



March 29, 2007

RMEA 07-0015

Mr. Jerry Rigby
Rigby Thatcher Andrus Rigby & Moeller
25 N 2nd E
Rexburg, ID 83440

Dear Mr. Rigby:

Rocky Mountain EnvironmentalSM has completed an initial evaluation of a proposed transfer of groundwater rights in the Eastern Snake River Plain Aquifer [ESRP].

In summary, it appears that no mitigation should be required for the proposed transfer for reasons described herein.

PROPOSED TRANSFER

The proposed transfer is summarized below:

From Well:

Name	Darrell C. and Theda C. Neville, 2263 W. 1000 N. Rexburg, ID 83440
From Rights:	22-2178
P/D:	Section 29, T06N, R40E, 109.7 acres
Grid Cells	<u>row 33. column 57</u> OK
Amounts	384 AFA; 128 AF per trimester
Comments	Water right recommended in the SRBA. Proposed transfer is irrigation to irrigation. Hence, no consumptive use calculation or forfeiture analysis warranted.

To Well:

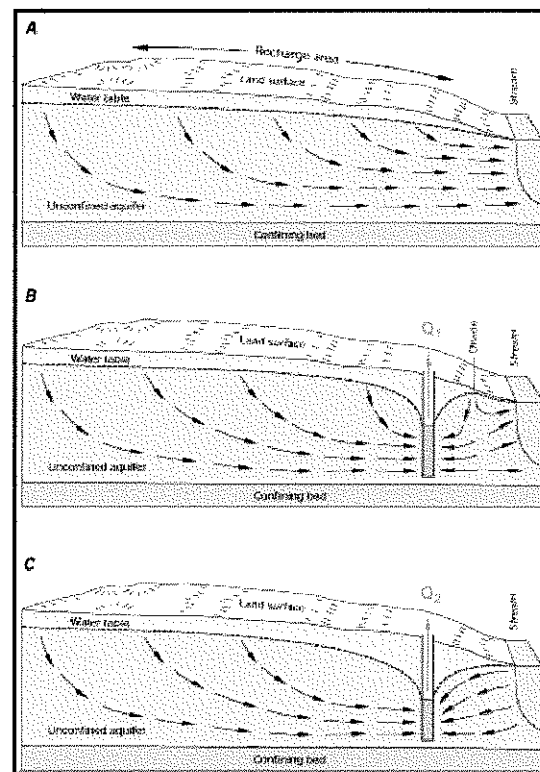
Name	DKJ LLC, 665 Centennial Loop, Rexburg, ID 83440
TO P/D:	Section 22, T06N, R41E
Grid Cells	row 34 column 59
Amounts	384 AFA; 128 AF per trimester
Comments	New POD just outside (east) of ESPA model boundary. Used nearest cell for analysis.

BACKGROUND

Idaho Department of Water Resources [IDWR] requires a hydrologic analysis of the pumping effects that arise when groundwater appropriators change the point of diversion of their wells. Below is a general explanation of the effects of groundwater pumping on surface streams and reservoirs. This background information forms part of the basis for the attached charts and figures and Rocky Mountain EnvironmentalSM's opinions rendered herein.

The figure on the right illustrates the effect of consumptive use of groundwater on surface water. Before a well is pumped, groundwater flows through the aquifer and discharges into streams and reservoirs (Block A). When a well is first pumped, water is extracted from aquifer storage (Block B). As pumping continues, continued consumptive groundwater uses depletes stream flow through two mechanisms. Water can be induced to flow out the bottom of a stream under the gradient caused by pumping. Additionally, the pumping well intercepts groundwater before it discharges into the stream (Block C).

The effect of a pumping well on surface water is a function of aquifer properties [transmissivity and storativity] and the



Stream depletion from groundwater withdrawal. Obtained from USGS Circular 1186.

distance from the stream [the **geographic effect**]. A well located closer to a stream has a greater effect sooner than a well located farther from a stream.

Less obvious, but more important, is the **residual effect** of groundwater pumping. After pumping ceases, a stream will continue to lose water to the effected portion of the aquifer for some period of time [assuming there is no capture of water from other sources].

Because this residual effect is not intuitive, the analogy to welding metal illustrates the phenomenon. A welder heats metal with a torch, but when finished, the metal is still too hot to touch. The heat will eventually dissipate, but the total heat dissipated equals the total heat applied. Likewise, the **residual** effects of pumping remain in the aquifer and will cause the stream to lose water until the total volume of stream depletion equals the total volume of water pumped and consumptively used ¹.

Because of the effects of pumping on stream flow and declining discharge at springs in southern Idaho, Idaho Department of Water Resources [IDWR] implemented a new transfer and mitigation procedure² in the Eastern Snake Plain Aquifer [ESPA]. The *effects.xls* spreadsheet³ is used to estimate the geographic and residual effects of consumptive use at the original and proposed P/D. The spreadsheet is based on Idaho Water Resources Research Institute's computer model of the Snake River Plain Aquifer ^{4, 5}. Inputs to the spreadsheet include location of the FROM Well(s) and the TO Well, consumptive use [pumping] in

¹ Jenkins, C.T., 1968, Techniques for computing rate and volume of stream depletion from wells: *Ground Water*, v. 6, no. 2., p. 37-46.

² Dreher, K.J., and Young, N.C., 2002, Administrator's Memorandum: Interim policies and procedures currently applicable for applications to transfer groundwater in the Eastern Snake River Plain only: Transfer Processing No. 24, Idaho Department of Water Resources.

³ Cosgrove, D. M., and Johnson, G. S., 2003, Eastern Snake River Plain Aquifer Ground-water rights transfer spreadsheet: User's Manual, ver. 1.1. Obtained from <http://www.if.uidaho.edu/~johnson/ifiwrri/effects.html>.

⁴ Cosgrove, D.M., Johnson, G.S., Laney, S., and Lindgren, J., 1999, Description of the Snake River Plain aquifer model (SRPAM): Idaho Water Resources Research Institute, University of Idaho, Moscow, ID, 60 p.

⁵ Johnson, G.S. and Cosgrove, D.M., 1999, Application of Steady State Response Ratios to the Snake River Plain Aquifer: Idaho Water Resources Research Institute, University of Idaho, Moscow, ID, 27 p.

acre-feet/trimester at both the FROM Well(s) and the TO Well, and date of first diversion at the FROM Well(s).

HYDROLOGIC EFFECT OF PROPOSED TRANSFER

Rocky Mountain EnvironmentalSM completed an initial screening under the assumptions listed above, and the output of the *effects.xls* spreadsheet are summarized below:

1. *Hydrologic Response–Heise/Ashton to Lewisville Reach:* The enclosed chart under this title depicts (under Total Effect Without Transfer) that the original well if allowed to continue pumping approaches a value slightly more than 120 acre-feet per trimester. If the transfer is approved, the near term depletion would decrease significantly but then over time (steady state) would approach a value just below 120 acre-feet per trimester for a **net decrease in depletion**.
2. *Hydrologic Response–Near Shelley to Neeley Reach:* The enclosed chart under this title depicts (under Total Effect Without Transfer) that the original well if allowed to continue pumping approaches a value of 4 acre-feet per trimester at steady state. If the transfer is approved, the near term depletion would slightly decrease from the original but then over time would slightly increase. There would be no net increase in depletion until about year 2074. Thereafter, the net increase in depletion from original would increase by about 1 acre-foot per trimester at steady state. However, the value of increase is within 5% difference of total depletion and is **not considered significant**.
3. *Hydrologic Response– Neeley to Minidoka Reach.* The enclosed chart under this title depicts (under Total Effect Without Transfer) that the original well if allowed to continue pumping approaches a value of about 0.18 acre-feet per trimester at steady state. If the transfer is approved, the net depletion would decrease until about 2092. Thereafter the net depletion from original would increase by about 0.02 acre-feet per trimester in the year 2109. The value of increase is within 5% difference of total depletion and **is not considered significant**.
4. *Hydrologic Response– Milner to King Hill Reach.* The enclosed chart under this title depicts (under Total Effect Without Transfer) that the original well if allowed to continue pumping approaches a value of about 0.27 acre-feet per trimester if allowed to achieve steady state. If the transfer is approved, the net depletion would decrease until about 2092. Thereafter the net increase in depletion from original would increase by about 0.01 acre-feet per trimester in the year 2109. The value of increase is within 5% difference of total depletion and **is not considered significant**.

5. The *Net Transfer Effect* chart reveals that:
- There is a significant decrease in depletion in the near term (present to about year 2040).
 - After year 2040, there remains a **net decrease in depletion** as the effects of pumping approach steady state.

In summary, it appears that no mitigation should be required for the proposed transfer as described herein.

As questions may arise, please call me to discuss this transfer.

Sincerely,



W. Roger Warner

Vice President

e-mail: rwarner@rockymountainenvironmental.com

Enclosures:

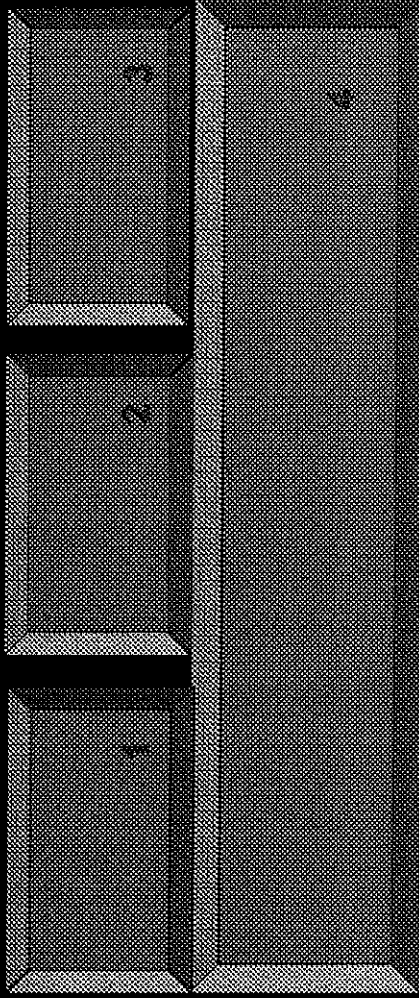
- effects.xls spreadsheet input page
- Output graphs from effects.xls spreadsheet
 - Heise/Ashton to Lewisville Reach
 - Near Shelley to Neeley Reach
 - Neeley to Minadoka Reach
 - Milner to King Hill Reach
 - Net Transfer effect

GROUND-WATER RIGHTS TRANSFERS

UNIVERSITY OF IDAHO - IDAHO WATER RESOURCES RESEARCH INSTITUTE

Cells this color are set up for user entries

ENTER STARTING DATE FOR SIMULATION. THEN PUSH "UPDATE DATES" BUTTON		TRANSFER NO:
YEAR	1960	unknown
SEASON	SPRING	TRANSFER NAME
	▼	Neville-Jeppesen



ENTER CELL LOCATIONS:		'FROM1' CELL	'FROM2' CELL	'FROM3' CELL
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COLUMN	59	57	0	0

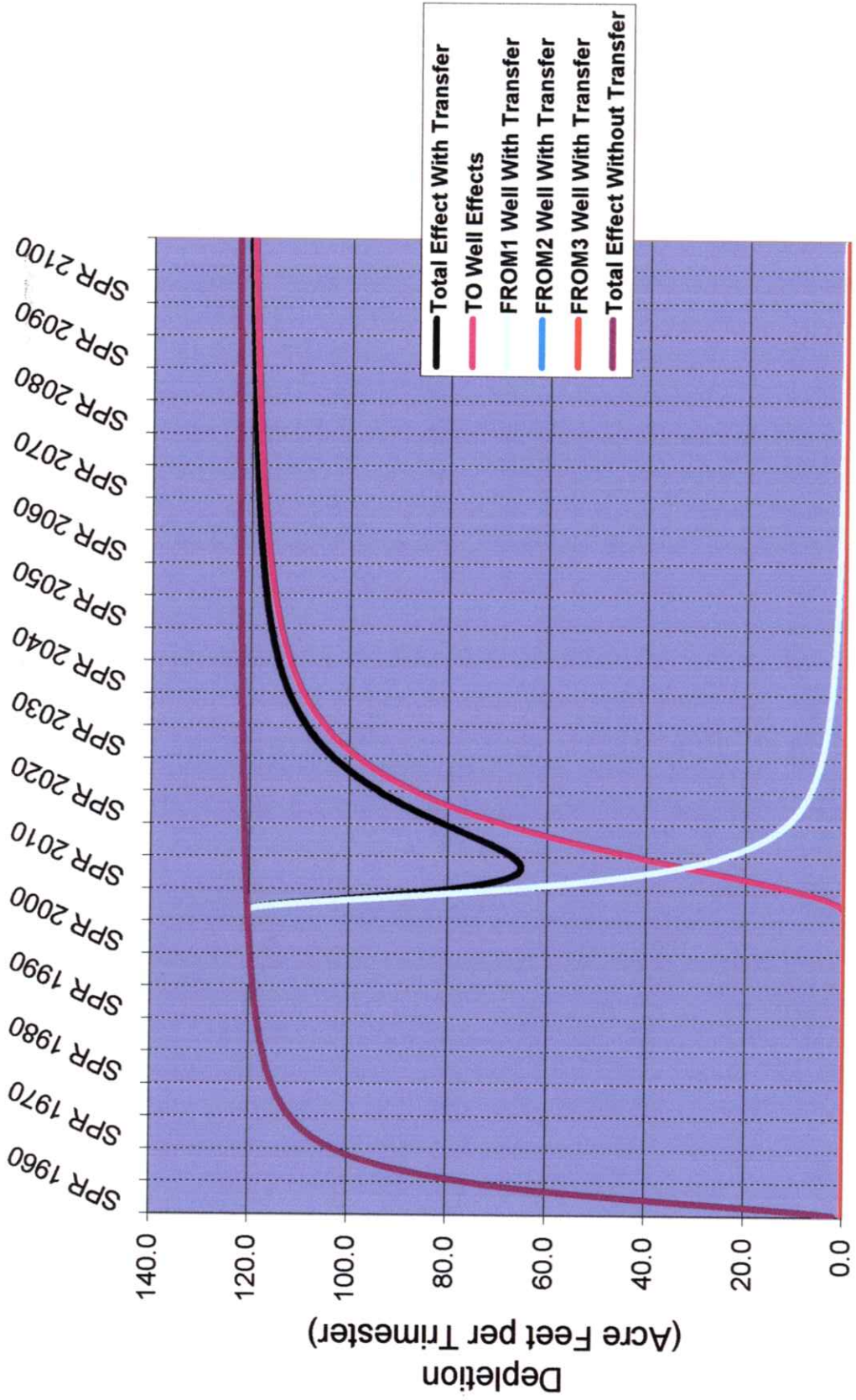
TRIMESTER OF ACTIVITY	TO WELL		FROM1 WELL		FROM2 WELL		FROM3 WELL	
	Protected Use	With Transfer	Without Transfer	With Transfer	Without Transfer	With Transfer	Without Transfer	With Transfer
	AF/TRIMESTER	AF/TRIMESTER	AF/TRIMESTER	AF/TRIMESTER	AF/TRIMESTER	AF/TRIMESTER	AF/TRIMESTER	AF/TRIMESTER
SPR 1960	0	128	128	0	0	0	0	0
SUM 1960	0	128	128	0	0	0	0	0
WIN 1960	0	128	128	0	0	0	0	0
SPR 1961	0	128	128	0	0	0	0	0
SUM 1961	0	128	128	0	0	0	0	0
WIN 1961	0	128	128	0	0	0	0	0
SPR 1962	0	128	128	0	0	0	0	0

SUM 1997	0	128	128	0
WIN 1997	0	128	128	0
SPR 1998	0	128	128	0
SUM 1998	0	128	128	0
WIN 1998	0	128	128	0
SPR 1999	0	128	128	0
SUM 1999	0	128	128	0
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SUM 2000	0	128	128	0
WIN 2000	0	128	128	0
SPR 2001	0	128	128	0
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WIN 2001	0	128	128	0
SPR 2002	0	128	128	0
SUM 2002	0	128	128	0
WIN 2002	0	128	128	0
SPR 2003	0	128	128	0
SUM 2003	0	128	128	0
WIN 2003	0	128	128	0
SPR 2004	0	128	128	0
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WIN 2004	0	128	128	0
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WIN 2005	0	128	128	0
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WIN 2006	0	128	128	0
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SUM 2007	128	0	128	0
WIN 2007	128	0	128	0
SPR 2008	128	0	128	0
SUM 2008	128	0	128	0
WIN 2008	128	0	128	0
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WIN 2009	128	0	128	0
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SUM 2010	128	0	128	0
WIN 2010	128	0	128	0
SPR 2011	128	0	128	0
SUM 2011	128	0	128	0
WIN 2011	128	0	128	0
SPR 2012	128	0	128	0
SUM 2012	128	0	128	0
WIN 2012	128	0	128	0
SPR 2013	128	0	128	0
SUM 2013	128	0	128	0

Hydrologic Response--Heise/Ashton to Lewisville

Customer Name: *Neville*

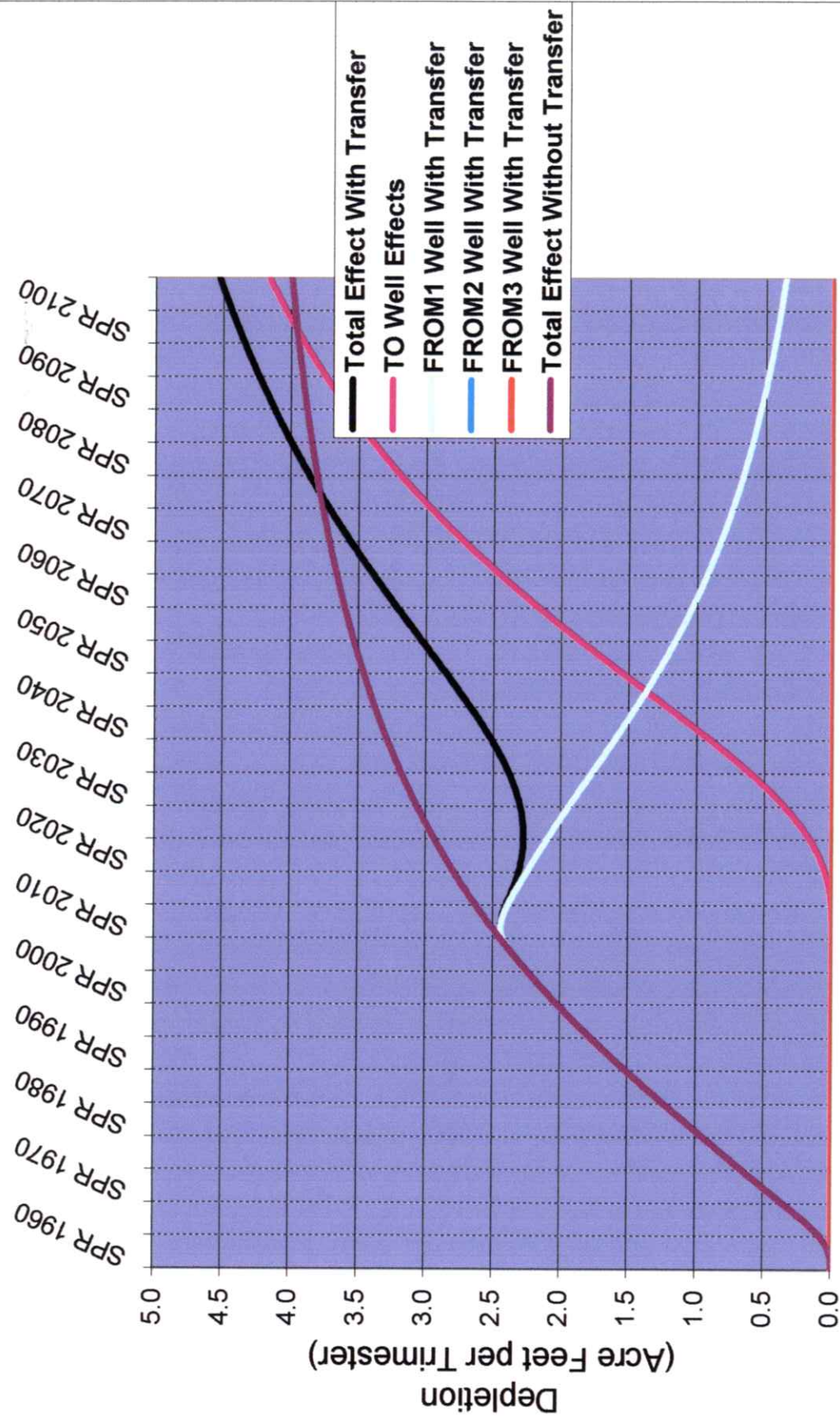
Transfer No:



Hydrologic Response--Near Shelley to Neeley Reach

Customer Name: *Neville*

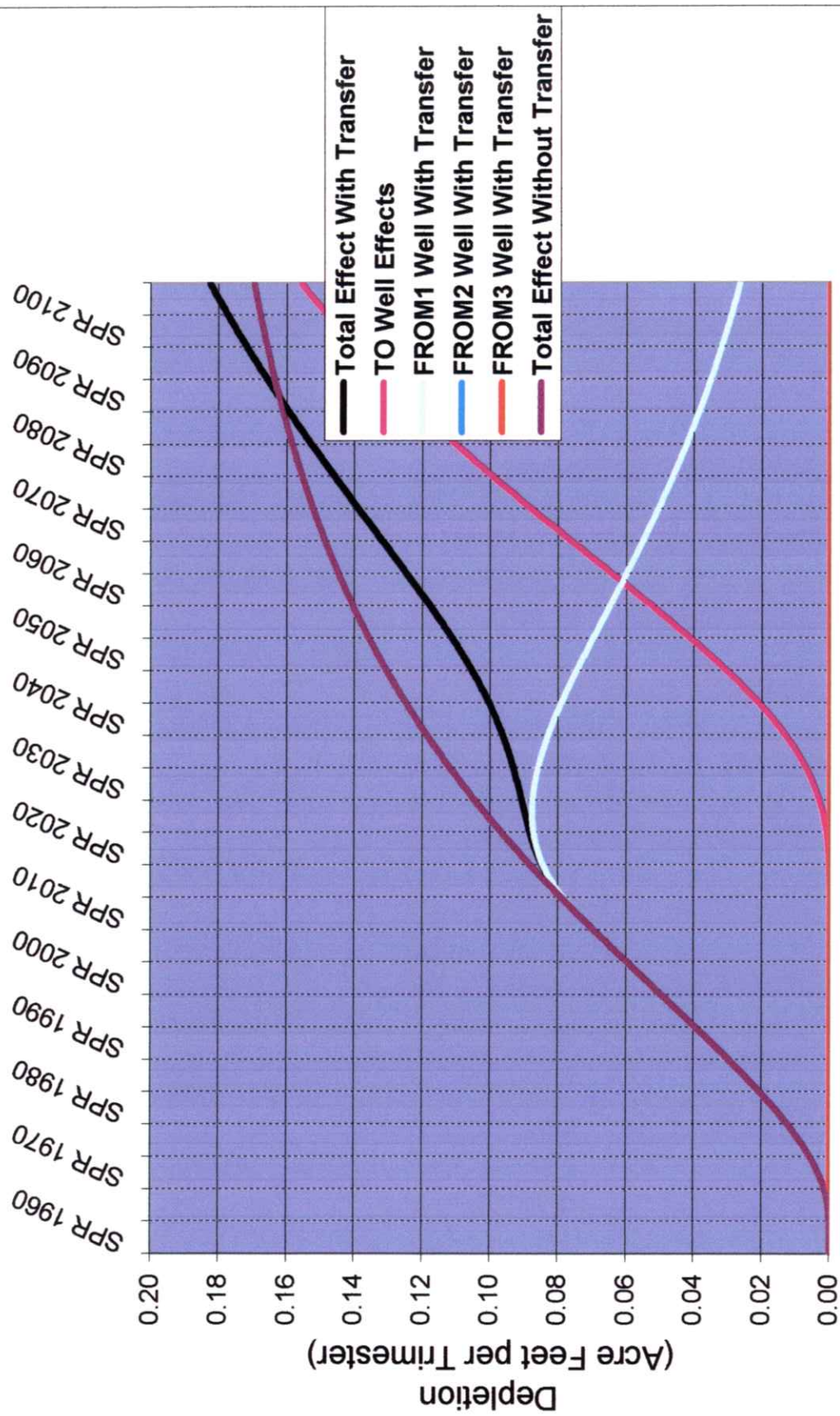
Transfer No:



Hydrologic Response--Neeley to Minidoka Reach

Customer Name: *Neville*

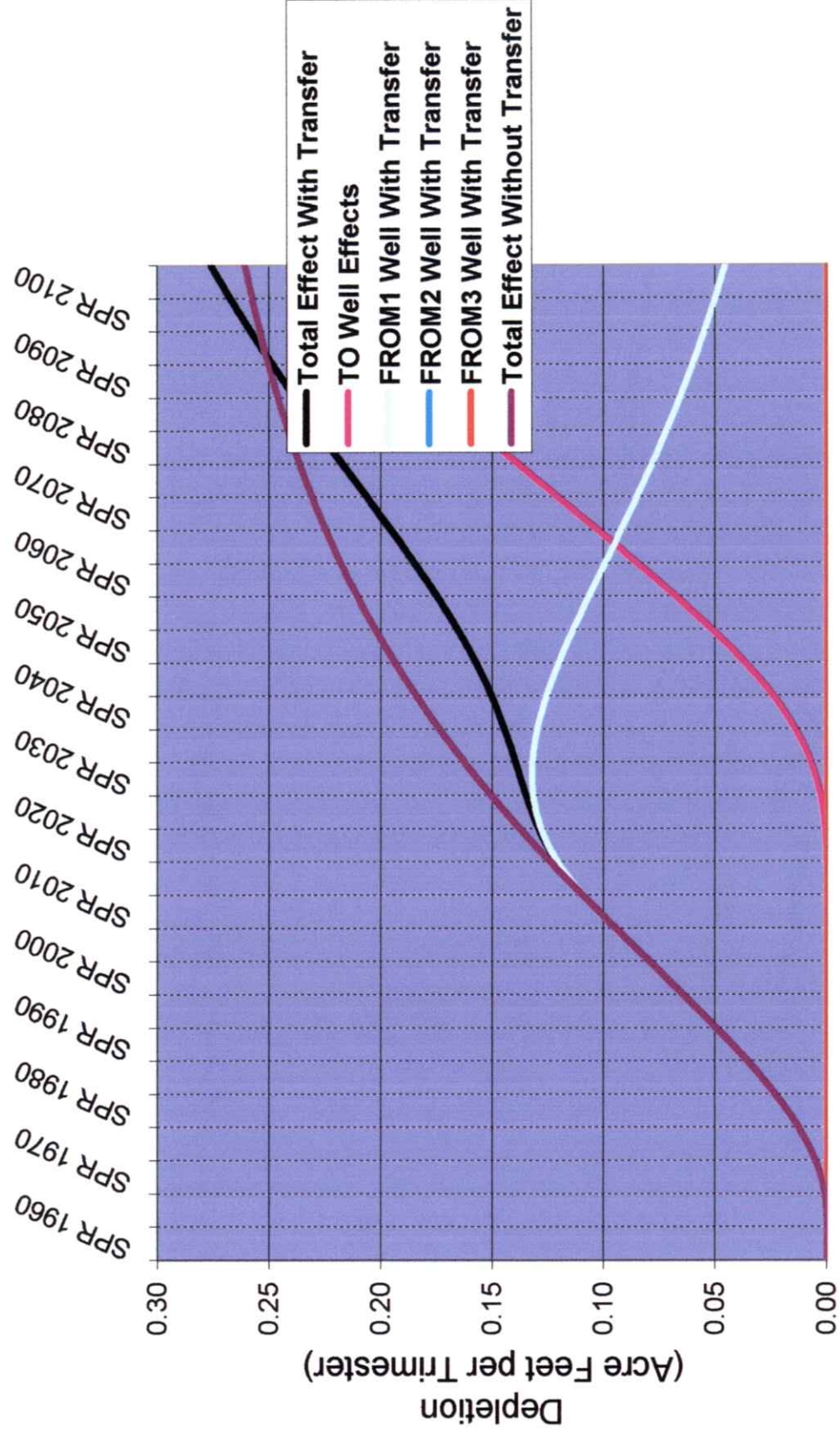
Transfer No:



Hydrologic Response-- Milner to King Hill Reach

Customer Name: *Neville*

Transfer No:



Net Transfer Effect (Total Effect With Transfer - Total Effect Without Transfer)

Neville

