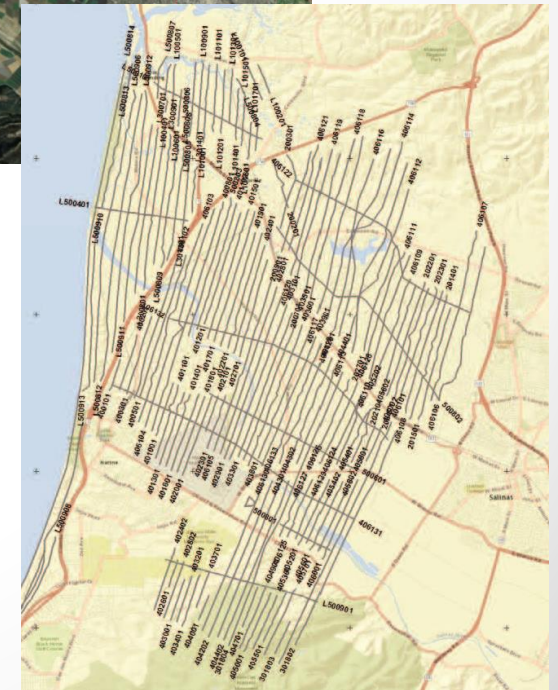
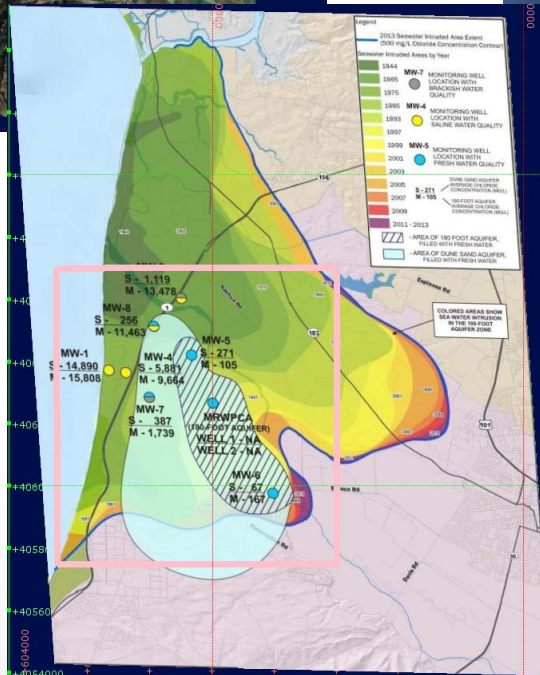


# **MARINA COAST WATER DISTRICT**

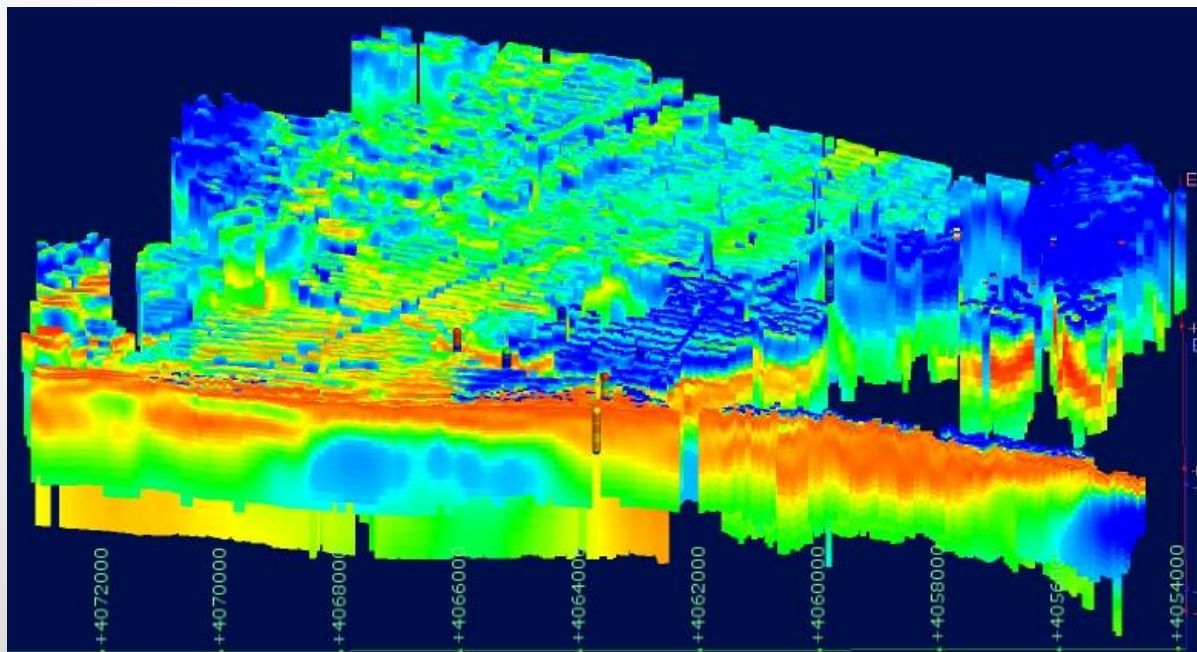
**BOARD OF DIRECTORS MEETING  
AUGUST 7, 2017**

# AEM STUDY AREA

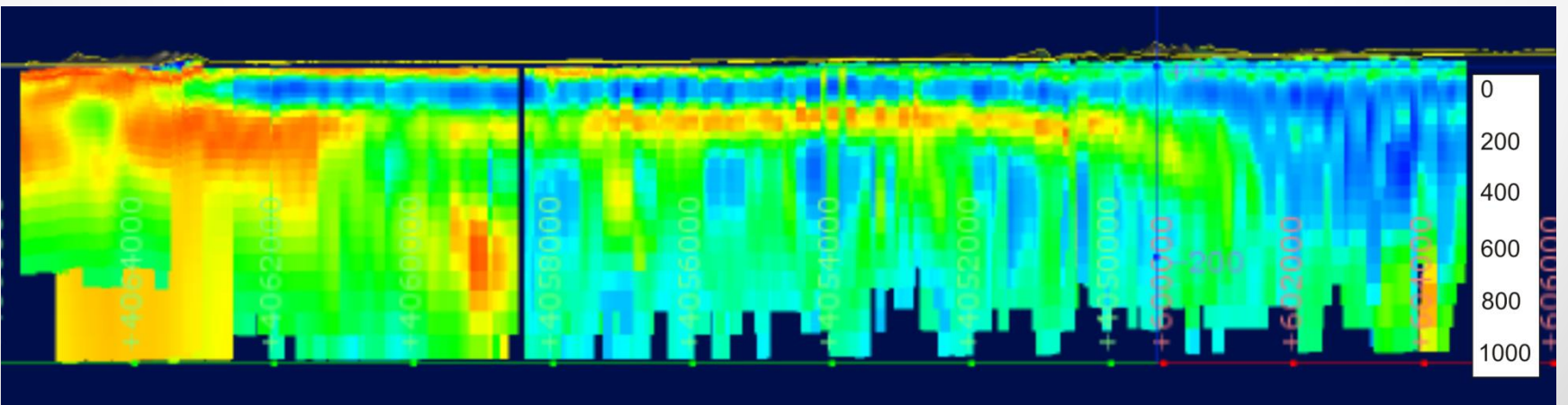
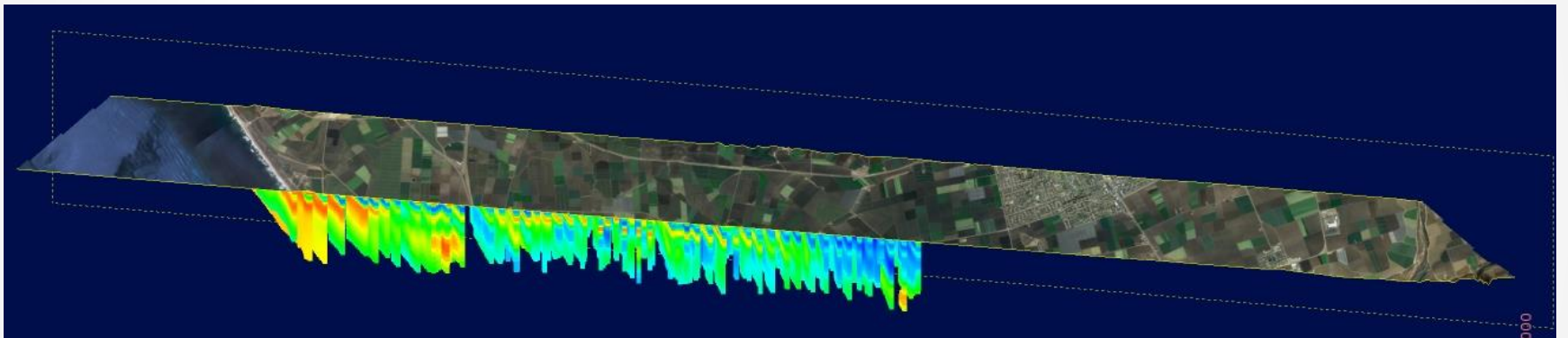




WAS THE  
AEM  
SURVEY  
A SUCCESS?



# PROFILE SELECTION



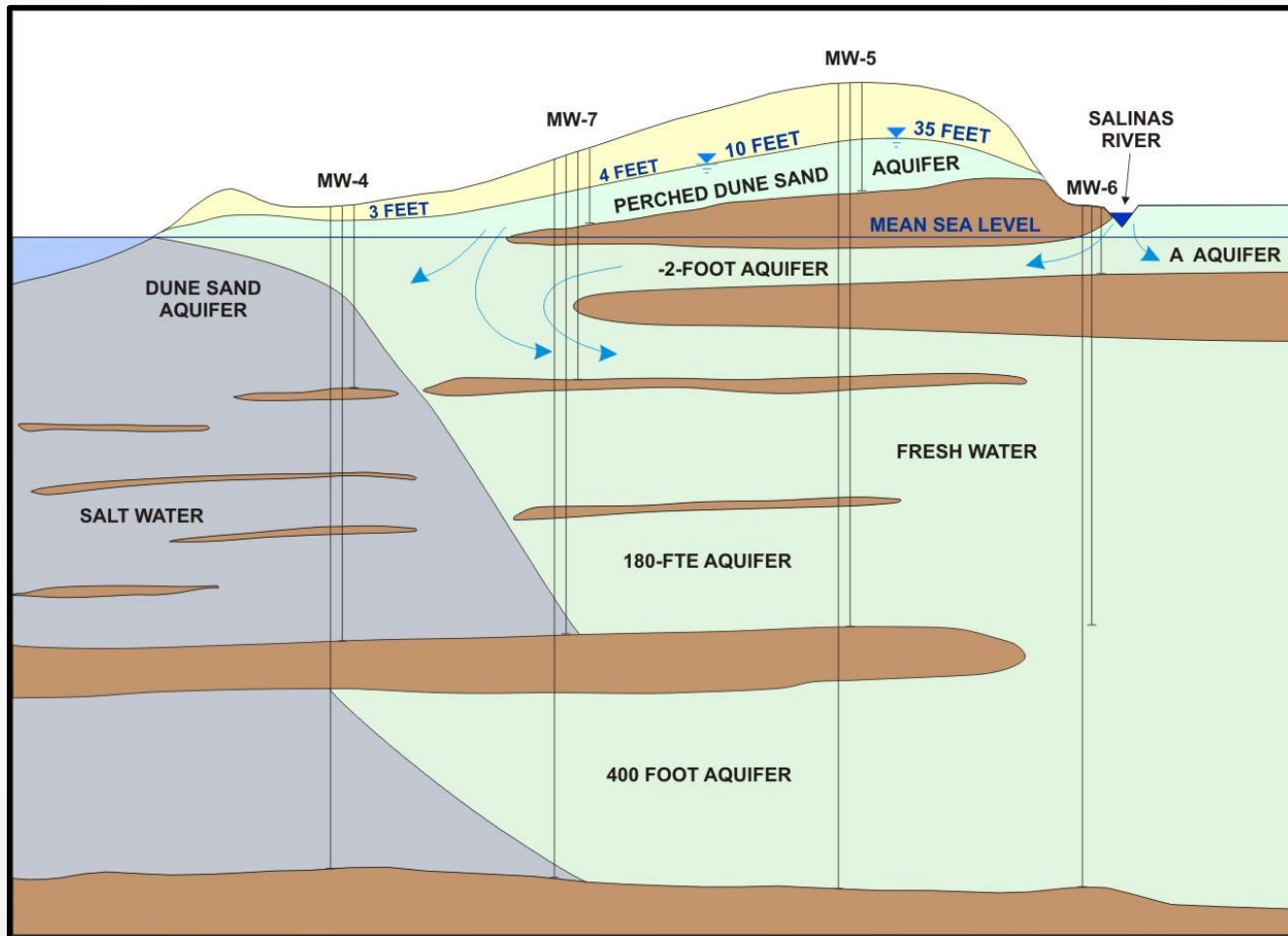
# FUTURE USES OF AEM DATA

- **GROUNDWATER BASIN MANAGEMENT AND FUTURE AREAS OF STUDY INCLUDING APPARENT AREAS OF SEAWATER INTRUSION PREVIOUSLY UNIDENTIFIED AND LOCATING MONITORING WELL NETWORKS**
- **INTAKE LOCATIONS FOR SALINE GROUNDWATER OR BRACKISH GROUNDWATER PRODUCTION PROJECTS**
- **HYDROGEOLOGIC FRAMEWORK FOR GROUNDWATER MODEL CONSTRUCTION**
- **LOCATION OF GROUNDWATER RECHARGE PROJECTS INCLUDING SURFACE SPREADING OR ASR**
- **MUNICIPAL SUPPLY WELL LOCATIONS AND TARGET DEPTHS**

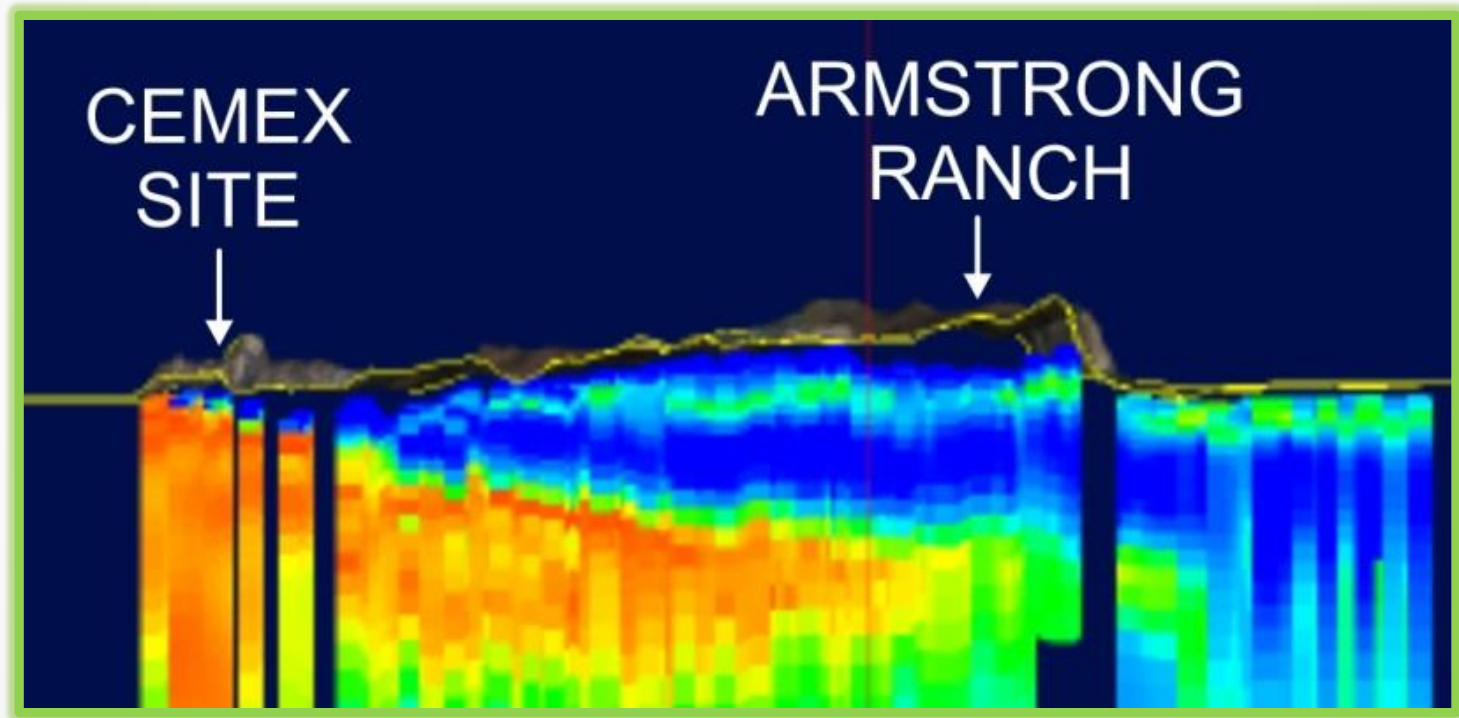




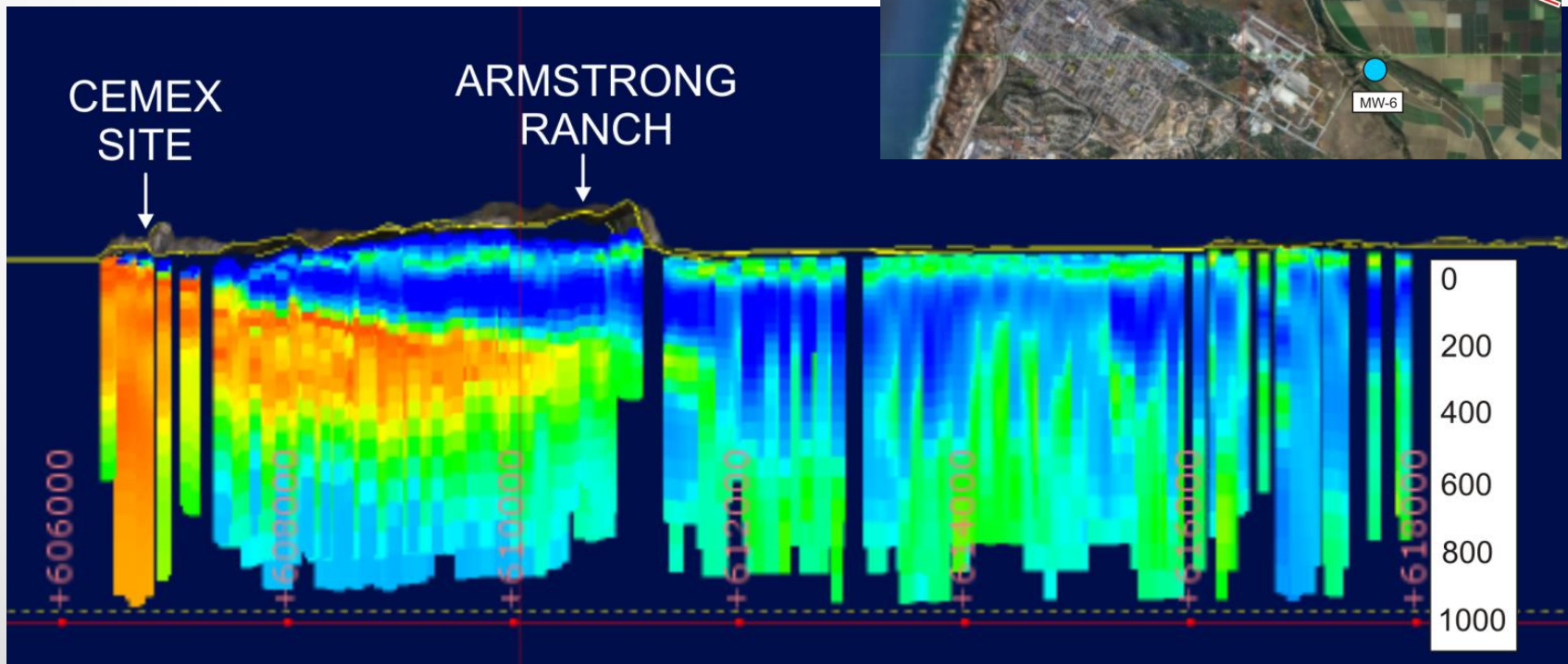
# CONCEPTUAL INTERPRETATION OF MPWSP TEST SLANT WELL DATA



# AEM DATA

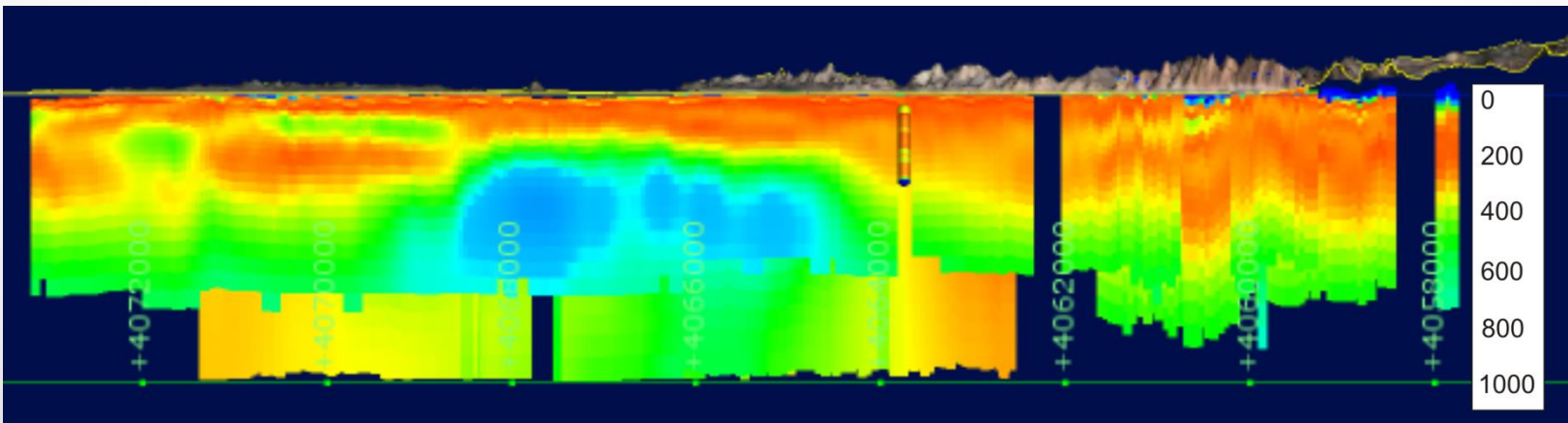


# PROFILE PERPENDICULAR TO COASTLINE DS – 180-FTE CONNECTIVITY

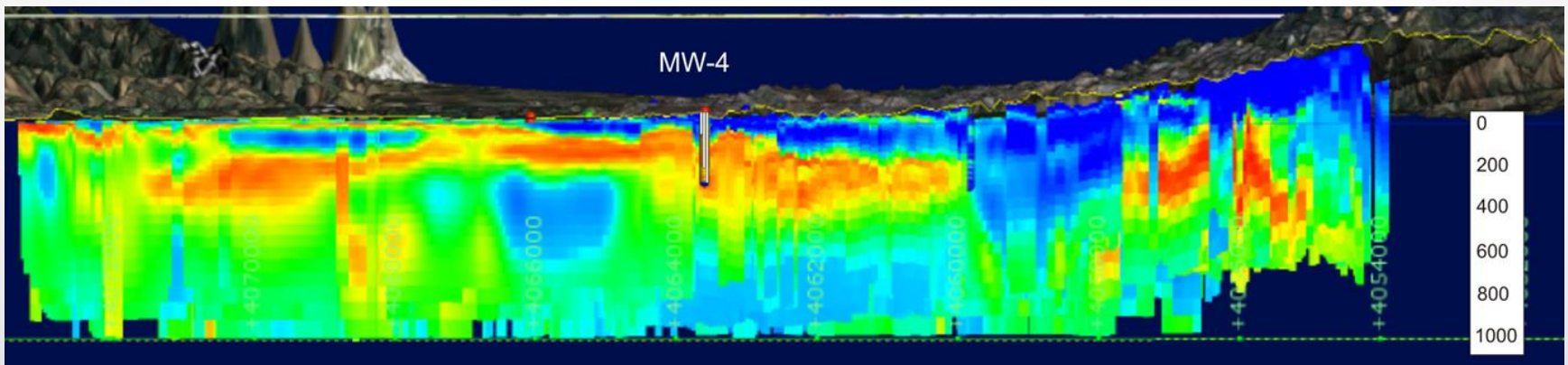




# PROFILE PARALLEL TO COASTLINE ON THE BEACH

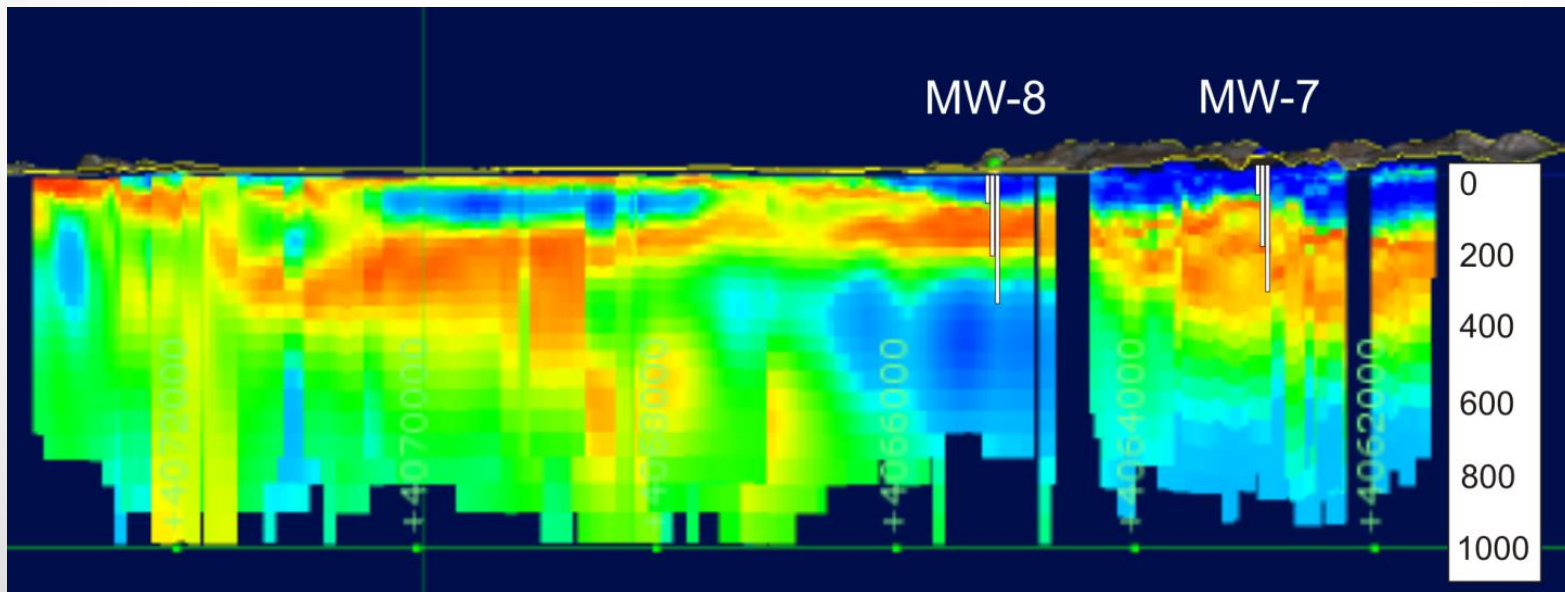


# PROFILE PARALLEL TO COASTLINE BEHIND THE ACTIVE DUNES





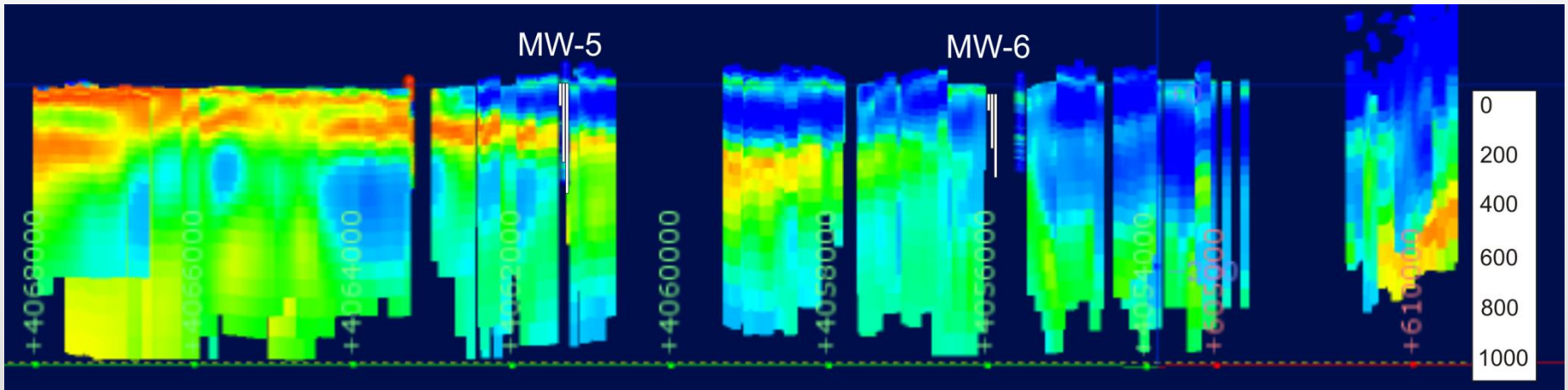
# PROFILE THROUGH MONITORING WELLS MW-7 & MW-8

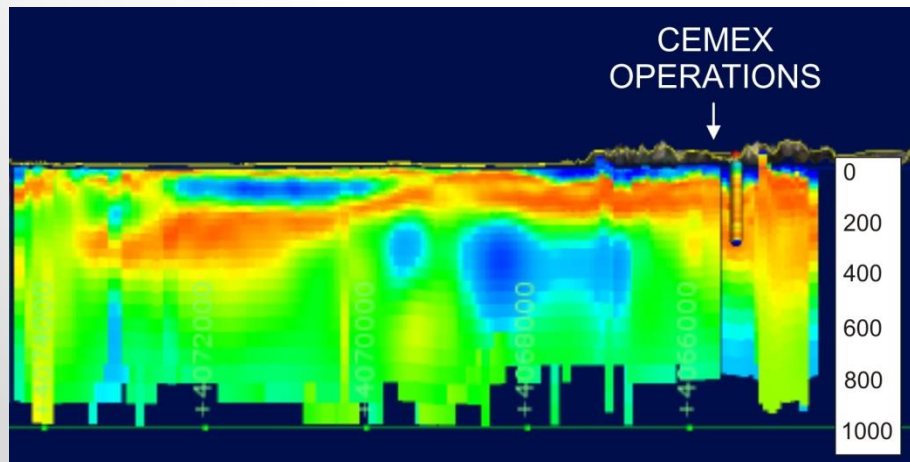
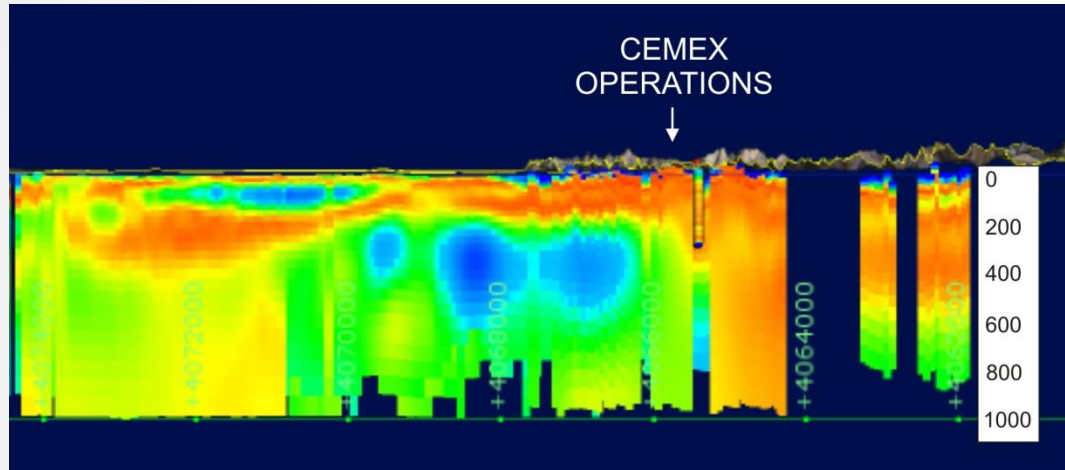
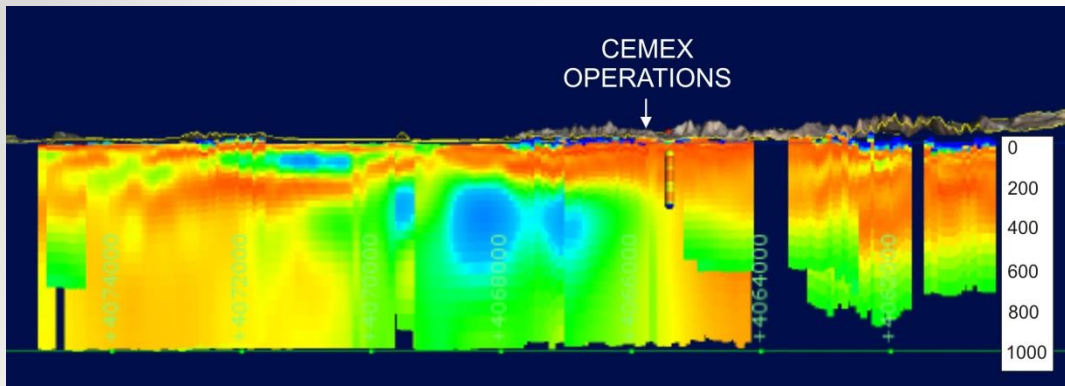




# PROFILE THROUGH MONITORING WELLS

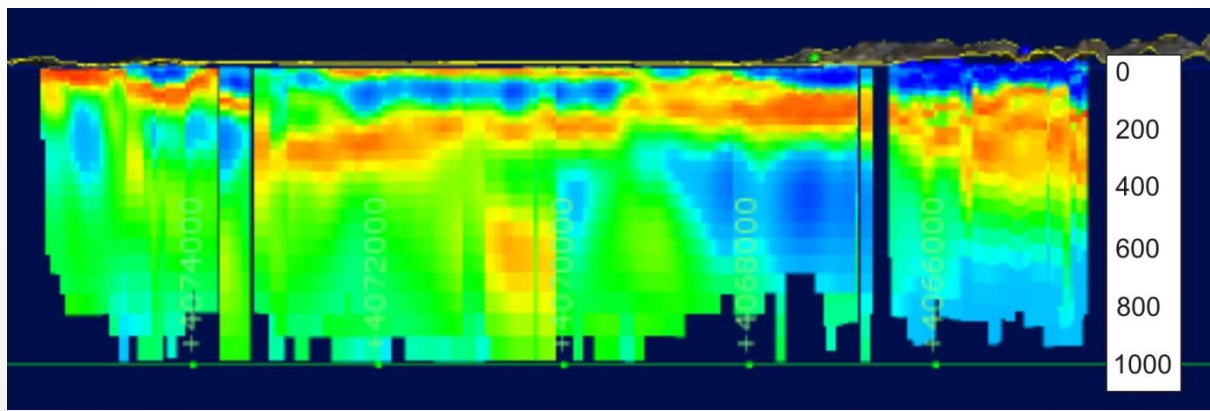
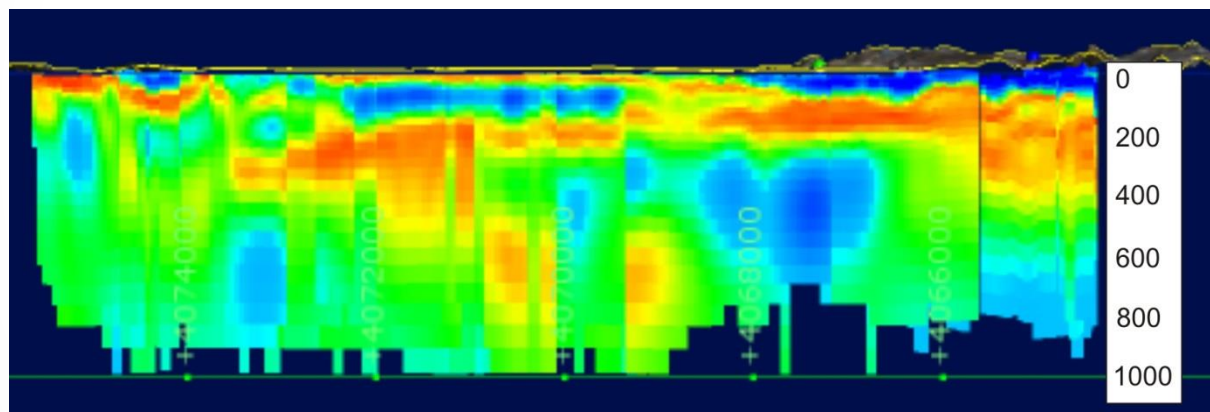
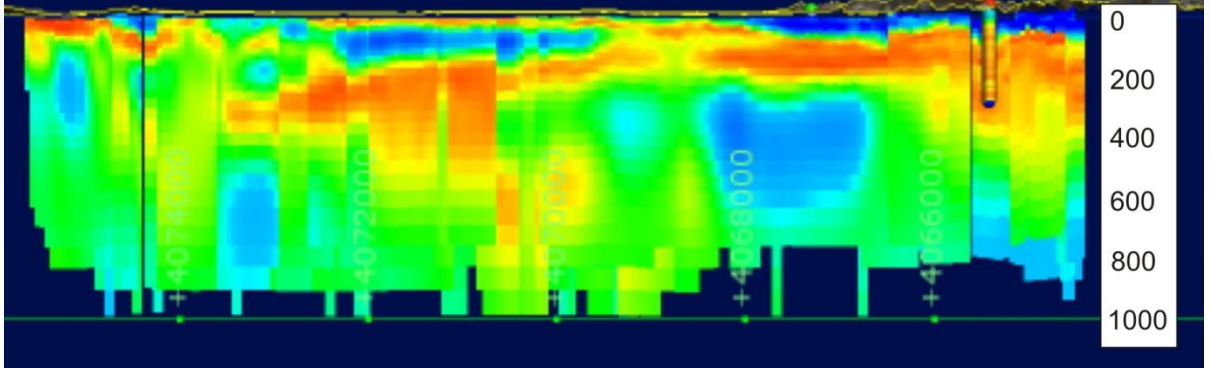
## MW-5 & MW-6





PROFILES  
AWAY FROM  
COASTLINE  
IN 200-FOOT  
INCREMENTS

# CEMEX OPERATIONS

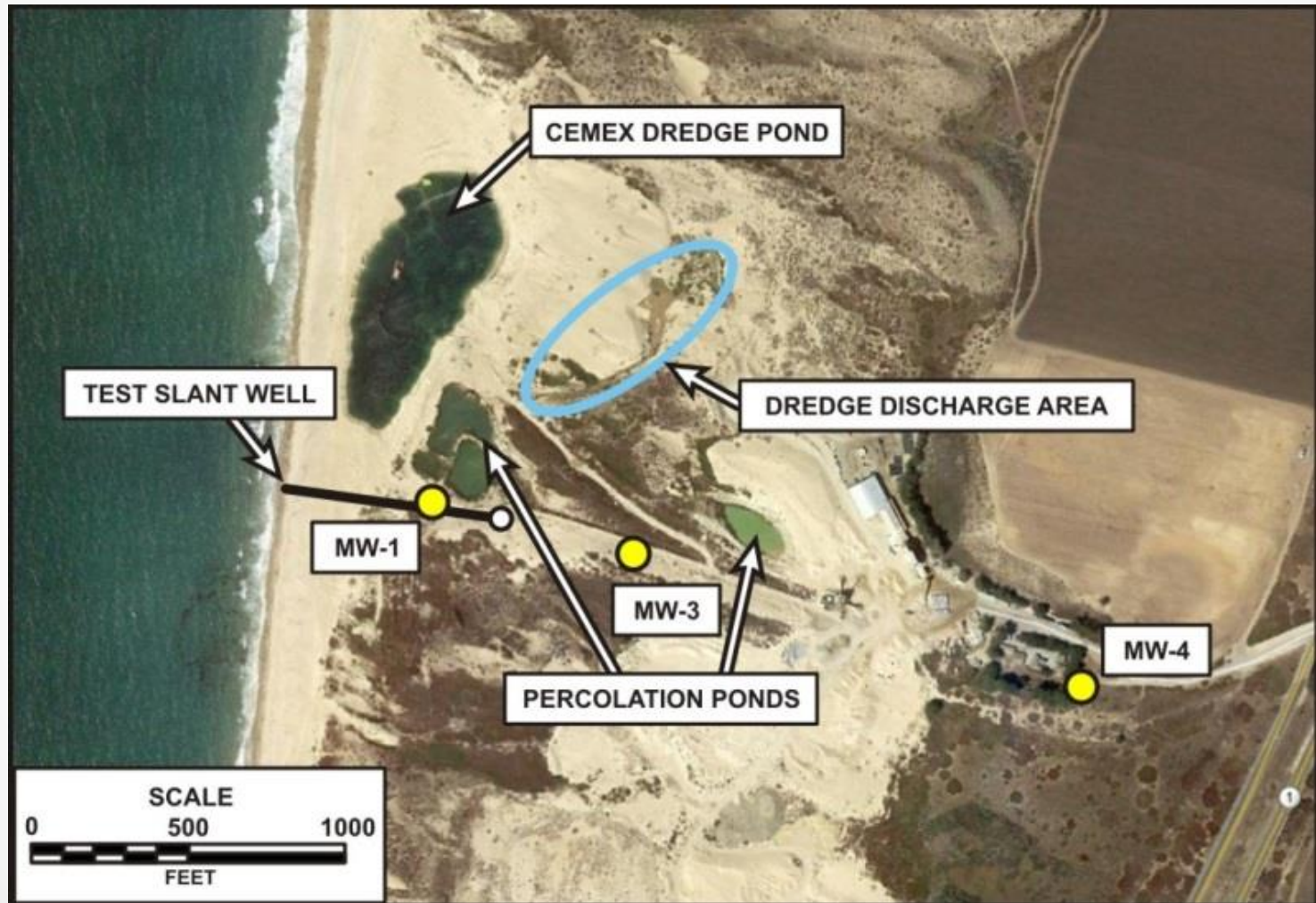




# AEM DATA IMPLICATION FOR MPWSP ISSUES

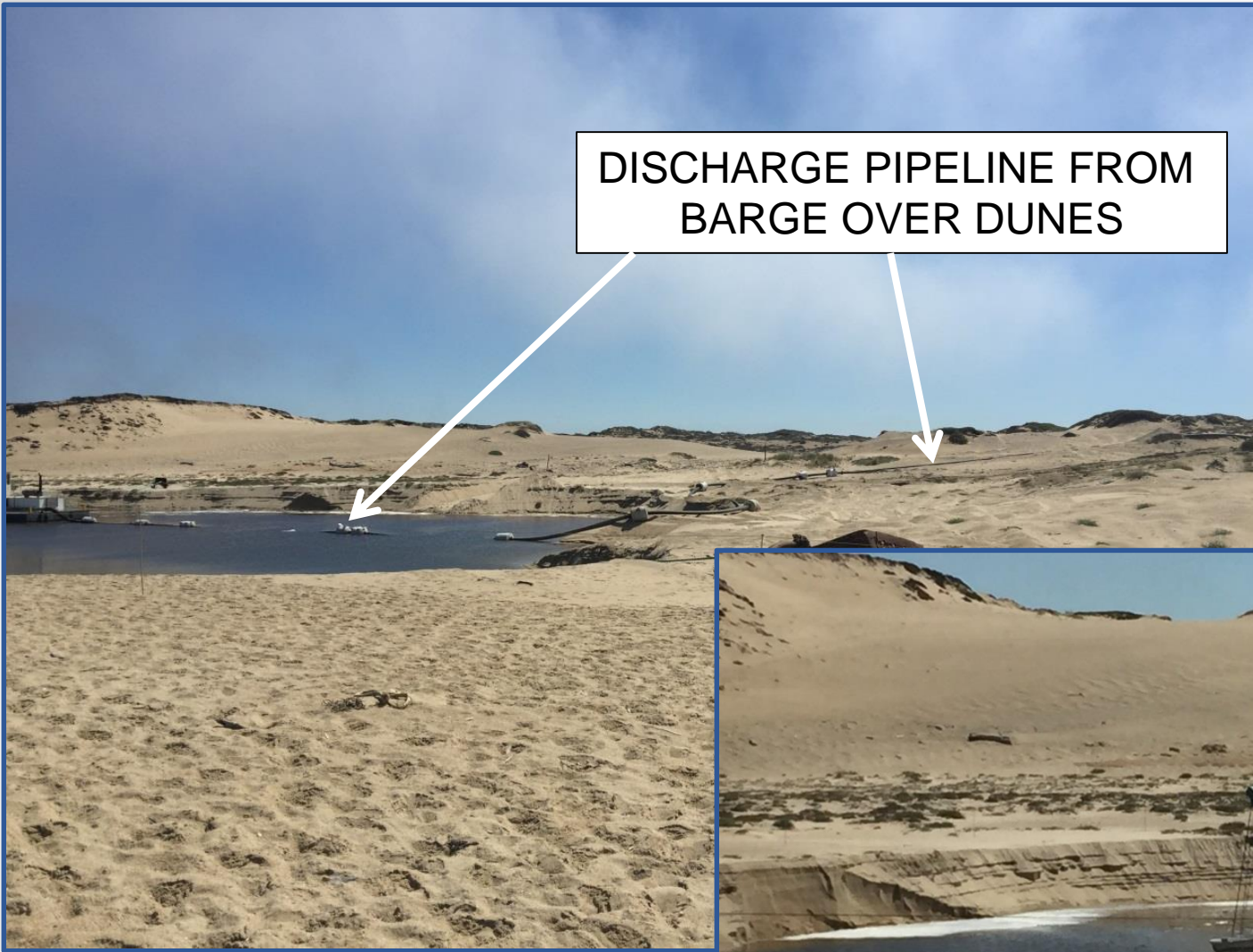
- CEMEX HAS A LOCAL INFLUENCE ON GROUNDWATER BY RECHARGING SEAWATER AT THE SURFACE FROM DREDGE MINING OPERATIONS AND WASH WATER PONDS
- FRESH GROUNDWATER EXISTS IN THE DUNE SAND AQUIFER AND UPPER 180-FOOT AQUIFER AS WE MOVE AWAY FROM CEMEX SITE BOTH INLAND AND ALONG THE COAST AND SEAWATER INTRUSION IS NOT UBIQUITOUS IN ALL ZONES ONLY IN VERY NARROW COASTAL MARGIN
- THESE FINDINGS INDICATE A GREATER AMOUNT OF FRESHWATER WILL BE PRODUCED THAN IS ESTIMATED BASED ON BIASED TEST SLANT WELL WATER QUALITY DATA
- 400-FOOT AQUIFER IS THE MOST INTRUDED ZONE IN THE VICINITY OF THE CEMEX SITE
- MODEL CONSTRUCTION INADEQUATE SOUTH OF RIVER

# SALINE GROUNDWATER RECHARGE FROM CEMEX PLANT OPERATIONS





DISCHARGE PIPELINE FROM  
BARGE OVER DUNES



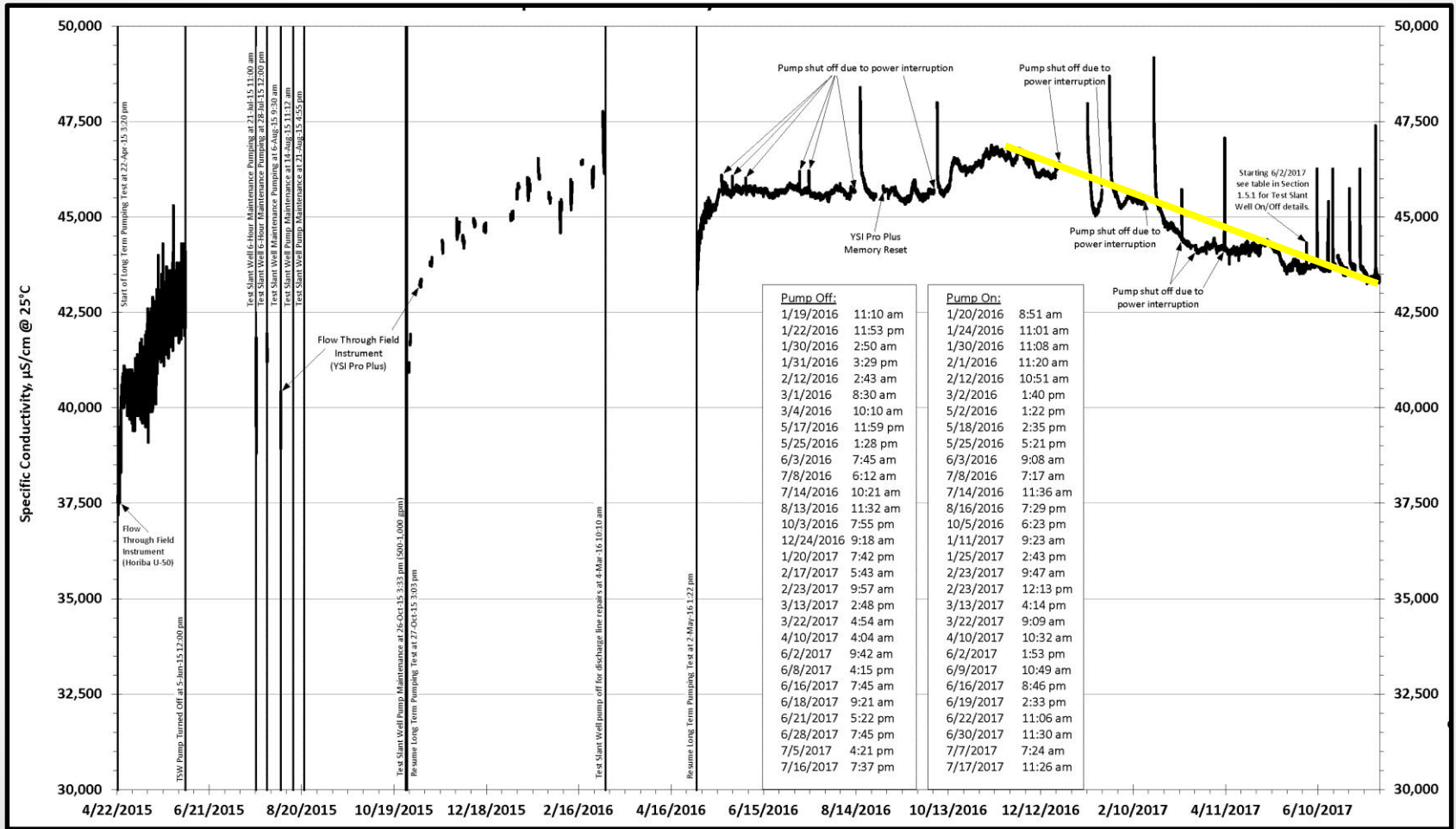
DREDGE  
BARGE



DREDGE BARGE INTAKE  
ON BOTTOM OF POND



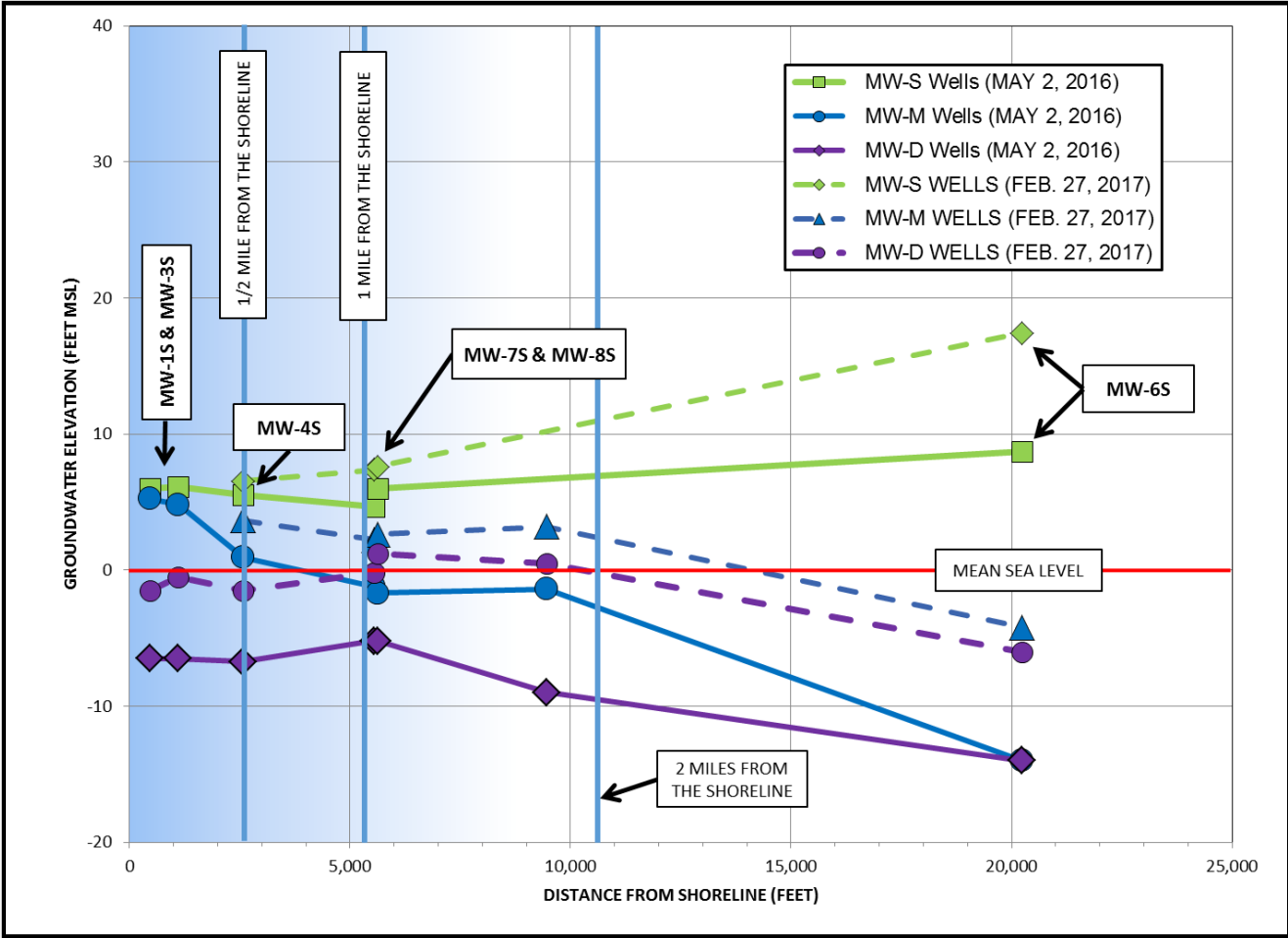
# TSW CONDUCTIVITY DATA



# REGIONAL ISSUES OBSERVED

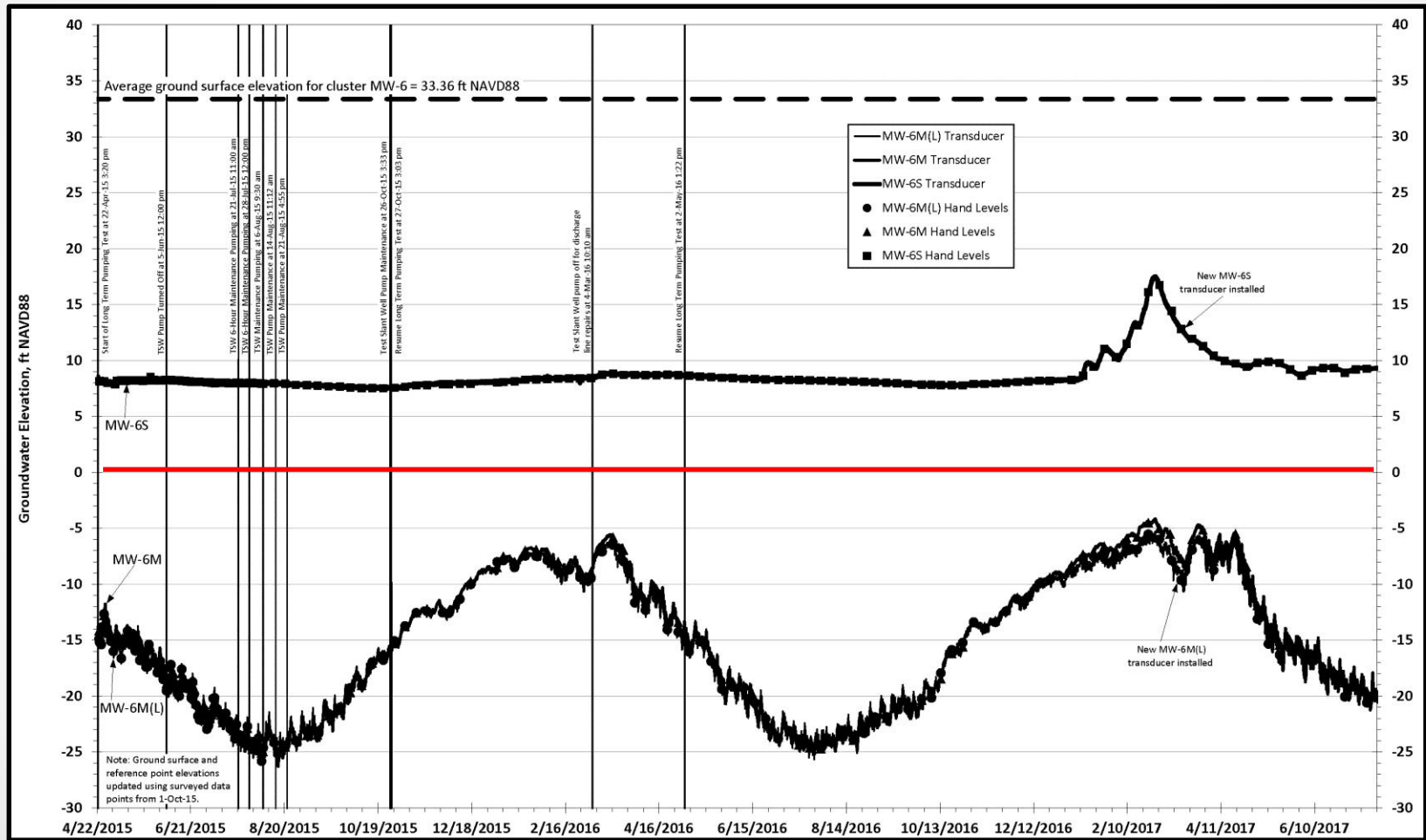
- **FRESHWATER RECHARGE HAS BEEN SIGNIFICANT IN THIS AREA OF THE 180-400-FOOT SUBBASIN AND PROVIDES PROTECTIVE GROUNDWATER LEVELS FOR THE SHALLOWER AQUIFER ZONES (DUNE SAND AND 180-FOOT AQUIFER)**
- **THE FRESHWATER INFLUENCE HAS REDUCED THE LANDWARD GROUNDWATER GRADIENT WITHIN THE NORTH MARINA PORTION OF THE BASIN**
- **EFFORTS TO REDUCE THE ONSHORE GRADIENT BY THE PROHIBITION OF PUMPING ARE ENHANCED BY THE RECHARGE FROM THIS PORTION OF THE COASTLINE**

# COASTAL GROUNDWATER GRADIENTS

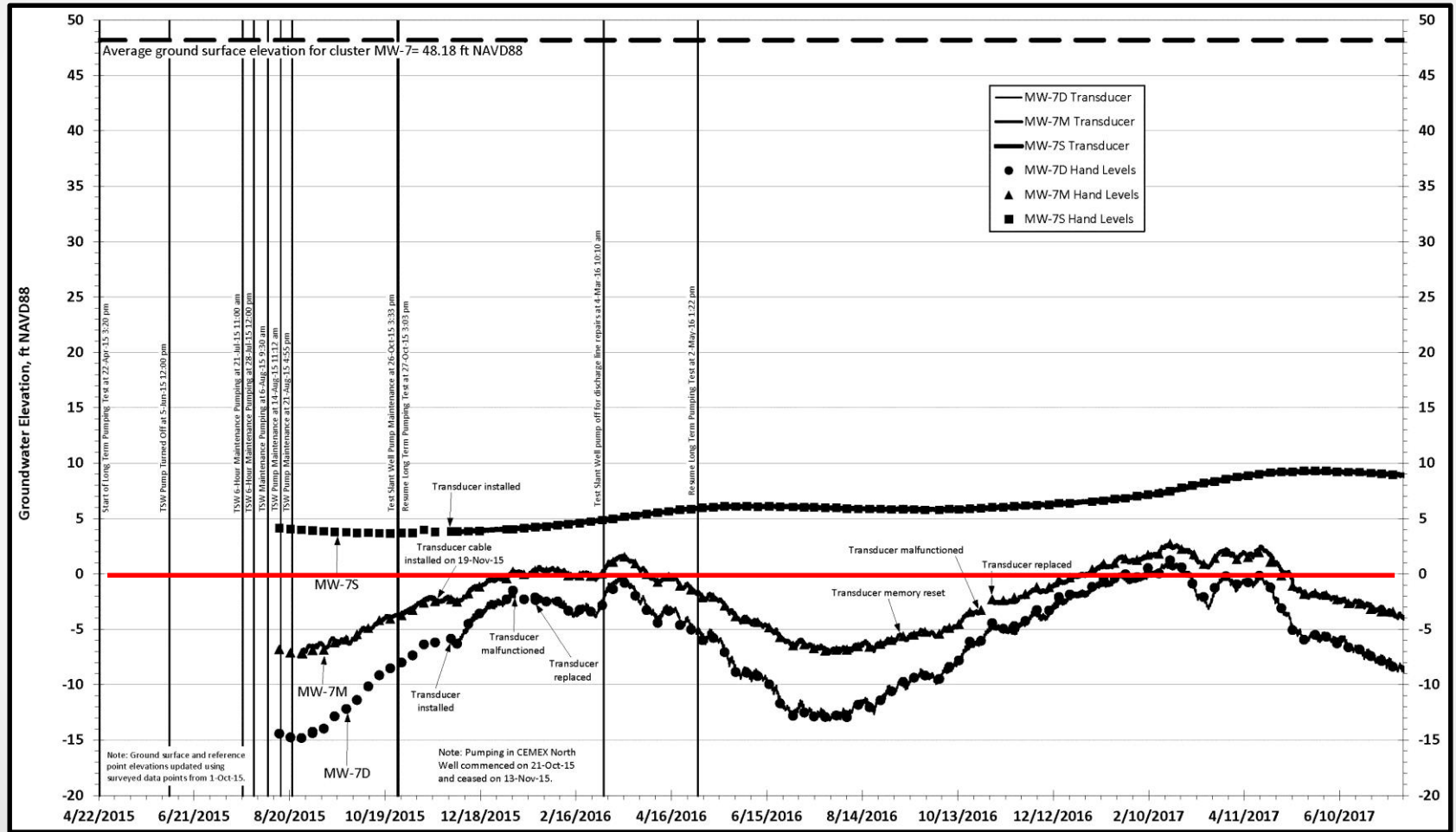




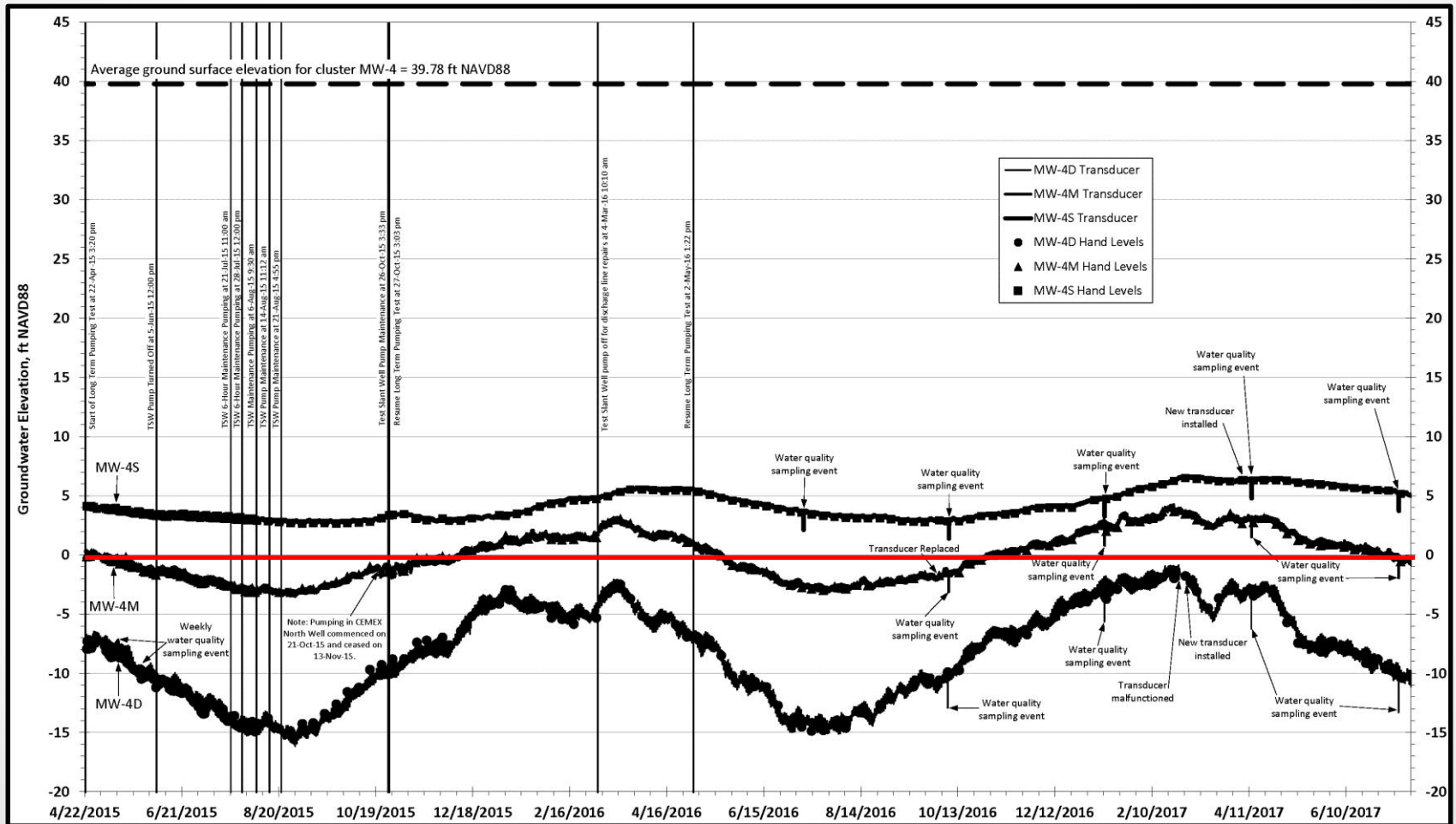
# MW-6 WATER LEVEL DATA



# MW-7 WATER LEVEL DATA

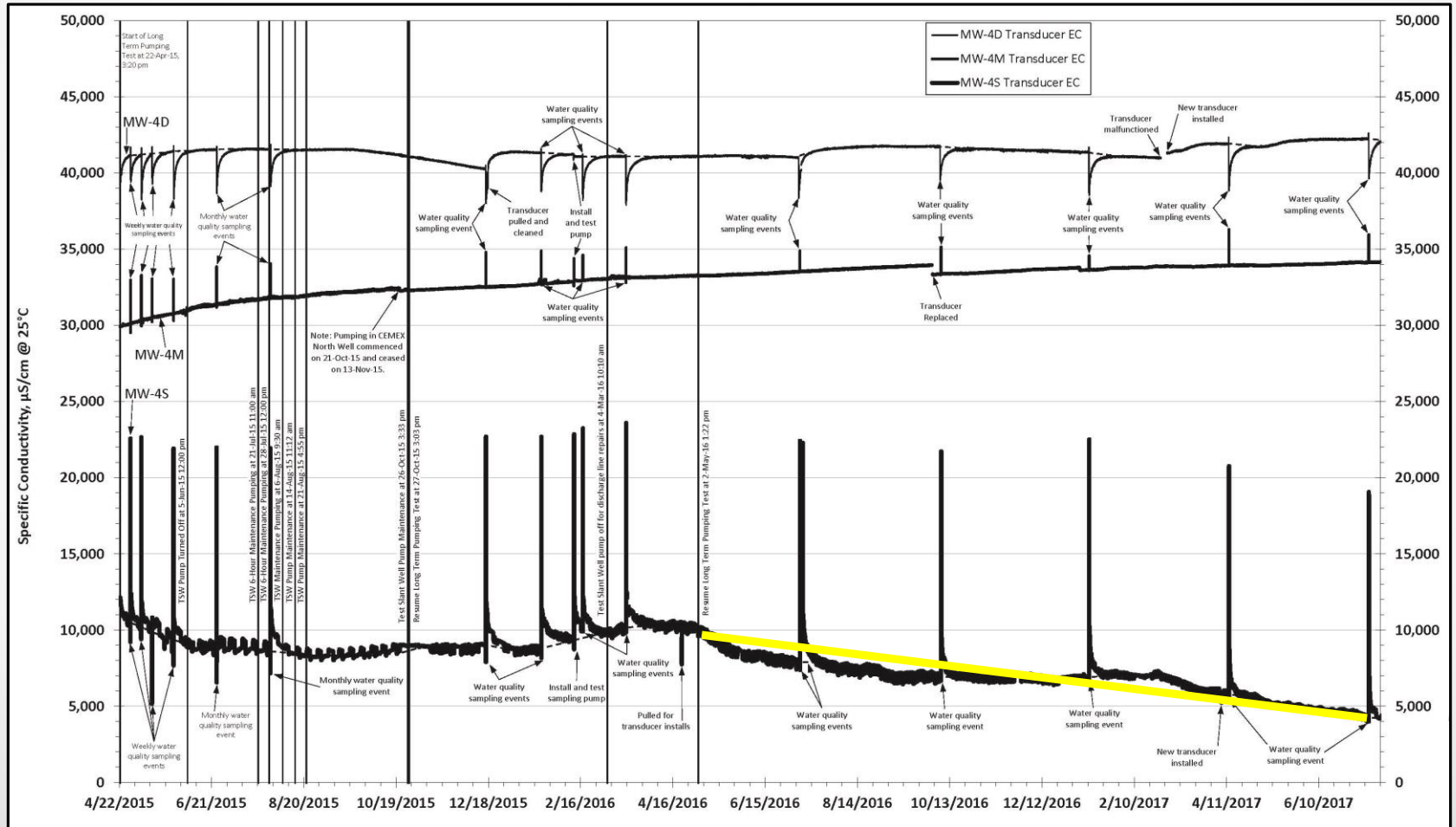


# MW-4 WATER LEVEL DATA

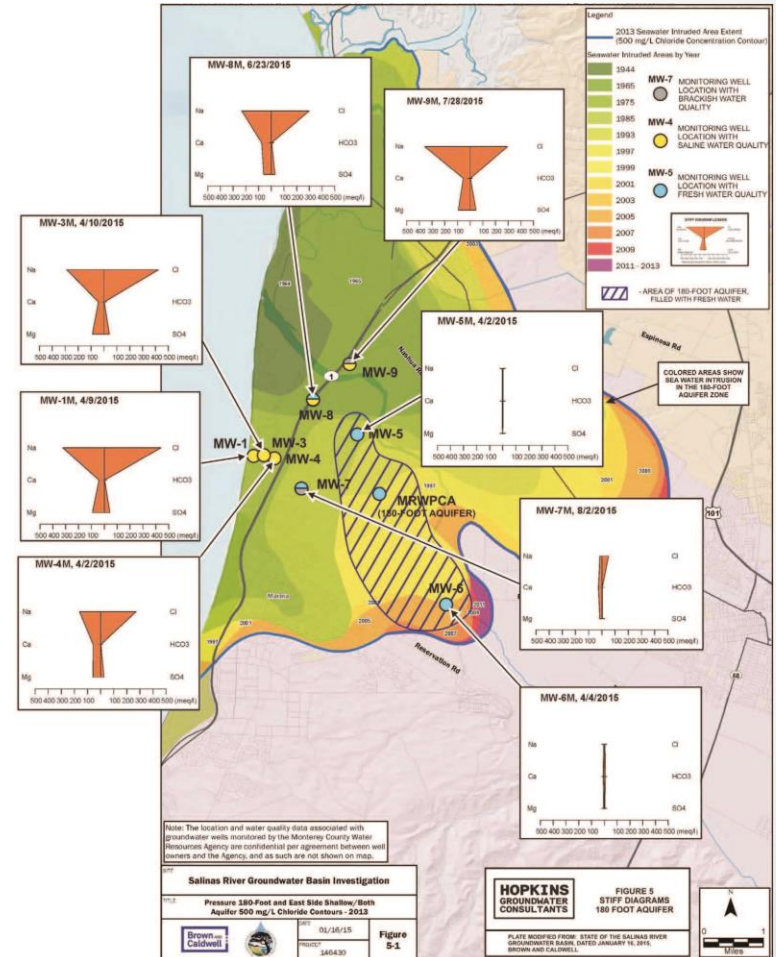
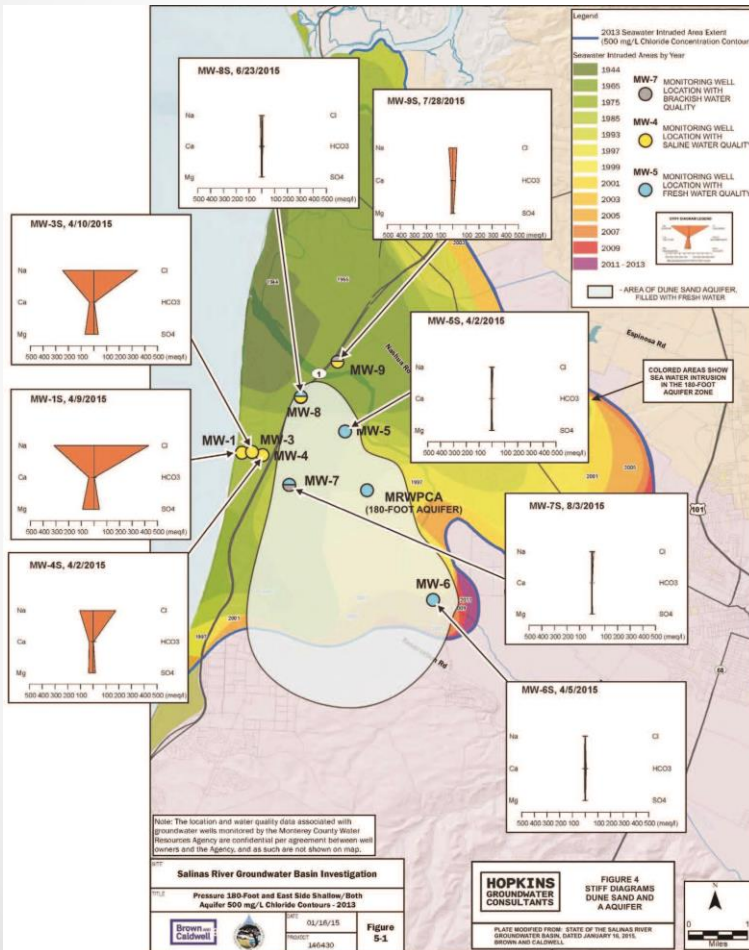




# FRESH WATER SALTWATER INTERFACE MOVING SEAWARD

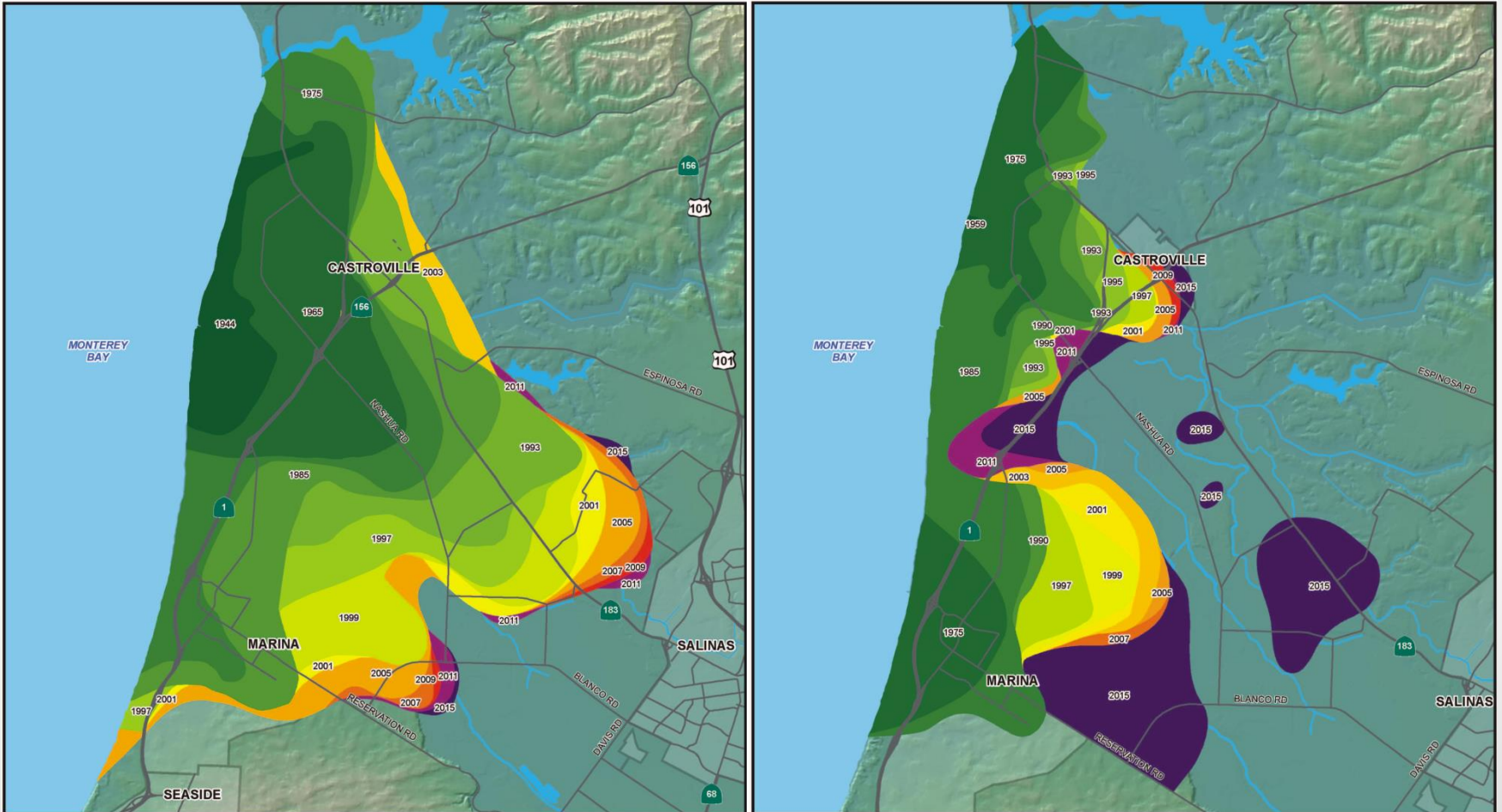


# LABORATORY WATER QUALITY TEST RESULTS

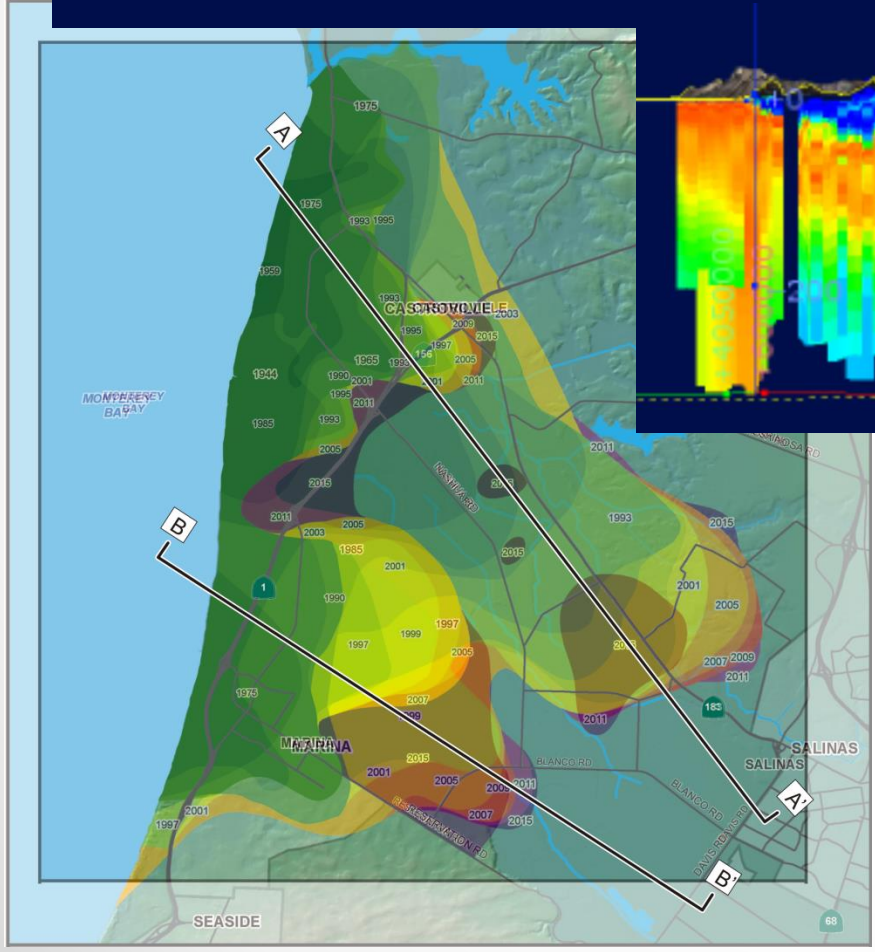
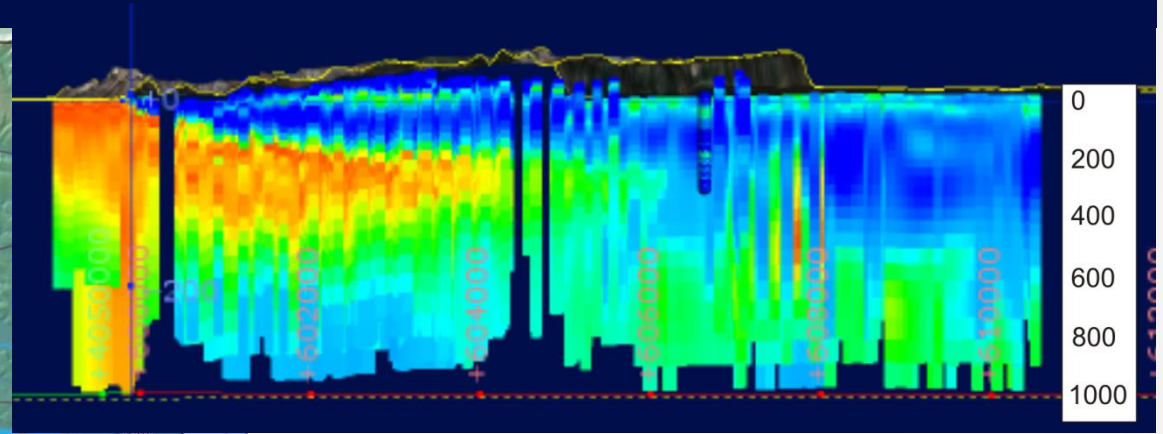
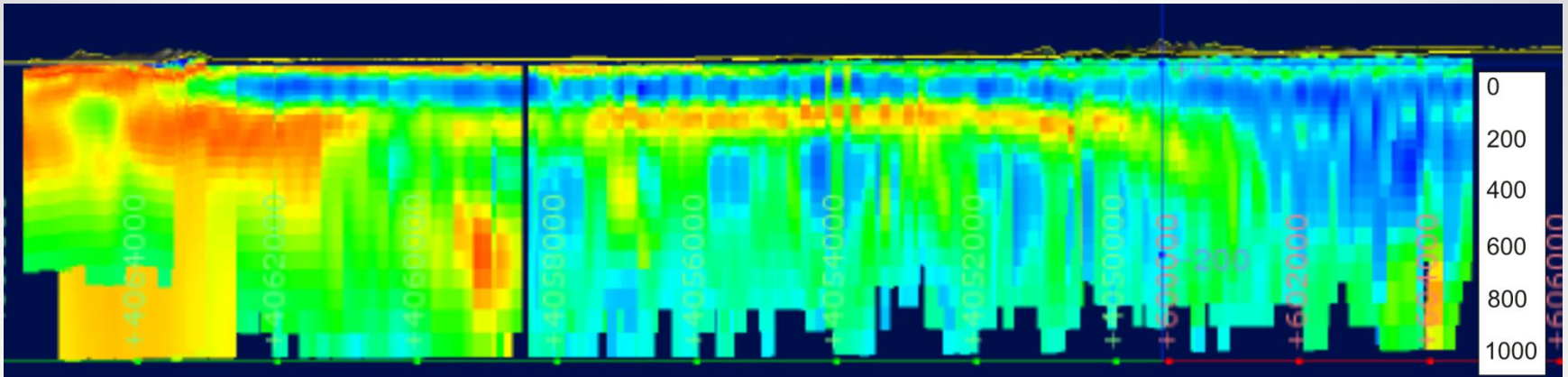


NOT ALL SALTS IN GROUNDWATER ARE FROM THE OCEAN

# MCWRA 2015 SALTWATER INTRUSION MAPS

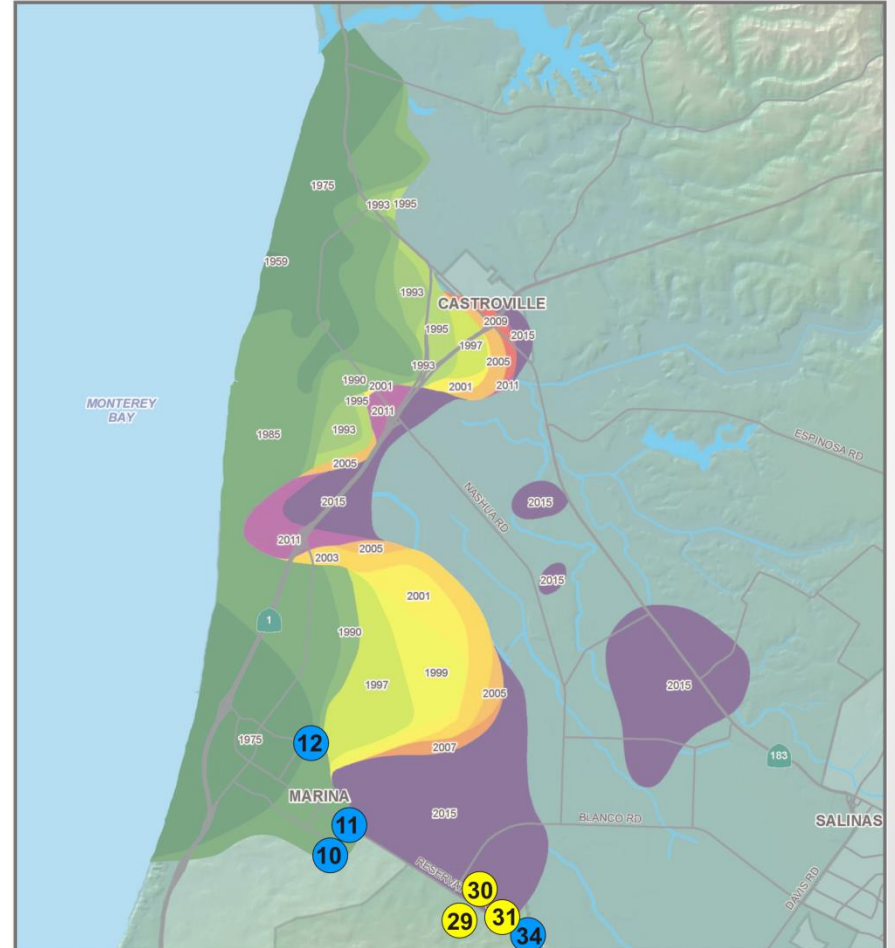
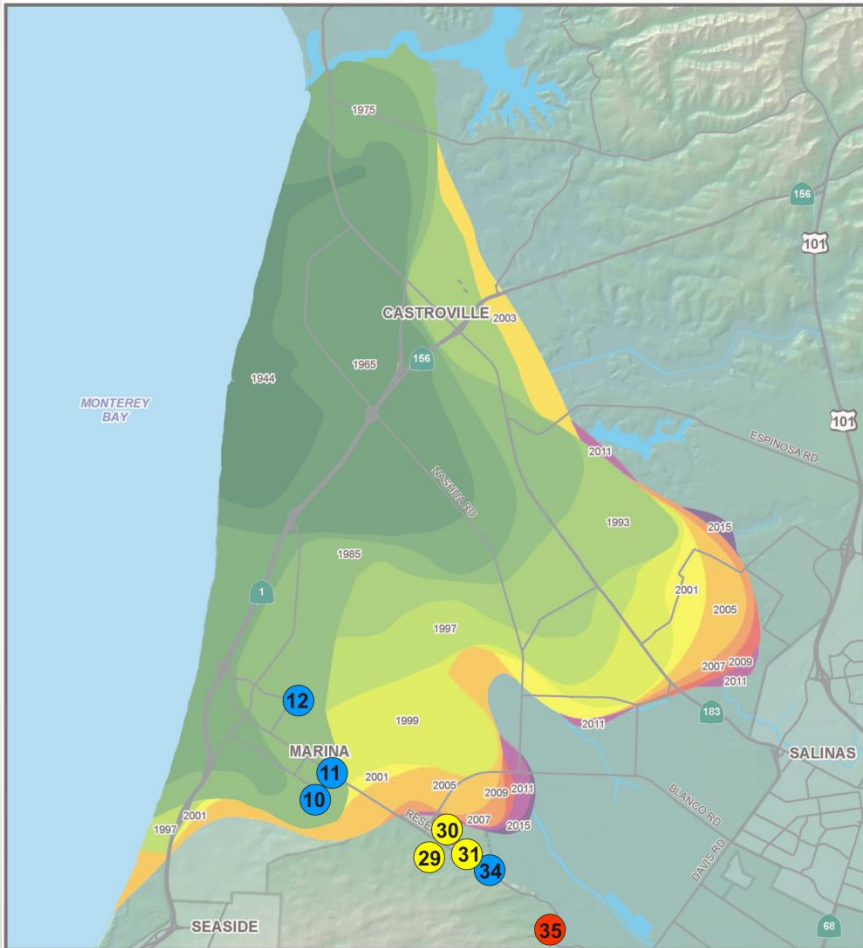






MAP VIEW VERSES  
PROFILE VIEW

# MCWD WELLFIELD



QUESTIONS?