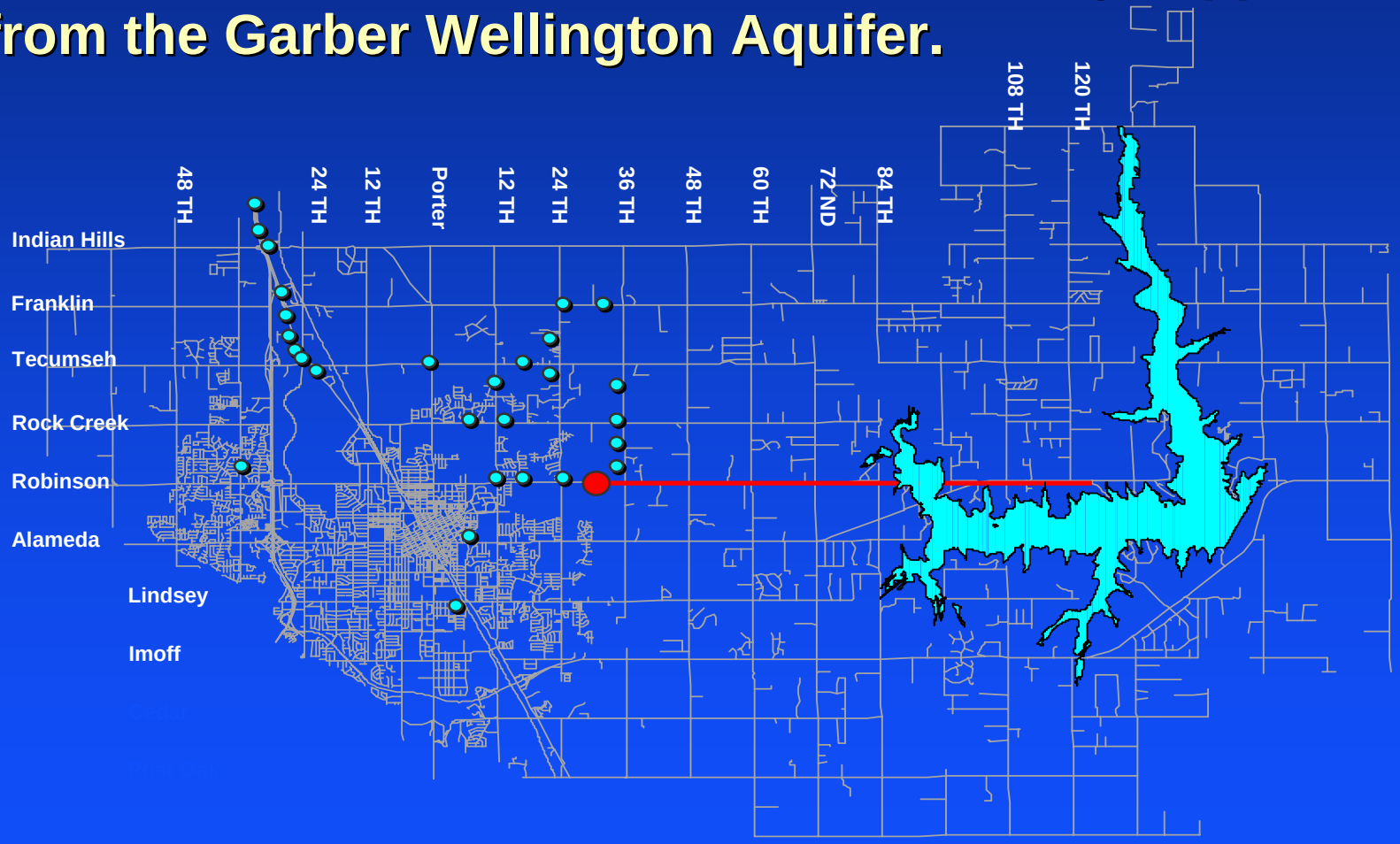
Arsenic In Groundwater

The Municipal Approach

Where does Norman's Water Come From Anyway?

- Norman receives approximately 70% of its water from Lake Thunderbird with the remaining supplies from the Garber Wellington Aquifer.



Sample the Worst Case Arsenic Scenario to Investigate Potential Impacts

- In the Spring of 2000 a worst case Arsenic scenario was induced wherein all of Norman's wells were operated simultaneously and the water treatment plant production was minimized in an effort to measure water quality at the tap.

- All samples were compliant with current and possible future arsenic levels.

Long Term Water Supply Planning

- Norman was completing their Long Term Strategic Water Supply when lower Arsenic limits began to be discussed. (February, 2001)

- Impact potential was reported briefly in the final report.

- The plan noted significant impacts were likely once the limits were adopted.

The Limits are Set and the Public gets Scared

- **The situation in Norman has been publicly discussed in publications such as:**

The Norman Transcript

The Oklahoman

The Daily Oklahoman

The Tulsa World

The Dallas Morning News

US News and World Report

The Wall Street Journal

and

Scientific American

Quickly Getting the Public's Attention in a Very BAD Way

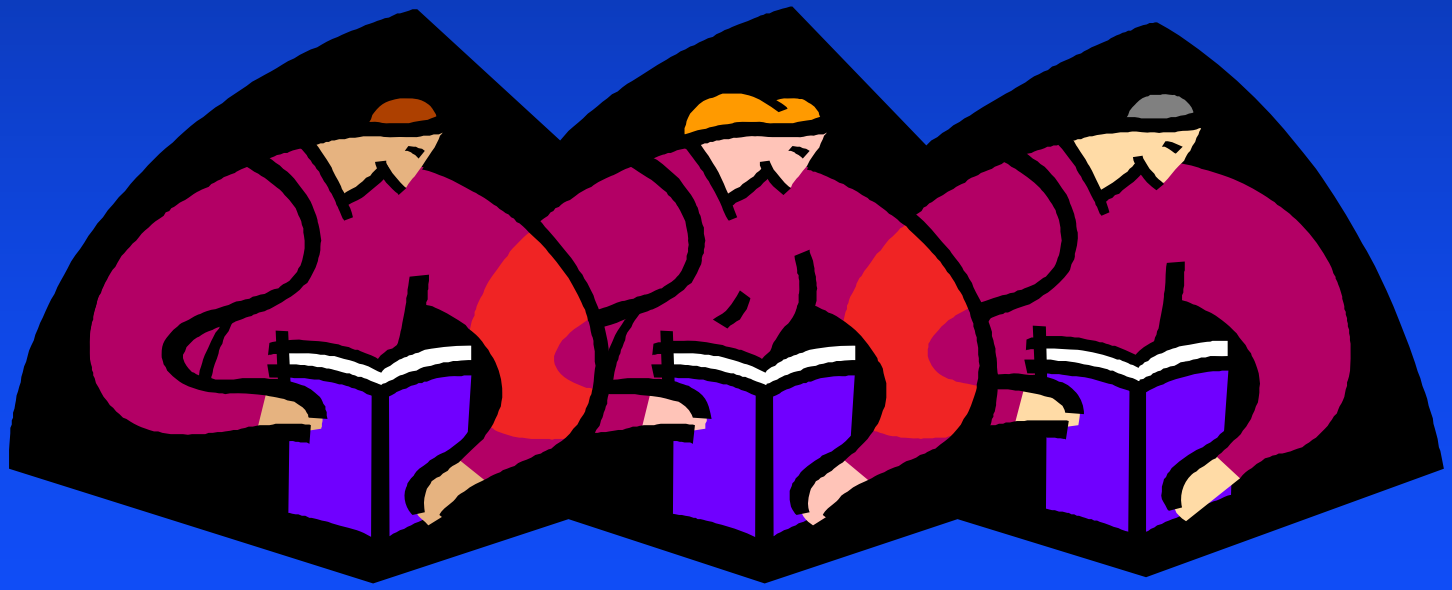
Scientific American **labeled Norman, Oklahoma, the #1**

"Need to Know Danger Zone" **in America.**

June, 2001

The First Steps are the Most Important Steps

- Upon the establishment of the new 10 parts per billion limit for Arsenic, Norman contracted with CH2M HILL to complete an Arsenic Study to establish possible solutions to the problems faced. Study completed in June 2002.



Understand the Real Problem if Possible

City of Norman Well Field, 2003

EXPLANATION

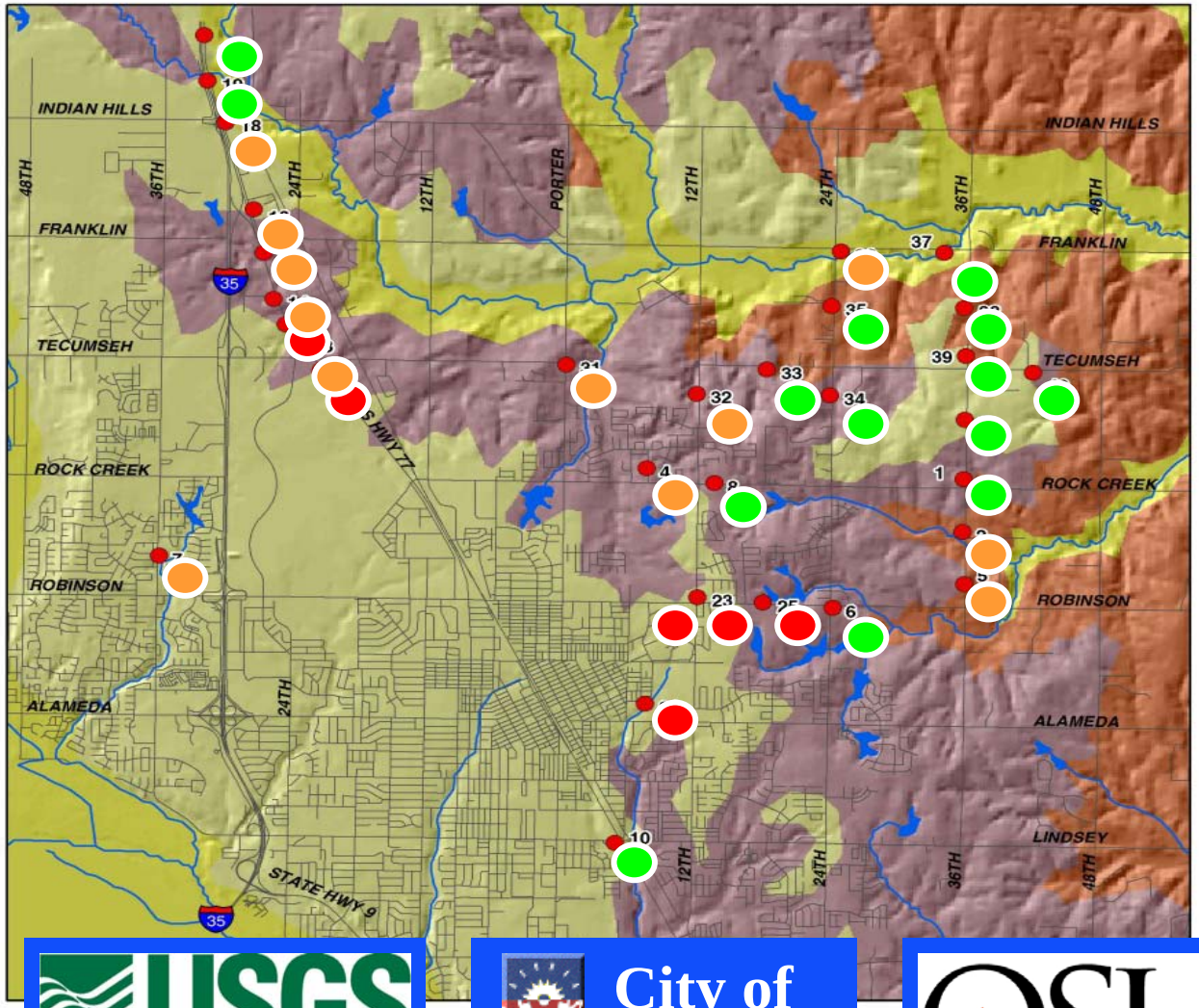
- Norman Roads
- Rivers and streams
- Norman wells

Geologic Unit

- WATER
- Alluvium
- Terrace
- Hennessey Group
- Garber-Wellington Fm.

Arsenic, dissolved, in µg/L

- > 50 µg/L
- 10 - 50 µg/L
- < 10 µg/L



EPA

USGS science for a changing world

City of Norman

OSU

Assessing the Impact

NOW

Well #	Flow (gpm)	Flow (TGD)
1	189	272.2
2	310	446.4
3	235	338.4
4	249	358.6
5	192	276.5
6	239	344.2
7	159	229.0
8	235	338.4
10	134	193.0
11	112	161.3
12	164	236.2
13	190	273.6
14	177	254.9
15	215	309.6
16	143	205.9
18	136	195.8
19	210	302.4
20	155	223.2
21	144	207.4
23	160	230.4
25	100	144.0
31	196	282.2
32	182	262.1
33	200	288.0
34	229	329.8
35	140	201.6
36	241	347.0
37	211	303.8
38	230	331.2
39	186	267.8
40	217	312.5
HP1	100	144.0
HP3	160	230.4
TOTAL FLOW		8.8 MGD

- **Peak day demands require the use of all available water wells. The Arsenic Rule reduces available supplies.**

- **Available Peak Day Supplies drop from 8.8 MGD to 4.4 MGD.**

January 1st

Well #	Flow (gpm)	Flow (TGD)
1	189	272.2
2	310	446.4
3	235	338.4
4	249	358.6
5	192	276.5
6	239	344.2
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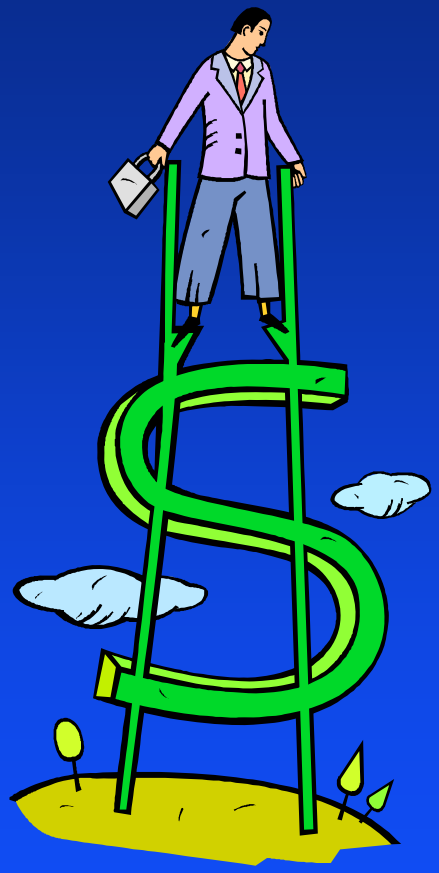
34	229	329.8
35	140	201.6
36	241	347.0
37	211	303.8
38	230	331.2
39	186	267.8
40	217	312.5
HP1	100	144.0
HP3	160	230.4
TOTAL FLOW		4.4 MGD

How Do you Pay for a Unfunded Mandate?

- The Arsenic Rule will cost Norman over $11.1 million.



- How do you get the Voters to approve funds to provide for this need?

Paying for an Unfunded Mandate

- Undertake a Cost of Service Study to assess who should pay for what and by what means should they do it…

- A public vote is expected in Spring 2006 to fund a comprehensive water supply solution.

Communicate! Communicate! Communicate!

- Public Discussions
- Public Emotions
- Public Communication
- Public Approval

Respond to Citizen Concerns

- Responding to citizen concerns has always been our top priority.

- Citizens always have staff available to discuss any Arsenic related concern.

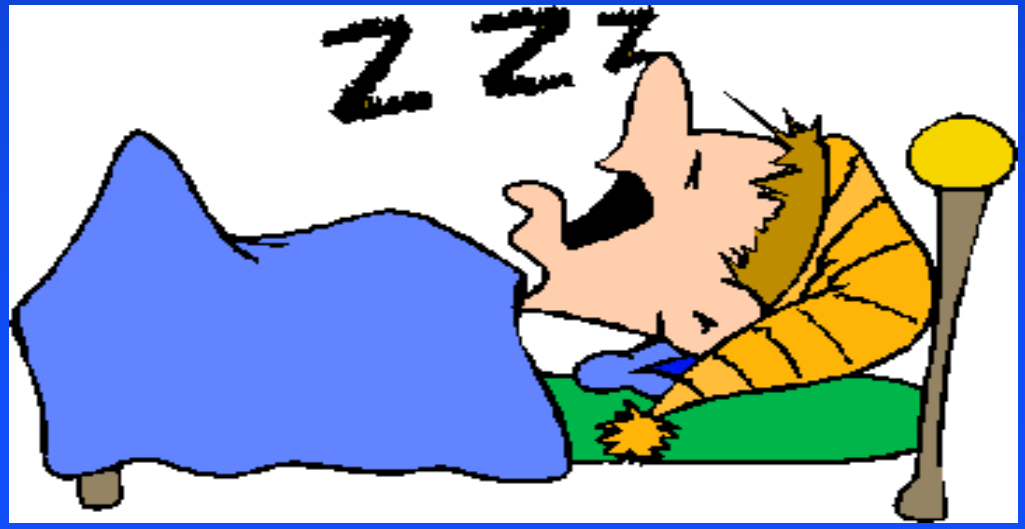
Respond to Citizen Concerns

Citizen Asks: Is the Arsenic levels responsible for my sons lethargic behavior? I read about our problems in ***Scientific American***. I just cannot get him to do anything around the house lately and I am concerned that something is wrong. I read that Arsenic can change a persons energy level.

Staff Responds: The Arsenic levels are way below that published in Scientific American. (with a lengthy explanation of the details)

Staff Asks: How old is your son?

Citizen Responds: He is 13 and he did not use to be this way when he was younger. Do you think that it may be the water that is causing him to be lazy or is it just me?



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The Municipal Approach