

Innovative Groundwater Management in the Mojave Desert – A Case Study NAWS China Lake

***25th Groundwater Resources Association of CA
Annual Meeting, September 28, 2016***

Richard Booth, PG, CHg
Senior Hydrogeologist, Lahontan Water Board (retired, sort of)

Kathy Monks, PG
Project Manager, Senior Hydrogeologist
Tetra Tech

Mike Stoner
Lead Geologist, Naval Air Weapons Station, China Lake, CA



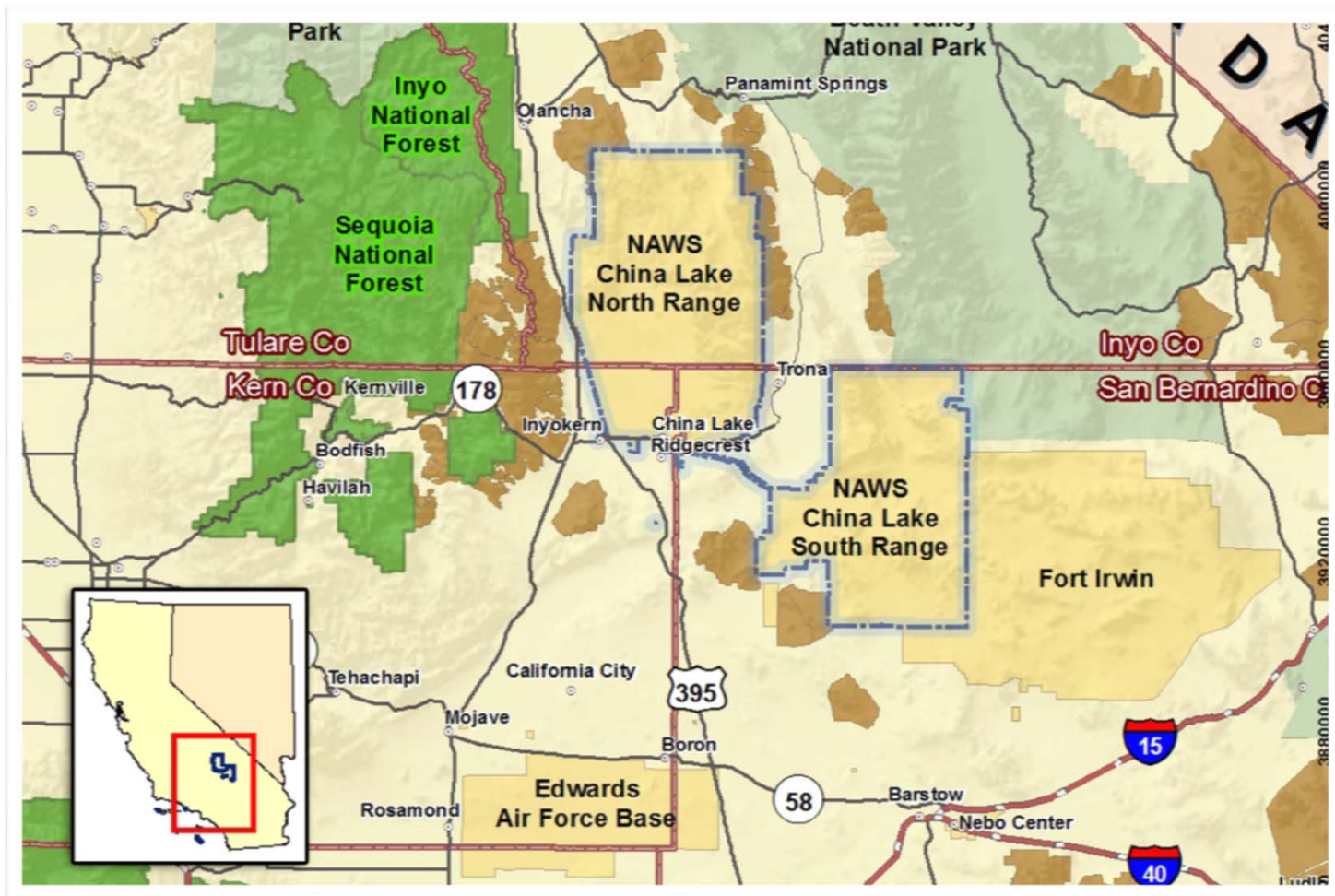
September 28, 2016

INTRODUCTION – TOPICS TO BE DISCUSSED



- **Naval Air Weapons Station (NAWS) China Lake Case Study**
 - ✓ Naturally degraded groundwater quality
 - ✓ Not economically feasible to treat
- **State Water Resources Control Board (SWRCB) Considerations**
- **Technical Justification – Hydrogeological Conceptual Site Model**
- **How to De-designate a Beneficial Use**
- **How to Apply Your Situation within SGMA**
 - GSAs
 - Partnering with the California Department of Water Resources (DWR) and stakeholders in the community
 - Possible De-designation Applications

NAWS CHINA LAKE – SITE LOCATION



NAWS CHINA LAKE – TOPOGRAPHIC FEATURES



STATE WATER RESOURCES CONTROL BOARD (SWRCB) CONSIDERATIONS



MUN use is defined in Chapter 2 of the Basin Plan as:

Municipal and Domestic Supply – “Beneficial uses of waters used for community, military, or individual water supply systems including, but not limited to, drinking water supply.”

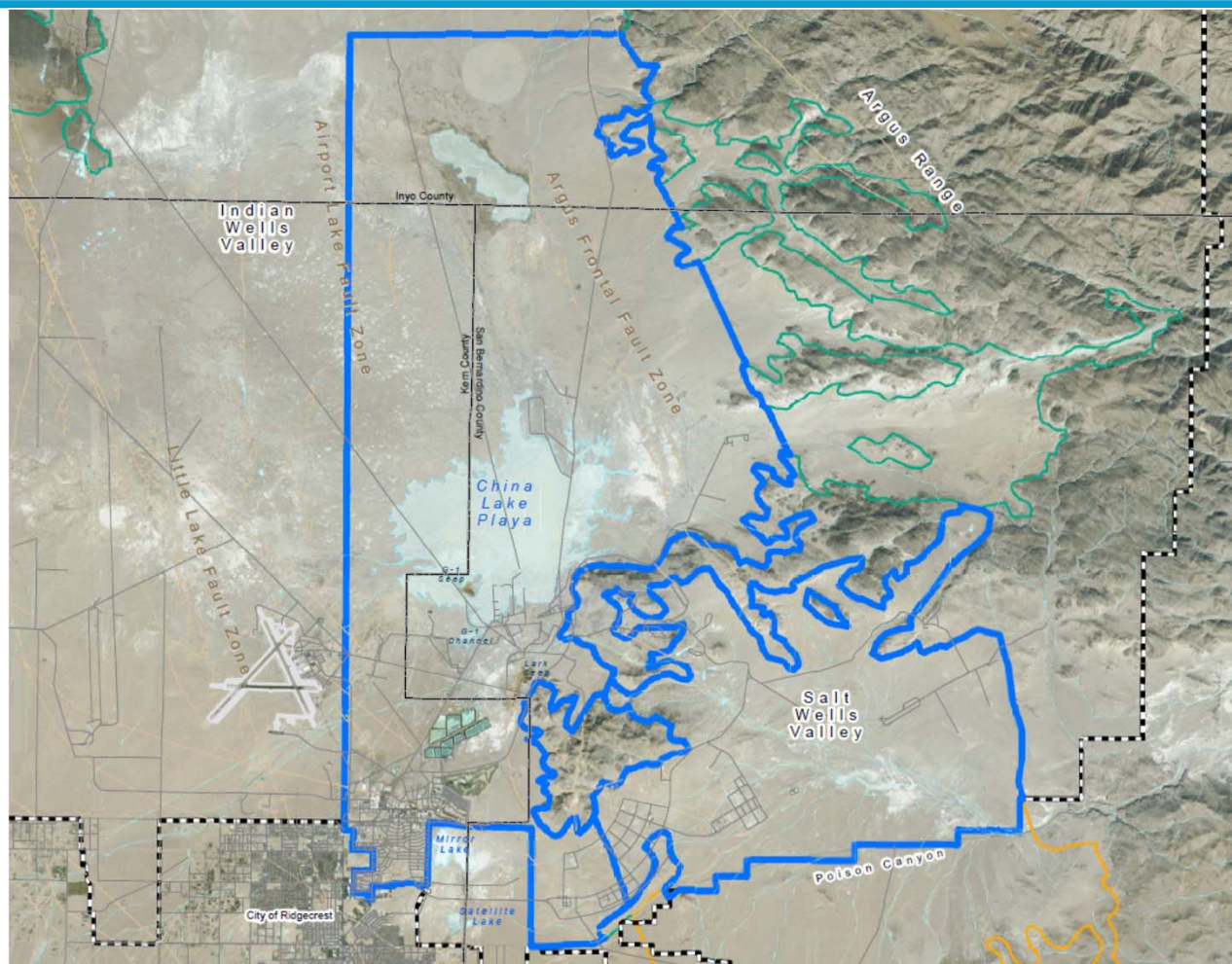
Exceptions to MUN under (SWRCB Resolution No. 88-63) include:

- Groundwater bodies with total dissolved solids (TDS) concentrations exceeding 3,000 milligrams per liter (mg/L), or
- Naturally occurring contaminants at concentrations not conducive to treatment, or
- If the groundwater source cannot provide sufficient water to supply a single well capable of producing an average yield of 200 gallons per day

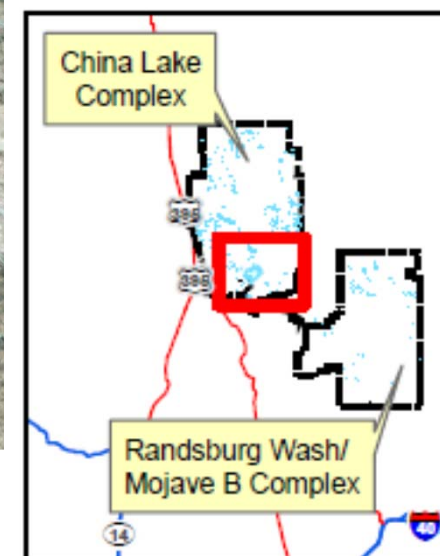


1. How to determine where to draw the boundaries of the de-designation area.
2. Are the boundaries stable, that is, will they change over time?
3. Can the groundwater quality be economically and technically treated to drinking water standards now or in the foreseeable future?

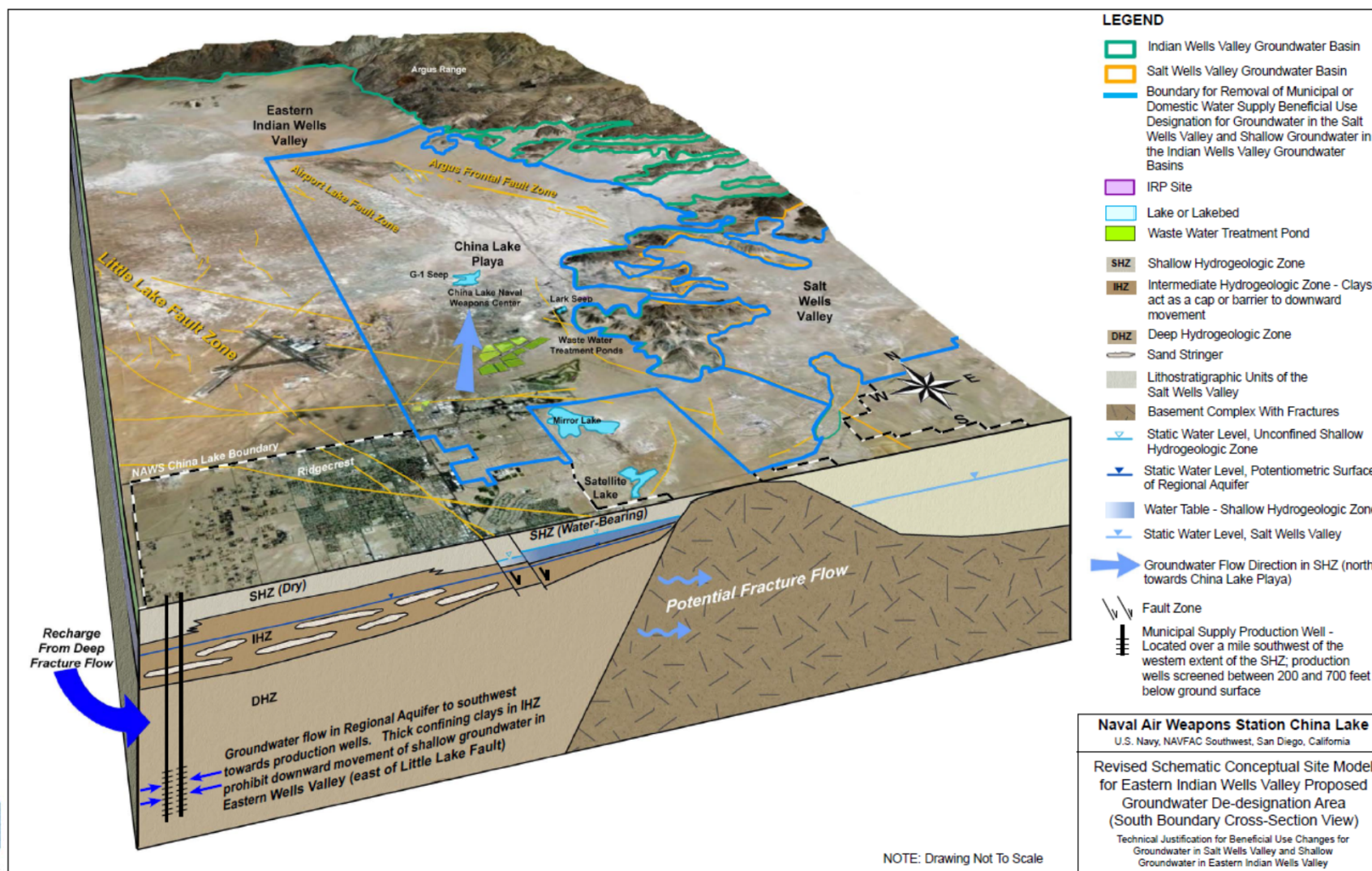
DE-DESIGNATION AREA DELINEATED BY BASIN PLAN AMENDMENT



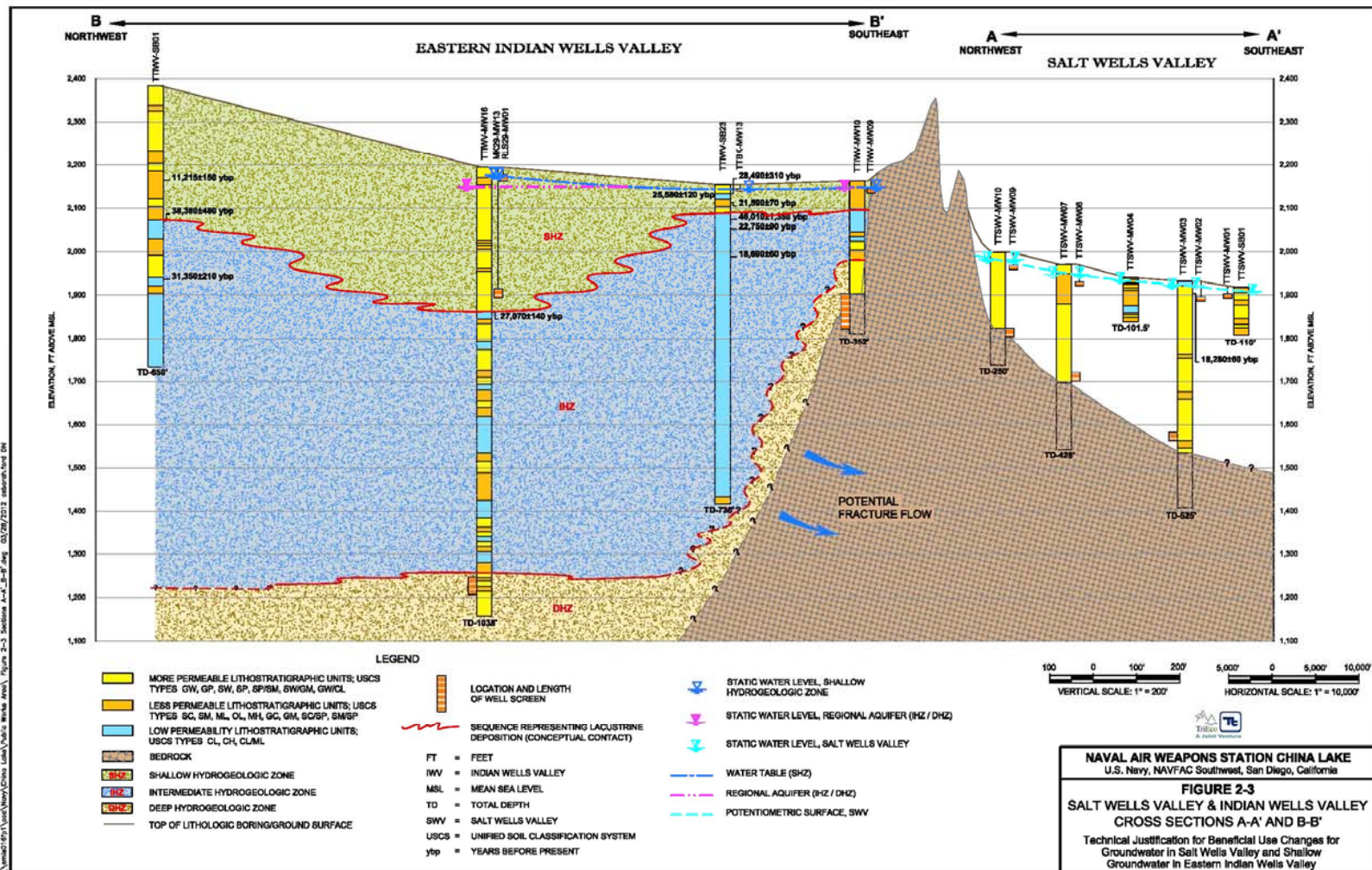
- Boundary for Removal of Municipal or Domestic Water Supply Beneficial Use Designation for Groundwater in the Salt Wells Valley and Shallow Groundwater in the Indian Wells Valley Groundwater Basins
- Indian Wells Valley Groundwater Basin
- Salt Wells Valley Groundwater Basin
- Lake or Lakebed
- Treatment Pond
- Fault, Located or Inferred
- Intermittent or Dry Drainage
- Light duty road
- Runway
- Naval Air Weapons Station (NAWS) China Lake Boundary



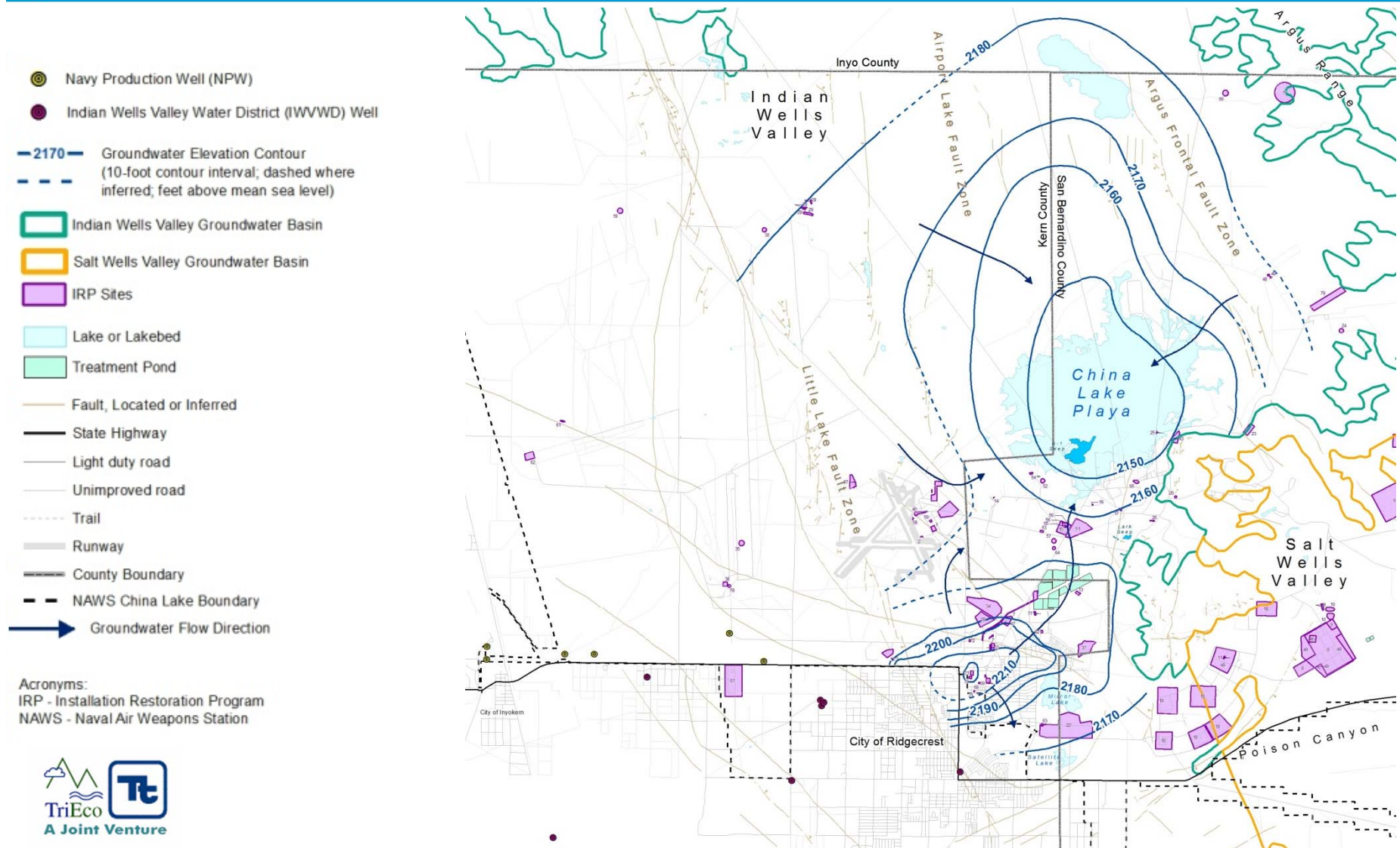
HYDROGEOLOGICAL CONCEPTUAL SITE MODEL



NORTHWEST-SOUTHEAST CROSS-SECTION SHOWING INDIAN WELLS VALLEY AND SALT WELLS VALLEY



SHALLOW HYDROGEOLOGIC ZONE WATER TABLE CONTOUR MAP FOR EASTERN INDIAN WELLS VALLEY



ECONOMIC CONSIDERATIONS – WATER TREATABILITY ANALYSIS



- Treatability analysis results**

TABLE 1: COMPARISON OF DRINKING WATER ALTERNATIVES – INDIAN WELLS VALLEY
NAWS China Lake, California

Alternative	Effectiveness	Implementability	Minimum Estimated Cost (\$ per year)
POU/POE RO	Effective for all primary constituents. Meets all MCLs. Effectiveness is tempered by a byproduct of waste brine.	Not implementable. Relatively complex to install and maintain for typical homeowner. For existing construction, retrofitting may prove difficult. If owner is not vigilant, lapses in treatment effectiveness can have health effects. Waste brine can only be hauled to a Class I landfill facility as a liquid or solid industrial waste.	\$555 ¹
Source Blending	Effective if enough source water of higher quality is blended with water of poor quality. For the IWV study area, some groundwater is degraded enough to render this alternative ineffective. May not meet all MCLs, depending on available sources.	Prohibitive if another, higher quality source is not relatively close. Careful water quality monitoring is required to ensure blended drinking water meets MCLs. Negative health effects possible. Availability of an alternative, higher quality source may negate need to blend and abandonment of lower quality source.	NA
Bulk Water Hauling	Effective. This method avoids beneficial use of groundwater as municipal or domestic supply. Water supply meets all MCLs.	Contract trucking and delivery is very implementable. Associated tank, feed pump, pressure tank, and piping may be more difficult to site and install.	\$4,270
Public Water System	Effective. This method avoids beneficial use of groundwater as municipal or domestic supply. Water supply meets all MCLs.	Easy implementation at boundary of service areas of existing public water systems, although additional piping would be necessary to extend the service area. At all other areas within the study area, connection to the nearest public water system would be prohibitive.	\$460

Notes:

IWV Indian Wells Valley
MCL Maximum contaminant level
NA Not applicable

POE Point of entry treatment (typically a whole-house filter)
POU Point of use treatment (typically an under-sink filter)
RO Reverse osmosis

- Indian Wells Valley Water District Pilot Study – concluded total project cost for a treatment system to produce 3,000 acre-feet per year is \$46 million and operation and maintenance cost would be \$3 million/year**



TECHNICAL JUSTIFICATION FOR GROUNDWATER EXEMPTION IN EASTERN INDIAN WELLS VALLEY



- **TDS concentrations as high as 56,000 mg/L; mean concentration of 3,118 mg/L exceeds the 3,000 mg/L criterion, based on a data set of 167 samples.**
- **Naturally occurring arsenic concentrations as high as 1,190 µg/L; mean concentration of 230 µg/L (MCL is 10 µg/L).**
- **Average concentrations of chloride, sulfate, and manganese all exceed the respective secondary MCLs.**

REGULATORY STEPS TO DE-DESIGNATE TO AMEND THE WATER BOARD BASIN PLAN



The Regional Water Board:

1. Identifies the need (e.g., a request from a GSA)
2. Performs a Scoping Meeting
3. Prepares a staff report, including
 - CEQA checklist
 - Technical Justification
4. Publishes a Hearing Notice for comments
5. Responds to comments and revises amendment, if necessary
6. Holds an Adoption Hearing (and approves the amendment)
7. Regional Water Board approves the amendment with a resolution

The State Water Board hears the item at their Board meeting (and approves)

The Regional Water Board receives approval from Office of Administrative Law and files with various agencies

You are done.



SCOPING AND COMMUNITY INVOLVEMENT



- No public comments in opposition
- Comments in favor of MUN de-designation
 - Indian Wells Valley Cooperative Groundwater Group
 - Indian Wells Valley Water District
 - China Lake Restoration Advisory Board (RAB)
- Modifications in originally proposed de-designation boundary based on input from
 - China Lake RAB – delete corridor between China Lake Complex and Randsburg Wash/Mojave B Complex
 - Victorville Lahontan Regional Water Quality Control Board personnel – exclude area in the vicinity of Mirror Lake and Satellite Lake and canyon areas between the Indian Wells and Salt Wells Valley basins from de-designation

OTHER DE-DESIGNATION OF BENEFICIAL USES



- **Other Examples**

- ✓ **Entire Searles Valley groundwater basin, also in the Lahontan Region**
- ✓ **Groundwater beneath Royal King Mine in Central Valley Region**
- ✓ **Tulare Lake groundwater basin, also in Central Valley Region**



APPLICATIONS FOR DE-DESIGNATION OF BENEFICIAL USES



Groundwater quality impaired by:

- Oil and gas fracking
- Oil & gas wastewater disposal
- Seawater intrusion
- Salt & nutrients from legacy agriculture
- Others?



PROCESSES FOR DE-DESIGNATION OF BENEFICIAL USES



Water Board de-designation process
in conjunction with
Department of Water Resources:

- Sub-basin delineation
- SGMA Management Area

QUESTIONS....



Contact Information:

Rich Booth
rbooth1334@gmail.com
(530) 525-2042

Kathy Monks
kathy.monks@tetrattech.com
(530) 470-0498

Mike Stoner
caseyr5@verizon.net
(760) 384-8792

