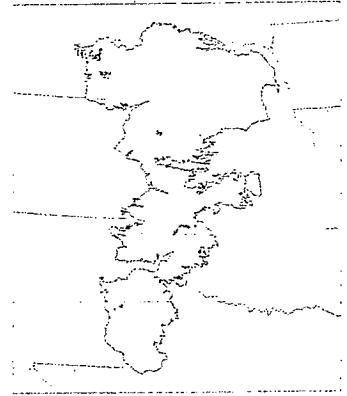


High Plains Hydrology LLC  
7956 S. Shawnee St.  
Aurora, CO 80016-7206  
(303) 693-0299



April 2, 2007

Steve Gaul  
Supervisor, Planning and Assistance Division  
Nebraska Department of Natural Resources  
P.O. Box 94676  
Lincoln, NE 68509-4676

RECEIVED

APR 04 2007

DEPARTMENT OF  
NATURAL RESOURCES

Dear Steve:

Enclosed please find my monthly report for March, an invoice for the time and expenses for work with the Department of Natural Resource, and a spreadsheet supporting the time. If you have any questions, please give me a call. Thank you.

Sincerely,

Richard R. Luckey  
Senior Hydrologist

**Groundwater Modeling Support for the Nebraska Department of Natural Resources**

**Status Report, March 31, 2007**

- Objectives:** 1. Provide modeling support as requested; and
2. Compare COHYST and RRCA models in area of overlap, with emphasis on the groundwater mound area.

**Status:**

Dick continued to work on the differences between the Cooperative Hydrology Study (COHYST) models and the Republican River Compact Administration (RRCA) model in March. He got the latest eastern COHYST model from Steve Peterson and started looking at 1950-97 recharge. He compiled average 1950-98 recharge by county for both the Central Model Unit and the Eastern Model Unit. He corrected the recharge arrays to remove the boundary flows.

Dick got the Republican River Compact Administration (RRCA) calibrated model from Paul Koester and worked on the recharge in that model. The only way to meaningfully compare RRCA and COHYST recharge is on a seasonal basis (May-September and October-April). Dick wrote some programs to extract the monthly RRCA recharge and sum it by season. When checking this against what GMS said was the monthly recharge for a selected cell, something appeared to be amiss. However, it turned out he had offset the time steps in GMS by one year. By the end of the month, he verified that GMS was okay and the programs were functioning okay. However, he still has to process the bulk of the data.

Dick met with Ann Bleed, Jim Schneider, and Jesse Bradley to discuss the differences between the COHYST estimates of recharge on dryland and irrigated land. The differences are making substantial differences in the revised estimates of the effects of new irrigated land after 1997 that needs to be mitigated for the Platte River Recovery Program. They discussed some sensitivity analysis that Doug Hallum could do to see how much of a difference that this made. While Dick thinks the total recharge is about right in the COHYST models, he conceded that individual components could be in error. He also noted that the Peer Review thought that recharge was too large in the Eastern Model Unit, but did not understand the argument why. The group also talked about some tests of the COHYST models to see how much the difference between dryland and irrigated land recharge could be changed without affecting model calibration.

Dick had several calls with Doug Hallum about the COHYST version of ZoneBudget and how to run it. Dick also helped Doug with how to compute the differences between dryland and irrigated land recharge to account for gained and lost irrigated land between 1997 and 2005.

**Plans for next month:**

Dick will continue to compare recharge between the RRCA and COHYST models. He will average the recharge from the central and eastern models to get a single COHYST dataset. He will complete data processing to get seasonal RRCA recharge. He will get average 1950-98 for both models. Once that is done, he will decide if something further needs to be done to compare the recharge between the models.

Dick will do other tasks as requested by DNR.

# High Plains Hydrology LLC

7956 S. Shawnee St.  
Aurora, CO 80016-7206  
Phone (303) 693-0299 Cell (303) 916-5973



# INVOICE

INVOICE #120  
DATE: APRIL 2, 2007

**TO:**  
Nebraska Department of Natural Resources  
301 Centennial Mall South  
P.O. Box 94676  
Lincoln, NE 68509-4676

**FOR:**  
Services of Senior Groundwater Modeler

LABOR DESCRIPTION	HOURS	RATE	AMOUNT
March, 2007, Task 1-1 (see attached spreadsheet)	5.75	\$ 70.00	\$ 402.50
March, 2007, Task 1-2 (see attached spreadsheet)	65.75	70.00	4,602.50
EXPENSES DESCRIPTION	QUANTITY	UNIT PRICE	LINE TOTAL
<b>TOTAL this Period</b>			\$ 5,005.00
<b>Previous balance</b>			\$ 1,172.50
<b>Payments received</b>			\$ 1,172.50
<b>TOTAL</b>			\$ 5,005.00

Make all checks payable to **High Plains Hydrology LLC**  
Total due in 30 days. Overdue accounts subject to a service charge of 1% per month.

**Thank you for your business!**

Date	Start	Stop	Start	Stop	Start	Stop	Hours	Task 1	Task 2	Task 3	DNR 1-1	DNR 1-2	Notes
03/01/2007	10:00 AM	12:30 PM	1:00 PM	5:00 PM			6.50	1.00		5.50			Monthly reports. Checking Clint's new results. I screwed up and used old spreadsheet. Reviewed OAZFA report. Computing summaries for OAZFA report. Checked OAZFA text against tables and graphs.
03/02/2007	8:45 AM	12:45 PM					4.00			3.00		1.00	Downloading RRCA stuff from Paul Koester. Reading OAZFA report for consistency among text, tables, and graphs. Updated OAZFA report. EMU 1997-98 streamflow to OAZFA report. Reran WMU model calibration to get 1997-98 streamflow. Fixed OAZFA stuff found Friday. Helping Doug with ZoneBudget issues.
03/05/2007	8:00 AM	10:30 AM					2.50			2.00	0.50		Entered WMU 1997-98 streamflow into OAZFA report. Worked on new depletions by NRD scope of work and sent out. Worked on scope of work for validating models and sent out.
03/06/2007	7:30 AM	12:30 PM	1:15 PM	4:30 PM			8.25	7.25		1.00			Made COHYST travel arrangements. Worked on RRCA recharge. Made program to split RRCA recharge array to monthly data sets. Looked for problem with sum_recharge.exe. Program was okay. Input file was bad. Summed summer recharge for 1950-97 and tried to put into GMS (failed). Program to make sum_recharge run in batch mode.
03/07/2007	7:15 AM	12:45 PM	1:30 PM	4:45 PM			8.75	1.00				7.75	Program to sum recharge files in batch mode. Batch files to run sum_recharge. Summer recharge done. Batch files to sum winter recharge.
03/08/2007	7:15 AM	12:15 PM	3:00 PM	4:30 PM			6.50					5.00	Program to sum recharge files in batch mode. Batch files to run sum_recharge. Summer recharge done. Batch files to sum winter recharge.
03/09/2007	7:00 AM	12:00 PM					5.00						Winter recharge done.
03/12/2007	7:30 AM	12:15 PM	2:00 PM	4:45 PM			7.50	0.50		1.00	0.50	5.50	Build recharge dat program. Helping Doug with ZoneBudget issues. Call from Clint on various issues. Built recharge for canal leakage and added to GMS. Looking at Clint's results and OAZFA documentation.
03/13/2007	7:00 AM	12:30 PM	1:15 PM	3:00 PM			7.25	1.00		5.25		1.00	Reviewed archival database proposal for COHYST. Read RRCA recharge into GMS. Check and incorporate Clint's OAZFA stuff into report. Computed Wyoming to Highway 183 summary numbers and added to report. OAZFA report sent to Technical Committee. Worked on OAZFA PowerPoint. Testing new version of wal2dat6.exe.
03/14/2007	1:45 PM	4:15 PM					2.50	1.50		1.00			Checking wal2dat6.exe. Updated utilities documentation. Distributed to Technical Committee. Looking at supplemental water well file. Checking OAZFA CD-ROM (will have to remake when done checking).
03/15/2007	8:00 AM	12:30 PM	1:30 PM	3:45 PM			6.75	4.75		2.00			Supplemental water on surface-water areas. Checking OAZFA documentation archival CD-ROM. Call to Duane on supplemental water and other COHYST stuff. Worked on monthly model work scope and sent to Technical Committee.
03/16/2007	7:00 AM	10:45 AM	1:00 AM	1:00 PM			5.75	2.00					Prepare for conference call on supplemental water in surface-water areas. Conference call. Looking at COHYST recharge in RRCA area.
03/19/2007	7:00 AM	12:30 PM	1:15 PM	4:00 PM			8.25						Summarizing COHYST recharge in RRCA area.
03/20/2007	8:45 AM	12:30 PM	2:45 PM	4:00 PM			5.00				0.25		Looked at RRCA recharge without reservoirs. Helped Doug with model issues. Summarize CMU recharge by county in RRCA area.
03/21/2007	7:15 AM	12:15 PM	1:30 PM	3:30 PM			7.00				2.00	5.00	Calculated RRCA recharge without groundwater recharge. Helping Doug a lot with recharge calculations. EMU recharge in RRCA area to scatter points.
03/22/2007	7:15 AM	11:30 AM	1:15 PM	4:45 PM			7.75					7.75	Summarized EMU recharge in RRCA area. Looking for errors in RRCA recharge processing.
03/23/2007	7:30 AM	12:00 PM					4.50					4.50	Checking RRCA recharge. Something strange with recharge in GMS.
03/26/2007	9:15 AM	10:15 AM	1:00 PM	1:00 PM			5.25	5.25					Helping Clint. Reviewed COHYST work scopes that I didn't write. Travel for Technical Committee meeting.
03/27/2007	9:00 AM	12:00 PM	1:00 PM	5:00 PM			7.00	7.00					Technical Committee meeting.
03/28/2007	8:30 AM	11:00 AM	11:30 AM	12:30 PM			7.75	5.25			2.50		All times central. Met with DNR staff on difference between dryland and irrigated land recharge. Worked on COHYST work scope proposals.
03/29/2007	11:30 AM	12:30 PM	1:00 PM	2:45 PM			2.75	2.75					Talked with Steve about EMU model. Travel on my own time.
03/30/2007	8:00 AM	1:00 PM					5.00					5.00	Worked on COHYST work scope proposals.
													Checking RRCA recharge processing. Extract recharge exe okay. GMS recharge okay. I was off one year in previous checking. Worked on batch files to make seasonal recharge from RRCA monthly recharge.
							131.60	39.26		20.75	6.75	65.75	March total and total by task number