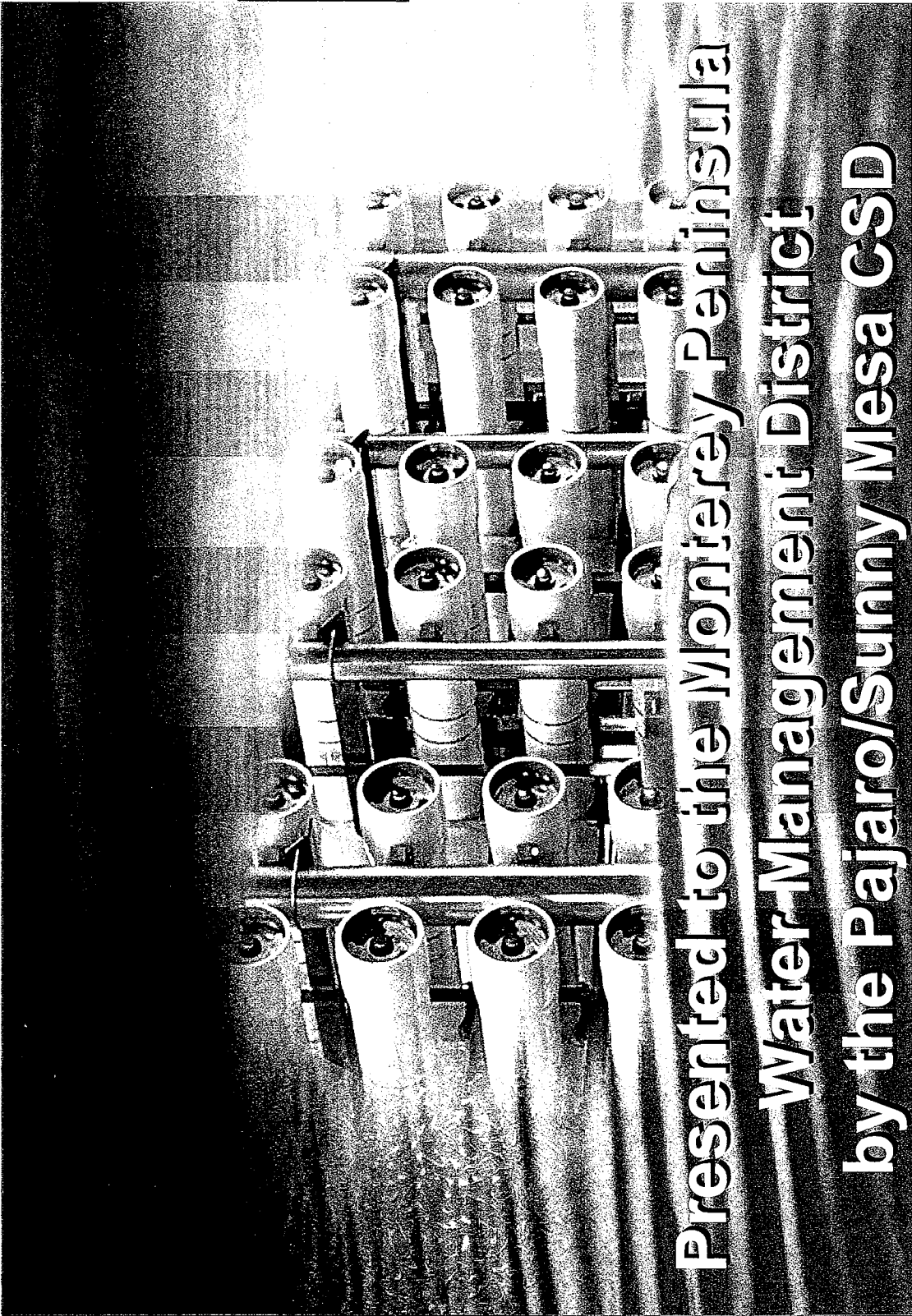


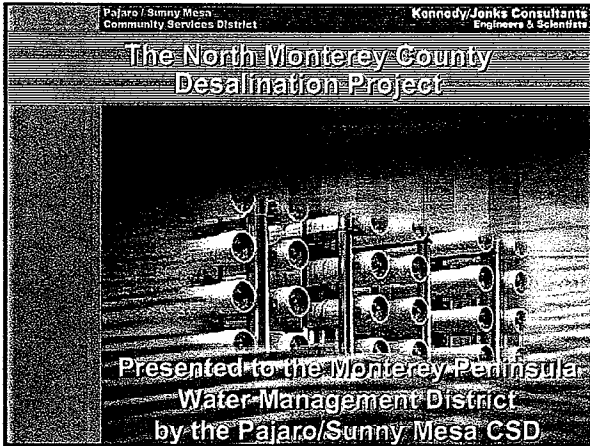
Pajaro / Sunny Mesa  
Community Services District

Kennedy/Jenks Consultants  
Engineers & Scientists

# The North Monterey County Desalination Project



Presented to the Monterey Peninsula  
Water Management District  
by the Pajaro/Sunny Mesa CSD




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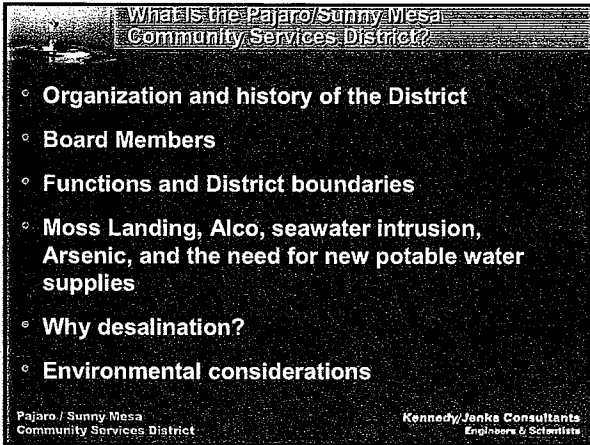
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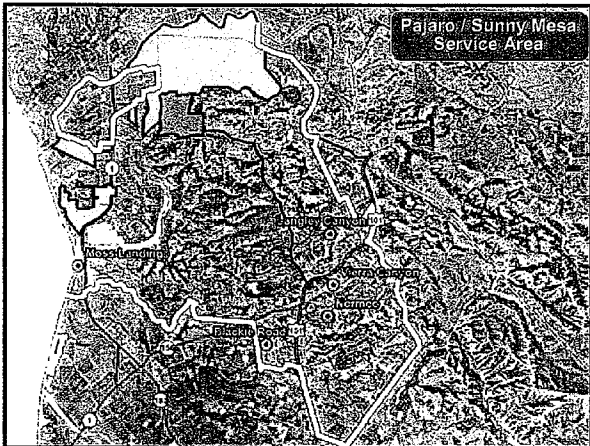
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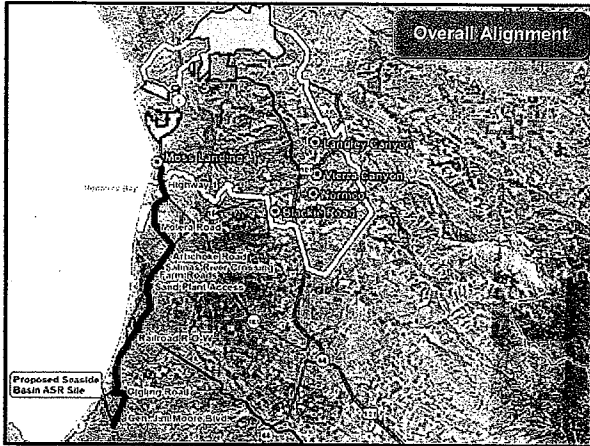
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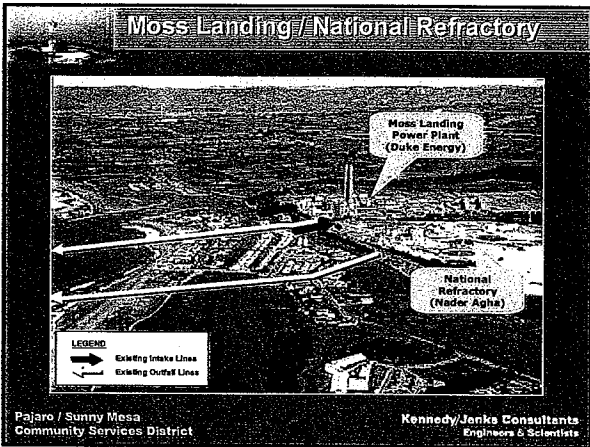
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**Val S. Frenkel, Ph.D., P.E.**

- **20+ years of experience**
  - Desalination
  - Water & Wastewater Treatment
  - Water Reuse
- **100+ Membrane Projects**
  - Including 20 desalination plants
- **30 publications**
- **4 patents**

Pajaro / Sunny Mesa Community Services District  
Kennedy/Jenks Consultants Engineers & Scientists

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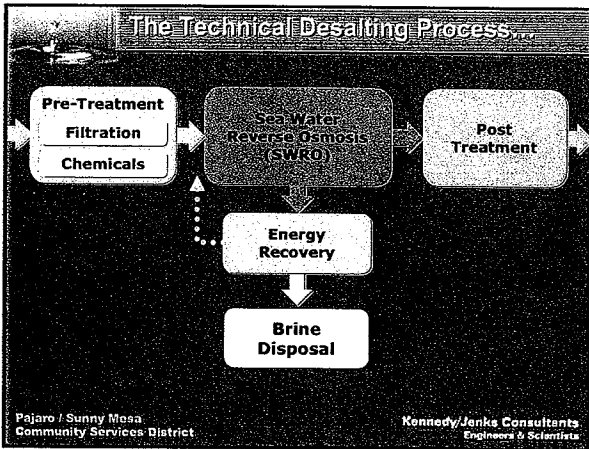
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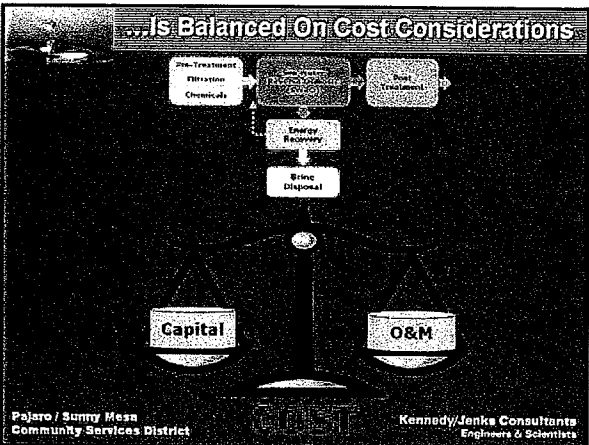
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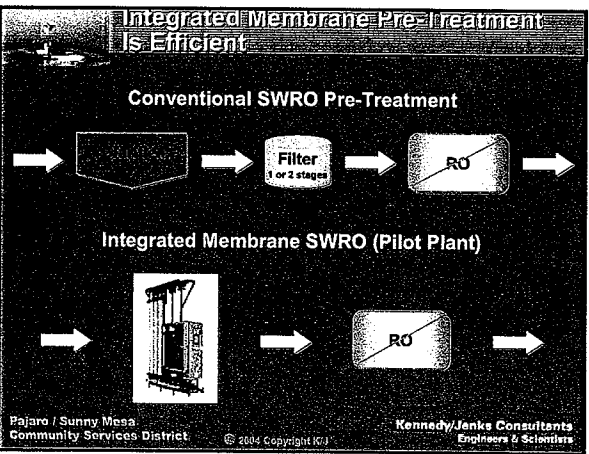
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### Advances in SWRO

- New Membrane Materials (TFC)
- Higher Energy Recovery Ratio
- Low Fouling Additives
- Higher Recovery
- Membrane Pre-Treatment
- Large Diameter RO



COST

.... Lower Capital and O&M Costs

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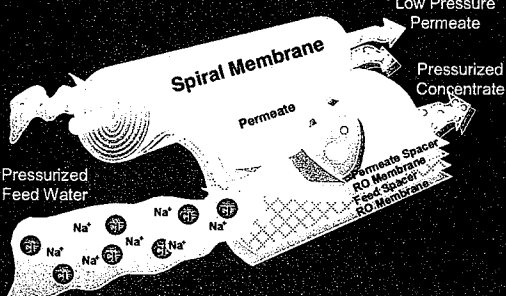
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### RO Spiral Wound Membrane



Low Pressure Permeate

Pressurized Concentrate

Permeate

Permeate Spacer

RO Membrane

Feed Spacer

RO Membrane

Pressurized Feed Water

Na<sup>+</sup> Cl<sup>-</sup> Na<sup>+</sup> Cl<sup>-</sup> Na<sup>+</sup> Cl<sup>-</sup> Na<sup>+</sup> Cl<sup>-</sup> Na<sup>+</sup> Cl<sup>-</sup> Na<sup>+</sup> Cl<sup>-</sup>

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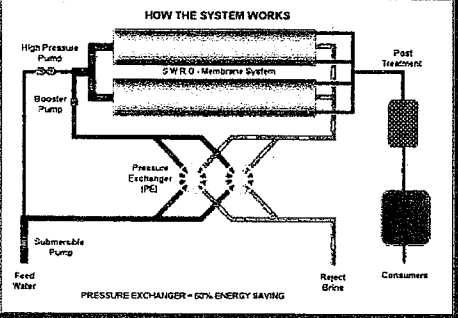
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### Energy Recovery – How Does It Work?



HOW THE SYSTEM WORKS

High Pressure Pump

Booster Pump

Pressure Exchanger (PE)

Submersible Pump

SWRO Membrane System

Post Treatment

Reject Brine

Consumers

Feed Water

PRESSURE EXCHANGER = 60% ENERGY SAVING

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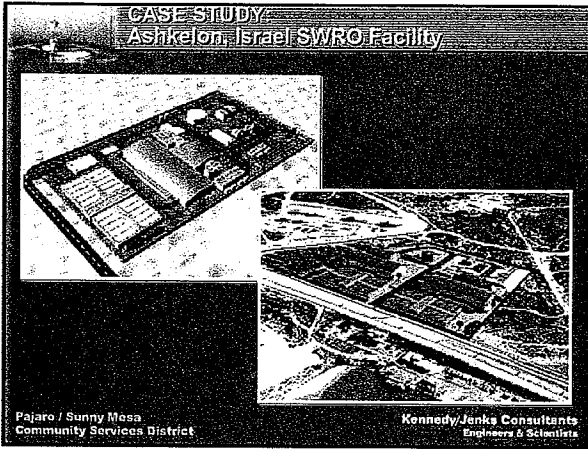
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**Ashkelon Capital and O&M Costs**

Parameter	Metric	US
Capacity	165,000 m3/day (330,000 m3/day)	44 MGD (88 MGD)
<b>CAPITAL TOTAL</b>	<b>\$ 212 M</b>	<b>\$ 212 M</b>
Capital cost for 20 yrs at 6%	\$ 0.17 /m3	\$ 0.64 / 1000 gal
Energy cost at 4 KW-H/m3, \$ 0.06 /KW-H	\$ 0.24 /m3	\$ 0.91 / 1000 gal
Chemicals + Labor	\$ 0.117 /m3	\$ 0.44 / 1000 gal
<b>TOTAL WATER COST</b>	<b>\$ 0.527 /m3</b>	<b>\$ 1.99 / 1000 gal</b>

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- Summary**
- New technologies and applications are making SWRO cost-effective
  - Recent national and international SWRO projects offer valuable lessons
  - North Monterey County Desalination Project to pilot the most advanced SWRO desalination technologies (MF/UF, Membrane Cleaning Methods, Energy Recovery)
- Pajaro / Sunny Mesa  
Community Services District
- Kennedy/Jenks Consultants  
Engineers & Scientists

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## What Makes This Project Special?

### Who Will Own Our Water For The Next 100 Years?

- Redundancy, compliance with county policies, and environmental considerations:
  - Duke cooling water (8 to 12 hours per day)
  - On-site storage - maximize environmental protection
  - The intake and the outfall at the former National Refractories site - a back-up system for de-sal
- A publicly owned, locally controlled, not-for-profit desalination plant is in the best interests of the residents, businesses, and environmental resources of Monterey County

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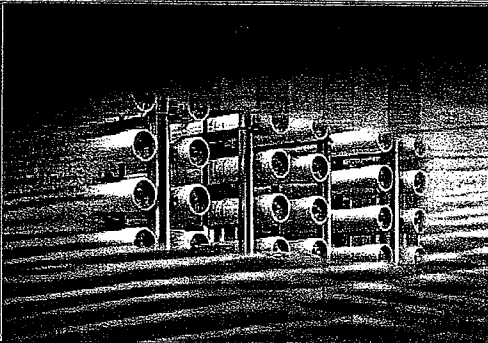
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## Questions & Discussion



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