Balancing Treated Demand and Annual Contractual Commitment

Special Board of Directors’ Meeting
June 14, 2012
Overview of Treated and Untreated Aqueduct Systems

- Operated as separate and independent systems
  - State and Federal regulatory requirements
- Treated and untreated deliveries are based on Member Agency operations
  - Water Authority responds to member agencies needs
- Untreated Water Sources
  - IID transfer, Canal Lining Water, MWD imported supplies
    - IID is take or pay commitment of up to 280,000 AFY
Deliveries made to Member Agency and Water Authority treatment plants and storage reservoirs
- Untreated water accounts for 75% of total deliveries through MWD System or 300,000 – 375,000 AFY
- Includes deliveries to Twin Oaks Water Treatment Plant
- Approximately 60% of deliveries to member agencies are untreated (240,000 – 295,000 AFY)
Overview of Treated and Untreated Aqueduct Systems

- Treated Water Sources include
  - MWD Skinner Filtration Plant,
  - Twin Oaks Valley WTP
  - Member agency contracts: Helix, OMWD, City of San Diego (Miramar), City of Oceanside

- Treated deliveries are made directly to Member Agency distribution systems
  - Approximately 40% of total deliveries to member agencies is treated water
  - 180,000 – 200,000 AFY
Water Authority Conveyance System
Untreated Water Conveyance System
Treated Water Conveyance System

- TOVWTP (25 MGD min)
- Carlsbad Desal (50 MGD)
- MWD Meter (32 MGD min)
- P2A Pump Station (39 MGD)
- San Vicente Reservoir
- Lower Otay Reservoir
- San Vicente Pipeline
- Demand Second Aqueduct north of Twin Oaks
- Demand First Aqueduct south of Pipeline 2A
- Demand Second Aqueduct south of Twin Oaks
- Demand Second Aqueduct north of Twin Oaks
Financial viability of the Project rests on the annual/monthly commitment by the Water Authority to purchase water produced by the Project. Water Authority commitment must align with our seasonal/annual demand profile for treated water.

- Demand profile is based on latest annual projections from the 2010 UWMP and seasonal modeling from 2012 Master Plan Update.
Setting the Contractual Commitment for Water Purchases

- Available treated water demand that could be served by the Project is influenced by:
  - Local hydrology (wet, dry, average weather variation)
  - Seasonality (high and low peak demands)
  - MWD meter minimum flow requirements
  - Twin Oaks Valley WTP contract minimum production
  - Available flow from the Project
  - Maintenance of MA water treatment plant operations
Treated Water System Planning

- Future regional demands based on 2010 UWMP (2015 thru 2035)
- Master Plan allocates projected demands based on historical deliveries
  - Provides treated/untreated splits
  - Member Agency demands are spatially located by aqueduct segments
- Goal is to Optimize the use of all regional treated water facilities
  - Avoid stranding assets
2010 UWMP: Projected Annual Demands by Member Agency

2012 Master Plan: Model Projected Aqueduct Flow Rates
- Generate daily demand shapes using historical meter data
- Allocate member agency demands to aqueduct system based on meter location
- Consider demand response to local hydrology
- Local supply availability
- Weather variability

Available Demands to be served by Carlsbad Desal Plant
- Monthly average demand
- Total annual demand

Consider Prioritization of Treated Water Flows
- MWD meter minimum
- TOVWTP minimum production

Projection of Daily Treated Water Demands
Treated Water Aqueduct Delivery System

- **Demand Second Aqueduct north of Twin Oaks**
- **TOVWTP (25 mgd)**
- **Carlsbad Desal (50 mgd)**
- **Demand Second Aqueduct south of Twin Oaks**

Typical Current Treated Water Operations
- MWD meter serves Second Aqueduct n/o Twin Oaks
- Twin Oaks WTP serves Second Aqueduct s/o Twin Oaks
- MWD serves all First Aqueduct
- Pipeline 2A Pump Station off-line
Seasonal Demand Pattern for Monthly Treated Water Deliveries

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<td>Dec-16</td>
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Results from Demand Analysis

- Annual demands will vary based on wet, normal and dry year hydrology
- Low winter period demands are not conducive to a single base load monthly volume for any treatment plant
  - Twin Oaks Valley WTP
  - Carlsbad Desalination
- Projected treated water demands not aligned with a fixed commitment to purchase 56,000 AFY from the Carlsbad Desalination Plant
  - While effectively utilizing Twin Oaks WTP asset
  - Not incur penalty charges from MWD
Options to Align Water Authority Commitment with Treated Demands

- Reduce the size of the desalination plant
- Establish a lower fixed commitment based on wet or multi-year demands, with flexibility to purchase additional supply in normal and dry years
Resizing Alternatives Analyzed

- Initially analyzed 3 facility alternatives
- Alternatives
  - Current 50 MGD capacity
  - Initial 40 MGD capacity, expandable to 50 MGD
  - Reduced 40 MGD plant and pipeline
- All 3 alternatives analyzed using 110 years of hydrology and weather data
  - Dry, wet, normal weather
- Cost information for all 3 alternatives developed
  - 2012 dollars, 2020 and 2030 projected demands
Resizing Alternatives Analyzed

- Alternatives reduced to 2 configurations
  - 50 MGD capacity plant and pipeline
    - 12 MGD minimum production to align with low winter demand
  - 40 MGD capacity plant and pipeline
    - 10 MGD minimum production to align with low winter demand
- 50 MGD configuration most cost effective
  - 20% reduction in capacity resulted in less than 10% capital cost reduction
  - Minor near-term savings for additional MWD purchases result in greater costs as MWD rates increase over time
  - 50 MGD configuration best aligns with Water Authority demand profile
### Case 1 - 50 MGD Desal Plant, Min Production = 12 MGD
#### 2020 Normal Year Hydrology, Daily Data

Desal = 50,845 AF  
Twin Oaks WTP = 76,493 AF  
MWD = 49,191 AF  
Delivered to Untreated = 147

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Case 1 - 50 MGD Desal Plant, Min Production = 12 MGD
2020 Wet Year Hydrology, Daily Data

Desal = 50,073 AF
Twin Oaks WTP = 72,253 AF
MWD = 45,796 AF
Delivered to Untreated = 325 AF
### Case 2 - 40 MGD Desal Plant, Min Production = 10 MGD
#### 2020 Normal Year Hydrology, Daily Data

- **Desal** = 41,955 AF
- **Twin Oaks WTP** = 80,106 AF
- **MWD** = 54,432 AF
- **Delivered to Untreated** = 110 AF

#### Table: Treated Deliveries (AF)

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Case 2 - 40 MGD Desal Plant, Min Production = 10 MGD
2020 Wet Year Hydrology, Daily Data

Desal = 40,997 AF
Twin Oaks WTP = 76,736 AF
MWD = 50,303 AF
Delivered to Untreated = 239

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## Revising the Annual Contractual Commitment: Optimizing capacity

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Case 1 – 50 MGD Desal Plant, Minimum Production of 12 MGD 2001 to 2010 Hydrology Trace, Daily Data

Average Annual Production = 53,560 AF
Case 1 – 50 MGD Desal Plant, Minimum Production of 12 MGD
1991 to 2000 Hydrology Trace, Daily Data

Average Annual Production = 52,425 AF
Revising the Annual Contractual Commitment

- Annual Commitment should be set around a wet year demand
  - Avoid paying for water not needed
  - Higher unit cost offset by lower rate impact in wet years

- Analysis of 110 years of hydrology indicated
  - Approx. 75 to 80% of the time demand in a wet year would exceed 50,000 AF
  - Still maintain Twin Oaks WTP Contract minimum and avoid MWD penalties
  - Most years will average 52,000–54,000 AF
Staff Proposed Annual Contractual Commitment

- Recognizing the 50,000 AF wet year result, provide an additional buffer to account for wet years
- Establish 48,000 AFY as the Water Authority's contracted annual minimum deliveries
  - Fixed cost will be covered at 48,000 AFY
  - Deliveries over 48,000 AF at Water Authority's discretion and subject to a variable charge (to be negotiated)
Two step approach of minimum and maximum has multiple benefits

- Better aligns with demand profile
- Provides Water Authority opportunity to maximize cost efficiencies in higher demand periods
- Conservative minimum allows flexibility in operations and ensures Water Purchases only water it needs

Given direction by Board Advisory Group to discuss approach with Poseidon and incorporate into Draft Agreement
Agenda

- Cost components of Carlsbad Desalination Project
- Currently identified range of Carlsbad Desalination costs and unit prices
- Comparison to the financial cost of alternative local supplies
- Identification of alternatives for incorporation into rates and charges
- Estimate of potential rate impact
- Next Steps
What Makes Up the Cost of Desalination?

- Direct costs associated with Plant and Conveyance Pipeline
  - Poseidon’s unit price for production of treated water
  - Unit price for conveyance to Second Aqueduct (Pipeline 3)

- Indirect costs associated with improvements to existing Water Authority owned facilities
  - Capital cost of distribution improvements
    - Pipeline 3 Relining and rehabilitation
    - Twin Oaks WTP modifications

- Twin Oaks WTP operational impact
  - Reduced utilization of plant
    - Higher unit cost due to inefficiencies
What is the Cost?

- The Water Authority’s payments are linked to water production
  - No payments are made unless water is produced
  - The risk of construction and operation are transferred to Poseidon
- The Water Unit Price is tied to the underlying costs of the project
  1. Amortization of Capital Cost
     - Debt Service Charge
     - Equity Return Charge
  2. Fixed Operating Costs of the Plant
     - Fixed O&M Charge
     - Fixed Electricity Charge
  3. Variable Costs of Producing Product Water
     - Variable O&M Charge
     - Variable Electricity Charge
Capital Budget

- Financing Costs
- Capitalized Interest
- Other Project Costs
- Pipeline EPC
- Plant EPC
The Water Unit Price: Production

- **Fixed Charges**
  - Debt Service
  - Equity Return
  - Fixed O&M
  - Fixed Elect.
  - 75%

- **Variable Charges**
  - Variable O&M
  - Variable Electricity
  - Incremental cost of water production
  - Paid for water taken by the Water Authority
  - 25%

- **Water Unit Price**
  - Debt Service
  - Equity Return
  - Fixed O&M
  - Fixed Elect.
  - Variable O&M
  - Variable Electricity
  - Pass-through price structure
How Does the Water Authority Pay for Conveyance?

The Water Authority’s payments for conveyance are linked to Plant performance:

- No payments are made unless water is produced
- The risk of construction is transferred to Poseidon
- Debt Service payment is paid through the price of water
- If Poseidon fails to produce water they pay conveyance debt service
- No recourse to Water Authority

The Water Unit Price incorporates the Debt Service cost for the new Water Authority owned conveyance pipeline:

- No payments are made unless water is produced
- Amortization of Capital Cost
  - Debt Service Charge
Indirect Costs:
Connecting to Existing Regional Facilities

- Capital cost of Pipeline 3 and TOVWTP modifications
  - Debt service
  - Minimal O&M

- Staff recommends Water Authority recourse financing
  - Significant interest savings over conveyance pipeline municipal financing
  - Very limited exposure to “pipeline to nowhere” risk
  - Accelerates needed extension of Pipeline 3 useful life
    - Condition assessments indicated limited life remaining
  - TOWTP modifications improve operational flexibility
1. The **Capital Costs** are driven by:
   - Poseidon’s Capital Budget
   - Bond Issuance
   - Negotiated Equity Return
   - Conveyance Pipeline Costs
   - Water Authority system improvements

   *The Capital Charge is fixed at a pre-established escalation rate*

2. **Operating Cost** is driven by:
   - Terms of Poseidon’s O&M Agreement with IDE
   - Other Water Authority operating expenses

3. The **Electricity Charge** is driven by:
   - Terms of Poseidon’s O&M agreement with IDE
   - SDG&E rates
   - Water Authority’s option to select supplier

   *The Electricity Charge will vary with electricity prices*
Summary of the Range of Costs for the Carlsbad Desalination Project

Direct costs

- **Capital Costs**
  - Desal Plant Related: $530-$570 Million
  - Includes: planning, permitting, design, construction, mitigation and legal costs
  - Conveyance Pipeline: $140-$150 Million
  - Total Capital Costs: $670-$720 Million

- **Financing Costs**
  - Reserves, capitalized interest, etc: $200-$250 Million

- **Operating and Maintenance Costs:**
  - Non Electricity: $23-$26 million annually
  - Electricity: $26-$30 million annually
Summary of the Range of Costs for the Carlsbad Desalination Project

Indirect costs

- Capital Costs
  - Pipeline 3 relining and Rehab: $50-$56 Million
  - TOVWTP Modifications: $10-$12 Million
  - Total Capital Costs: $60-$68 Million*
- Operating and Maintenance Costs: Nominal

Twin Oaks Inefficiencies

- Operating Costs
  - Reduced production: $2-$4 Million/Yr annually

*Does not include financing costs
History of Estimated Unit Price from Poseidon

- Does not include indirect Water Authority costs
- Term sheet pricing provided on July 28, 2010
- Updated pricing was provided on July 21, 2011 resulted in 5% increase in the price of water (after inflation)

- Current range of pricing based on resizing of demand and escalated to 2012 dollars

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<td>Updated to reflect final Construction Pricing</td>
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| Current Range (pending completion of due diligence) | $1,954- $2,165/AF
The Water Unit Price at the Fence

Fixed Costs
- Debt Service Charge
- Equity Charge
- Fixed O&M
- Variable Electricity

Variable Costs
- $515 - $530

Total
- $1,172 - $1,327
- $1,687 - $1,857
The Water Unit Price with Conveyance

Fixed Costs
- Debt Service Charge
- Equity Charge
- Fixed O&M
- Fixed Elec

Variable Costs
- Var. O&M
- Variable Electricity

Conveyance
- Conveyance

Total
- Total

Costs Range:
- $1,172 - $1,327
- $515 - $530
- $268 - $302
- $1,955 - $2,159

San Diego County Water Authority
The Water Unit Price with Conveyance and Water Authority Improvements

- **Fixed Costs**:
  - Debt Service Charge
  - Equity Charge
  - Fixed O&M
  - Debt Service Charge $1,172 - $1,327
  - Equity Charge $515 - $530
  - Fixed O&M $268 - $302

- **Variable Costs**:
  - Variable O&M
  - Variable Electricity
  - Variable O&M $268 - $302
  - Variable Electricity $70 - $87

- **Conveyance**
  - Conveyance
  - Water Authority Improvements
  - Water Authority Improvements $70 - $87

- **Indirect Costs**
  - Indirect Costs
  - Total $2,025 - $2,246
The Water Unit Price with Conveyance and Water Authority Improvements

Fixed Costs
- Debt Service Charge: $1,172 - $1,327
- Equity Charge
- Fixed O&M
- Fixed Elec

Variable Costs
- Variable Electricity: $515 - $530
- $268 - $302

Conveyance
- $70 - $87

Indirect Costs
- $37 - $83

TO Ineff.
- $2,062 - $2,329

Total
- $2,062 - $2,329

Water Authority Improvements
- Twin Oaks Inefficiencies
### Impact of Carlsbad Desalination if Applied to CY 2013 Rates

- **Based on conservative 2013 sales of 466,000 AF**
  - First year of operation sales (2016) projected at 520,000 AF
- **5 Retail Agency Average Composite Cost (CY 2012)**
  - Fixed Charge: $19.83 monthly
  - Commodity Charge: $51.40
  - Composite Monthly Residential Bill: $71.23

<table>
<thead>
<tr>
<th>Wholesale Charges</th>
<th>Proposed Rates Monthly Retail Cost 2013</th>
<th>Percent Retail Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Range</td>
<td>$5.00</td>
<td>7.0%</td>
</tr>
<tr>
<td>High Range</td>
<td>$5.20</td>
<td>7.3%</td>
</tr>
</tbody>
</table>

Actual rate impact will vary by member agency

**Notes:**
1. Analysis based on retail rates for the City of Carlsbad, Helix Water District, the City of San Diego, Sweetwater Authority, and Otay Water District.
2. Tier 1 and Tier 2 pricing blocks vary by member agency.
3. Historic total water demand used to calculate member agency specific weighting factors.
4. Individual member agency commodity charge calculated using its average single family residential water use (hcf).
5. Composite commodity charge is the sum of the individual member agency's commodity charge times its weighting factor.
Comparison With Alternative Local Supplies
Deciding to Develop a Local Supply

Many factors contribute to this decision including both monetary and non-monetary factors:

- **Non-Monetary**
  - Reliability
  - Regulations
  - Governmental Policy (i.e. reduced carbon footprint, etc)

- **Monetary**
  - External funding
  - Avoided costs
  - Offsetting revenue
  - Other benefits
What is Unit Cost?

- There are several economic/financial methods to evaluate project cost and viability. These methods include:
  - Unit cost
  - Life-cycle cost
  - “Net” cost (after accounting for avoided costs/external funding/other benefits)
  - Present Value (PV)
  - Cost/Benefit Ratio

- Previous Board direction to start at the true unit cost of supply
  - Necessary to analyze potential impacts to rates and charges of implementation

- Unit Cost ($/AF) is equal to:
  
  \[
  \text{Amortized annual Capital Cost ($)} + \text{Annual Operating Cost ($)}
  \]
  
  \[
  \text{Annual beneficially used water production (AF)}
  \]
Sources of Unit Cost Data

- North San Diego County Regional Recycled Water Project, April 2012
- City of San Diego Recycled Water Study, Draft Report, March 5, 2012
- Otay River Brackish Groundwater Desalination Feasibility Study, June 2009
- San Diego County Water Authority Camp Pendleton Seawater Desalination Project Feasibility Study Final Report, December 2009
- Sweetwater Authority Staff communication, September 2010
- City of Oceanside Staff communication, September 2010
Financial Assumptions

- **Financial Assumptions**
  - Required for “Apples to Apples” comparison
- **Unit Costs exclude:**
  - grants, subsidies, Federal-State subsidized low interest loans
  - Avoided costs
  - Indirect economic and societal benefits
- **Costs are expressed in 2011 dollars with the exception of Carlsbad Desalination (2012 dollars)**
- **For comparative purposes capital costs are amortized at 5% over 30 years**
  - Carlsbad Desalination is amortized at 7.75% for 30 years (weighted average cost of capital)
- **Contingencies left as project proponents analyzed**
- **Deduction for subsidies based on incentive amount in 2011 dollars**
  - May differ with economic analysis that considers NPV of a static financial subsidy over the term of incentive agreement
Typical Local Supply Cost Components

Treatment Plant

Concentrate/Waste Disposal

Conveyance/Distribution
Unit Cost Considerations

- Unit cost can be a helpful tool to establish a range of costs for local supplies
  - One of several ways to evaluate a new local supply project
  - When establishing a range of cost-effectiveness, a common basis is critical for a valid comparison
  - Total unit cost is necessary to evaluate rate impacts

- New local water supply unit costs (with treatment and distribution) appear to fall in a range between $1,500 and $2,500 per acre-foot

- “Net” unit cost to agency is a key factor in determining cost-effectiveness
  - Avoided costs and benefits are agency specific and part of any business decision
Cost of the Next Increment of Local Supply

Actual Proposed San Diego Region Project Unit Costs - $/AF

(Before incentives, grants, or netting out avoided costs
2011 Dollars unless otherwise noted)

<table>
<thead>
<tr>
<th>Project</th>
<th>Brackish Groundwater</th>
<th>Indirect Potable Reuse</th>
<th>Seawater Desalination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carlsbad (Poseidon)</td>
<td>~2,060</td>
<td>~2,330</td>
<td>~2,300</td>
</tr>
<tr>
<td>Mission Basin Narrows</td>
<td>$1,717</td>
<td></td>
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<tr>
<td>Otay River</td>
<td>$1,475</td>
<td>$2,086</td>
<td></td>
</tr>
<tr>
<td>City of SD RWS *</td>
<td>$1,975</td>
<td>$2,375**</td>
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<tr>
<td>North San Diego County Regional Reuse</td>
<td>$1,628</td>
<td>$1,730</td>
<td>$1,900</td>
</tr>
<tr>
<td>Camp Pendleton Desalination</td>
<td>~2,330</td>
<td>~2,300</td>
<td>~2,340</td>
</tr>
</tbody>
</table>

* Cost range includes wastewater related costs that may reduce the unit cost by up to $600/AF.

** Incentive funding reduced at 2011 value of $275. RWS assumes deduction for incentives on 20 year NPV basis.
Role of Local Supplies

- Local Supply development is integral to supply diversification
- Region must double the amount of local supply to meet 2020 Urban Water Management Plan reliability goals
- Diversification requires development of multiple sources of supply
  - Not either one supply or another- “all of the above”
  - Each supply has its own unique benefits
  - Risk of shortage is managed by reducing dependence on any single source
- Establishing a realistic range of local supply costs provides a decision making basis for developing local supplies
  - agencies make business decisions from their own individual perspective