LEGAL AND PRACTICAL ISSUES IN DESALINATION

LESSONS LEARNED AT CARLSBAD

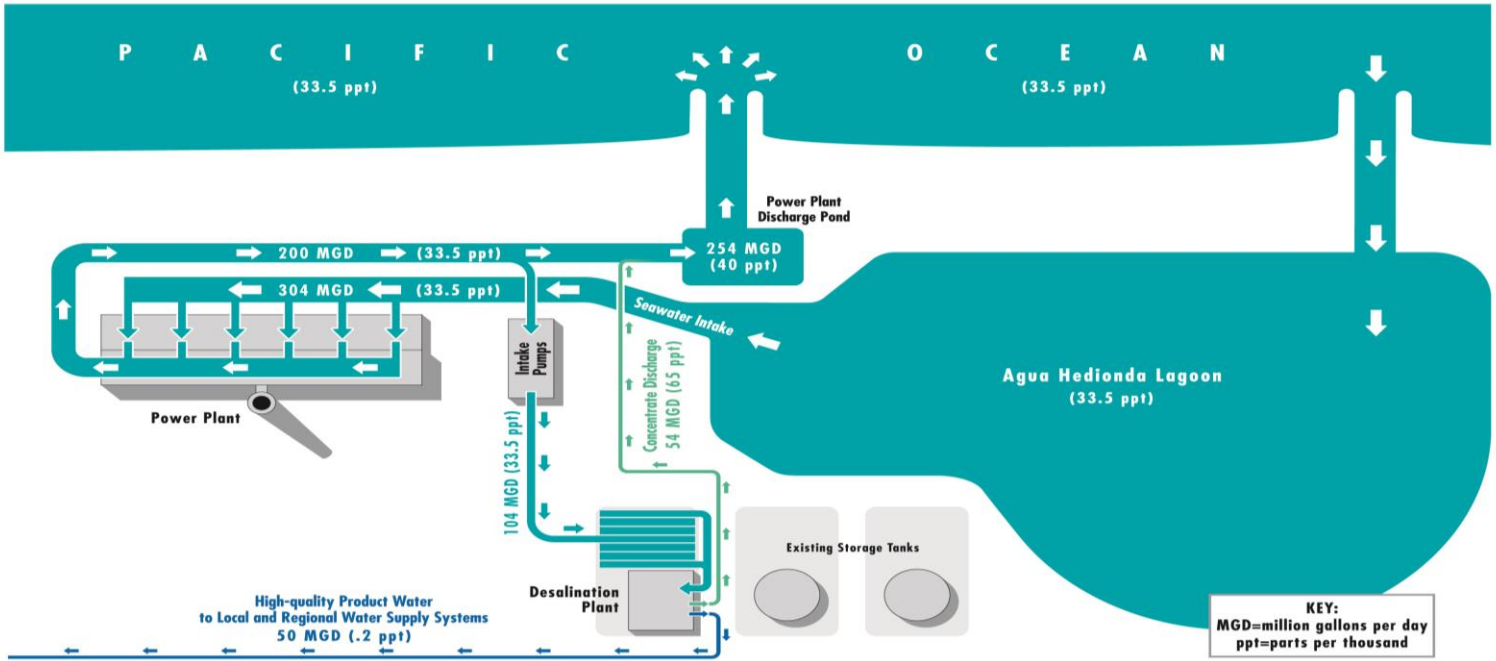
September 30, 2016

CARLSBAD SEAWATER DESALINATION PROJECT

- Carlsbad Seawater Desalination Project (“Project”) consists of 50 MGD (56,000 AFY)
- Developed and owned by Poseidon Resources Channelside LP (“Poseidon”)
- Co-located with Encina Power Station (which relies on once-through-cooling)
- Includes 12-mile, 54”diameter conveyance pipeline
- Currently the largest desalination plant in the Western Hemisphere
- Produces 7% to 10% of San Diego County’s potable water demand

PROJECT LAYOUT

PROJECT SCHEMATIC



PERMITTING ISSUES

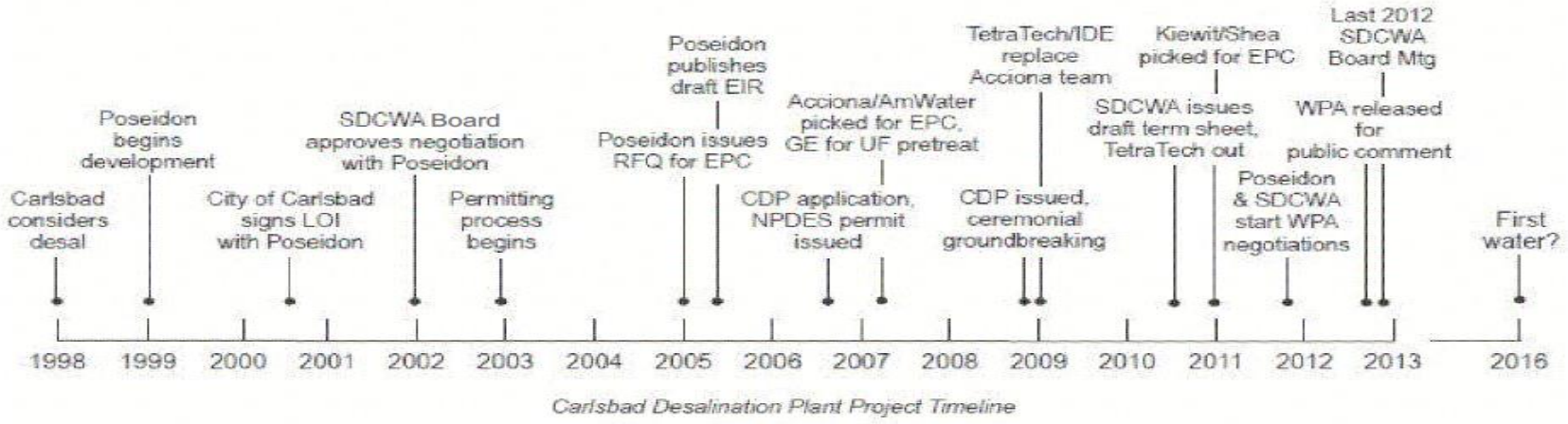
- "Regulatory Gauntlet"
- Carlsbad ("local") Permits – zoning, planning, redevelopment agency, encroachment (for use of public streets for pipeline), CEQA
- State Lands Commission – Approval for use of state-owned tidelands
- RWQCB – Approval for seawater intake and ocean discharge of brine
- California Coastal Commission ("CCC") – Issuance of Coastal Development Permit ("CDP") for development in coastal zone
- Each agency reviews all issues de novo.

PROJECT ENVIRONMENTAL ISSUES

- Marine life impacts due to seawater intake (i.e., “impingement/entrainment”)
- Marine life impacts due to brine discharge
- Growth-inducing impacts (i.e., “If you build it, they will come.”)
- Energy use, including greenhouse gas generation from project power usage
- Seawater intakes: once-through-cooling v. subsurface/slant wells

LAWSUITS

- Permits and environmental issues spawned 6 lawsuits (and 14 total “legal challenges”) prior to construction of the Project.



Carlsbad Desalination Plant Project Timeline

EFFECTS OF REGULATORY MAZE

- Number of permits, multiplicity of legal challenges cause delays, increase costs.
  - CDP from CCC is final hurdle; CCC approval of Carlsbad took two years.
- Design changes require (re)approval of each permitting agency. Fear of added delays, litigation stifle subsequently discovered design innovation.

REGULATORY MAZE (cont.)

- Governor Brown issued Executive Order B-29-15 after site visit to Sierra Nevada Mountains.
- Sierra snowpack was at 8% of normal on March 27, 2015, the lowest percentage since measurements began in 1950.
- Executive Order:
  - Imposed mandatory, statewide potable water cuts and encouraged conservation.
  - Mandated priority review and approval of water infrastructure projects, including desalination, that increase local supplies. Desal projects proposed in Marin, Monterey, Orange, San Diego, Santa Barbara and Santa Cruz counties.
- Maze frustrates compliance with Executive Order B-29-15.

LESSONS LEARNED – Permitting

- Need "One-Stop Shopping" – Streamline process so that one central agency provides all approvals.
  - E.g., California Energy Commission, which centralized permitting authority over thermal power plants producing more than 50 Mws
- Poseidon is attempting this approach informally for the proposed desal plant in Huntington Beach.
  - Poseidon recently deferred consideration of the Huntington Beach CDP to allow for an interagency agreement among the CCC, RWQCB and State Lands Commission to consider Poseidon's applications for approval or amendment. Delay allows agencies to review an agreed-upon common plant design and consider permits in proper sequence.

LESSONS – Lawsuits

- Reform legal process to provide for administrative objection(s) after each permit.
- Objection(s) would preserve objector(s) right to file suit following issuance of final permit.
- Permitting process would continue, during which project proponent(s) and objector(s) would have opportunity to negotiate and resolve issues.
- Objector(s) would have 30 days after issuance of last permit to file suit (if objections not resolved before then).
- If no objection(s) made, litigation would be foreclosed.

LESSONS – Practical

- Permits
  - Currently permits are discussed, written and negotiated prior to plant operations.
  - This forces plant operations to fit within permit constraints, and the owner and operator have to live with consequences.
  - E.g., Carlsbad NPDES permit was written in 2005, and is based on IDE's 2005 technology for the Ashkelon Desalination Plant (instead of its 2015 technology for Sorek).
  - E.g., NPDES permit imposes daily/monthly discharge limits instead of annual limits (which does not take into account planned operational down time).

LESSONS – Practical

- Permits (cont.)
  - DDW Permit: Department of Drinking Water ("DDW") permit provisions were finalized during the completion of construction since Carlsbad was the first large scale SWRO plant in California.
  - Consequently, some DDW permit provisions required physical modifications to system design and installation.
    - Added double block and bleed systems for cleaning of RO trains to ensure no chemicals entered product lines
    - Rerouted equipment and power supplies on product tank
    - Lowered alarm and shut down limits for RO permeate conductivity

LESSONS – Practical (cont.)

- Regulations
  - "Square Peg v. Round Hole" situation
  - There are no actual desalination regs. Surface water treatment regs. are used, or regs. are drafted from academic, not practical/operational, standards.
  - Net result: seawater membranes (which remove 99.9% of everything) are being treated as surface water treatment filters (which do not).
  - E.g., At Carlsbad, regulators required turbidity analyzers to be installed to obtain log removal credits (for giardia, cryptosporidium).

LESSONS – Practical (cont.)

- Regulations (cont.)
  - Regulators are familiar with equipment manufacturers that historically have not supplied seawater desal; they can be more expensive than needed.
  - Regs. require plant to be operated by "state-certified RO operators." BUT there aren't (m)any as U.S. has little/no history with seawater desal.
  - Regs. require "state-certified laboratories" to analyze water quality. Lack of familiarity can result in errors. Solution is to obtain state certification for in-house testing.

LESSONS – Construction

- Construction
  - Footprint must accommodate production capacity for current and future plans.
  - Carlsbad's footprint is 1/3 of what IDE typically uses and city-imposed height limits prevent vertical RO membranes. This constrains capacity increases at plant.
  - Design must vary as no two plants are the same.
    - E.g., Membranes are designed to operate at ideal temperatures for influent water of 25°C (approximately 72°F). BUT, Carlsbad influent water fluctuates between 16°C and 31°C (approximately 61°F and 88°F) because influent water taken from power plant.
    - E.g., Rainfall at Carlsbad lagoon intake reduces TDS, which increases permeate that passes thru membranes.

LESSONS – Construction

- Must design/construct/operate around permits; this may not allow for innovations to address issues that arise during operation.

- Understand that the “perfect plant” CANNOT be built.

LESSONS – Environmental

- "*The opera ain't over till the fat lady sings*" – *Ralph Carpenter, Texas Tech Sports Information Director, 1976.*

- *"It ain't over till it's over" – Yogi Berra, 1973*

LESSONS– Environmental (cont.)

- Guess what: When it comes to environmental scrutiny, the fat lady never sings and it's never over.

- Carlsbad has produced 10 billion gallons of drinking water, but debate rages on over whether the Project is necessary or economical.
  - Opponents still contend the Project is too energy intensive and unnecessarily expensive than other water supplies.
  - Supporters argue the Project is a major reason San Diego is no longer subject to state-ordered water cuts.

- Why?: Three other plants are being considered for the region (Huntington Beach, Camp Pendleton and Rosarito, Mexico), and denigrating Carlsbad might help to discourage those projects.

Takeaways

- Best to engage all stakeholders early, often and always.
  - E.g., There may be design changes, such as subsurface intakes, if feasible, or, as Poseidon proposes for Huntington Beach, 1mm slot width seawater intake screens and salinity diffuser technology that satisfy objections.
  - E.g., There may be no other alternatives, such as potable reuse.
- Public outreach is critical.
  - Court vocal supporters to balance opposition.
- Plan on lots of time, patience and money.
- Like Rome, desal plants are not built in a day.

Takeaways (cont.)

- *"It's supposed to be hard. If it wasn't hard, everyone would do it. The hard . . . is what makes it great." – Tom Hanks, as manager Jimmy Dugan, in A League of Their Own, 1992*

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