

Tucson Water Turnaround: Crisis to Success

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Outline

- Conversion from GW to CAP water
- Organizational Issues
- Water Treatment
- Distribution System
- Debacle
- Turnaround and Success
- Lessons Learned

We are presenting Tucson's story and have written a book about it so that this does not happen again—anywhere, as it did in Flint, MI and now in Newark, NJ.

Objectives

- Present policy decisions by the Tucson City Council that caused many of the problems
- Explore the lack of technical planning and management errors made by Tucson Water before and during the colored water crisis in 1992-94
- Show how a successful management team turned failure into a singular success
- Present the “lessons learned” that are applicable to any utility or organization

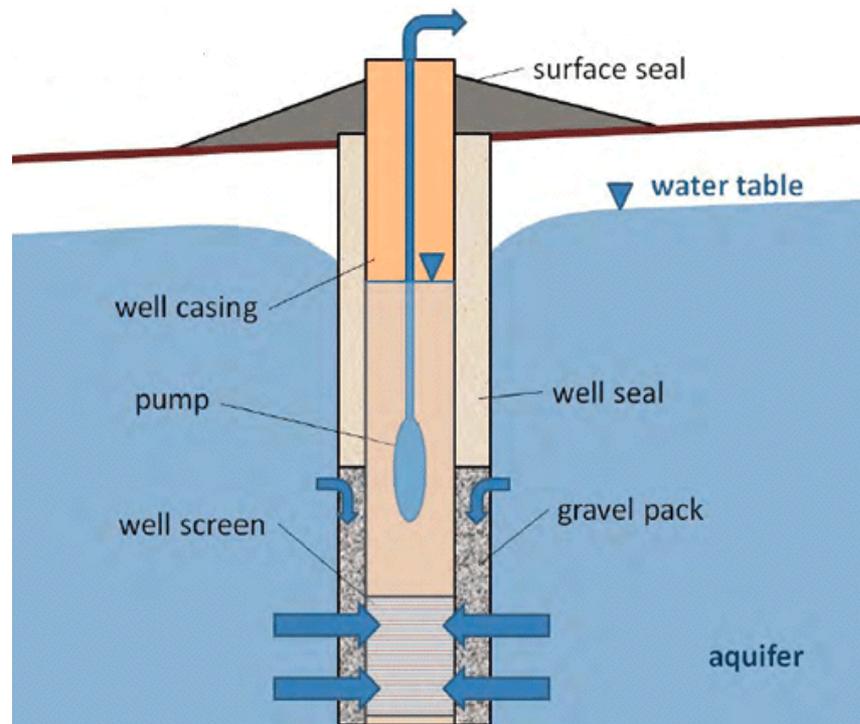
Sources of Information



- Thousands of documents
- Over 50 interviews with people who were there
- Secondary sources
- Interviews with corrosion experts

From the beginning...

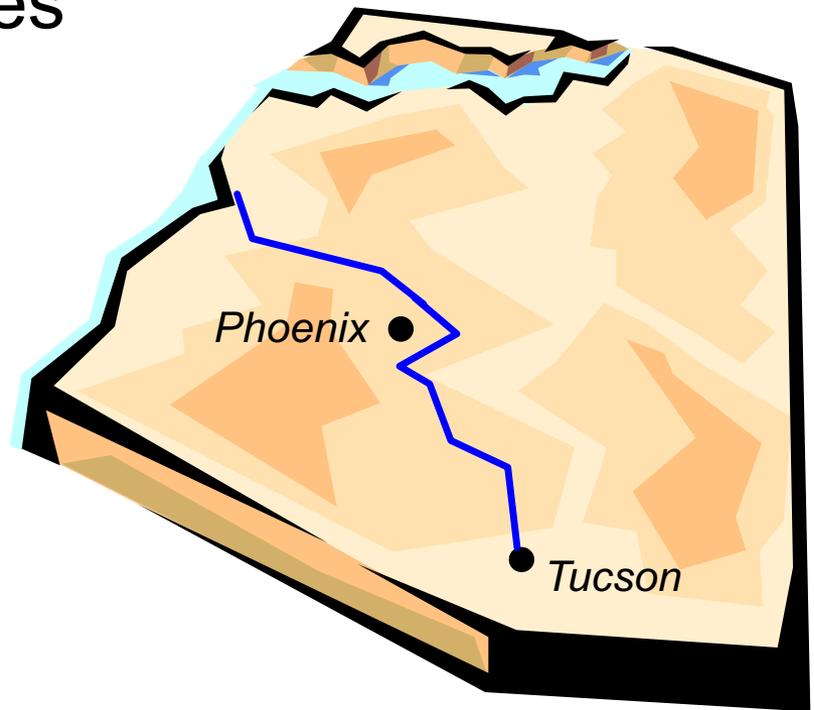
Tucson was a groundwater utility prior to arrival of the Central Arizona Project



However, groundwater levels were dropping drastically. A sustainable water source had to be found.

CAP Timeline

- 1968--Congress approves CAP
- 1973--Groundbreaking
- 1985--Water arrives in Phoenix
- 1991--Water delivered to Tucson area
- Nov. '92--Water served to Tucson customers



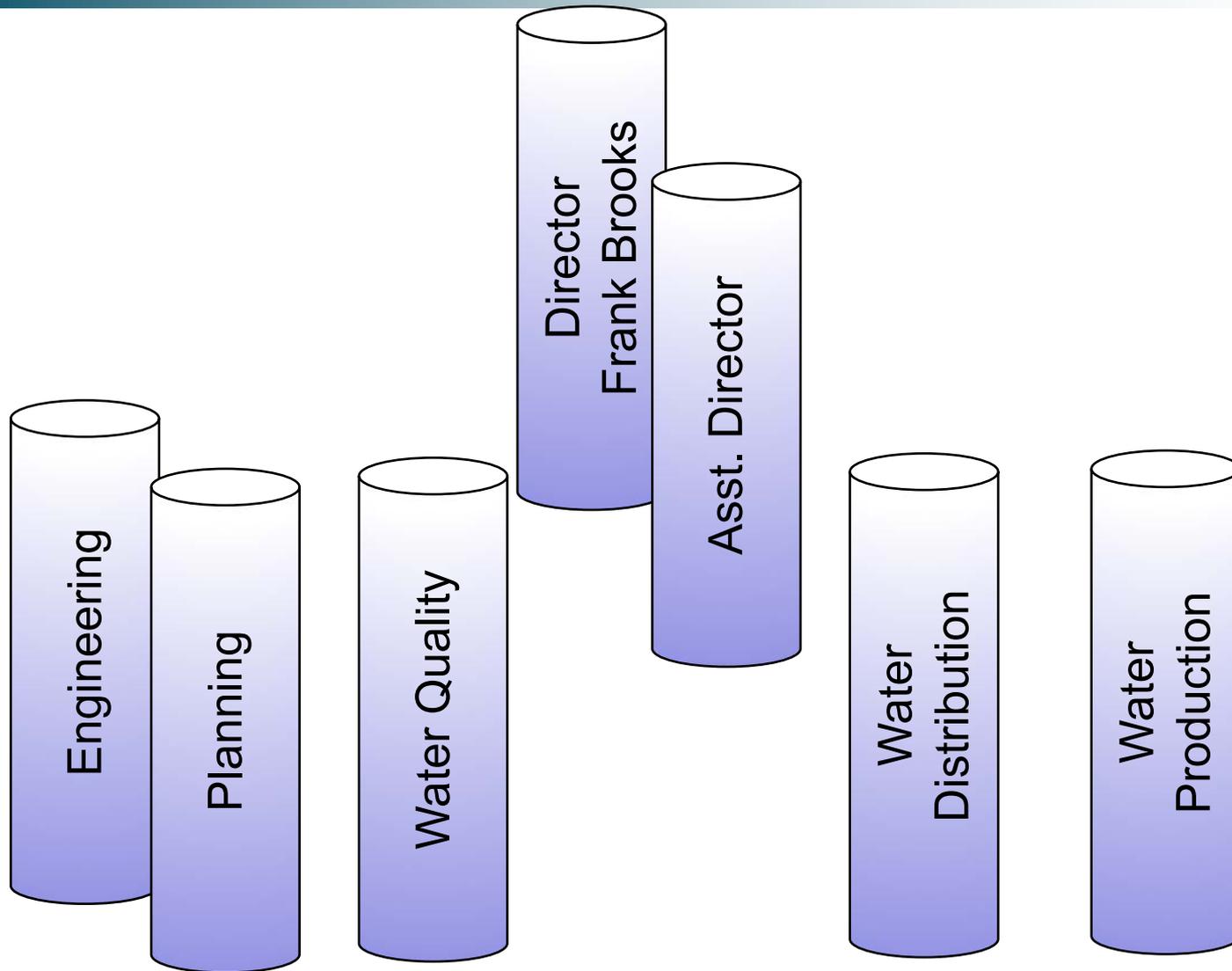
CAP and GW Quality

Parameter	Median Raw CAP (a)	Median Groundwater (b)
pH, units	8.3	7.6
Total Dissolved Solids	691	276
Hardness	330	110
Sodium	105	37
Sulfate	295	33
Chloride	92	12
Nitrate	0.07	0.9
Iron	0.08	<0.05
Manganese	0.01	<0.05
Fluoride	0.34	0.3
Total Organic Carbon	2.9	0.24

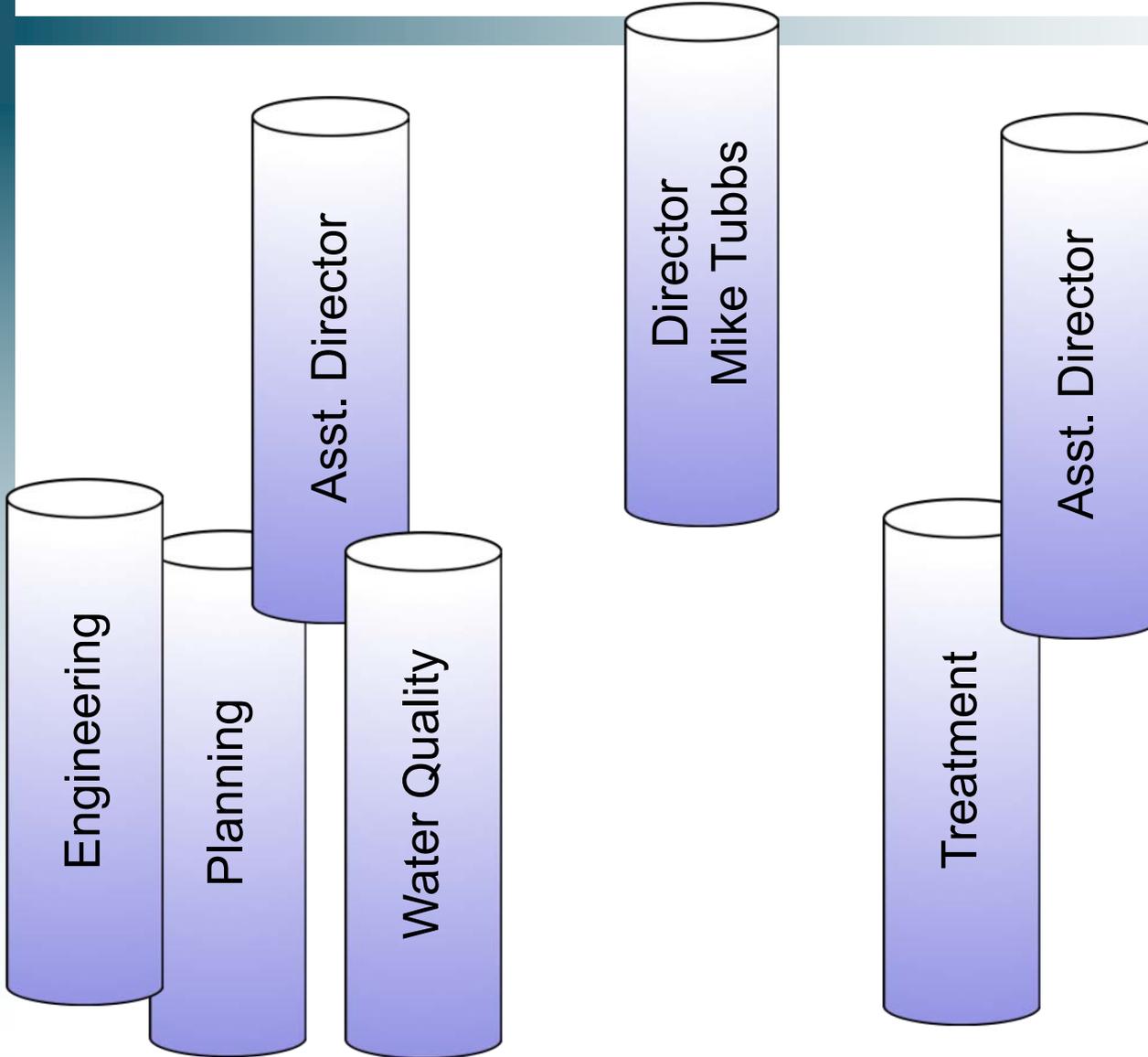
Tucson Water Table of Organization, 1990-94



Tucson Water Table of Organization, pre-1988



Tucson Water Table of Organization, 1990-94



Managing the Conversion

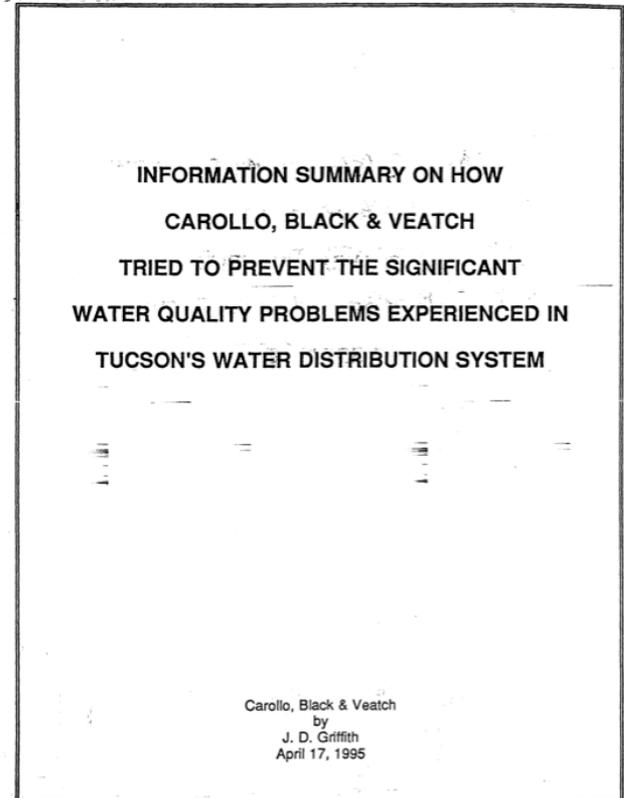
- Not one manager in Tucson Water had ever converted a groundwater utility to a mixed surface water/groundwater system. Not one.
- What does a utility do in this situation?
Hire the best consultants it can find.
- Two top-level joint ventures were contracted:
 - Montgomery-Johnson-Brittain, 1981-84, to work with the community to set finished water quality
 - Carollo, Black & Veatch, 1985-1994, to design and build the treatment plant

Tucson's Disastrous Relationships with Consultants

- Consultants were viewed as the “enemy” by some Tucson Water managers
- Montgomery-Johnson-Brittain was fired
- Carollo, Black & Veatch was sued after WTP completion
- David Johnson, the project manager for the design of the WTP, called the design consultant “avaricious”
- He personally rejected recommendations for studying impacts of CAP water on distribution materials

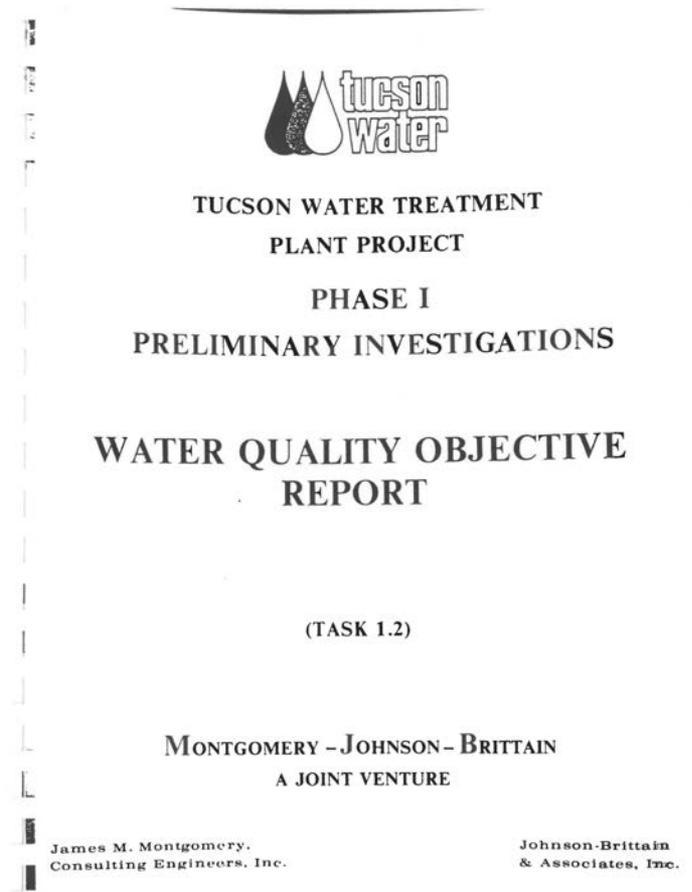
Plea for Distribution Studies

- On numerous occasions in the 1980s, Carollo, Black & Veatch practically begged Tucson Water to authorize them to study the impact of CAP water on the distribution system.



Disastrous Policy Decision

- On May 29, 1984, the Tucson City Council adopted a THM goal of 20 $\mu\text{g}/\text{L}$
- Existing THM MCL was 100 $\mu\text{g}/\text{L}$
- Drove the design of the WTP
- Consequences were severe



Hayden-Udall Water Treatment Plant

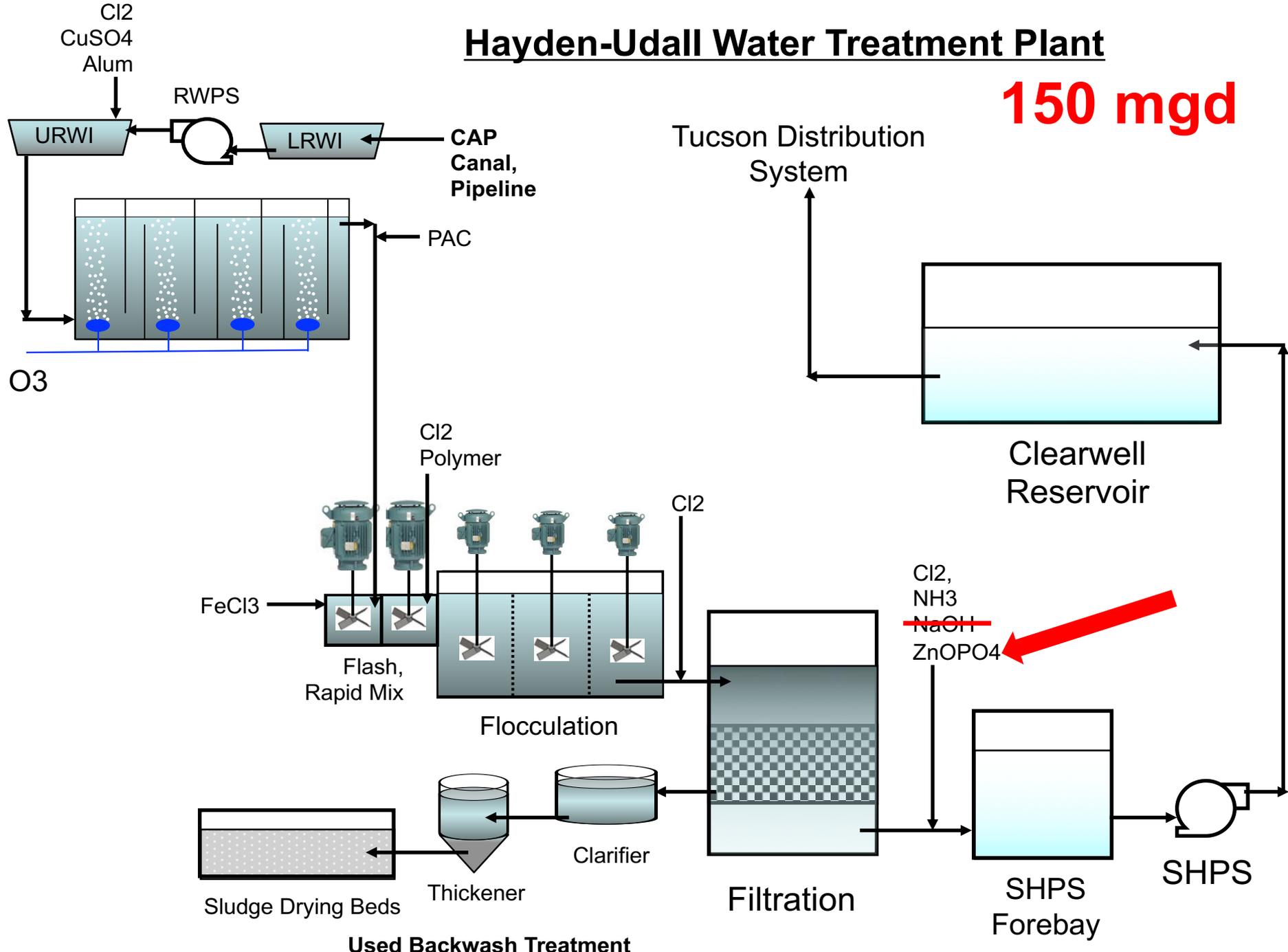
- Montgomery-Johnson-Brittain strongly recommended a conventional plant with sedimentation basins - a typical design to treat Colorado River Water
- Tucson Water wanted a “Ferrari:” a cutting-edge ozone/direct filtration/chloramine treatment plant



Tucson Water chose the DIRECT FILTRATION plant

Hayden-Udall Water Treatment Plant

150 mgd

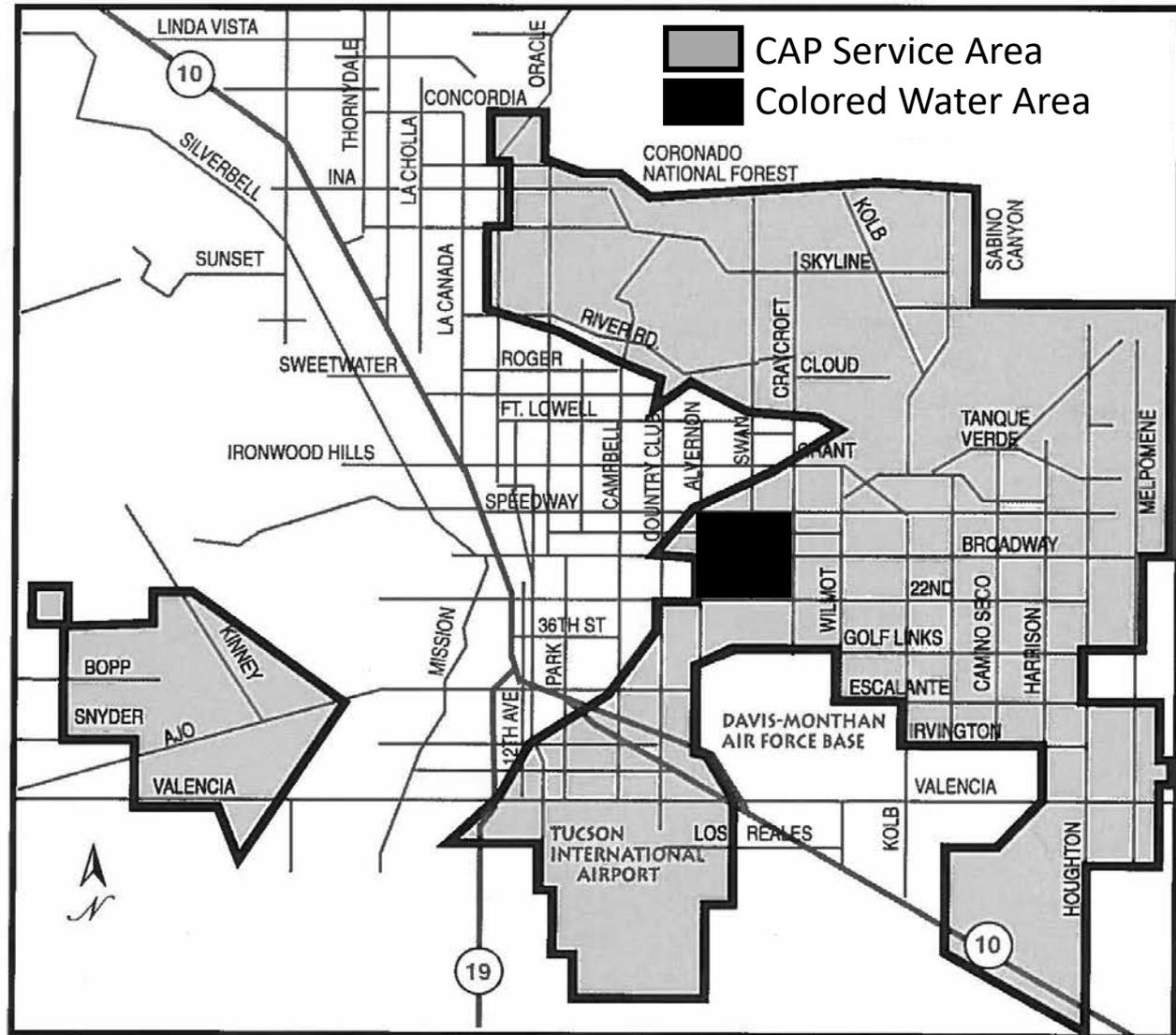


Used Backwash Treatment

November 1992: Direct Delivery of CAP Water Began



Tucson CAP Service Area and Colored Water Area

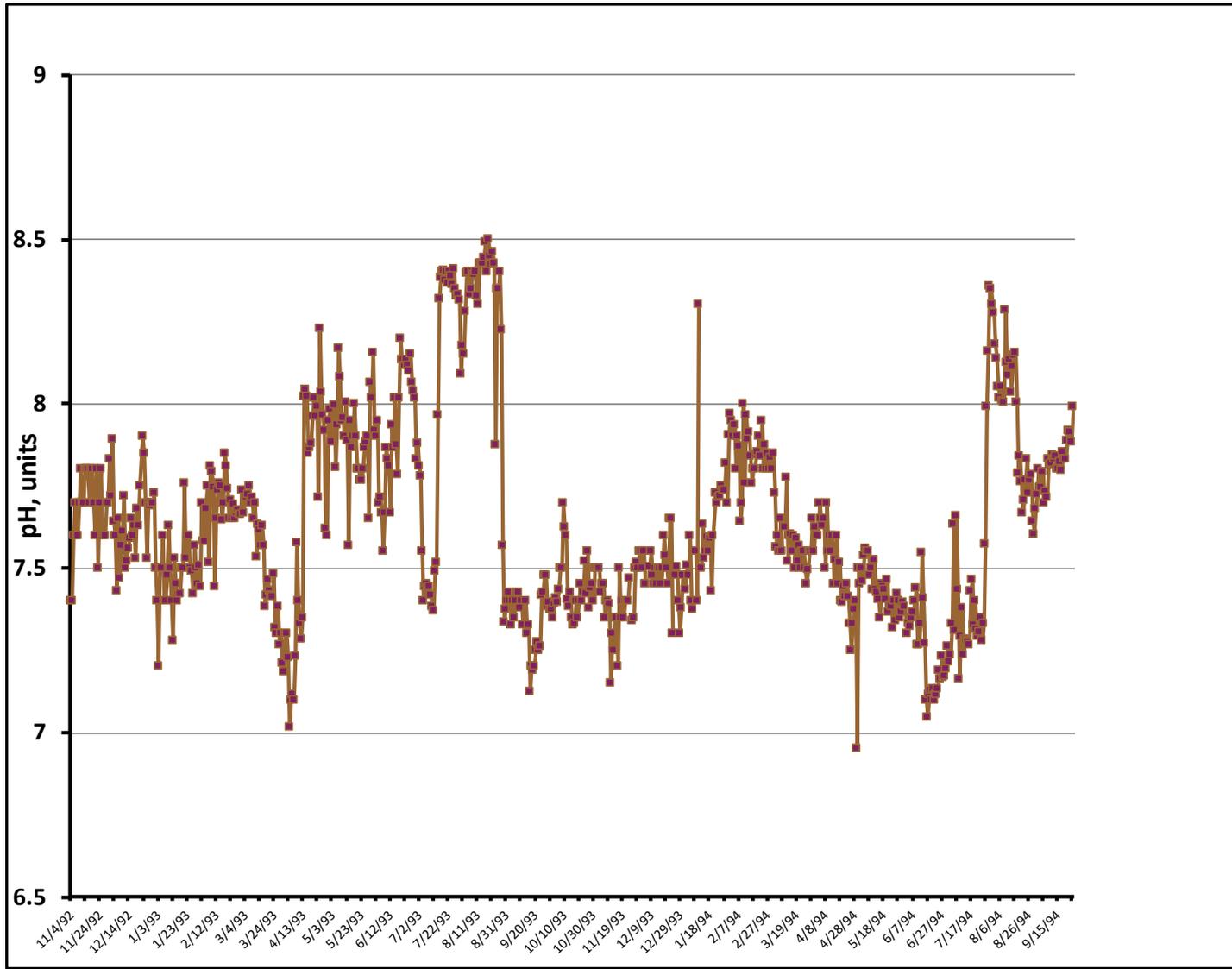


200 Miles of Galvanized Steel Pipe in the DS

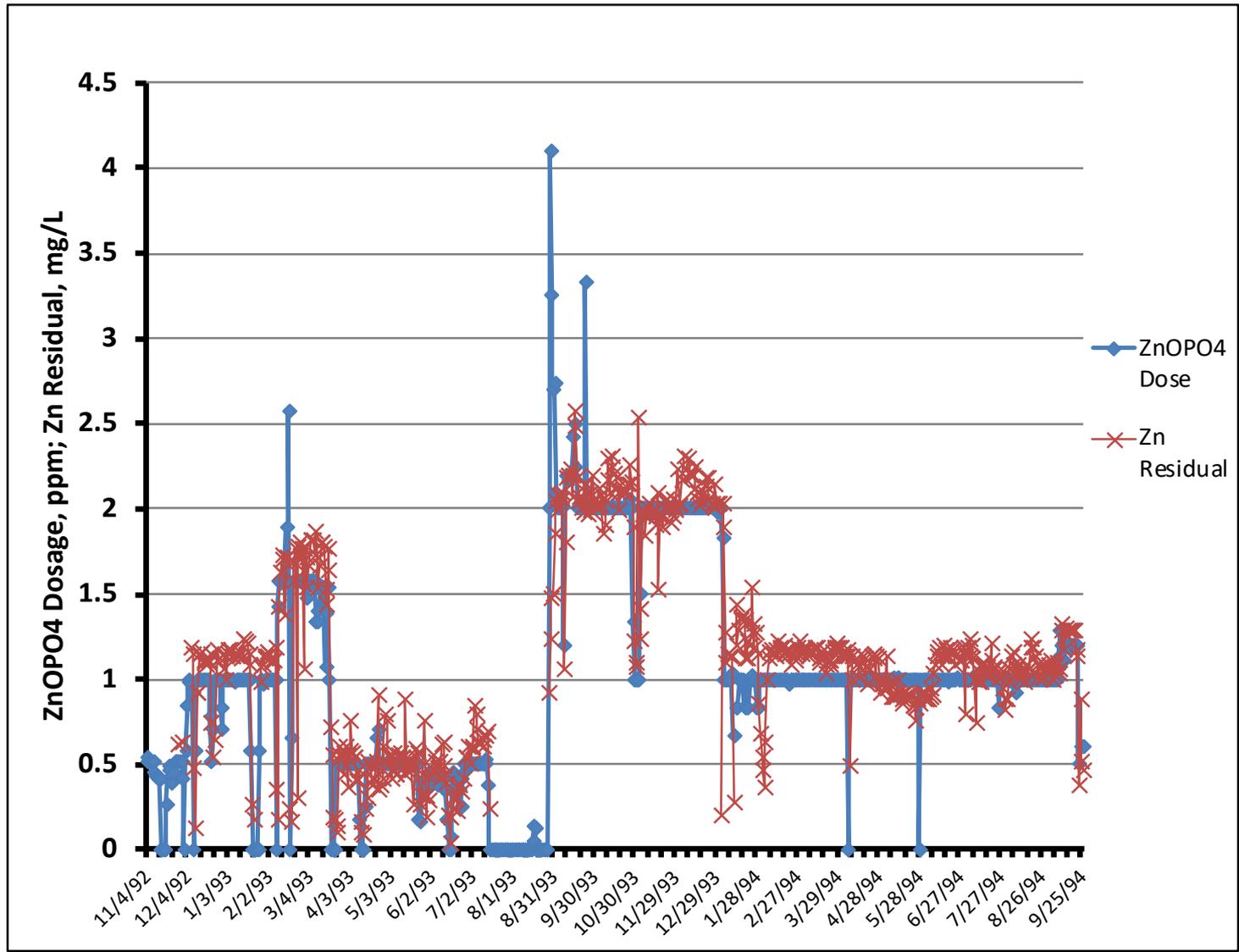


**Main replacement funding kept being stripped from
Tucson Water's budget by the City Council**

Treatment Plant: Effluent pH, 1992-94



Treatment Plant: ZnOPO4 Dose, Zn Residual, 1992-94

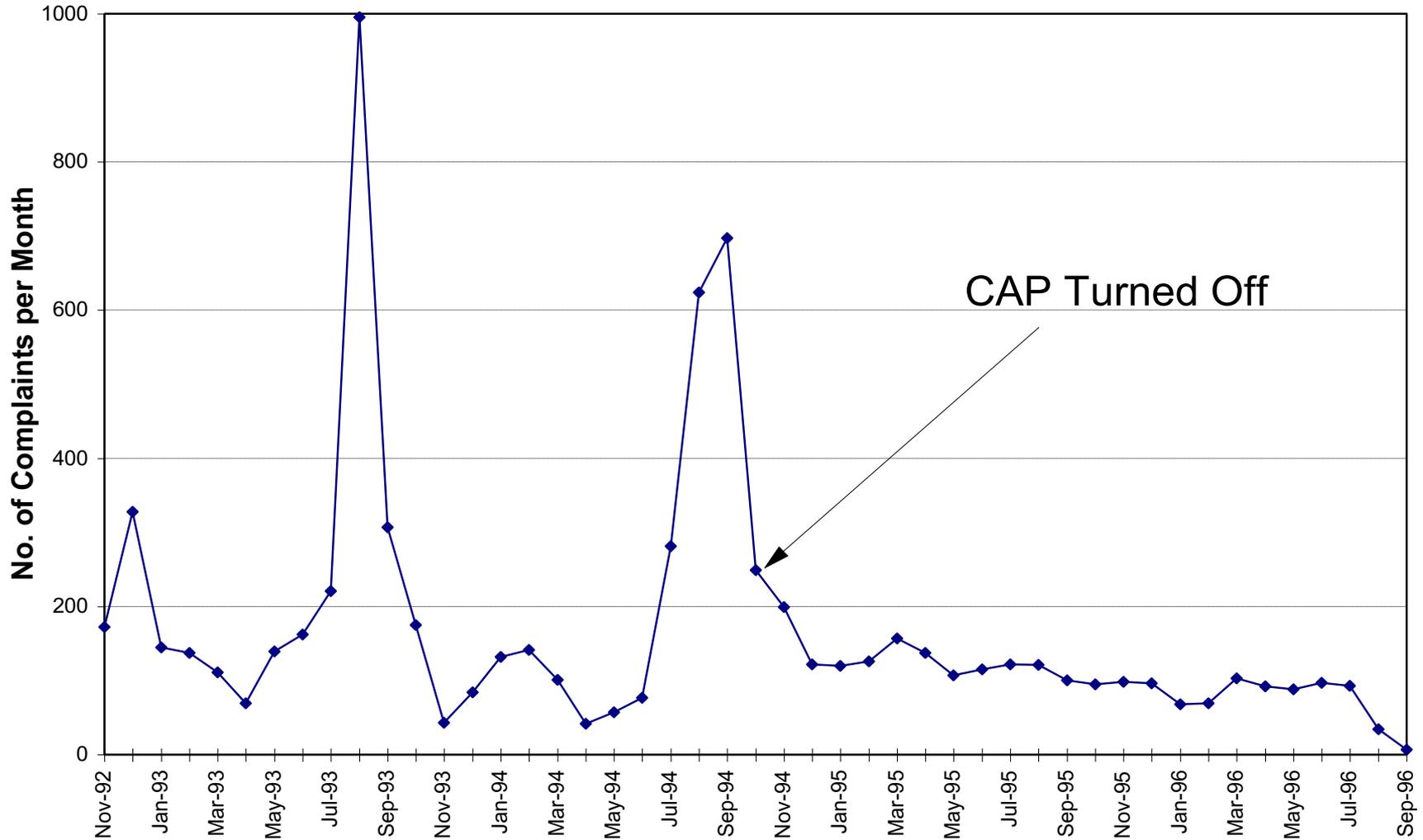


November 1992 to September 1994

- CAP turned on
- Complaints begin
- The stonewall era
- Political solutions
- Bifurcation
- Continued complaints
- CAP turned off



Total Monthly Color Complaints



The Treatment Plant

Since that date, the surface water treatment plant has been rusting in the sun



The Biggest Mistake a Water Utility Manager Can Make

- When faced with this...



- For the love of heaven, don't say this...

“The water meets all federal and state drinking water standards.”

Why?

Turning Point: Public Apology, 5/27/97

- We're Sorry...
- A few years ago, Tucson Water let you down
- We want to take responsibility for serving discolored water and apologize to each and every one of you.



"AT THE TAP"

Dear Tucson Water Customers, Estimados Clientes de Tucson Water,

We're Sorry... Lo Sentimos...

A few years ago, Tucson Water let you down. The decisions Tucson Water management made about the delivery of CAP water failed to meet the one standard that we should have been focused on all along - the quality of the water in your homes and businesses.

Hace unos años, Tucson Water le falló. Las decisiones que la administración de Tucson Water tomó sobre la entrega del agua del CAP fallaron en cumplir con la norma en la que teníamos que habernos concentrado - la calidad del agua en sus casa y en sus negocios. En 1993 y 1994, parte del agua que entregado estaba descolorida o oía y sabía mal - queremos asumir la responsabilidad por haber entregado esa agua y pedirles disculpas a cada uno de ustedes.

In 1993 and 1994, some of the water we delivered was discolored or smelled and tasted bad — we want to take responsibility for serving that water and to apologize to each and every one of you.

Today we're announcing a different approach to the way we serve you.

Hoy anunciamos un enfoque diferente a la forma en que le servimos a usted.

We're going to look at water "At The Tap." We want to work together with you to determine what's important to you in your water and how to deliver a product that's acceptable to you in both quality and price. To assist us in this program, we've assembled a team of experts in water quality, corrosion control, water treatment, and taste and odor. You'll be hearing and seeing a lot more in the future about what we're calling "At the Tap" - the Customer Focus on Water Quality Program. Watch for announcements and updates about the program and how you can participate, in future water bills, on television, in the newspaper, and elsewhere. For more information, contact us at 791-4331.

Vamos a tomar en consideración al agua "De La Llave" (At the Tap.) Queremos colaborar con usted para determinar qué es importante para usted y cómo entregar un producto que pueda usted aceptar tanto en cuanto a su calidad como a su precio. Para ayudarnos en este programa hemos reunido a un equipo de expertos en la calidad del agua, control de la corrosión, tratamiento del agua, sabor y olor. En el futuro usted verá y oirá mucho más sobre lo que llamamos "De La Llave" (At the Tap) - el Programa del Enfoque del Cliente en la Calidad del Agua. Esté pendiente de los anuncios y boletines informativos las próximas facturas del agua, en la televisión, en el periódico y en otros lugares sobre el programa y cómo puede usted participar. Para más información llame al 791-4331.




For more information contact us at 791-4331

Tucson TTY#791-2639 City of Tucson web site <http://www.ci.tucson.az.us>

We Need Your Help

You can help us begin our "At the Tap" program by completing this questionnaire and returning it along with your next water bill.

We are planning to publish regular water quality updates. What information would you like these updates to contain?

Chlorine Hardness Sodium Bacteria

Other _____

Do you have any other comments? _____

Major cross streets closest to your home or business? _____

Necesitamos su ayuda

Puede usted ayudarnos a comenzar el programa "De La Llave" (At the Tap) llenando este cuestionario y devolviéndolo junto con el pago de su próxima factura del agua.

Planeamos publicar regulares boletines informativos de la calidad del agua. ¿Qué información quiere usted que contengan estos boletines informativos?

Cloro Dureza Sodio Bacterias

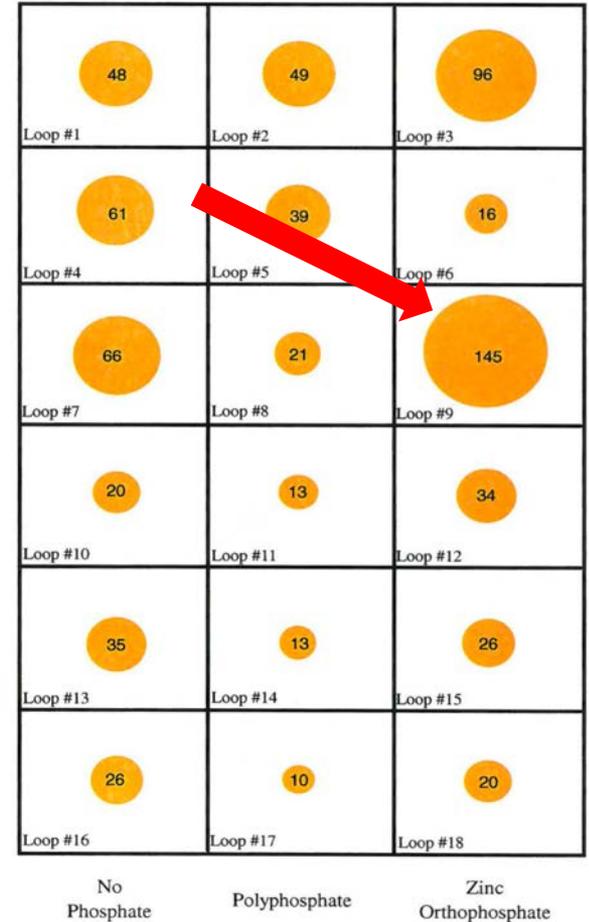
Otro _____

¿Tiene usted algún otro comentario? _____

¿Cuál es el principal cruce de calles más próximo a su domicilio o negocio? _____

Bench-Scale Corrosion Studies

Total Mass Iron, mg



* Area of bubble proportional to value

Pilot-Scale Studies

- Pilot-scale studies included to determine non-corrosive, future water quality.
- **Result:** A blend of recharged CAP water and GW, pH of 8.2 and polyphosphate corrosion inhibitor

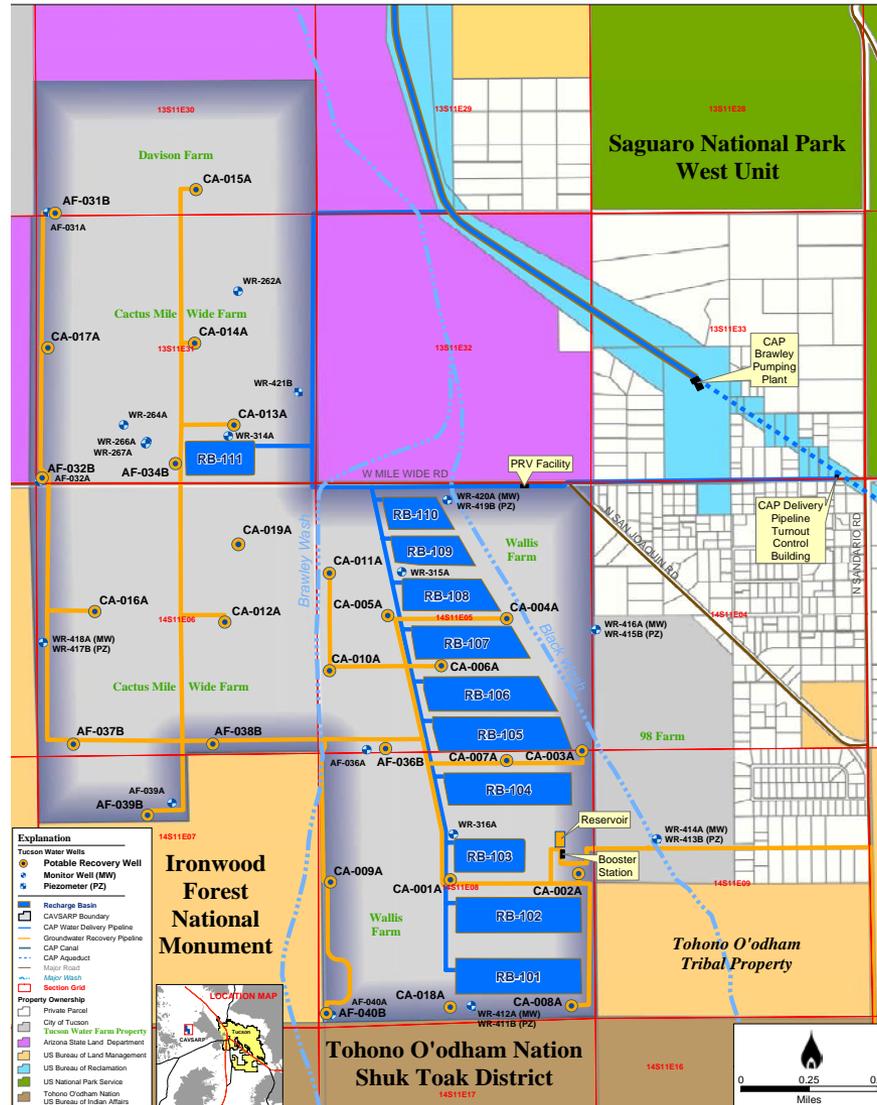


Customer Input on Water Quality

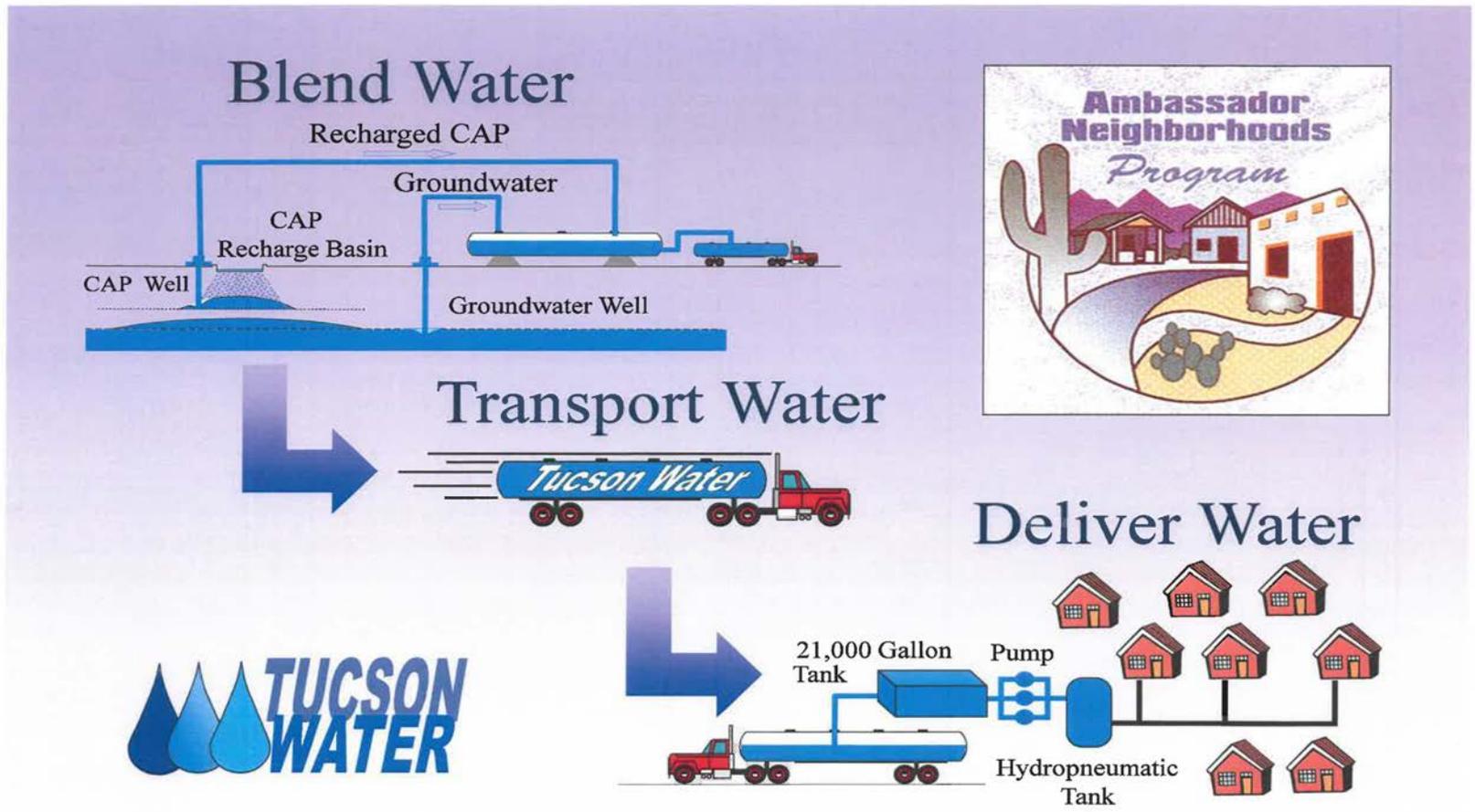


- Flavor Profile Analysis with expert panels, customers and the media
- Determined optimal blend for subsequent large-scale, public studies

Beginning in 1996—Central Avra Valley Storage and Recovery Project



Ambassador Neighborhoods Program



Bottled Water of CAP/GW Blend



A New Water Team in Town

David Modeer

Open, approachable, teambuilder, strategic thinker, truth teller/believable, the face of Tucson Water

Hundreds of TW volunteers at events; Speakers Bureau; Info Van; PSAs; newsletters

Built partnerships in the community: Southern Arizona Leadership Council, UofA, businesses, organizations

Instituted real-time water quality information program for the public

Defeated even more restrictive 1999 Proposition



On May 3, 2001, the Clearwater Facility was put into operation



Outcome

- Water quality goals have been met.
- Tucson's primary drinking water supply is now Colorado River Water.
- Tucson Water has banked excess CAP water for the future.
- Groundwater pumping has been curtailed (over 80 wells shut down) reducing the risk of land subsidence.
- Tucson has become one of the more drought-resistant cities in the Southwest.

Ultimately, this is a success story.

If you think Tucson is unique....

Think again. These utilities have all experienced corrosion issues, customer outrage, and in some cases serious public health disasters.

Washington, D.C., 2001

Oklahoma City, OK, 2003

Fresno, CA, 2004

Beijing, China 2008

Longview, WA, 2013

Flint, MI, 2014

Woodland, CA, 2016

Newark, NJ, 2018

Lessons Learned

1. Consultants are your partners—not the enemy.
2. Leading edge can be the “bleeding edge.”
3. Stringent water quality goals can have severe, unintended consequences.
4. Listen to your customers.
5. Sampling customer opinion is fraught with problems. 51% is not a mandate.
6. Listen to your critics no matter how obnoxious.
7. Develop a comprehensive customer complaint database.

Lessons Learned (cont.)

8. Do the technical and public information work if you change supplies or treatment.
9. Break down management silos. If necessary, start firing and transferring people until they get the message.
10. If you are not out with your employees learning what they do and what their problems are, find another line of work.
11. If you do not take care of crumbling infrastructure, it will come back to haunt you. March on City Hall and demand funding.

An Example of Marching on City Hall



Lessons Learned (cont.)

12. Do not lie to your customers or policy makers. Lies will break you. Transparency matters.
13. Communicate with your staff, customers, and policy makers until they get tired of hearing from you.
14. Always give the credit to someone else.
15. Hire people who are smarter than you are.
16. Be honorable.
17. Be courageous and do what is right.

Lessons Learned (cont.)

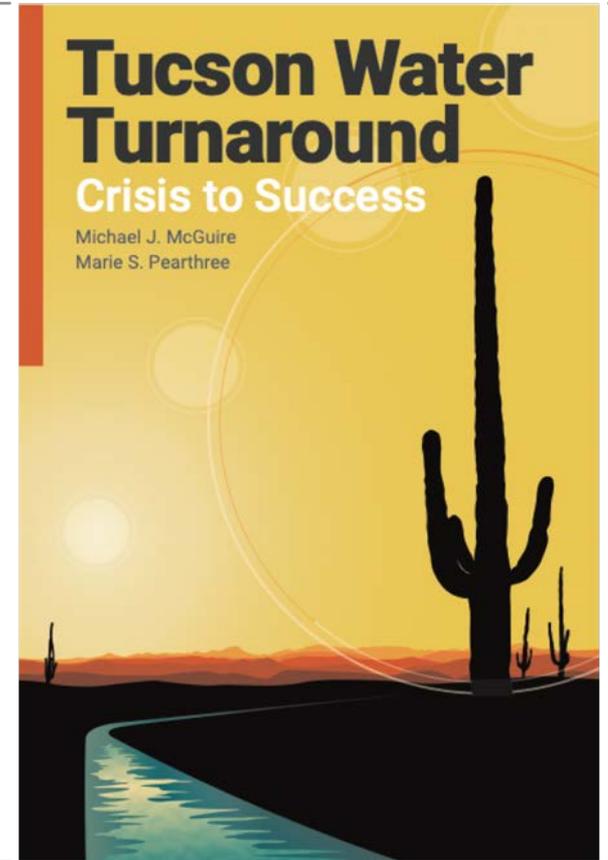
18. Show up at every major pipeline break or service interruption; not just for the photo op. Get into the trench. Walk the pipe.
19. Redundancies in water supplies and treatment processes are gifts that never stop giving.
20. Celebrate success.



Senior managers as barbeque servers to TW staff

If you want to know the whole story...

- Read our book “Tucson Water Turnaround: Crisis to Success”
- Published by AWWA
- Available from the authors, Amazon and AWWA



Thank you!