

CONTAMINANTS IN THE SALTON SEA

Jim Setmire, Hydrologist USGS/USBR

Contaminants of Concern: Selenium, Nutrients, DDE, Boron, Sediment

Dissolved solids or chloride as an indicator, Colorado River water = 750 mg/L TDS. Looking at agricultural processes that control dissolved solids. Possibly show DH/O18O16 plot that indicates that evaporation is the main process controlling dissolved solids concentrations in the subsurface drainwater of the Imperial Valley tile water = median. Tail water = similar to Colorado River water Surface Drains = median from 49 drain samples New and Alamo River's at outlet to Salton Sea = medians from detailed study. Salton Sea water = 44,000 mg/L and 15,000 mg/L chloride.

Selenium:

Colorado River water 2 ug/L, Subsurface drainwater - In May 1988 measured subsurface drainwater at 119 sumps and gravity tiles had median 25 ug/L (1-360 ug/L).

In 1994-5 - sampled 820 sites within the Imperial Valley - Discharge and specific conductance were measured at all 820 sites. Laboratory analyses at 304 of the sites had Median selenium concentration of 28 ug/L ranging from 1-311 ug/L. Selenium in tile water increases by evaporative concentration in a similar manner to chloride or dissolved solids. Give Se/Cl ratios that demonstrate that highest selenium concentrations have similar ratio to Colorado River water and median subsurface drainwater and also Alamo River Tail water 2-3 ug/L. Surface Drains - August 1994 sampled 49 sites had median of 6 ug/L (2-52 ug/L). New and Alamo River's at outlet to Salton Sea median 4 ug/L and 8 ug/L.

Interface area - Alamo River 200 feet seaward of the end of the levee on the left bank - water 3 ft deep - at a depth of 1.3 feet sp cond 5,000 uS, DO 4.2 mg/L (56%) and Se 8ug/L. At 3 feet - sp cond 51,000 uS, DO 1.2 mg/L (18%) and Se 1.0 ug/L. Special sample collected in June 1989 on river side of interface had total Se of 6.35 ug/L with 2.56 ug/L in the +4 selenite state and 3.79 in the +6 selenate oxidation state. At interface total Se 2.4 ug/L (<method specific reporting limit) with 1.79 ug/L at +4 selenite and <0.2 in the +6 selenate state. Salton Sea water 1 ug/L. None of selenium is in the highly oxidized +6 selenate state.

Selenium in sediments:

Colorado River if available. Soils from fields in Imperial Valley (270 soil cores representing 15 fields have median concentration of 0.2 ppm selenium ranging from <0.1 to 1.3 ppm. Bottom sediment from 48 surface drains in Imperial Valley have median concentration of 0.5 ppm ranging from 0.1 to 1.7 ppm. Bottom sediment in Salton Sea 11 sites have median concentration of 2.7 ppm with range from 0.58 to 11 ppm. Compare to particle size distribution table and contour plot - Very fine sediment <0.002 mm in deepest parts of Salton Sea have highest selenium concentrations. Composed of highly organic matter, low density detritus.

Selenium in biota:

Invertebrates from Salton Sea had Se concentrations ranging from 0.8 to 12.1 ug/g dry weight - critical dietary threshold is 5 ug/g - only pileworms had concentrations exceeding the threshold - very limited sampling in numbers and area. Fish in the Sea had higher concentrations than fish in the freshwater drain/river system.

NIWQP focus has been on selenium concentration in food chain of both fresh water system and in the Salton Sea. Bioaccumulation and biomagnification of selenium.

Nitrogen -	Nitrate plus nitrite	Ammonia
East Highline	0.22 mg/L	0.03 mg/L
Subsurface drainwater	12.0 mg/L	0.07 mg/L
Surface drainwater	4.95 mg/L	0.19 mg/L
Salton Sea	0.1 mg/L	1.41 mg/L

Organic nitrogen at 2.95 mg/L and Organic carbon 42 mg/L

Particle size
Contours,
& Selenium
Conc.