DWR EXHIBIT M

Informal Submissions, Carl Nuzman

August 7, 2003

MEMORANDUM

August 7, 2003

To: The File

From: Tom Huntzinger

Cc:

Subject: Wichita recharge and recovery

A meeting was held with Carl Nuzman this date. He has been retained by the GMD 2 board to assess the technical merits of the applications for permit to divert source water from the Little Ark. River, recharge it to the Equus Beds, and subsequently recover it.

Initial concerns were expressed about the depth of the bank storage wells under the term permit for the pilot project. The wells are drilled to the base of the Equus beds aquifer and screened substantially below the streambed. It is his argument that well logs indicate low permeability clay layers of substantial thickness exist between the top of the screen and the stream, effectively eliminating the hydraulic connection between the wells and the water temporarily stored in the banks. He further argues that the present design merely withdraws water from one location of the Equus Beds aquifer and injects it at another location capturing no stream runoff water. Well log data submitted shows clay layers of about 30 feet with a thin sand layer of less than 10 feet above the clay. About 10 feet of clay also is shown between the stream bed and the sand layer.

His conclusion is that there is no practical opportunity to pump bank storage water from the clay adjacent to the stream.

Data and some analysis were submitted informally without cover letter.

Wichita Aquifer Storage & Recov

CARL E. NUZMAN, P.E., P.Hg.
Consulting Engineer/Hydrologist

SHEET NO. 1 OF

CALCULATED BY Carl Nuzman DATE 7/17/03

The concern of the Consultant and several members of GMD #2 is that no direct communication between the Little Arkansas River and Channel to the Equus Beds aquifer exists at the test site.

The concept of pumping bank storage water only when 40 feet or more of low permeable clay exists between the water in the Little Ark Channel and the aquifer is not realistic nor accepted by this Consultant and was of major concern by several members of the GMD No 2.

The pumpage of water for the recharge project was not in compliance with the terms and conditions of Temp permit Fle No 95908 in that most of the water pumped was Equus Beds aquifer water recharged from Natural Precipitation and not limited to "Bank Storage Water" only.

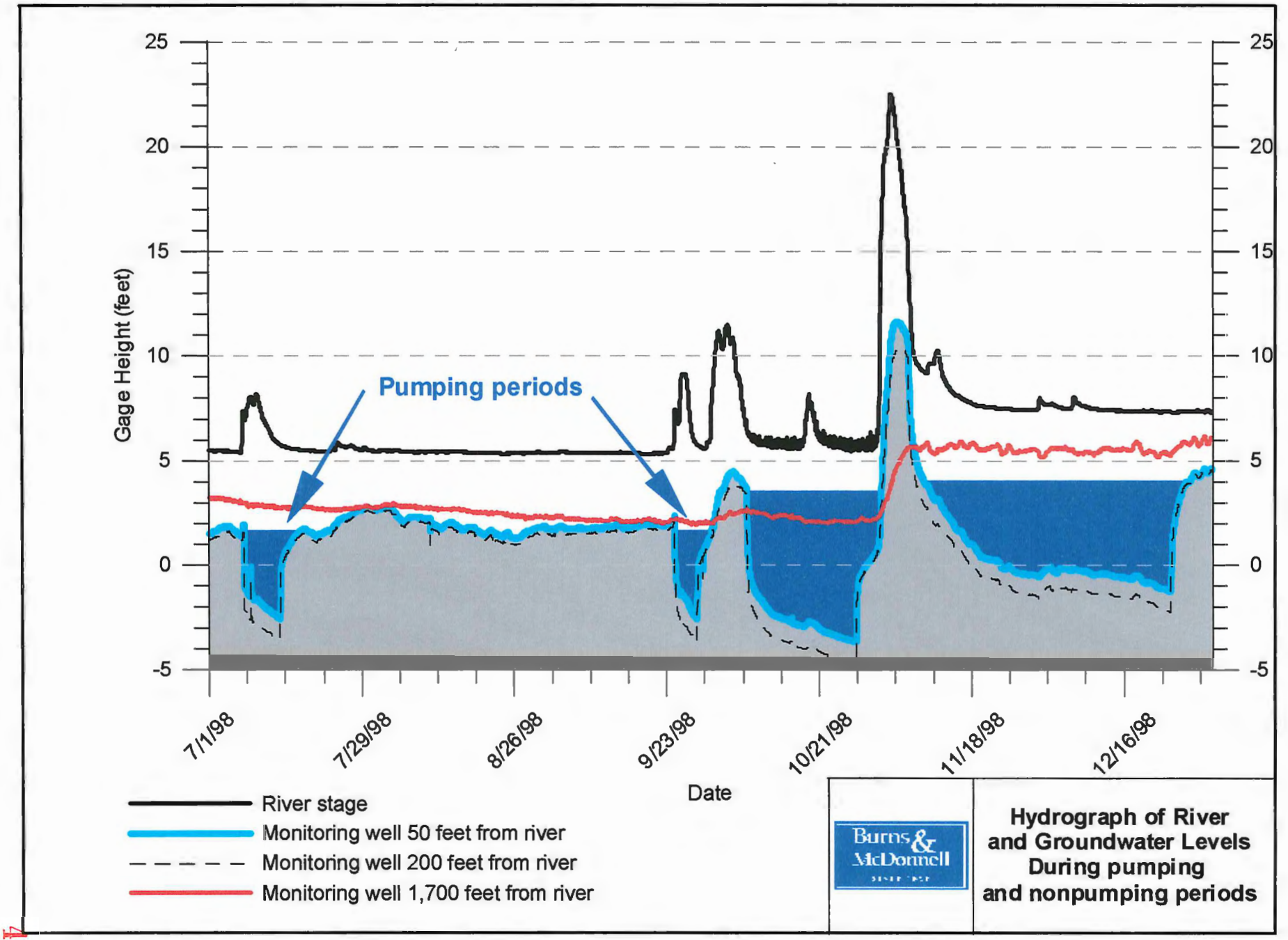
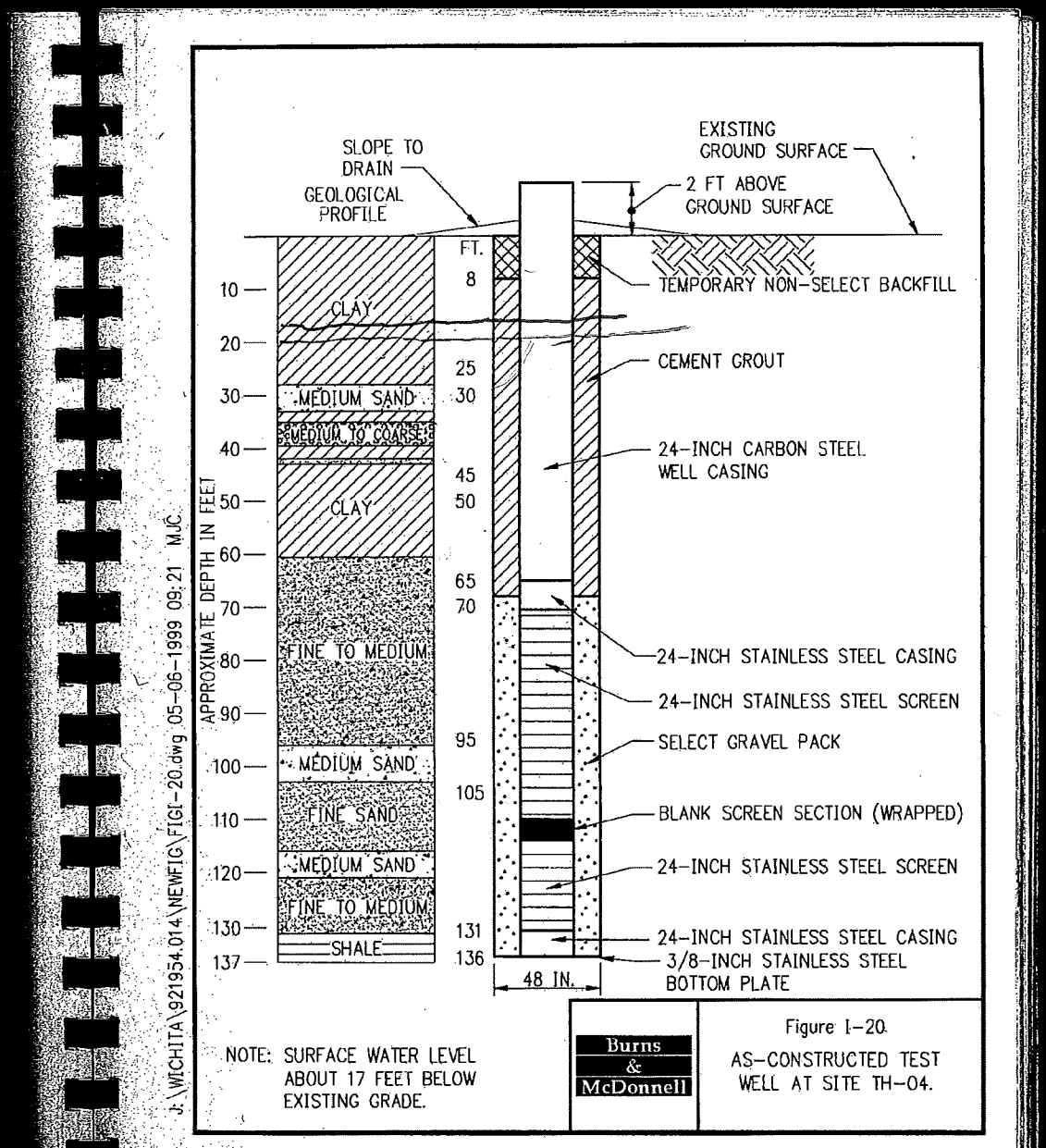

25
20
15
10
5
0
-5
Gage Height (feet)
Pumping periods
7/1/98
7/29/98
8/26/98
9/23/98
10/21/98
11/18/98
12/16/98
Date
River stage
Monitoring well 50 feet from river
Monitoring well 200 feet from river
Monitoring well 1,700 feet from river
Burns & McDonnell
Hydrograph of River and Groundwater Levels During pumping and nonpumping periods

Figure I-21

DRAWDOWN
UPPER AND LOWER ZONES
SITE TH-04

J:\WICHITA\92194.014\NEWFIG\FIG1-21.dwg 07-15-1999 16:06 MJC



NOTE: SURFACE WATER LEVEL ABOUT 17 FEET BELOW EXISTING GRADE.

Burns & McDonnell

Figure I-20.
AS-CONSTRUCTED TEST WELL AT SITE TH-04.

Done with Gilliland

DRAFT

MAY 5 1998

EXHIBIT "A"

ADDITIONAL CONDITIONS OF TERM PERMIT

FILE NO. 959087

The approval of this term permit is subject to the following additional conditions:

1) The withdrawal well is equipped with a water meter pursuant to Equus Beds Groundwater Management District No. 2 (District) Metering Policy 8103.5;

2) The withdrawal well shall operate during bank storage events in the Little Arkansas River;

3) Bank storage, for the purpose of permit conditions, is limited to flows in the Little Arkansas River at the well site equal to or greater than 20 c.f.s. during the months of October through March, and equal to or greater than 42 c.f.s. during the months of April through September;

4) Well construction plans are submitted to the District for approval and shall include but not be limited to casing and screen schedules, grout intervals and pump settings;

5) At the well site a monitoring well is drilled and completed in the lower zone of the aquifer for measuring and testing purposes;

6) The applicant is granted a maximum of 5,760 operational hours of the authorized point of diversion for the purpose of conducting aquifer tests, water level measurements, water use measurements and other pertinent data, in order to determine if there is separation of the aquifer's upper and lower zones at the well site; and the applicant shall submit said data and test results to the Division of Water Resources and the District within the specified time period; 240 da

7) No water shall be pumped from the lower unit of the aquifer, if determined by the Division of Water Resources and the District that aquifer separation exists;

8) Based on the findings and conclusions of the Division of Water Resources and the District, the well is constructed to allow only withdrawal of bank storage water;

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EXHIBIT "A"
ADDITIONAL CONDITIONS OF TERM PERMIT
FILE NO. 959087

MAY 5 1998

9) Final construction of the well shall maintain separation between the aquifer's upper and lower zones;

10) The use of Class V UIC recharge wells is authorized by the Kansas Department of Health and Environment and minimum water quality standards for effluent approved by the Department for organic and inorganic compounds, pesticides and bacteria are met;

11) The Class V UIC wells and basin discharge lines are equipped with flow meters;

12) The annual groundwater diversion and injection quantities, and water quality analyses are reported to the Division of Water Resources and the District by March 1, of each year;

13) The recharge system is constructed, operated and monitored to prevent groundwater contamination;

14) The operation of the withdrawal and recharge wells not impair existing water rights nor prejudicially affect the public interest; and

15) The diversion works shall be equipped with an hour meter so that total cumulative pumping time may be monitored.