California Water Service

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Quality. Service. Value.

Meeting the Chromium-6 Compliance Challenge

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Drivers Toward Compliance

Hinkley Groundwater Contamination:

- 1952-1966 – Groundwater contamination occurred after CrVI was used by PG&E to prevent rust in compressed gas cooling towers
- The chromium affects an area of groundwater at least eight miles long and two miles wide

State Water Resources Control Board

- MCL set at 10 ppb for hexavalent chromium effective on July 1, 2014

Company Water Quality Priorities

- Zero water quality violations
- Reliable and consistent testing – state certified lab
- Utilizing the best possible treatment technology

Timeline of Chromium-6 (CrVI) Compliance

December 2010/11 — Cal Water prepares for Public Health Goals study by conducting company-wide CrVI sampling

July 2011 — Public Health Goal for Hexavalent Chromium (CrVI) released

June 2013 — Through joint research with other utilities, Strong Base Anion Exchange (SBA-IX) is determined to be the best technology for Cr VI removal

January 2014 — Using Strong Base Anion Exchange, Cal Water carried out site specific testing to identify best performing resin and configuration for Cr VI treatment

March 2014 — Preliminary site designs and permitting are initiated

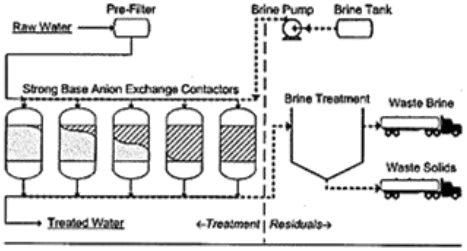
April 2014 — Two vendors selected based on site testing results: Dixon (Ionex SG), Willows (Ionex SG), and Salinas (Envirogen)

July 2014 — Drinking water standard for chromium-6 takes effect

March 2015 — Construction and site improvements commence

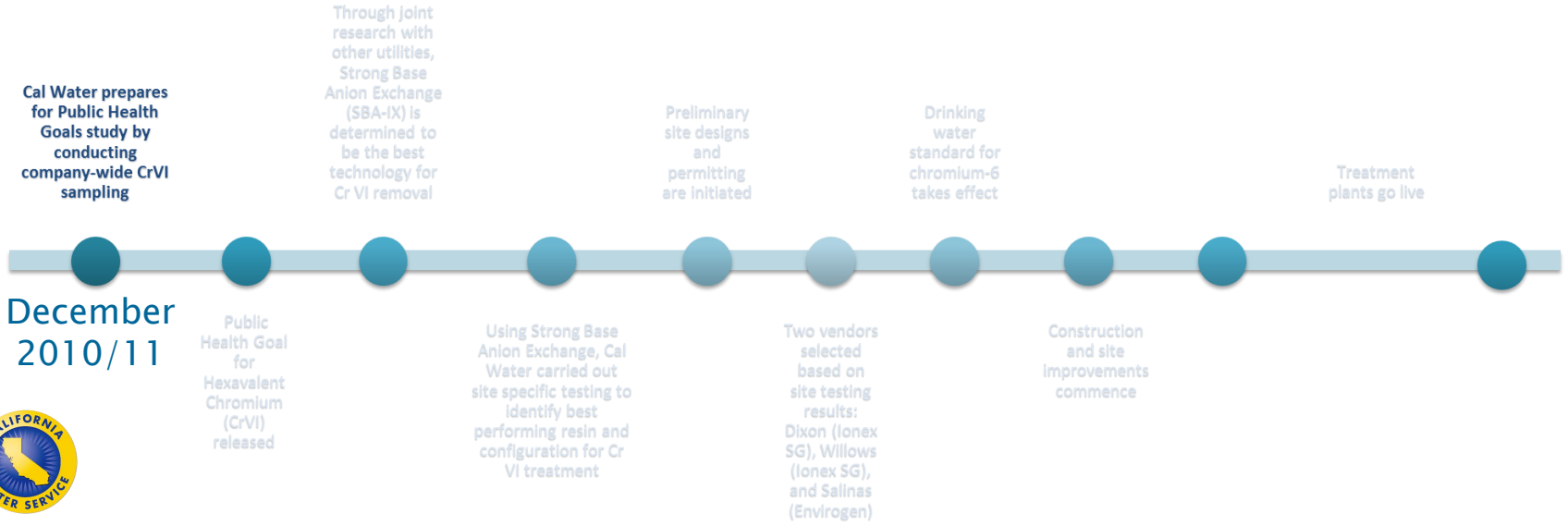
June 2015 — Treatment plants go live

December 2015



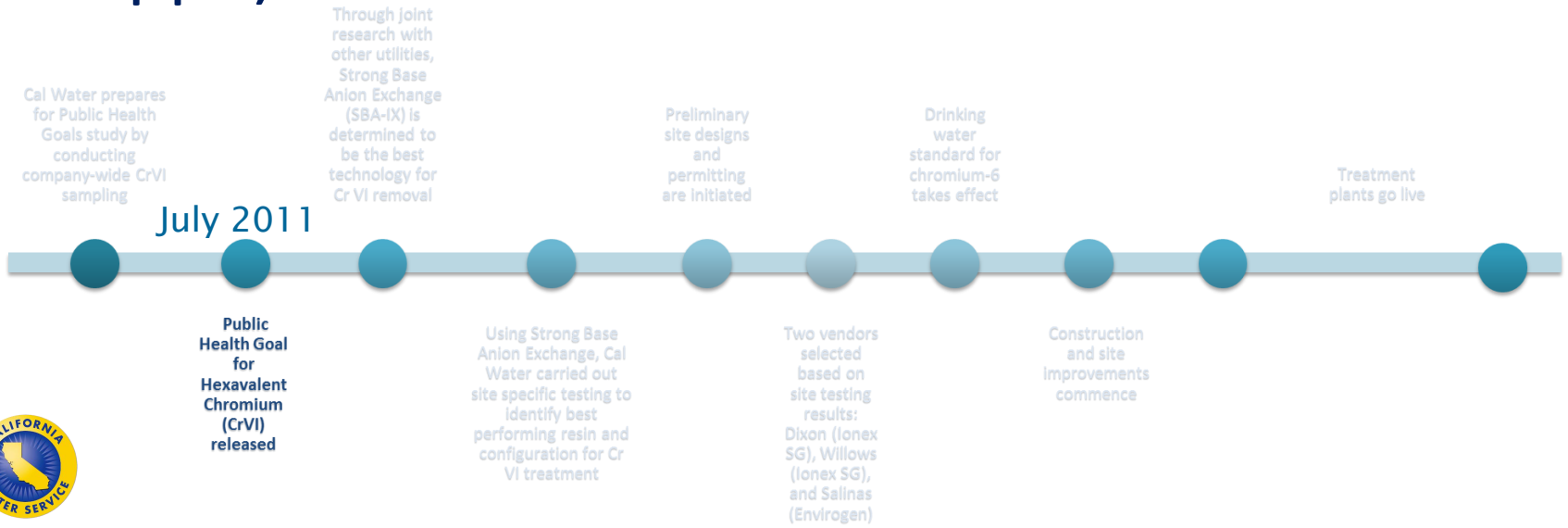
December 2010-2011

- In anticipation of the release of the Public Health Goal on Hexavalent Chromium, Cal Water sampled all sources company-wide to determine CrVI levels
- CrVI testing involved year-long sampling and data gathering
- Willows, Dixon, and Salinas were determined to be most impacted by the pending CrVI rule



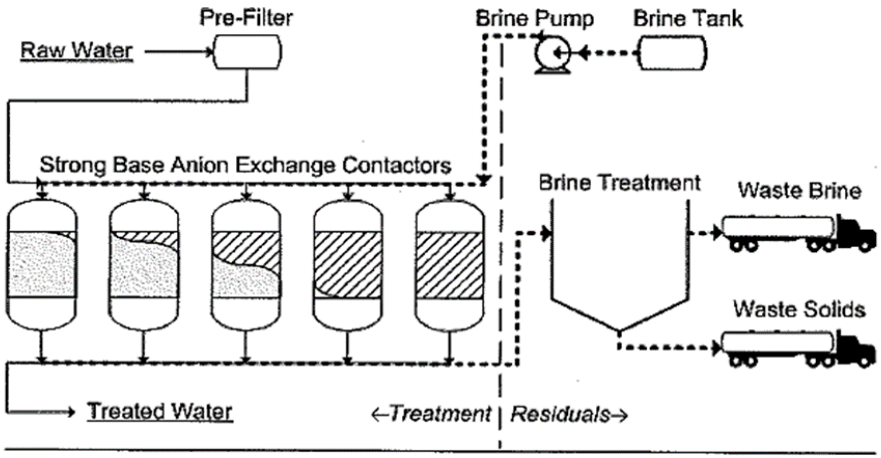
July 2011

- Public Health Goal (PHG) for Hexavalent Chromium was released by California's Office of Environmental Health Hazard Assessment (OEHHA) in July 2011 (0.02 ppb)



June 2013

- Cal Water partnered with other utilities and consultants through joint research efforts to find the best technology for CrVI treatment and disposal
- Strong Base Anion Exchange (SBA-IX) treatment was selected for impacted sites



Cal Water prepares for Public Health Goals study by conducting company-wide CrVI sampling

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June 2013

Using Strong Base Anion Exchange, Cal Water carried out site specific testing to identify best performing resin and configuration for Cr VI treatment

Preliminary site designs and permitting are initiated

Two vendors selected based on site testing results: Dixon (Ionex SG), Willows (Ionex SG), and Salinas (Envirogen)

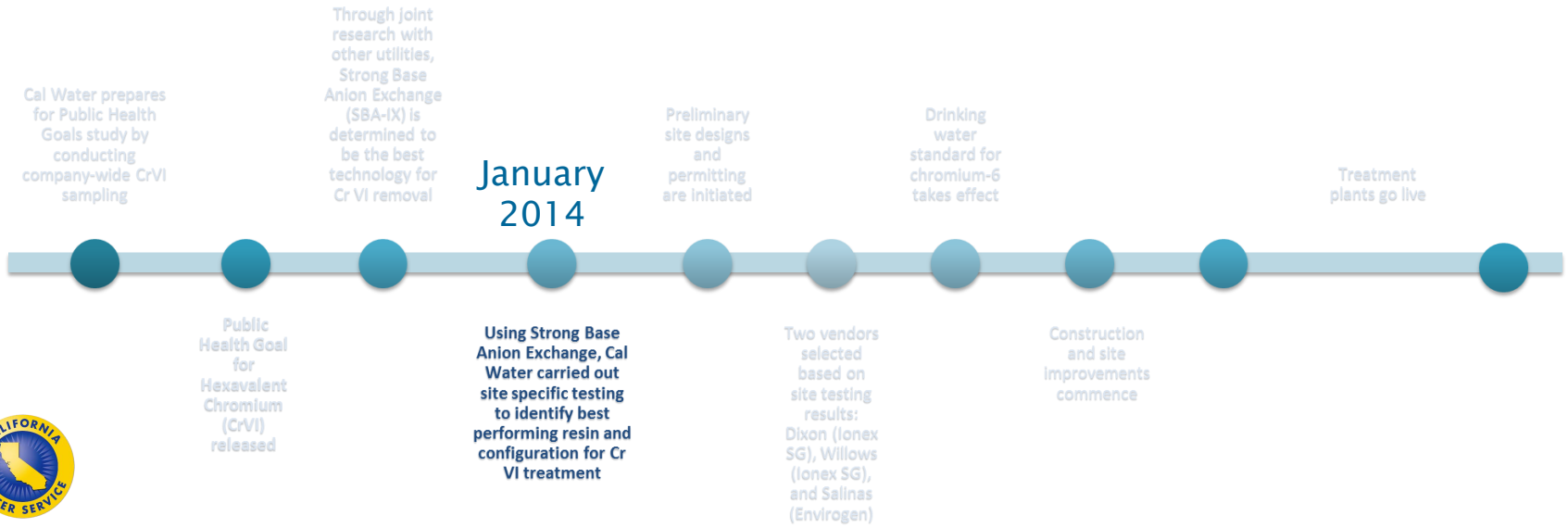
Drinking water standard for chromium-6 takes effect

Construction and site improvements commence

Treatment plants go live

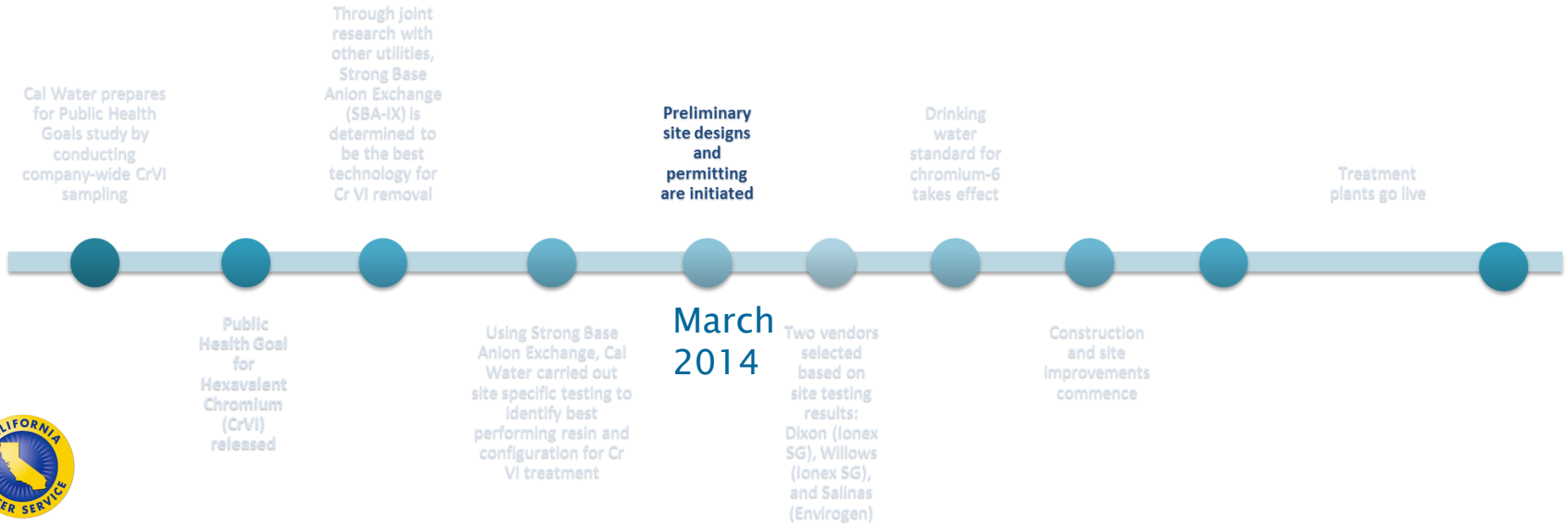
January 2014

- Site-specific testing utilizing Strong Base Anion Exchange was used to identify the best performing resin and the best configuration for CrVI treatment



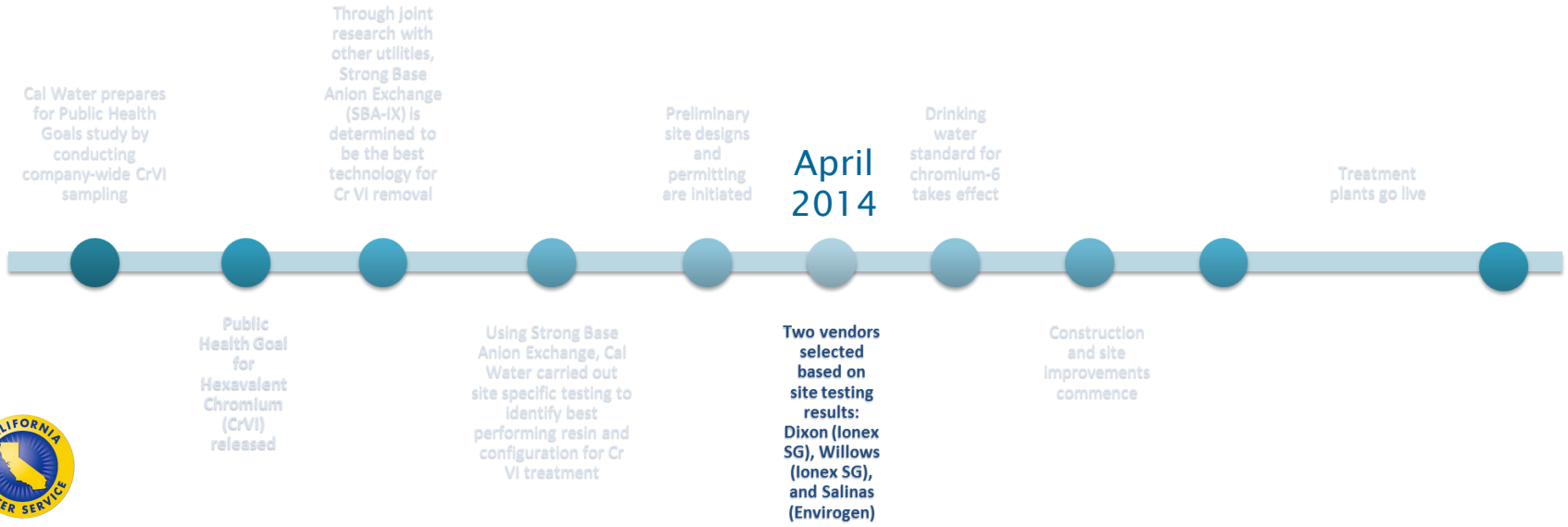
March 2014

- Preliminary site designs and permitting were initiated



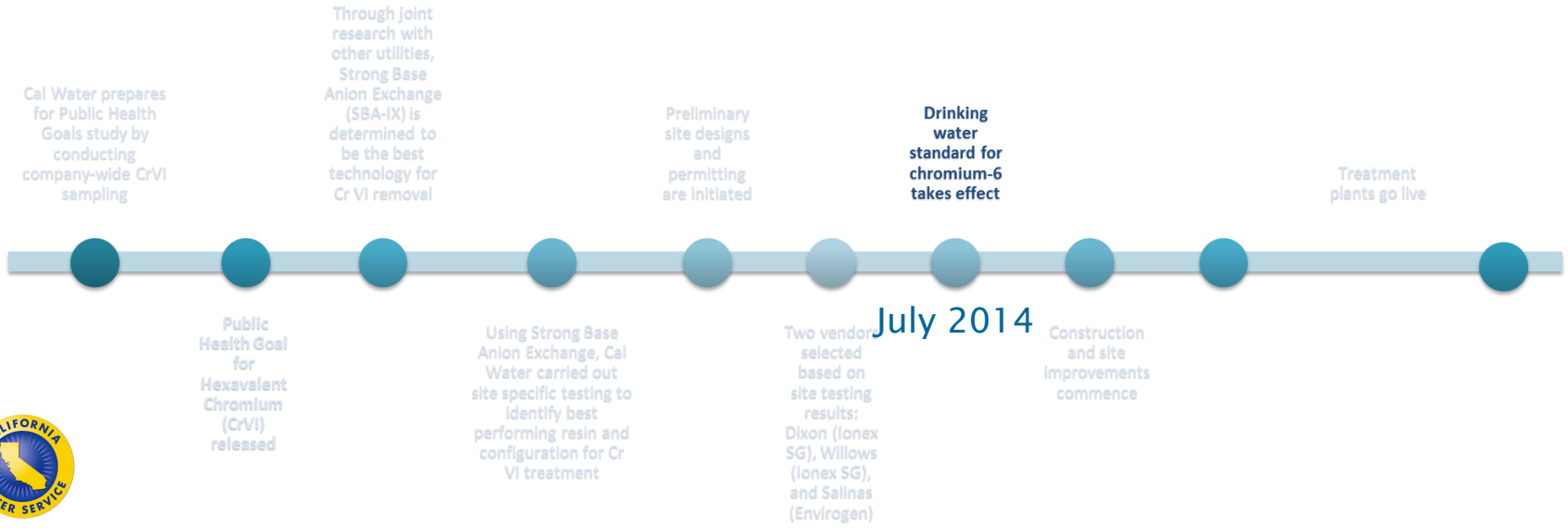
April 2014

- Equipment vendors Ionex and Envirogen were selected



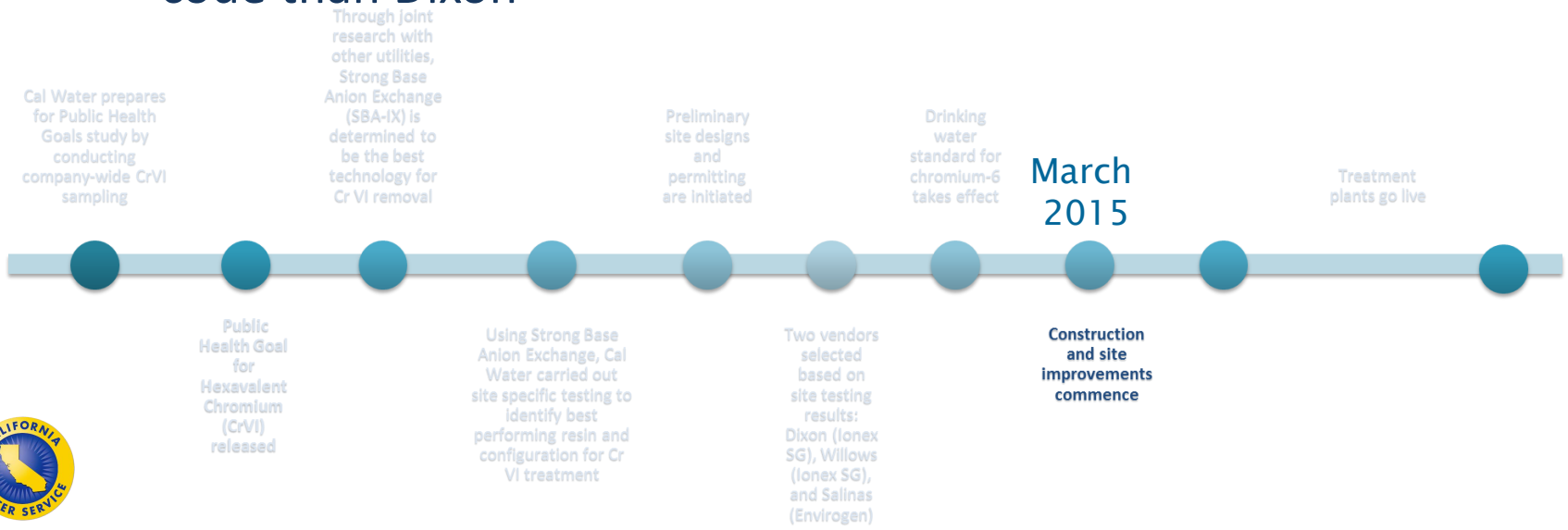
July 2014

- Drinking water standard for CrVI went into effect with up to 1 year compliance period, depending on CrVI levels



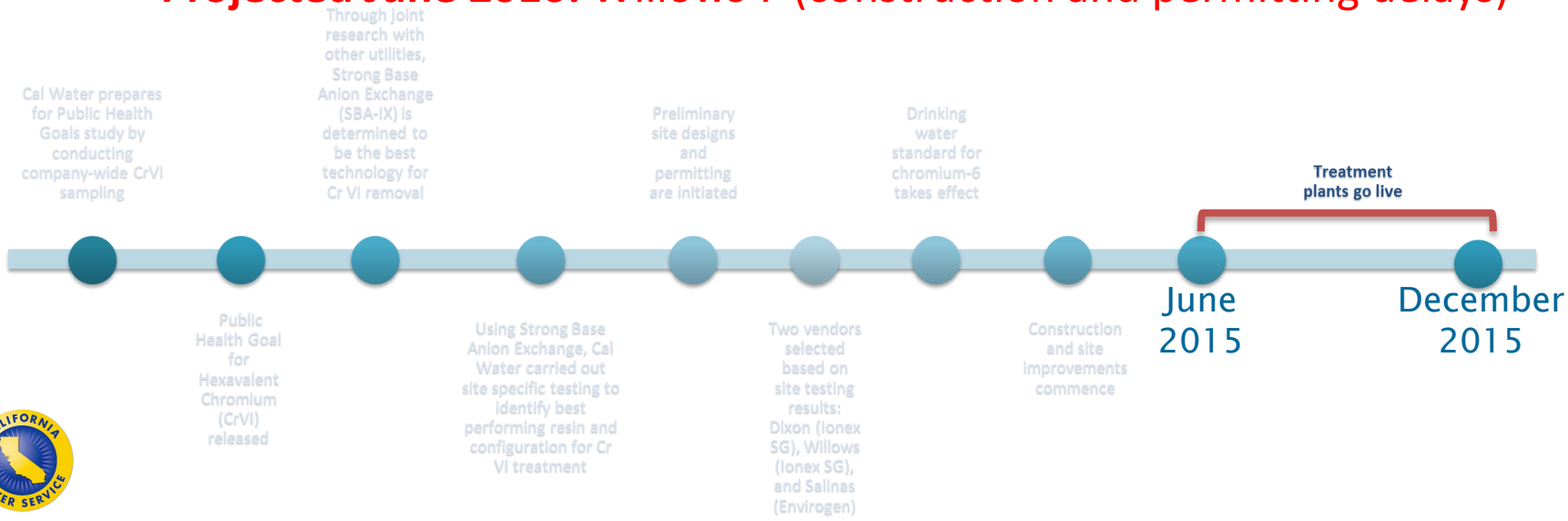
March 2015

- Construction and site improvements began
- Permitting challenges:
  - Dealing with structural foundation and fire code compliance that is at the discretion of the local permitting agency
  - City of Willows had more conservative interpretations of the code than Dixon



June-December 2015

- First treatment systems went live:
  - **June 2015:** Dixon 9 and Las Lomas 303
  - **August 2015:** Dixon 1
  - **September 2015:** Willows 9, Willows 4, Las Lomas 305
  - **October 2015:** Oak Hill 203
  - **December 2015:** Willows 8, Dixon 7
  - **Projected June 2016:** Willows 7 (construction and permitting delays)



Dixon Station 9 – Before & After

Dixon Station 9 Before Treatment

Dixon Station 9 After Treatment

Las Lomas Station 305 – Salinas

Existing Iron and Manganese Treatment Plant

- Las Lomas 305 had existing Fe/Mn treatment plant
- Piloting was conducted to determine of CrVI, Fe, and Mn could be removed using one existing system (**Reduction, Coagulation, Oxidation, Flocculation or RCOF)**

New vessels to increase the dosed chemical contact time

Cost Efficient Compliance

Tight Timeline

- Early recognition of impending rule and preemptively testing sources

Researched and developed ion exchange

- Participated with fellow water utilities to share knowledge and CrVI treatment technologies

Developed capital and O&M budget with consultant

- Continued researching current technologies (resin choice) to reduce waste disposal costs and waste generation
- Grant opportunities to offset capital need in Willows
- Corporate foresight, partnership mentality, and internal cooperation among Operations, Water Quality, Engineering, and Procurement that led to:
  - Complying on time
  - Beating budget estimate
  - Beating O&M estimate

Questions?