IRWIN WATER WORKS
IRWIN WATER WORKS

Why did USACE undertake this project?

- Fort Irwin is site of National Training Center
- 645,000 acres plus the airspace above available for training
- Comprehensive, realistic brigade-level training with live fire and force-on-force exercises
- Environment tests Service Members and equipment to their limits
- 5,000 – 6,000 Service Members train at Fort Irwin each month
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Why did USACE undertake this project?

- Groundwater is sole water supply

- Fort Irwin groundwater did not meet evolving drinking water standards

- Constructed Reverse Osmosis (RO) water supply network to meet “consumptive use” (drinking, cooking) demand

- RO system installed adjacent to existing Domestic System (DO) which is used for non-consumptive applications (bathing, laundry)
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Why did USACE undertake this project?

- Current system

Domestic (DO) system spigot

Reverse Osmosis (RO) system spigot
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What are the project’s objectives?

- Bring Fort Irwin into compliance with State of California and US EPA drinking water standards

- Build single-source water supply system with all building interiors and housing equipped with a sole spigot; all field water points provided with water which is fit for human consumption

- Extend lifespan of National Training Center

- Keep facility footprint to minimum; provide maximum training space

- Comply with Army’s “Net Zero” Initiative; build zero liquid waste discharge facility
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How did USACE meet project’s objectives?

- “Stacked” water treatment technologies

- Design-Build Contract; outcome-driven or performance-oriented contracting vehicle

- Contract required D-B Contractor to construct facility and perform 90-Day “Prove Out” to demonstrate operability
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“Stacked” technologies

Electrodialysis Reversal System

Close-Coupled Microfiltration/Reverse Osmosis System

Mechanical Evaporation System
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Electrodialysis Reversal (EDR)

- Membrane process; employs electromotive force

- 120 “Stacks” comprised of 600 anion-permeable membranes, 600 anion-permeable membranes, and 1200 spacers; arrayed in 5 Trains
Electrodialysis Reversal (EDR)

- Utilizes direct current; reversing polarity facilitates membrane flushing
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Reverse Osmosis (RO)

- Membrane technology; employs high pressure
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Reverse Osmosis (RO)

- Arrayed in 3 Trains, each comprised of 3 stages
- Coupled with 5 Microfiltration Trains

Potable Water

FEED WATER

Brine
IRWIN WATER WORKS

Mechanical Evaporation (ME)

- Incorporates thermodynamic and mass transfer processes; creates water vapor which is then condensed

FEED WATER ➔

Blower
(increase vapor pressure)

Condenser ➔

To Evaporation Ponds

Potable Water ➘

Irwin Water Works Plant Familiarization Brief, 16 MARCH 2017
IRWIN WATER WORKS

Treatment Overview

- EDR achieves 92% recovery; presently only system permitted
- MF/RO improves recovery to 97%
- ME improves recovery to 99.7%
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Wastestream Management

- 9 Evaporation Ponds; encompassing approximately 7 acres
- Equipped with leachate collection network, monitoring equipment, alarms
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Distribution System

- Installation of new untreated and treated water lines
- Extensive “flushing” program for existing distribution lines
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Budget/Schedule

- $100,112,660 budgeted with a construction and commissioning schedule of 1095 days. Notice To Proceed (NTP) issued by USACE on 19 October 2013.

- Current budget of $102,059,724 with construction and commissioning completed (anticipated) after 1635 days

Challenges

- Logistical struggles due to remote location of Fort Irwin

- Complicated construction due to situation in seismically active zone, area of high wind loads, and wide day/night and summer/winter temperature swings

- “Stacked” treatment technologies presented difficulties in commissioning various systems
IRWIN WATER WORKS

Small Business “Take Aways”

- Abundant opportunities for niche business (HVAC, SCADA, access control, door/lock installation, painting, fencing, low water-usage landscaping)

- Responsiveness is key

- Familiarity with EM 385-1-1 (USACE Safety and Health Requirements Manual) major differentiator