	1053.7	2405.7
SO4	83.00	83.00	4.324	216.6	530.7
Cl	218.00	218.00	65.049	512.5	1088.5
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.723	36.1	79.2
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**209.86**	**2564.79**	**5783.10**
pH	**7.00**	**7.00**	**6.24**	**7.37**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	444	10000
SiO2 saturation, %	12	12	59	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1375.49	
Langelier saturation index	0.21	0.21	2.38	2.5
Ionic strength	0.02	0.02	0.12	
Osmotic pressure, psi	9.1	9.1	48.7	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	87.4	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	1.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.93	kwh/kgal	Fouling factor	0.95	
Pass NDP	43.4	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi

Feed type: Brackish Well Non-Fouling

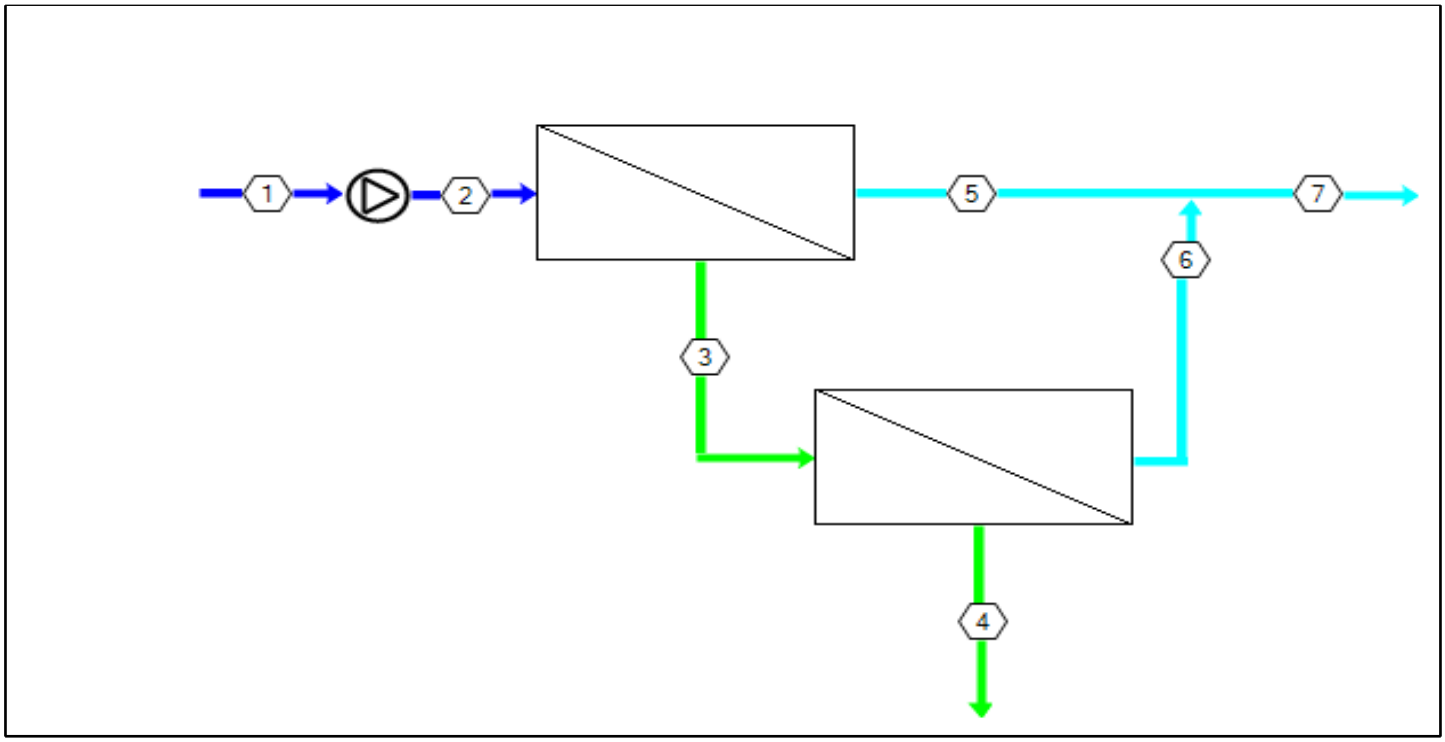
Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	459	40.8	15.4	15.3	9.4	19	1.2	24	0	78	129.7	ESNA1-LF-LD	108	18 x 6M
1-2	166.4	30.7	12.2	11.1	5.9	15.7	1.16	9	0	72.1	430.6	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	87.4	2.53	10.3	55.9	5.3	19	1.13	72	3.872	0.518	19.343	22.767
1-1	2	84.8	2.06	11.8	49.4	4.7	16.8	1.13	81.7	4.411	0.59	21.874	25.801
1-1	3	82.8	1.67	13.5	46.4	4.4	15.7	1.15	91.1	4.949	0.662	24.294	28.737
1-1	4	81.1	1.33	15.7	43.2	4.1	14.6	1.16	101.7	5.565	0.745	26.991	32.038
1-1	5	79.8	1.03	18.5	39.8	3.7	13.5	1.18	114.3	6.305	0.844	30.148	35.931
1-1	6	78.7	0.78	22	36	3.4	12.1	1.2	129.7	7.223	0.966	33.954	40.661
1-2	1	78	1.65	25.3	46.7	4.4	15.7	1.15	210.1	12.187	1.631	53.312	65.178
1-2	2	76.3	1.32	29.3	41.7	3.9	14	1.15	238.7	13.931	1.864	60.289	73.934
1-2	3	75	1.03	33.8	36.4	3.4	12.1	1.16	273.6	16.083	2.152	68.747	84.605
1-2	4	74	0.8	38.8	30.7	2.8	10.2	1.16	316.5	18.754	2.509	79.04	97.662
1-2	5	73.2	0.62	44.1	25	2.3	8.2	1.15	368.6	22.027	2.947	91.412	113.445
1-2	6	72.5	0.49	49	19.4	1.8	6.4	1.14	430.6	25.975	3.475	105.983	132.16

Permeate Throttling (Variable)

Project name Wellington-CurrentFeed-Tr7

Temperature : 79.0 °F Element age, P1 : 1.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	735	0	1049	7.00	1700
2	735	87.4	1049	7.00	1700
3	276	78.0	2565	7.37	3750
4	110	72.1	5783	7.70	7841
5	459	24.0	130	6.03	223
6	166	9.00	431	6.55	730
7	625	9.00	210	6.24	358

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	89.1	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	2.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.95	kwh/kgal	Fouling factor	0.90	
Pass NDP	45.4	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	455.5	40.8	15.5	15.2	9.5	18.7	1.2	24	0	79.7	137.4	ESNA1-LF-LD	108	18 x 6M
1-2	169.9	31.1	12.2	11.3	6	15.6	1.16	9	0	73.6	438.5	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	39.207	1099.3	2672.6
Ca	142.00	142.00	12.862	360.6	876.7
Mg	19.00	19.00	1.721	48.3	117.3
Na	143.00	143.00	55.378	317.3	641.7
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.002	0.1	0.1
Sr	1.700	1.700	0.211	4.3	10.2
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.008	2.5	16.7
HCO3	427.00	427.00	72.865	1049.5	2447.8
SO4	83.00	83.00	4.546	213.7	529.3
Cl	218.00	218.00	67.837	502.8	1072.5
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	3.893	35.5	78.2
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**219.32**	**2534.43**	**5790.50**
pH	**7.00**	**7.00**	**6.26**	**7.37**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	442	10000
SiO2 saturation, %	12	12	58	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1395.35	
Langelier saturation index	0.21	0.21	2.39	2.5
Ionic strength	0.02	0.02	0.11	
Osmotic pressure, psi	9.1	9.1	48.6	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb		Permeate flow/train	0.900	mgd
HP Pump flow	735.42	gpm	Raw water flow/train	1.059	mgd
Feed pressure	89.1	psi	Permeate recovery	85.00	%
Feed temperature	26.1	°C(79.0°F)	Element age	2.0	years
Feed water pH	7.00		Flux decline %, per year	5.0	
Chem dose, mg/l, -	None		Fouling factor	0.90	
Specific energy	0.95	kwh/kgal	SP increase, per year	7.0	%
Pass NDP	45.4	psi	Inter-stage pipe loss	0.000	psi
Average flux rate	13.9	gfd			

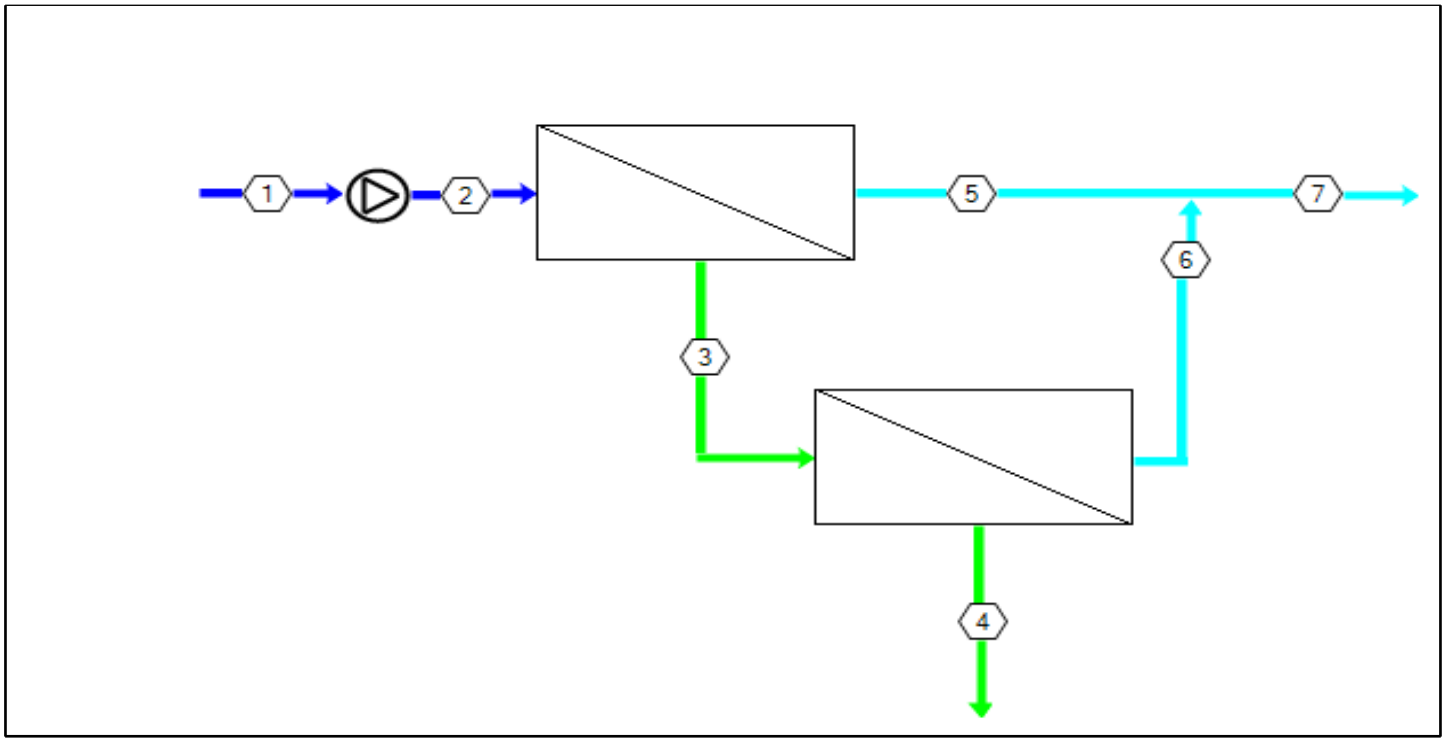
Feed type: Brackish Well Non-Fouling

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	455.5	40.8	15.5	15.2	9.5	18.7	1.2	24	0	79.7	137.4	ESNA1-LF-LD	108	18 x 6M
1-2	169.9	31.1	12.2	11.3	6	15.6	1.16	9	0	73.6	438.5	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	89.1	2.53	10.3	57.9	5.2	18.7	1.13	77.7	4.189	0.561	20.887	24.547
1-1	2	86.6	2.07	11.7	51.3	4.6	16.6	1.13	87.9	4.762	0.637	23.554	27.746
1-1	3	84.5	1.68	13.4	48.3	4.3	15.6	1.14	97.7	5.327	0.713	26.065	30.797
1-1	4	82.8	1.34	15.5	45.2	4	14.6	1.16	108.7	5.97	0.799	28.841	34.202
1-1	5	81.5	1.05	18.2	41.9	3.7	13.5	1.18	121.7	6.739	0.902	32.068	38.195
1-1	6	80.5	0.79	21.7	38.1	3.4	12.2	1.2	137.4	7.688	1.029	35.939	43.023
1-2	1	79.7	1.69	24.8	49	4.3	15.6	1.14	219.6	12.827	1.716	55.583	68.011
1-2	2	78	1.35	28.6	44.1	3.9	14	1.15	248.1	14.584	1.951	62.48	76.702
1-2	3	76.6	1.06	33	38.9	3.4	12.3	1.16	282.8	16.748	2.241	70.803	87.251
1-2	4	75.6	0.82	38	33.4	2.9	10.5	1.1	325.2	19.418	2.598	80.872	100.086
1-2	5	74.7	0.64	43.3	27.5	2.4	8.6	1.16	376.8	22.71	3.039	93.013	115.661
1-2	6	74.1	0.5	48.5	21.8	1.9	6.8	1.15	438.5	26.701	3.573	107.369	134.21

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 2.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	735	0	1049	7.00	1700
2	735	89.1	1049	7.00	1700
3	280	79.7	2534	7.37	3700
4	110	73.6	5791	7.70	7806
5	455	24.0	137	6.05	236
6	170	9.00	439	6.56	743
7	625	9.00	219	6.26	374

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	91.0	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	3.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.97	kwh/kgal	Fouling factor	0.86	
Pass NDP	47.5	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	452.3	40.8	15.7	15.1	9.5	18.4	1.2	24	0	81.5	145.1	ESNA1-LF-LD	108	18 x 6M
1-2	173.1	31.4	12.2	11.5	6.2	15.6	1.16	9	0	75.3	446.4	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	41.149	1084.9	2661.2
Ca	142.00	142.00	13.499	355.9	873.0
Mg	19.00	19.00	1.806	47.6	116.8
Na	143.00	143.00	57.537	311.0	629.3
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.003	0.0	0.1
Sr	1.700	1.700	0.222	4.2	10.1
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.009	2.5	16.4
HCO3	427.00	427.00	76.130	1045.4	2432.3
SO4	83.00	83.00	4.767	211.1	528.0
Cl	218.00	218.00	70.553	493.9	1056.9
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	4.059	34.9	77.2
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**228.58**	**2506.51**	**5740.25**
pH	**7.00**	**7.00**	**6.28**	**7.36**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	441	10000
SiO2 saturation, %	12	12	57	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1385.05	
Langelier saturation index	0.21	0.21	2.38	2.5
Ionic strength	0.02	0.02	0.11	
Osmotic pressure, psi	9.1	9.1	48.1	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	91.0	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	3.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.97	kwh/kgal	Fouling factor	0.86	
Pass NDP	47.5	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi

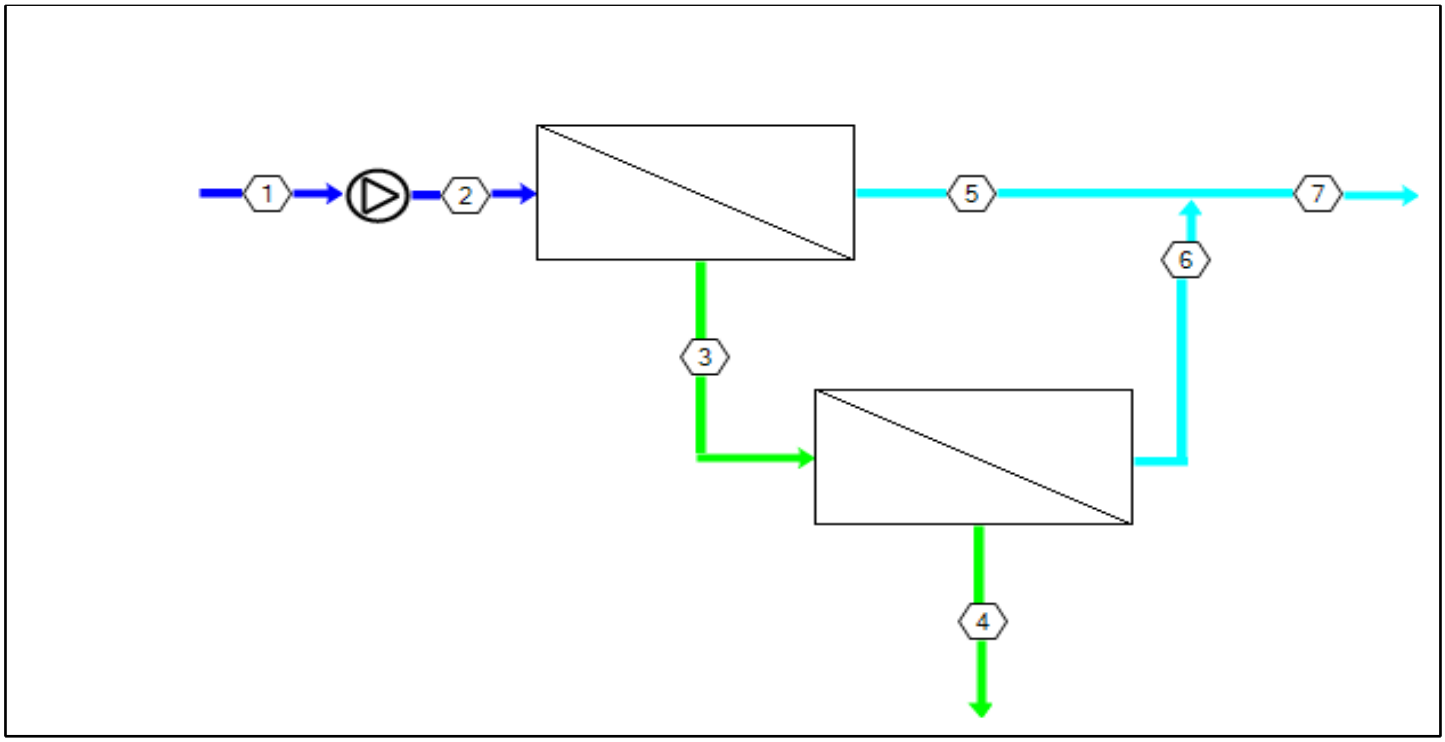
Feed type: Brackish Well Non-Fouling

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	452.3	40.8	15.7	15.1	9.5	18.4	1.2	24	0	81.5	145.1	ESNA1-LF-LD	108	18 x 6M
1-2	173.1	31.4	12.2	11.5	6.2	15.6	1.16	9	0	75.3	446.4	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	91	2.53	10.3	60.1	5.1	18.4	1.13	83.5	4.513	0.604	22.451	26.348
1-1	2	88.5	2.07	11.6	53.3	4.5	16.3	1.13	94.2	5.118	0.685	25.248	29.703
1-1	3	86.4	1.69	13.3	50.4	4.3	15.4	1.14	104.4	5.708	0.764	27.842	32.862
1-1	4	84.7	1.36	15.3	47.4	4	14.5	1.16	115.7	6.377	0.853	30.688	36.362
1-1	5	83.4	1.06	17.9	44.1	3.7	13.5	1.17	129	7.174	0.96	33.977	40.444
1-1	6	82.3	0.81	21.3	40.4	3.4	12.3	1.2	145.1	8.155	1.091	37.902	45.359
1-2	1	81.5	1.71	24.3	51.3	4.3	15.6	1.14	229.2	13.472	1.803	57.834	70.829
1-2	2	79.8	1.37	28	46.6	3.9	14.1	1.15	257.6	15.248	2.04	64.663	79.472
1-2	3	78.4	1.08	32.3	41.5	3.5	12.5	1.16	292	17.419	2.331	72.841	89.885
1-2	4	77.3	0.84	37.2	36.1	3	10.8	1.16	333.9	20.094	2.689	82.702	102.52
1-2	5	76.5	0.65	42.5	30.2	2.5	9	1.16	385	23.404	3.131	94.604	117.88
1-2	6	75.8	0.5	48	24.3	2	7.2	1.16	446.4	27.437	3.671	108.733	136.25

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 3.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	735	0	1049	7.00	1700
2	735	91.0	1049	7.00	1700
3	283	81.5	2507	7.36	3655
4	110	75.3	5740	7.70	7741
5	452	24.0	145	6.08	249
6	173	9.00	446	6.57	756
7	625	9.00	229	6.28	389

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	93.0	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	4.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.99	kwh/kgal	Fouling factor	0.81	
Pass NDP	49.8	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	449.4	40.8	15.9	15	9.6	18.2	1.19	24	0	83.5	152.7	ESNA1-LF-LD	108	18 x 6M
1-2	175.9	31.8	12.2	11.7	6.3	15.5	1.17	9	0	77.2	454.3	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	43.084	1072.0	2649.9
Ca	142.00	142.00	14.133	351.7	869.3
Mg	19.00	19.00	1.891	47.1	116.3
Na	143.00	143.00	59.636	305.2	617.3
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.003	0.0	0.1
Sr	1.700	1.700	0.232	4.1	10.1
H	0.00	0.00	0.001	0.0	0.0
CO3	0.35	0.35	0.010	2.3	16.1
HCO3	427.00	427.00	79.354	1016.0	2409.8
SO4	83.00	83.00	4.986	208.7	526.7
Cl	218.00	218.00	73.204	485.7	1041.7
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	4.223	34.3	76.3
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**237.67**	**2455.17**	**5683.73**
pH	**7.00**	**7.00**	**6.30**	**7.35**	**7.70**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	441	10000
SiO2 saturation, %	12	12	57	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1371.11	
Langelier saturation index	0.21	0.21	2.37	2.5
Ionic strength	0.02	0.02	0.11	
Osmotic pressure, psi	9.1	9.1	47.6	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	93.0	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	4.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	0.99	kwh/kgal	Fouling factor	0.81	
Pass NDP	49.8	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi

Feed type: Brackish Well Non-Fouling

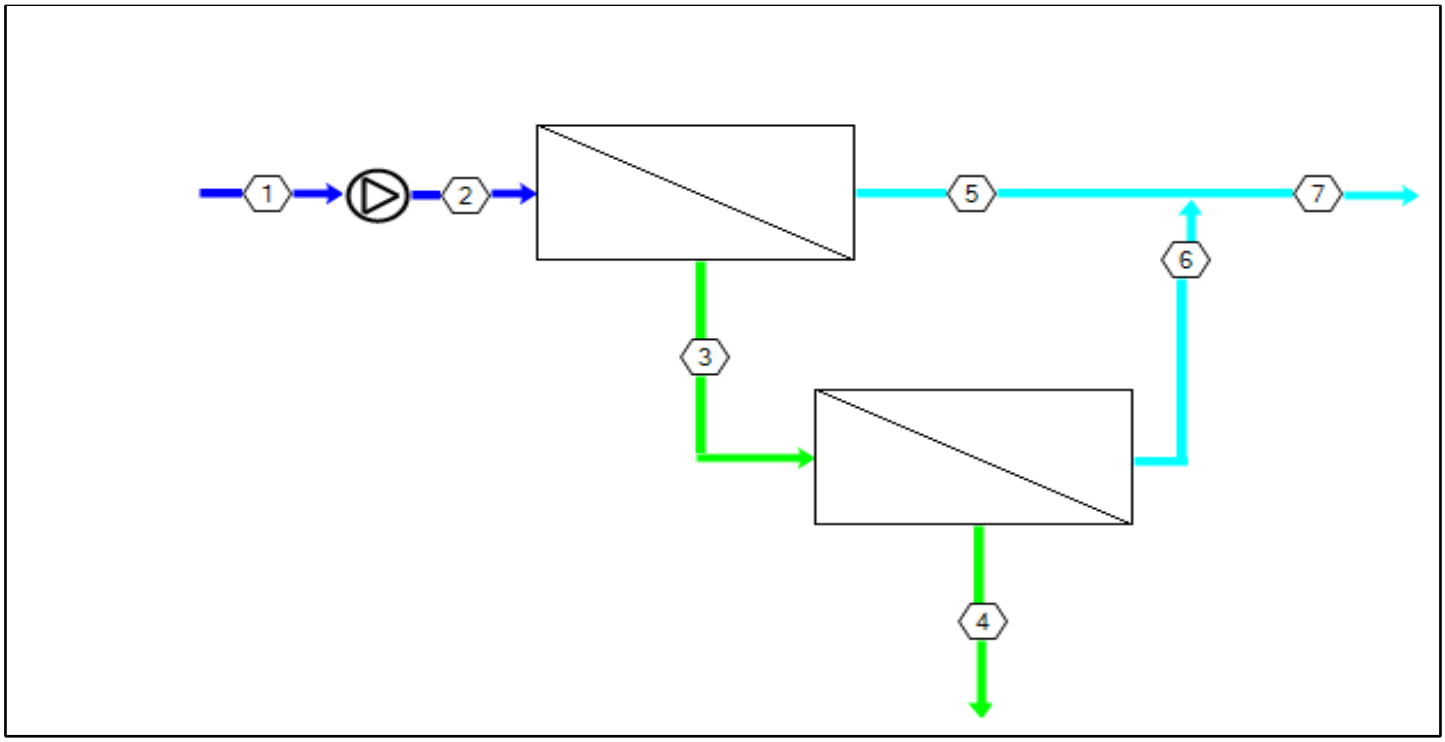
Pass - Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Stagewise Pressure Boost	Stagewise Pressure Conc	Perm. TDS	Element Type	Element Quantity	PV# x Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	449.4	40.8	15.9	15	9.6	18.2	1.19	24	0	83.5	152.7	ESNA1-LF-LD	108	18 x 6M
1-2	175.9	31.8	12.2	11.7	6.3	15.5	1.17	9	0	77.2	454.3	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure	Pressure Drop	Conc Osmo.	NDP	Permeate Water Flow	Permeate Water Flux	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	93	2.53	10.2	62.3	5	18.2	1.12	89.3	4.841	0.648	24.031	28.163
1-1	2	90.5	2.08	11.5	55.4	4.5	16.1	1.13	100.5	5.478	0.733	26.949	31.666
1-1	3	88.4	1.7	13.2	52.6	4.2	15.3	1.14	111.1	6.092	0.815	29.62	34.924
1-1	4	86.7	1.37	15.2	49.6	4	14.4	1.15	122.7	6.786	0.908	32.528	38.511
1-1	5	85.4	1.07	17.7	46.4	3.7	13.5	1.17	136.3	7.61	1.018	35.873	42.677
1-1	6	84.3	0.82	21	42.8	3.4	12.4	1.19	152.7	8.623	1.154	39.844	47.672
1-2	1	83.5	1.74	23.9	53.8	4.3	15.5	1.14	238.7	14.122	1.89	60.06	73.622
1-2	2	81.7	1.4	27.4	49.2	3.9	14.1	1.15	267	15.912	2.129	66.811	82.204
1-2	3	80.3	1.11	31.6	44.2	3.5	12.7	1.16	301.2	18.097	2.421	74.859	92.506
1-2	4	79.2	0.86	36.4	38.9	3.1	11.1	1.17	342.6	20.783	2.781	84.526	104.961
1-2	5	78.4	0.66	41.8	33	2.6	9.4	1.1	393.2	24.103	3.225	96.173	120.08
1-2	6	77.7	0.51	47.5	26.9	2.1	7.6	1.17	454.3	28.182	3.771	110.076	138.28

Permeate Throttling (Variable)

Project name Wellington-CurrentFeed-Tr7

Temperature : 79.0 °F Element age, P1 : 4.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	735	0	1049	7.00	1700
2	735	93.0	1049	7.00	1700
3	286	83.5	2455	7.35	3599
4	110	77.2	5684	7.70	7672
5	449	24.0	153	6.10	262
6	176	9.00	454	6.58	769
7	625	9.00	238	6.30	405

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	95.2	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	5.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	1.01	kwh/kgal	Fouling factor	0.77	
Pass NDP	52.1	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi
			Feed type	Brackish Well Non-Fouling	

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Stagewise Pressure Boost psi	Stagewise Pressure Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	446.8	40.8	16	14.9	9.6	17.9	1.19	24	0	85.6	160.2	ESNA1-LF-LD	108	18 x 6M
1-2	178.6	32.1	12.2	11.9	6.4	15.5	1.17	9	0	79.2	462.1	ESNA1-LF-LD	54	9 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	432.87	432.87	44.995	1060.2	2638.8
Ca	142.00	142.00	14.760	347.8	865.6
Mg	19.00	19.00	1.975	46.5	115.8
Na	143.00	143.00	61.673	299.8	605.7
K	0.00	0.00	0.000	0.0	0.0
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.020	0.020	0.003	0.0	0.1
Sr	1.700	1.700	0.242	4.1	10.0
H	0.00	0.00	0.000	0.0	0.0
CO3	0.35	0.35	0.011	2.3	15.9
HCO3	427.00	427.00	82.518	1012.1	2394.4
SO4	83.00	83.00	5.203	206.6	525.4
Cl	218.00	218.00	75.785	478.2	1027.0
F	0.00	0.00	0.000	0.0	0.0
NO3	0.00	0.00	0.000	0.0	0.0
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	15.00	15.00	4.383	33.8	75.4
B	0.00	0.00	0.000	0.0	0.0
CO2	59.59	59.59	59.59	59.59	59.59
TDS	**1049.07**	**1049.07**	**246.55**	**2431.24**	**5635.31**
pH	**7.00**	**7.00**	**6.32**	**7.35**	**7.69**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	3	3	34	400
SrSO4 / ksp * 100, %	2	2	25	1200
BaSO4 / ksp * 100, %	52	52	440	10000
SiO2 saturation, %	12	12	56	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	0.0	0.0	0.0	2.4
CCPP, mg/l	28.38	28.38	1360.92	
Langelier saturation index	0.21	0.21	2.37	2.5
Ionic strength	0.02	0.02	0.11	
Osmotic pressure, psi	9.1	9.1	47.1	

Permeate Throttling (Variable)

Project name	Wellington-CurrentFeed-Tr7				
Calculated by	wb				
HP Pump flow	735.42	gpm	Permeate flow/train	0.900	mgd
Feed pressure	95.2	psi	Raw water flow/train	1.059	mgd
Feed temperature	26.1	°C(79.0°F)	Permeate recovery	85.00	%
Feed water pH	7.00		Element age	5.0	years
Chem dose, mg/l, -	None		Flux decline %, per year	5.0	
Specific energy	1.01	kwh/kgal	Fouling factor	0.77	
Pass NDP	52.1	psi	SP increase, per year	7.0	%
Average flux rate	13.9	gfd	Inter-stage pipe loss	0.000	psi

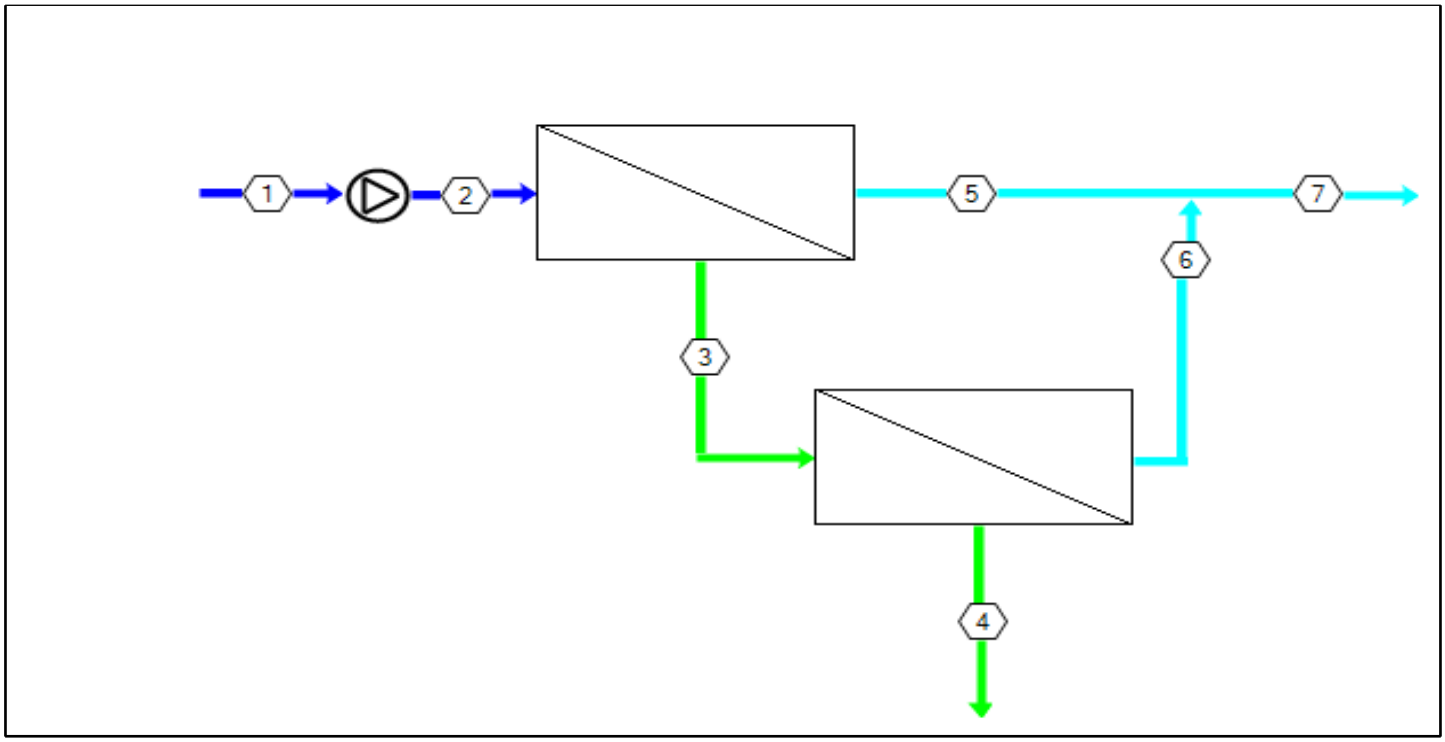
Feed type: Brackish Well Non-Fouling

Pass - Stage	Perm. Flow gpm	Flow / Vessel Feed gpm	Flow / Vessel Conc gpm	Flux gfd	DP psi	Flux Max gfd	Beta	Stagewise Pressure Perm. psi	Boost psi	Conc psi	Perm. TDS mg/l	Element Type	Element Quantity	PV# x Elem #
1-1	446.8	40.8	16	14.9	9.6	17.9	1.19	24	0	85.6	160.2	ESNA1-LF-LD	108	18 x 6M
1-2	178.6	32.1	12.2	11.9	6.4	15.5	1.17	9	0	79.2	462.1	ESNA1-LF-LD	54	9 x 6M

Pass - Stage	Element no.	Feed Pressure psi	Pressure Drop psi	Conc Osmo. psi	NDP psi	Permeate Water Flow gpm	Permeate Water Flux gfd	Beta	Permeate (Stagewise cumulative) TDS	Ca	Mg	Na	Cl
1-1	1	95.2	2.53	10.2	64.7	5	17.9	1.12	95.2	5.174	0.692	25.627	29.995
1-1	2	92.7	2.08	11.5	57.7	4.4	16	1.12	106.9	5.841	0.782	28.661	33.639
1-1	3	90.6	1.71	13	54.9	4.2	15.2	1.14	117.7	6.479	0.867	31.401	36.989
1-1	4	88.9	1.38	15	52	4	14.4	1.15	129.7	7.198	0.963	34.366	40.657
1-1	5	87.5	1.09	17.5	48.9	3.7	13.5	1.17	143.6	8.048	1.077	37.755	44.896
1-1	6	86.4	0.83	20.7	45.3	3.5	12.5	1.19	160.2	9.089	1.216	41.762	49.959
1-2	1	85.6	1.76	23.5	56.5	4.3	15.5	1.14	248.1	14.776	1.977	62.265	76.4
1-2	2	83.8	1.42	26.9	51.9	3.9	14.2	1.15	276.4	16.581	2.219	68.935	84.919
1-2	3	82.4	1.13	31	47	3.6	12.8	1.16	310.3	18.778	2.512	76.849	95.101
1-2	4	81.3	0.88	35.7	41.7	3.1	11.3	1.17	351.3	21.471	2.873	86.319	107.373
1-2	5	80.4	0.68	41.2	35.9	2.7	9.7	1.17	401.3	24.803	3.319	97.715	122.259
1-2	6	79.7	0.52	47	29.7	2.2	8	1.17	462.1	28.922	3.87	111.372	140.26

Permeate Throttling (Variable)

Temperature : 79.0 °F Element age, P1 : 5.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS (mg/l)	pH	Econd (µs/cm)
1	735	0	1049	7.00	1700
2	735	95.2	1049	7.00	1700
3	289	85.6	2431	7.35	3560
4	110	79.2	5635	7.69	7609
5	447	24.0	160	6.12	275
6	179	9.00	462	6.59	781
7	625	9.00	247	6.32	419