

2014
Membrane
Technology
CONFERENCE & EXPOSITION



Low Pressure Applications of Thin Film Nanocomposite (TFN) Membranes

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Thin-Film Nanocomposite Membrane Technology



- 50-100% more permeable than existing polymer technology
- Improves best-in-class salt rejection by 25%
- Drop-in replacement for existing membranes
- 5 Patents / 6 Applications in 12 Countries

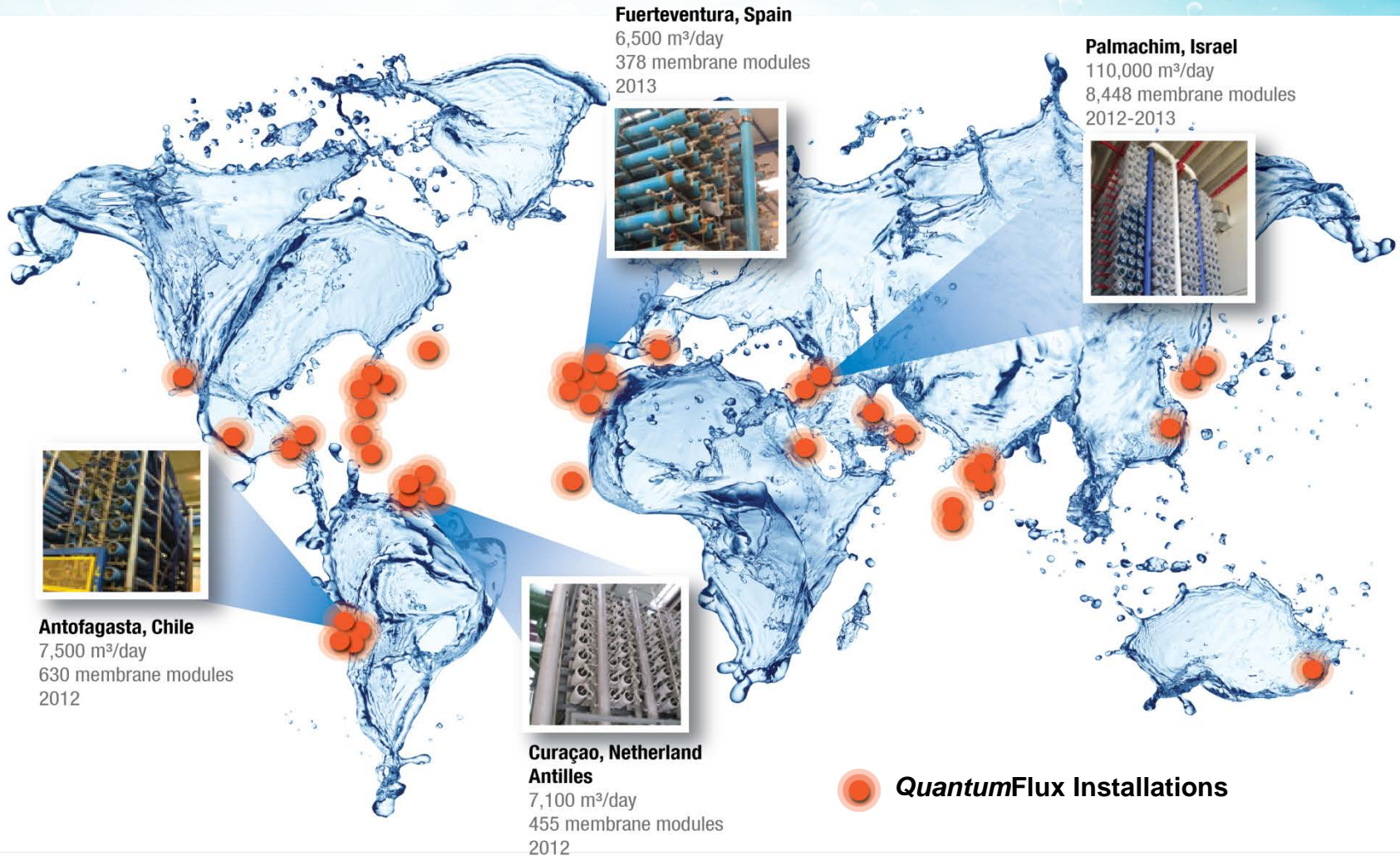
QuantumFlux SWRO Product Line

Product Specifications	Qfx SW 400 ES	Qfx SW 400 R	Qfx SW 400 SR
Permeate Flow Rate, m ³ /d (gpd)	52 (13,700)	34 (9,000)	24.6 (6,500)
Minimum NaCl Rejection, %	99.7	99.75	99.75
Stabilized NaCl Rejection, %	99.8	99.85	99.85
Active Membrane Area, m ² (ft ²)	37 (400)	37 (400)	37 (400)
Feed Spacer, mil	28	28	28
Stabilized Boron Rejection: %	89	93	93

*Performance differentiation
of the membrane enables
energy savings, OR flux
increase, OR enhanced
water quality*



Proven Technology



Third Party Independent Test

1-hour Test Conditions:

- 2,000 ppm of NaCl
- 225 psi of feed pressure
- 15% recovery
- pH: 8
- 25° C

NanoH ₂ O Element	Element Flow (gpd)	Rejection (%)
TFN Element #1	10068	99.82%
TFN Element #2	10129	99.74%
TFN Element #3	10864	99.75%
TFN Element #4	10887	99.60%
TFN Element #5	10270	99.81%
Average	10416	99.75%
Standard Deviation	365	0.079%
Competitor Element*	11264	99.38%

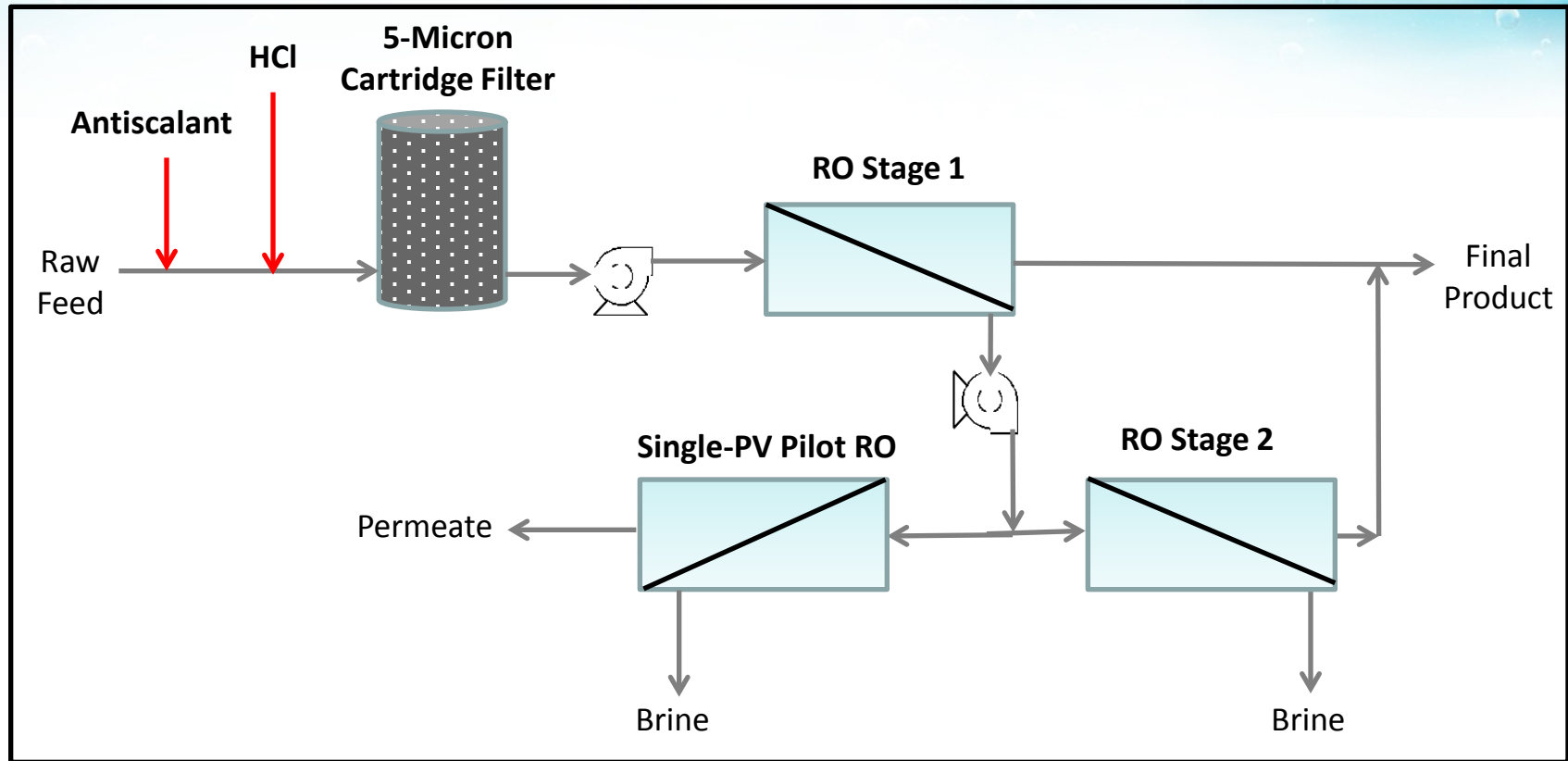
**Data sheet specifications: 10,500 gpd, 99.5%*

Pilot Test: Location

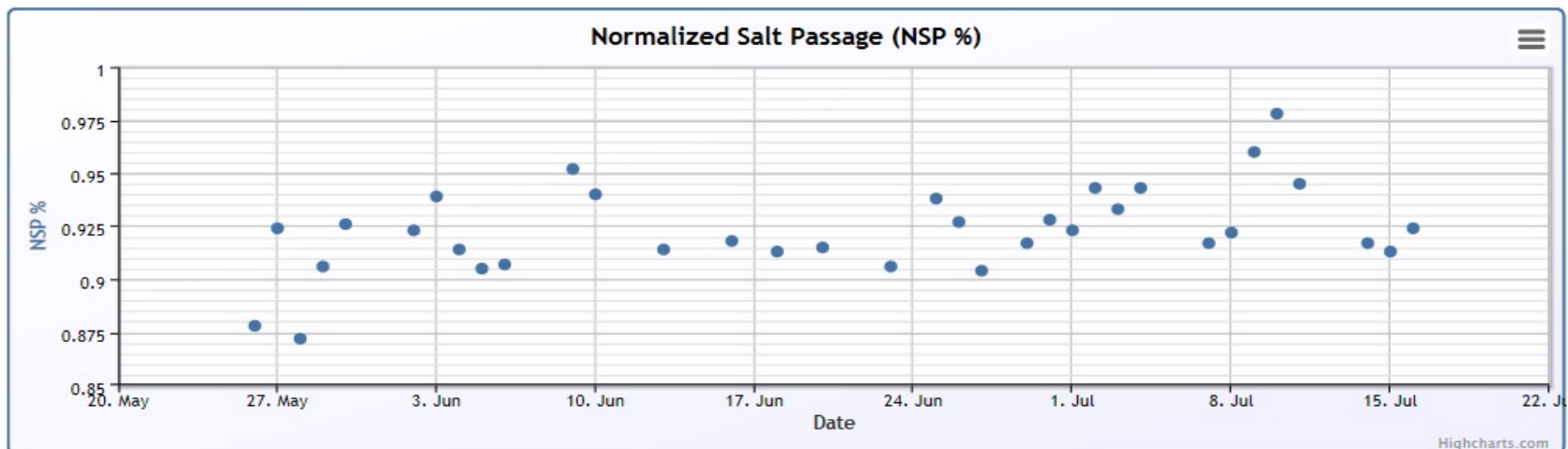
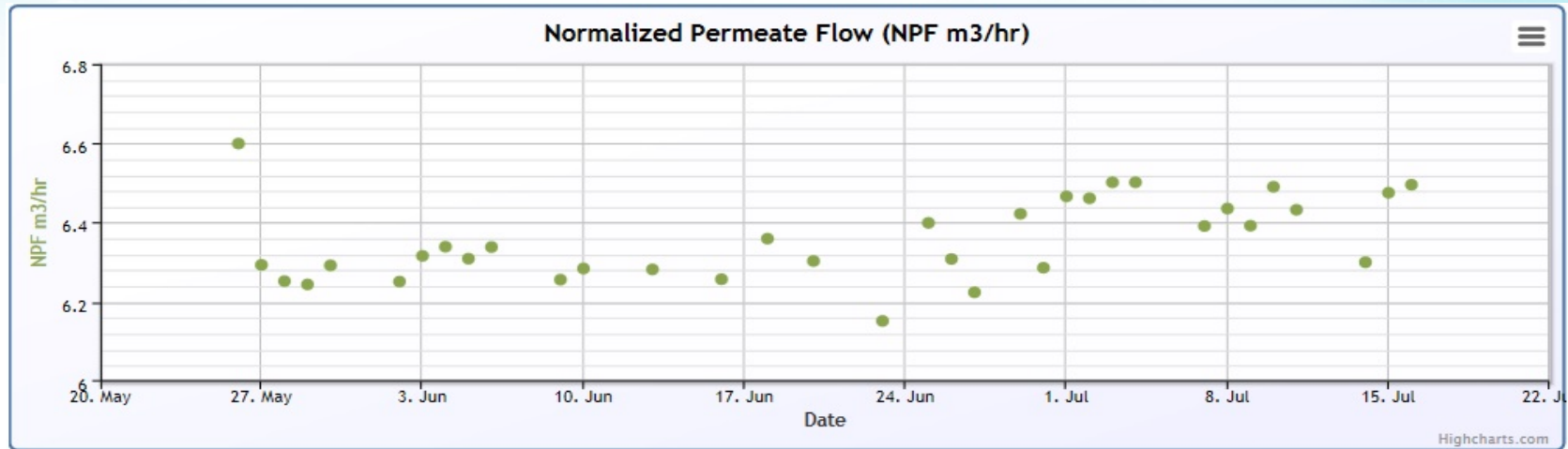
- Lahat Station, Israel
- 225 psi of feed pressure
- 15% recovery
- pH: 8
- 25° C



Pilot Test: Setup



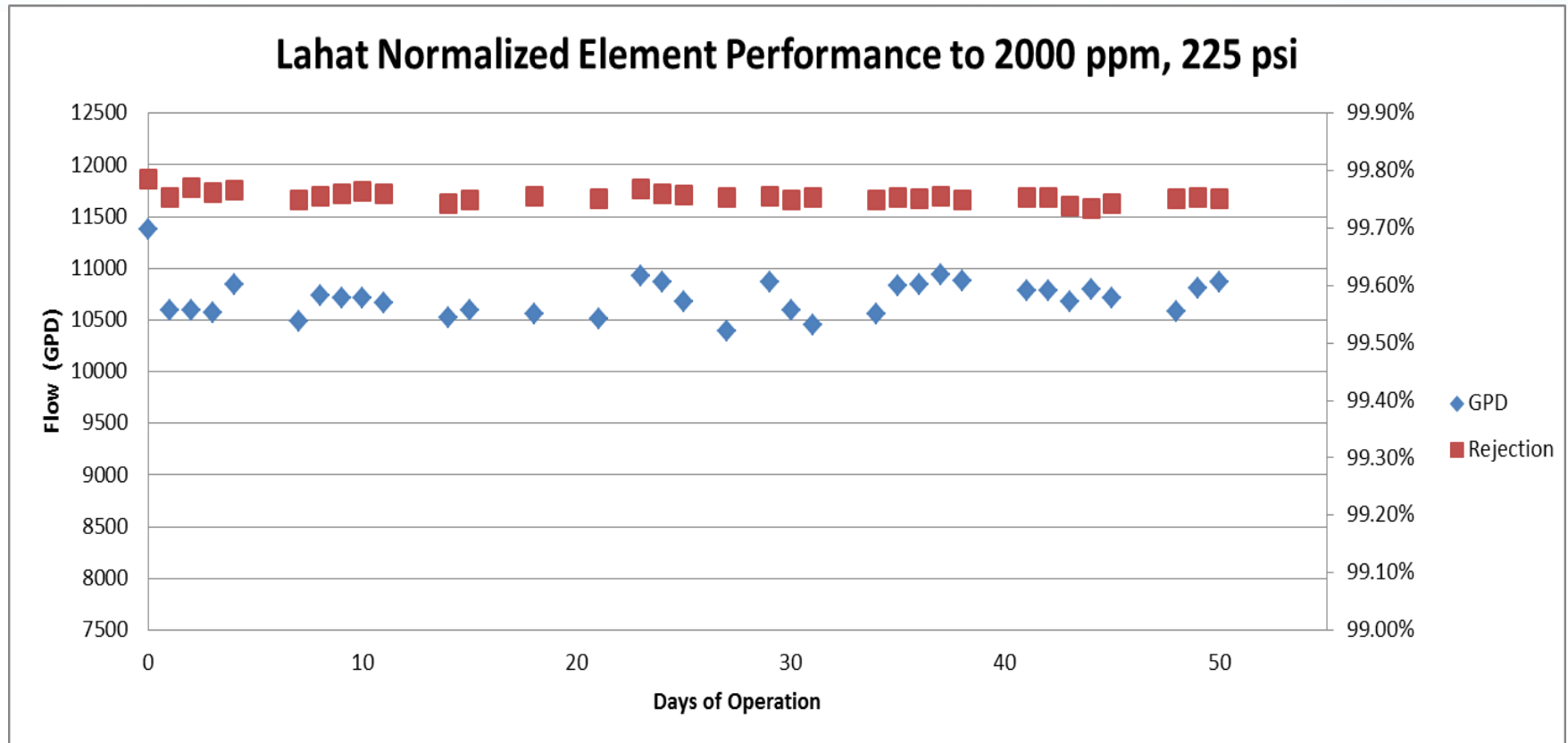
Pilot Test: Normalized System Performance



Pilot Test: Water Analysis

Parameter	Units	RO Feed water	Permeate	Brine
Alkalinity	mg/l	678.0	-	-
Bicarbonate	mg/l	830.0	-	-
Barium	mg/l	0.2	-	-
Calcium	mg/l	149.0	-	-
Chloride	mg/l	1460.0	11.0	3774.0
Fluoride	mg/l	3.5	-	-
Potassium	mg/l	10.4	-	-
Magnesium	mg/l	150.0	-	-
Nitrate	mg/l	97.0	-	-
Sodium	mg/l	921.0	-	-
Silica	mg/l	64.0	-	-
Sulfate	mg/l	210.0	-	-
Strontium	mg/l	4.0	-	-
TDS	mg/l	3600.0	~ 25	-
EC	μS/cm	5900.0	56.0	13860.0
Temp	°C	26.7	26.4	26.5
pH	-	7.6	5.5	7.7

Pilot Test: Normalized System Performance



Summary

✓ Third Party Independent

- Average Element Performance: **10,400 gpd and 99.75%** at standard BWRO test conditions

✓ Pilot Test at Lahat Station

- Validates the element performance found by the third party test
- Continuous operation demonstrates stability of the system and element performance

