

# Water for the Future

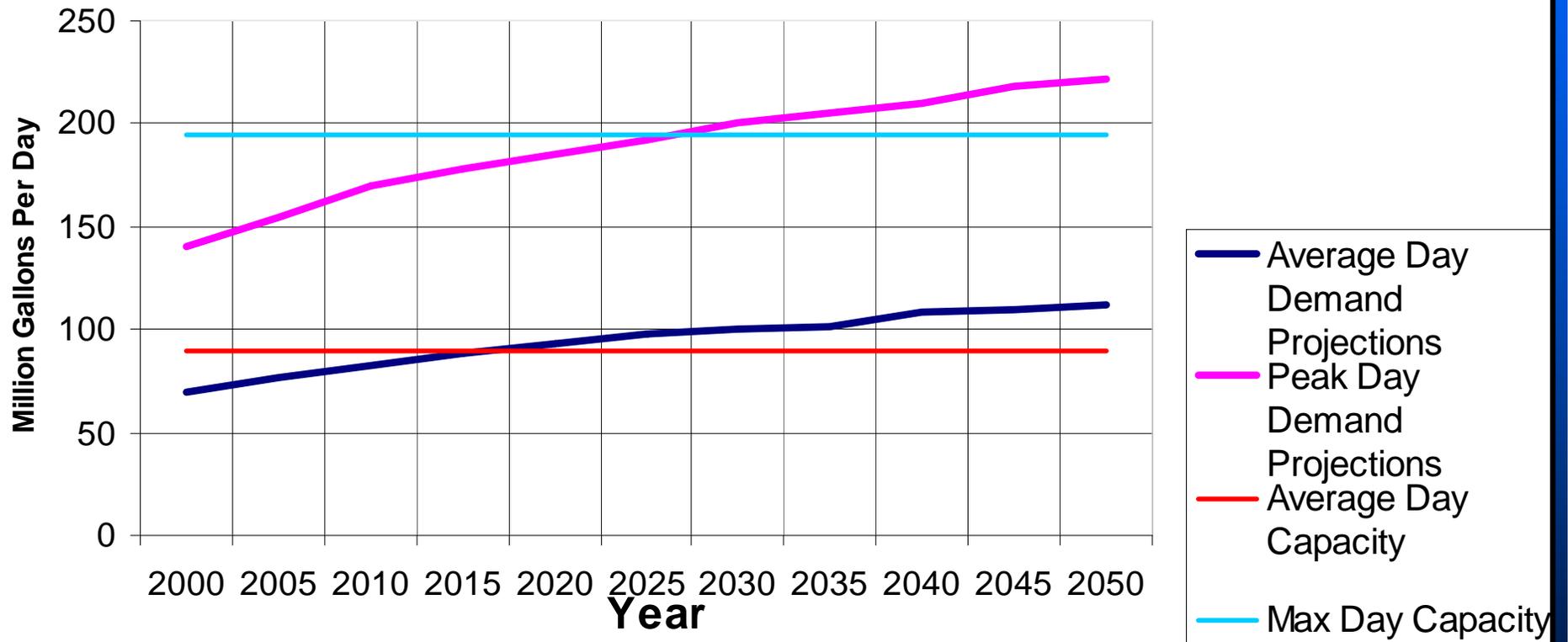
## The City of Wichita's Regional Aquifer Storage and Recovery Project



# Water Supply Planning

- City began looking for future water supplies in the 1980's.
- Integrated Local Water Supply Plan approved in 1993.

# Projected Water Supply Demands

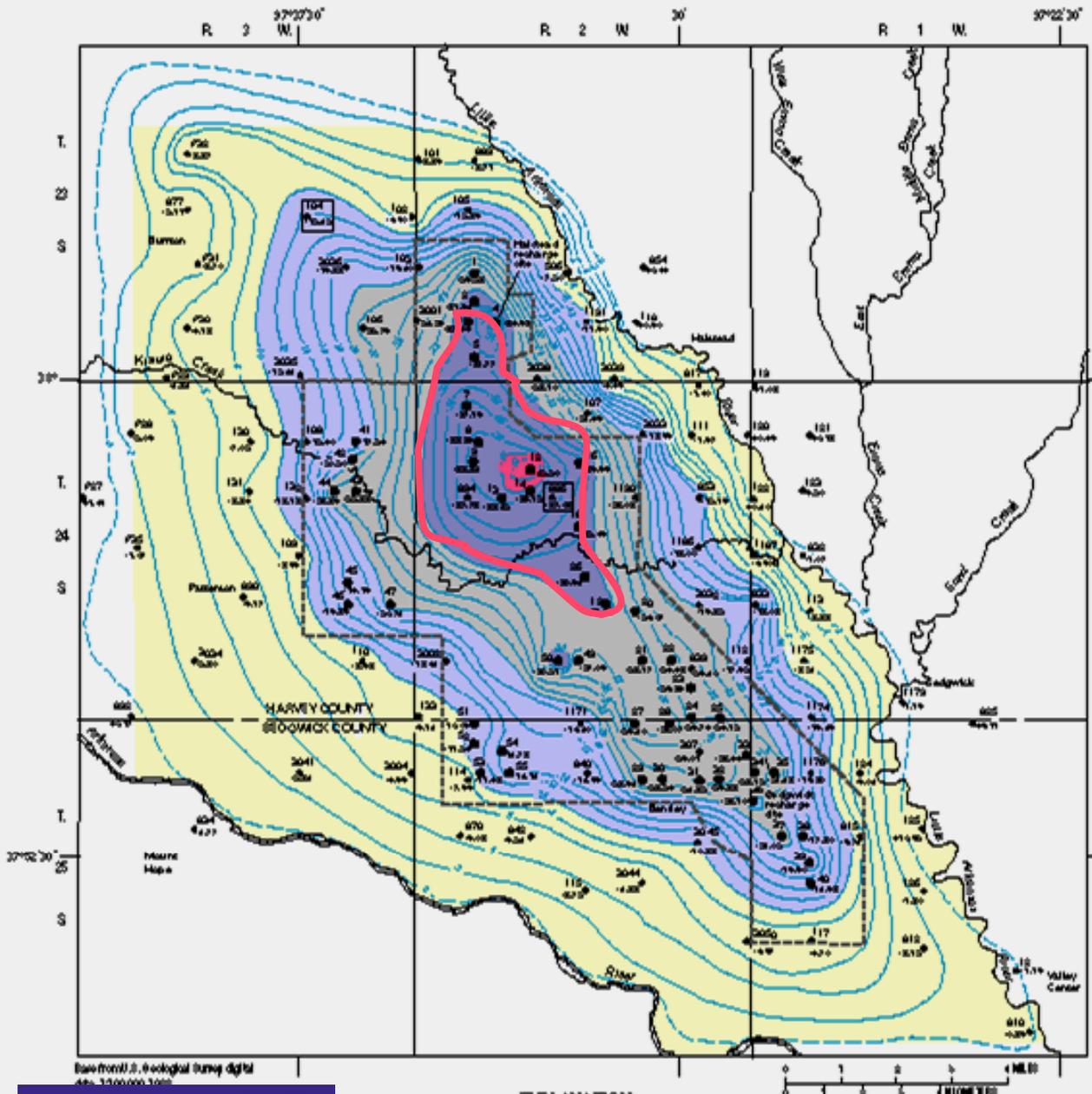


## **Integrated Local Water Supply Plan (ILWS Plan)**

- **Greater use of Cheney Reservoir.**
- **Conservation.**
- **Build a 100 MGD Aquifer Storage and Recovery (ASR) system.**
- **Re-develop the Bentley Reserve WF - 10 MGD.**
- **Expand Local Well Field - 45 MGD.**
- **Install additional raw water pipelines.**
- **Add a new water treatment plant - 65 MGD.**

Equus Beds Aquifer is a major source of water supply for the City of Wichita, but also a major source of water for agricultural and industrial use for the surrounding area.

Excess use of the aquifer has resulted in water levels declines of up to 40 feet, and the threat of salt-water contamination.



65 billion gallons are available for storage to return to 1940 water levels.

# ASR Project

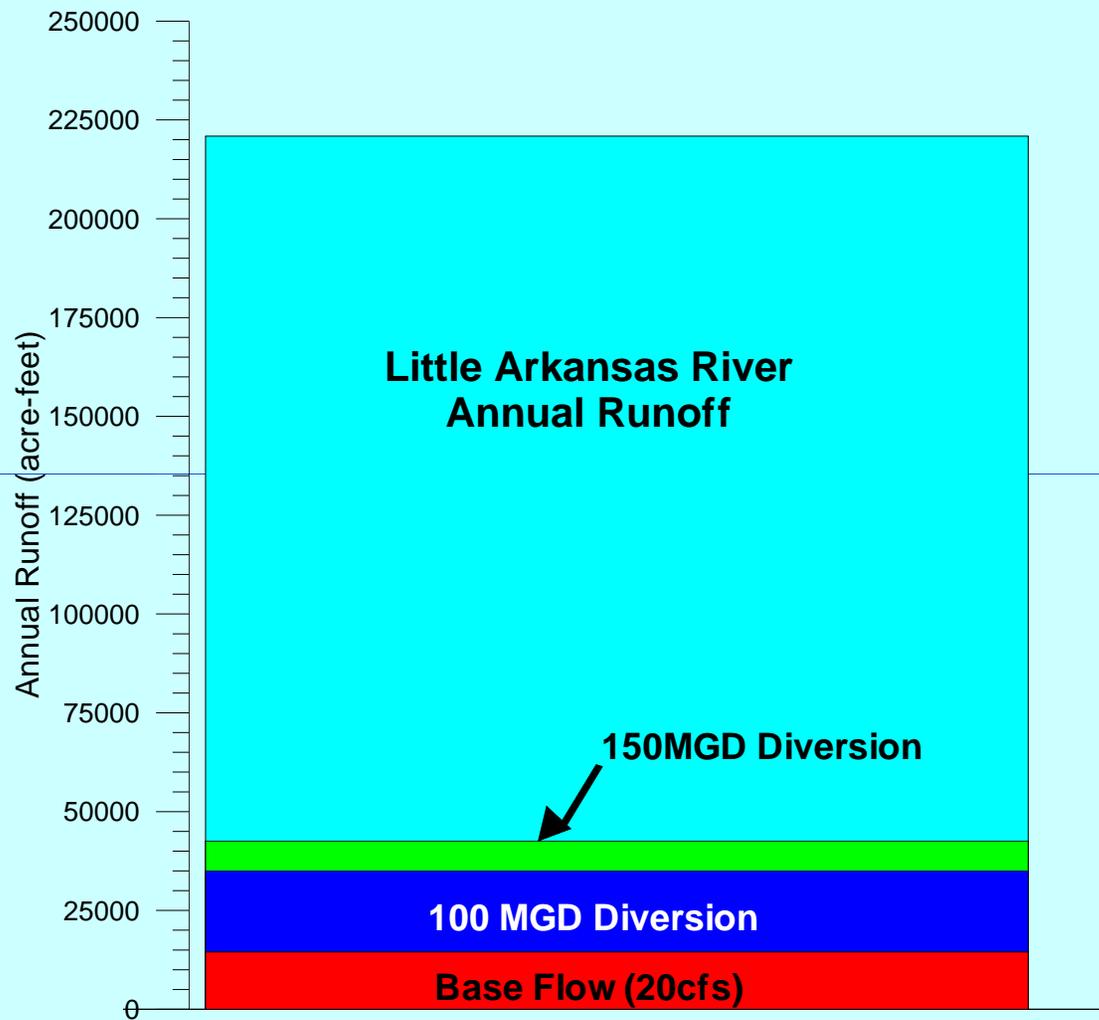
- Capture above base-flow from Little Arkansas River
- Use both diversion wells and surface water intake.
- Recharge through recharge wells and recharge basins.

# Aquifer Recharge Concepts

- Recharge water is from Little Arkansas River using “above-base flow” water captured by wells and surface water diversions.



An "Above-Base Flow" Event



## Annual Runoff of the Little Arkansas River

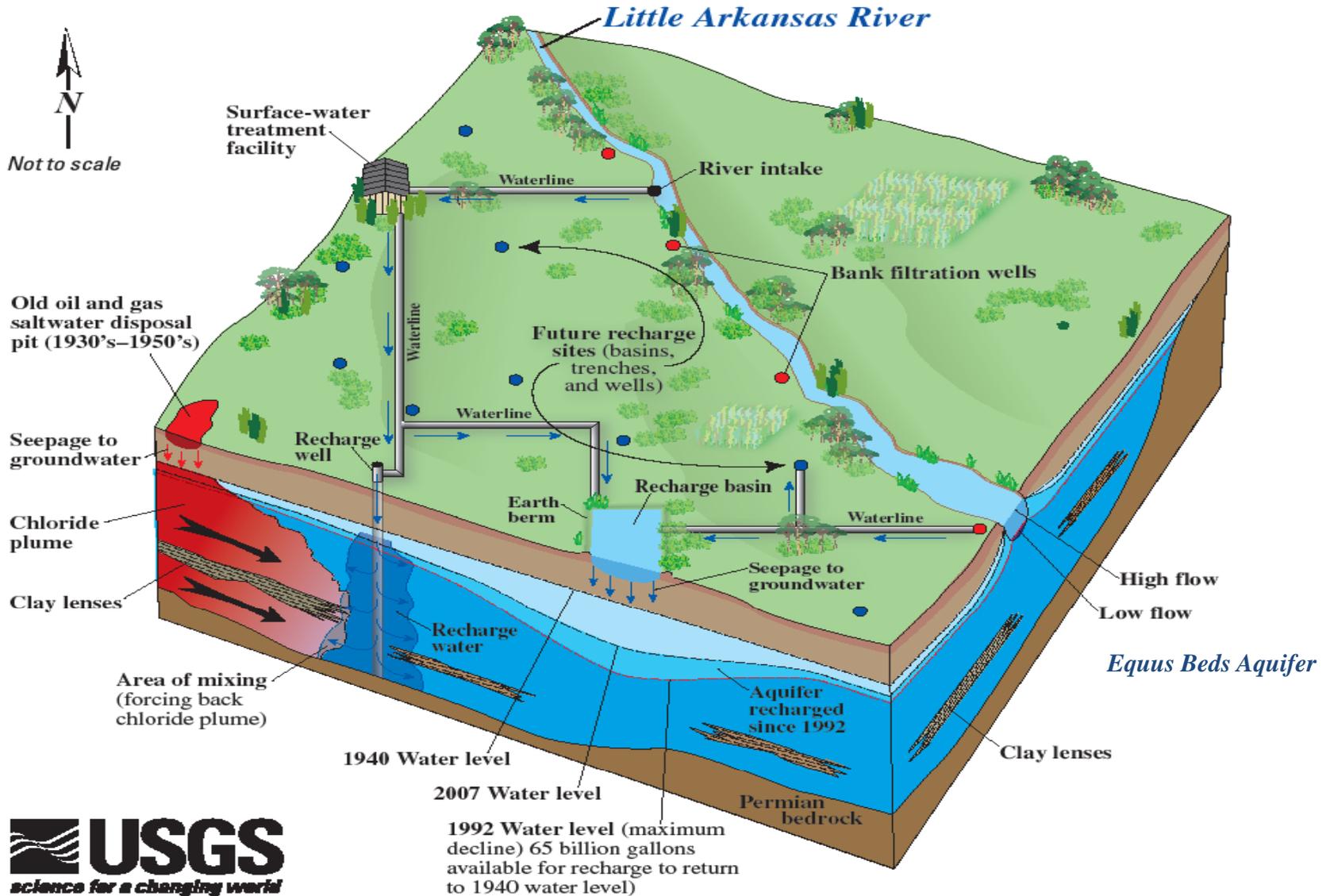
# How many days can recharge operate at flow exceeding 20 cfs? (\*=flow more than 56 cfs)

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
114	130	270	199	349	228	168	99	151	151	144*	6*	146*



# Equus Beds Aquifer—Aquifer Storage and Recovery

## Preserving Our Water...Our Future



## ILWS Plan is a **Win-Win** Project

- The City gets a water supply source that meets needs through 2050.
- Water Quality is protected from salt water contamination.
- No requirement to curtail irrigation.
- Irrigators have lower pumping costs.
- Improves low flows in Little Ark. River.
- Project uses less land than any other surface water development project.

Project represents a new approach to developing water resources while at the same time protecting an existing water resource from contamination.

Project is a key component of a  
water supply for 500,000 people

In 2006, the City of Wichita supplied about 23 billion gallons of water, and submitted \$1.38 million to the the Water Plan just that year.

Since its inception in 1985 the Water Plan has made substantial commitments towards the construction of surface water reservoirs for municipal and industrial use.

This project achieves the same role.

# Demonstration Project

- To address concerns about the ASR project, the City did a 5-year demonstration project to validate primary components of the project.
- Demonstration Project recharged over 1 billion gallons and confirmed that project would be successful.

# ASR Phase I

- Appropriation applications submitted to DWR, Nov. 2003.
- MOU approved by GMD and City Council Aug. 2004.
- DWR Public Hearing Dec. 2004.
- Appropriations granted in August of 2005.
- Construction began in March 2006.
- Construction completed Fall of 2006.

# Extensive Regulatory Controls on Project

- Project includes restrictions on flow conditions in the river.
- Installation of 7 additional monitoring wells near diversion wells.
- Class V permit from KDHE controls water quality to wells and basins.
- Installation of 28 monitoring wells near recharge sites.

# ASR Phase I

- Components of Phase I changed because testing found that River/Aquifer connection not as good as anticipated.
- Use fewer diversion wells and include a river intake.
- Include 7 MGD surface water treatment plant.

# ASR Phase I

- 3 River Diversion Wells.
- One 7 MGD River Diversion.
- One 7 MGD Surface Water Treatment Plant (Ballasted Flocculation).
- 4 Recharge Wells.
- 2 Recharge Basins.
- 14 Miles of Overhead Power Lines

Surface Water and Diversion Well systems are parallel, but separate. No surface water can go into recharge wells.



What have we built?

# Surface Water System





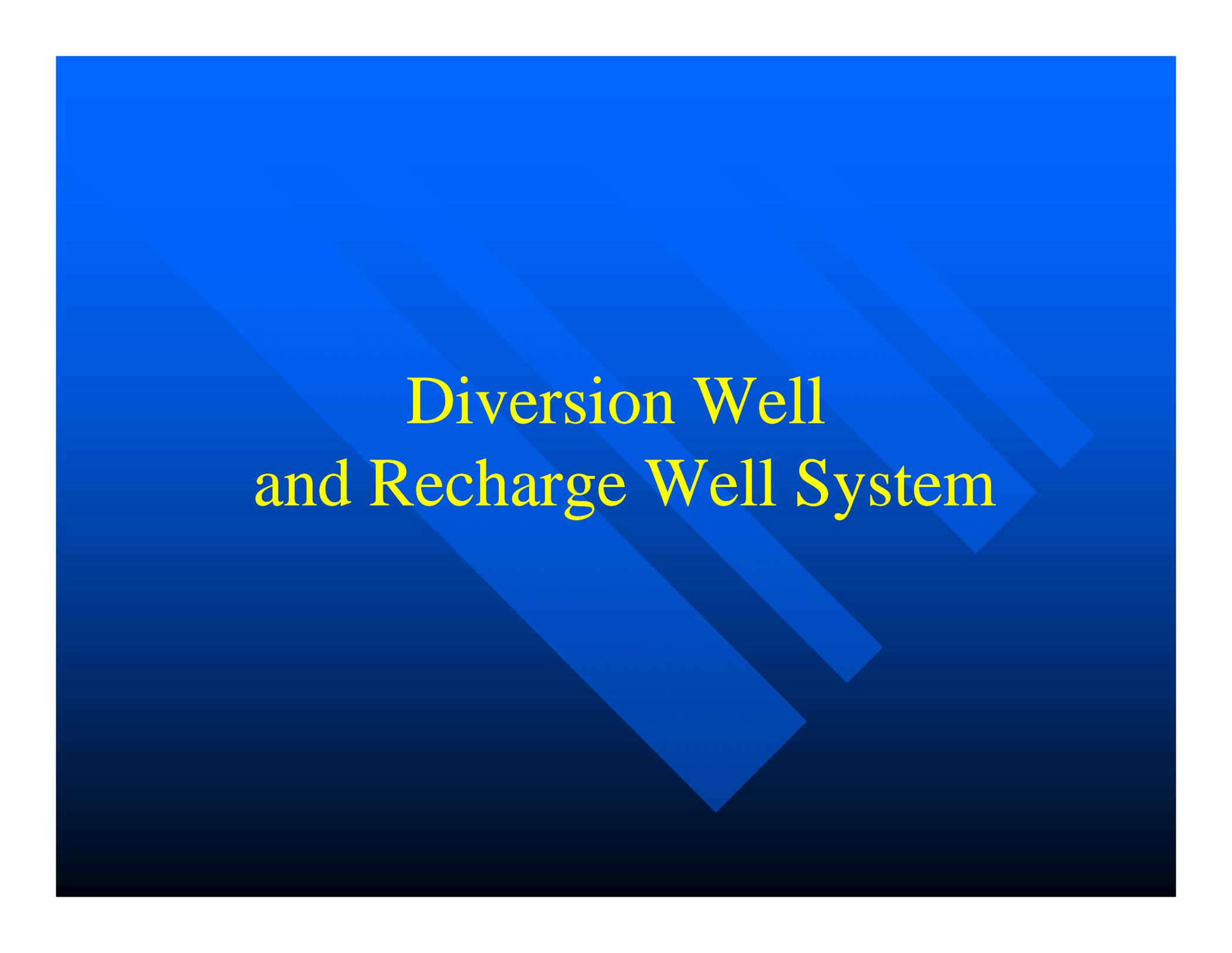










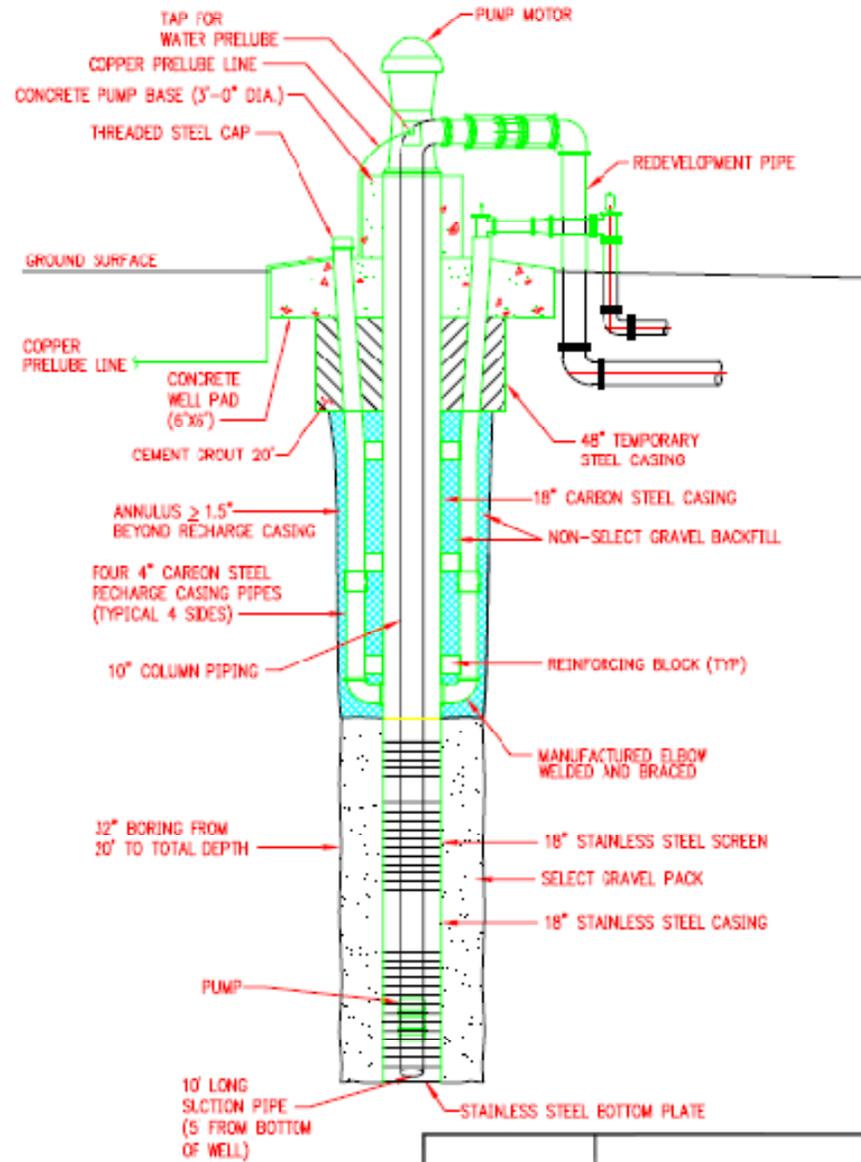
The background is a solid blue color with several diagonal stripes of a slightly lighter shade of blue, creating a textured effect. The stripes run from the top-left towards the bottom-right.

# Diversion Well and Recharge Well System





TYPICAL RECHARGE WELL



NOT TO SCALE



TYPICAL  
RECHARGE WELL  
SCHEMATIC

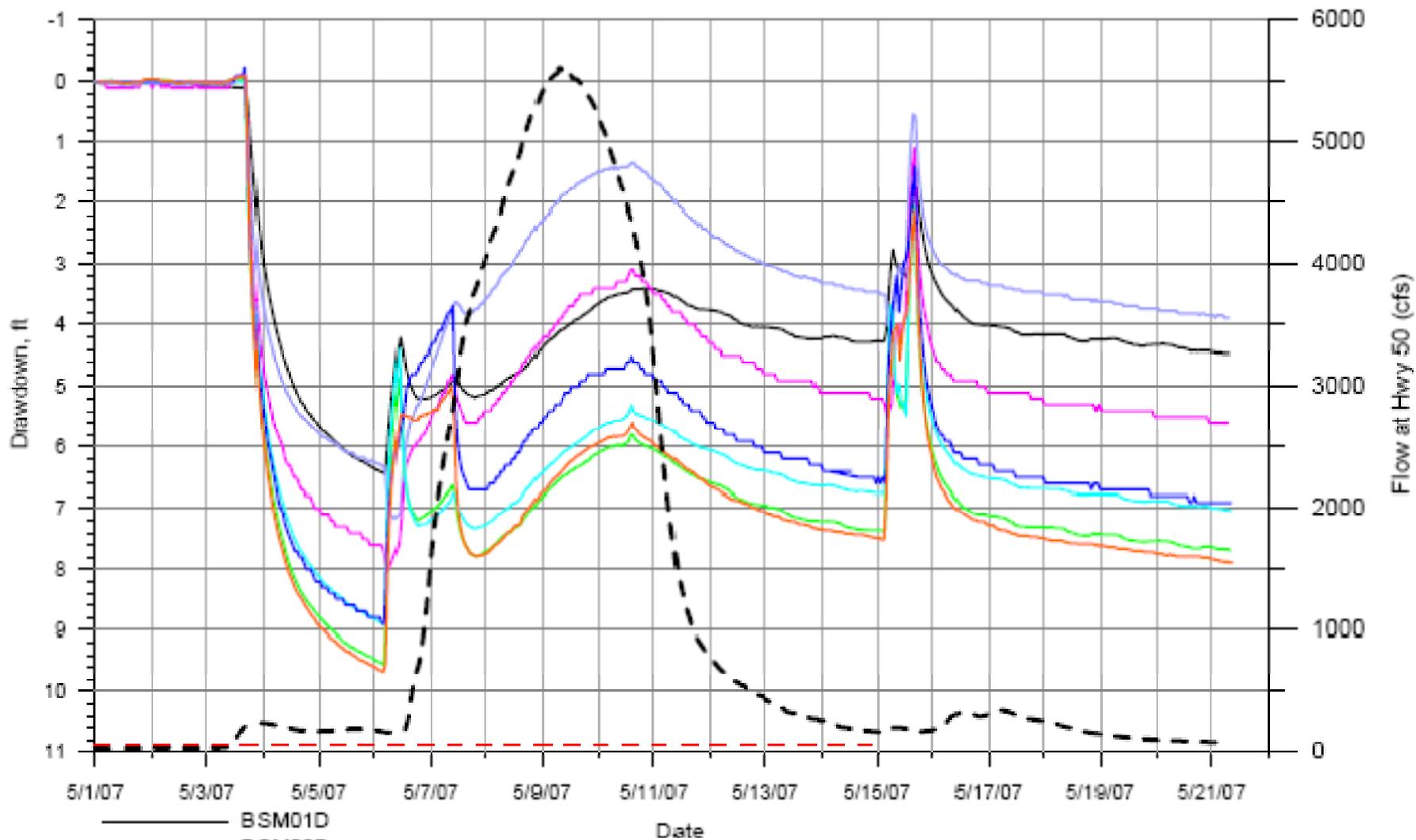


# Overhead Power Lines



# Performance of Diversion Wells

- Appropriations require at least 56 cfs in the river during irrigation season
- Drawdown less than 10 feet 660 feet from well
- Recovery to regional water level in less than 7 days
- No impairment to other groundwater users

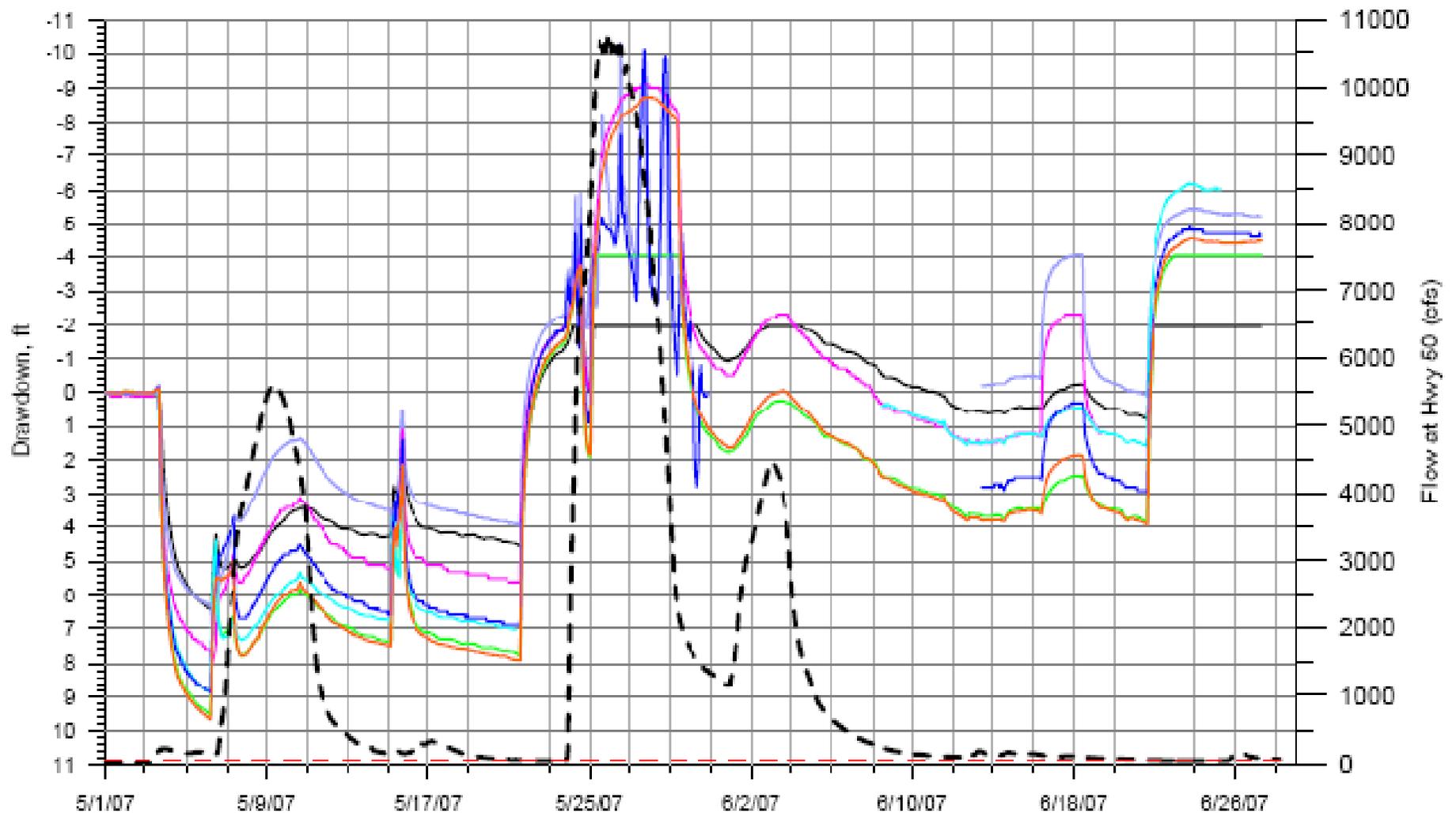


- BSM01D
- BSM02D
- BSM03D
- BSM04D
- BSM05D
- BSM06D
- BSM07D
- - - Flow at Hwy 50
- - - Min. Flow for Artificial Recharge



BANK STORAGE  
MONITORING WELLS  
May 1 - 21, 2007

DRAWDOWN  
HYDROGRAPHS



- BSM01D
- BSM02D
- BSM03D
- BSM04D
- BSM05D
- BSM06D
- BSM07D
- - - Flow at Hwy 50  
Min. Flow for Artificial Recharge



BANK STORAGE  
MONITORING WELLS  
May 1 - June 27, 2007

DRAWDOWN  
HYDROGRAPHS

# Hydrograph Results

During the period shown the diversion wells pumped over 112 million gallons (345 acre feet), yet in less than one day the water levels in the monitoring wells returned to levels that were 4 to 6 feet **HIGHER** than they were before the City started pumping

# Water Quality

- All water recharged must be below the Maximum Contaminate Level (MCL) established for drinking water.
- Currently treating surface water to remove atrazine.

# Water Quality

	Recharge Wells	Recharge Basins	Drinking Water Stan.
Atrazine	N/D	1.6 ppb	3 ppb
Arsenic	8.6 ppb	N/D	10 ppb
Hardness	135 ppm	123 ppm	NA
Chlorides	5.5 ppm	42.8 ppm	250 ppm
Nitrates	N/D	0.3 ppm	10 ppm

# Recharge Quantity

- 2006 – No recharge because of low flows in river.
- 2007- Over 350 million gallons recharged.

## Phase II

- Will capture and recharge up to 30 MGD.
- Will only use surface water.
- Will have treatment plant that will treat the water adequately to go directly into recharge wells.
- Includes replacement of approximately 17 miles of existing raw water pipeline.

## Phase II

- Will include 26 recharge/recovery wells, most at sites with existing municipal supply wells.
- Water quality established by KDHE – as safe as municipal water supply.

# Phase II

- Design to start in 2008
- Construction to begin in 2009, complete by 2011.