

Arizona Surface Water Quality Standards for Canals

...a view from 10,000 feet.

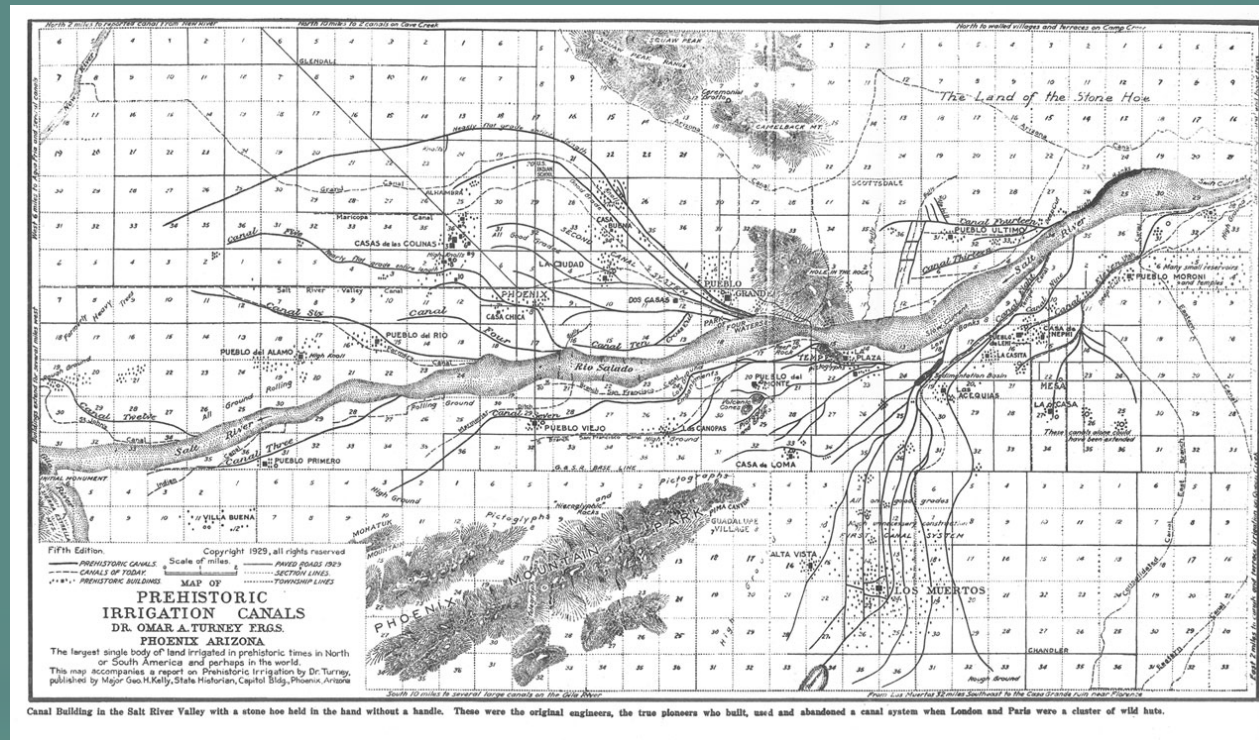
At ground level: Some Phoenix and Yuma area canals are considered Waters of the United States

Because of this status they require:

- Designated uses

- Standards to protect those uses

- AzPDES permits



Designated Uses: WoUS

De facto/assumed uses:

Aquatic and wildlife

Recreation/contact

Human consumption

Agricultural



Photo © Tom Brennan

Arizona's differentiated and refined uses for natural(ish) waterbodies:

- Domestic Water Source
- Fish Consumption
- Full Body Contact
- Partial Body Contact
- Aquatic and wildlife Coldwater
- Aquatic and wildlife Warmwater
- Aquatic and wildlife Effluent Dependent
- Aquatic and wildlife Ephemeral
- Agricultural Livestock Watering
- Agricultural Irrigation

Title 18, Ch. 11

Arizona Administrative Code

18 A.A.C. 11

Department of Environmental Quality – Water Quality Standards

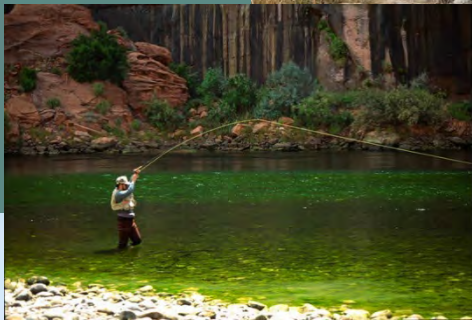
Appendix A. Numeric Water Quality Standards

Table 1. Water Quality Criteria By Designated Use (see f)

Parameter	CAS NUMBER	DWS (µg/L)	FC (µg/L)	FBC (µg/L)	PBC (µg/L)	A&Wc Acute (µg/L)	A&Wc Chronic (µg/L)	A&Ww Acute (µg/L)	A&Ww Chronic (µg/L)	A&Wedw Acute (µg/L)	A&Wedw Chronic (µg/L)	A&We Acute (µg/L)	AgI (µg/L)	AgI (µg/L)
Acenaphthene	83329	420	198	56,000	56,000	850	550	850	550	850	550			
Acrolein	107028	3.5	1.9	467	467	34	30	34	30	34	30			
Acrylonitrile	107131	0.06	0.2	3	37,333	3,800	250	3,800	250	3,800	250			

However...

One of these things is not like the others...



Courtesy Philip A. Fortman, Central Arizona Project

Canals are anthropogenic water conveyance devices:

Functionally pipes that have been cut in half.

Standards applied should protect the **designed** uses.



Not a designed use

Designated Uses for WoUS canals and the WQ Standards that protect those uses:

Domestic Water Source (where applicable)

Agricultural Livestock Watering

Agricultural Irrigation

Also:

Antidegradation criteria found at R18-11-107

Narrative Water Quality Standards found at R18-11-108

Including:

A. A surface water shall not contain pollutants in amounts or combinations that:

5) Are toxic to humans, animals, plants, or other organisms; (aka: **WET**)

7) Cause or contribute to a violation of an aquifer water quality standard prescribed in R18-11-405 or R18-11-406;

Domestic Water Source:

141 WQ standards

Where available, MCLs are used (88 nationally listed)

All Other DWS standards are calculated from primary data

Agricultural standards:

Primarily follow original “Gold Book” criteria



National Primary Drinking Water Regulations

Contaminant	MCL or TT ¹ (mg/L) ²	Potential health effects from long-term ³ exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L) ²
OC Acrylamide	TT ¹	Nervous system or blood problems; increased risk of cancer	Added to water during sewage/wastewater treatment	zero
OC Alachlor	0.002	Eye, liver, kidney or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops	zero
R Alpha/photon emitters	1.5 (picocuries per liter) (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation	zero
IOC Antimony	0.005	Increase in blood cholesterol; decrease in blood sugar	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder	0.005
IOC Arsenic	0.010	Skin damage or problems with circulatory systems, and may have increased risk of getting cancer	Erosion of natural deposits; runoff from orchards; runoff from glass & electronics production wastes	0
IOC Asbestos (fibers >10 micrometers)	7 (million fibers per liter) (MFL)	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits	7 MFL
OC Atrazine	0.003	Cardiovascular system or reproductive problems	Runoff from herbicide used on row crops	0.003

Human Health Calculations

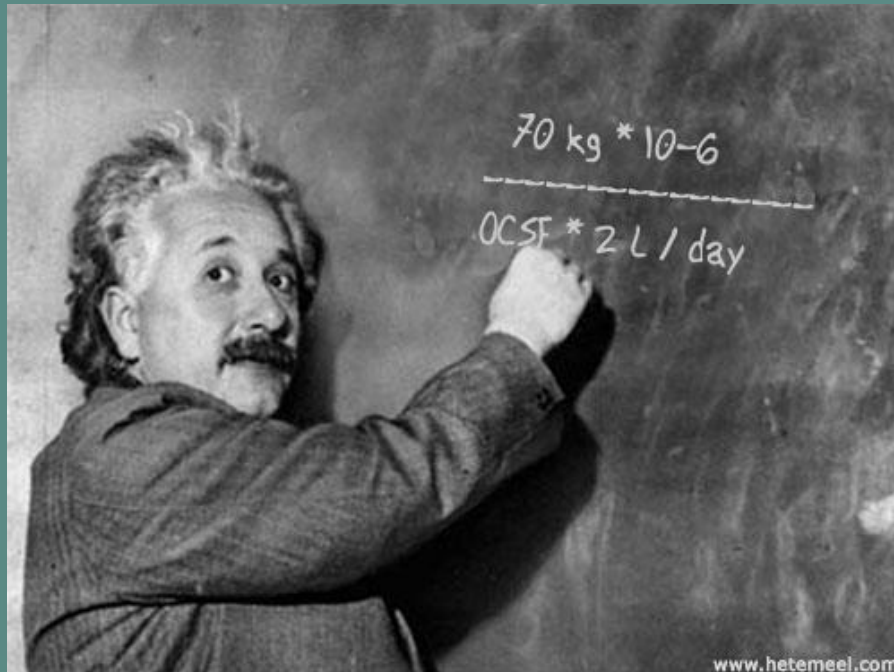
Basic Formulas:

For carcinogens:

$$\frac{BW * MARL}{OCSF * WC_{use}}$$

For non-carcinogens:

$$\frac{RfD * RSC * BW}{WC_{use}}$$



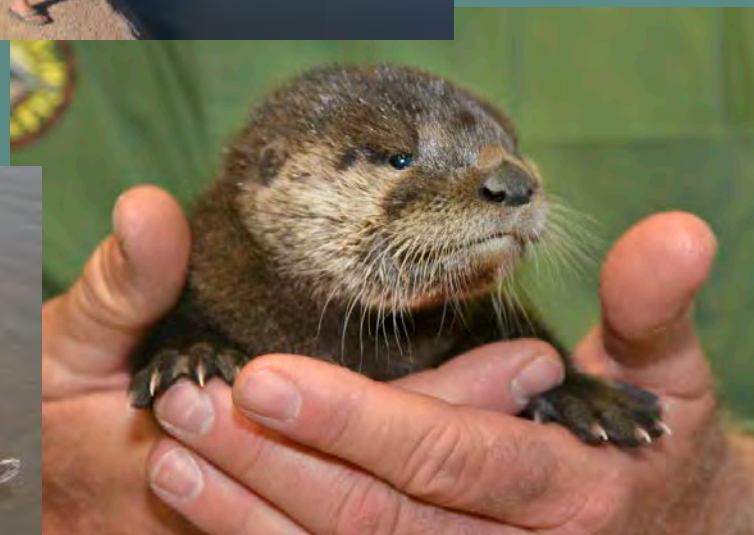
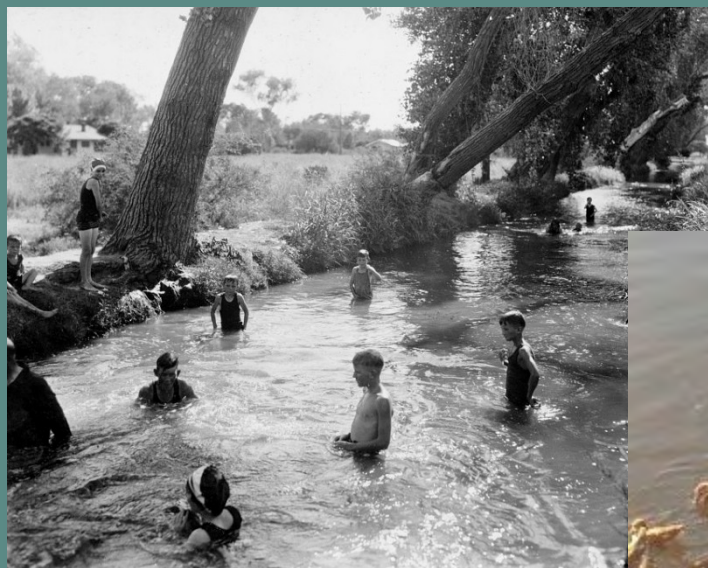
Uses our WoUS canals are **NOT** protected for:

Fish Consumption

Full Body Contact

Partial Body Contact

Aquatic and wildlife



Permits:

AZPDES permits are required for discharges to WoUS

Multiple permits on SRP canals including a complex mixing zone

Permit limitations based on “reasonable potential”

WET requirements:

At least one permit with WET testing requirement due to downstream discharge



Questions:

What are the designed uses?

What are you trying to protect?



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