

**BEFORE DEPARTMENT OF WATER RESOURCES**

**STATE OF IDAHO**

**COPY**

IN THE MATTER OF THE MITIGATION  
PLAN OF THE NORTH SNAKE AND  
MAGIC VALLEY GROUND WATER  
DISTRICTS IMPLEMENTED BY  
APPLICATIONS FOR PERMIT NOS. 02-  
10405 AND 36-16645 AND  
APPLICATION FOR TRANSFER NO.  
74904 TO PROVIDE REPLACEMENT  
WATER FOR CLEAR SPRINGS SNAKE  
RIVER FARM

(Water District Nos. 130 and 140)

**DIRECT TESTIMONY OF  
CHARLES M. BRENDHECKE**

**SUBMITTED ON BEHALF OF:**

**NORTH SNAKE GROUND WATER DISTRICT  
MAGIC VALLEY GROUND WATER DISTRICT**

**December 5, 2008**

**LIST OF SPONSORED EXHIBITS**

<b>Exhibit No.</b>	<b>Description</b>	<b>Page</b>
<b>4000</b>	<b>Resume of Charles M. Brendecke</b>	<b>3</b>
<b>4001</b>	<b>Exhibit 413 from Delivery Call Case</b>	<b>8</b>
<b>4002</b>	<b>Exhibit 414 from Delivery Call Case</b>	<b>8</b>
<b>4003</b>	<b>Exhibit 415 from Delivery Call Case</b>	<b>8</b>
<b>4004</b>	<b>Excerpts of Wylie Deposition Exhibit 31</b>	<b>9</b>

1                                   **DIRECT TESTIMONY OF CHARLES M. BRENDHECKE**

2  
3                                   **I.     INTRODUCTION**  
4

5   **Q.     STATE YOUR NAME, BUSINESS ADDRESS AND POSITION.**

6   A.     My name is Charles M. Brendecke. I am employed by AMEC Earth and  
7           Environmental, Inc., a division of AMEC plc. My business address is 1002  
8           Walnut Street, Suite 200, Boulder, Colorado, 80302. I am a principal of the firm.

9   **Q.     PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL**  
10 **BACKGROUND.**

11 A.     I received a Bachelor of Science degree in Civil Engineering from the University  
12           of Colorado in 1971. I received Master of Science and Doctor of Philosophy  
13           degrees in Civil Engineering from Stanford University in 1976 and 1979,  
14           respectively. I am a registered Professional Engineer in Idaho, Wyoming,  
15           Colorado, and Oklahoma. I have been a consulting engineer since 1973,  
16           practicing mainly in the areas of hydrology, water rights and water resources  
17           planning.

18 **Q.     Is Exhibit 4000 a copy of your current resume?**

19 A.     Yes it is.

20                                   **II.     DISCUSSION**

21 **Q.     WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

22 A.     The purpose of my testimony is to provide certain factual evidence pertinent to  
23           the mitigation plan filed by the North Snake Ground Water District and Magic

1 Valley Ground Water District (“Ground Water Districts”) in response to the water  
2 delivery call of Clear Springs Foods for its Snake River Farm.

3 **Q. PLEASE PROVIDE A BRIEF SUMMARY OF YOUR TESTIMONY**

4 A. My testimony will provide an overview of key aspects of the delivery call and  
5 related administrative orders, a summary of mitigation requirements imposed by  
6 those orders and a description of the mitigation benefits created by the various  
7 activities that make up the mitigation plan filed by the Ground Water Districts.  
8 Further details supporting the Ground Water Districts mitigation plan activities  
9 will be provided by other experts.

10 **Q. CAN YOU PROVIDE AN OVERVIEW OF THE DELIVERY CALL AND**  
11 **THE ADMINISTRATIVE RESPONSE TO IT?**

12  
13 A. Yes. The delivery called was filed on May 2, 2005, via a letter from Clear  
14 Springs Foods to the Idaho Department of Water Resources (IDWR). In that  
15 letter, Clear Springs Foods formally requested administration of junior surface  
16 and ground water rights in Water District 130 in order to deliver water to its water  
17 right nos. 36-04013A, 36-0413B, and 36-07148. These water rights serve the  
18 Snake River Farm, a Clear Springs Foods aquaculture facility located in the Snake  
19 River canyon north of Buhl, Idaho. On July 8, 2005, then IDWR Director Karl  
20 Dreher, issued an order containing a number of findings and conclusions, among  
21 them being that junior priority ground water pumping in Water District 130 was  
22 causing injury to Clear Springs Foods’ water right nos. 36-0413B and 36-07148.  
23 Director Dreher further concluded, based on model simulations using the Eastern  
24 Snake Plain Aquifer Model (ESPAM), that curtailment of pumping by ground  
25 water rights junior to the February 4, 1964, priority of water right no. 36-04013B

1 would cause spring discharges in the Buhl Gage to Thousand Springs reach of the  
2 Snake River to increase by an average of 38 cubic feet per second (cfs) at steady  
3 state conditions. He further concluded that 7 percent, or 2.7 cfs, of this increase  
4 would accrue to the spring outlet serving Snake River Farm. Director Dreher then  
5 laid out the framework, defined by the Conjunctive Management Rules (CMRs),  
6 within which junior ground water users could avoid administrative curtailment by  
7 phasing in the provision of replacement water to Snake River Farm over a period  
8 of five years. Subsequently Director Tuthill determined that the correct  
9 proportionality constant to apply to the reach gain in estimating Snake River Farm  
10 effects is 6.9% rather than 7%. See *Final Order Regarding Blue Lakes and Clear*  
11 *Springs Delivery Calls dated July 11, 2008, at page 3 (Finding of Fact 9).*

12 **Q. YOU MENTIONED THE EASTERN SNAKE PLAIN AQUIFER MODEL**  
13 **(ESPAM). CAN YOU BRIEFLY DESCRIBE THIS MODEL AND ITS**  
14 **CAPABILITIES?**

15  
16 **A.** Yes. The ESPAM is a computer model of the Eastern Snake Plain Aquifer that  
17 simulates the behavior of the aquifer in response to hypothetical changes in water  
18 inputs and outputs. It has been developed by the IDWR with assistance from the  
19 Idaho Water Resources Research Institute (IWRRI) and with oversight by a  
20 technical committee that included representatives of stakeholders dependent on  
21 the aquifer. The model represents the aquifer as a single layer of cells, each one  
22 square mile in area, and computes the flow patterns between these cells based on  
23 fundamental hydraulic principles. The model assumes that conditions within each  
24 cell are uniform and the flow equations that are used assume that the aquifer is a  
25 homogeneous, isotropic porous medium, like sand or gravel. In actuality, the

1 aquifer is heterogeneous and probably anisotropic, and is made up of  
2 discontinuous fractured lava flows. This means that the model is more accurate  
3 over larger areas and less accurate when applied to smaller areas. The IDWR has  
4 been unwilling to use it to predict the effects of specific well pumping on specific  
5 spring outlets, and I think this is a wise decision. The ESPAM was developed by  
6 competent people using commonly accepted methods, but it is a regional model  
7 and not a site specific one.

8 **Q. WHAT HAVE GROUND WATER USERS DONE IN RESPONSE TO THE**  
9 **DIRECTOR'S ORDERS IN THE SNAKE RIVER FARM DELIVERY**  
10 **CALL?**

11  
12 A. The Ground Water Districts have undertaken a variety of mitigation activities to  
13 provide substitute curtailment and replacement water to Snake River Farm and  
14 other calling spring rights. These activities include voluntary dry-ups of ground  
15 water irrigated lands, conversions of ground water-supplied lands to surface water  
16 supplies, and managed recharge of the aquifer in the vicinity of the springs. The  
17 initial voluntary dry-up program has been replaced with a Conservation Reserve  
18 Enhancement Program (CREP) that makes use of federal cost-share funding to  
19 assist with the retirement of ground water-supplied lands. The Ground Water  
20 Districts have funded a \$30 per acre incentive payment to all CREP contract  
21 participants.

22 **Q. HOW ARE THESE MITIGATION ACTIVITIES EVALUATED?**

23 A. The effects of mitigation activities are evaluated using the ESPAM. Information  
24 on the nature, location and extent of each activity is used to determine the net  
25 change in aquifer recharge on each relevant model cell and the model is then run

1 to obtain changes in flows between all model cells, including those that represent  
2 hydraulically connected river reaches. Changes in flows at Snake River Farm are  
3 then estimated as 6.9% of the simulated change in flow (gain or loss) to the Buhl  
4 to Thousand Springs reach.

5 **Q. HAVE YOU BEEN INVOLVED IN THE EVALUATION OF THE**  
6 **GROUND WATER DISTRICTS MITIGATION AND REPLACEMENT**  
7 **PLANS?**

8  
9 A. Yes. When the Ground Water Districts first began submitting mitigation and  
10 replacement plans in response to the 2005 Order I generally used the ESPAM to  
11 evaluate them prior to submittal. The IDWR performed similar analysis on the  
12 submitted information. The IDWR sometimes requested additional information  
13 or data to refine its analysis, and I often assisted with that. We were usually able  
14 to resolve our differences down to inconsequential amounts. Over time, because  
15 certain mitigation activities are very similar from year to year it became possible,  
16 for purposes of projecting the effects of a plan, to simply scale the results of  
17 previous analyses to reflect the current year's level of activity rather than generate  
18 new model runs to do so.

19 **Q. WHAT HAVE BEEN THE BENEFITS OF THESE MITIGATION**  
20 **ACTIVITIES?**

21  
22 A. The IDWR has carried out post-audits of the Ground Water Districts mitigation  
23 activities, using the ESPAM, to quantify the spring flow benefits of those  
24 activities. This post-audit process was described by Allan Wylie in his recent  
25 deposition. In general, these model evaluations show that the Ground Water  
26 Districts mitigation activities increase flows to the spring reach in which Snake  
27 River Farm diverts. The IDWR also evaluated the effects of recharge

1 experimentally by measuring flows in certain springs following recharge events in  
2 the fall of 2007 and then comparing those measured spring flow patterns to flow  
3 patterns from previous years when there was no recharge activity. These  
4 experiments also show that the Ground Water Districts mitigation activities have  
5 caused increases in spring discharges. One can certainly expect that the beneficial  
6 effects of other mitigation activities are present, as they are predicted to be so by  
7 the model. However, it is often difficult to discern them in measured spring flows  
8 because the required mitigation benefit is small relative to the spring flows,  
9 because the spring flows themselves are quite variable, and because exogenous  
10 factors such as weather and surface water use practices have effects that can  
11 enhance or cancel, wholly or partially, the effects of mitigation activities.

12 **Q. IS AQUIFER RECHARGE, IN YOUR VIEW, AN EFFECTIVE WAY TO**  
13 **IMPROVE THE FLOWS OF THE SPRINGS?**

14  
15 **A.** Yes, and both the recent experiment and historical data support this opinion. My  
16 **Exhibits 4001 through 4003**, which are copies of Exhibits 413 through 415 from  
17 the spring users' delivery call case, illustrate the strong relationships between  
18 incidental recharge from historical canal diversions and changes in spring  
19 discharges. **Exhibit 4001** shows the overall relationship between historical  
20 incidental recharge and spring discharges below Milner. **Exhibits 4002 and 4003**  
21 show, more particularly, the changes in spring discharges at the Clear Lakes  
22 spring complex observed shortly after the North Side Canal began operation.  
23 Snake River Farm diverts from one outlet of the Clear Lakes spring complex.  
24 The historical recharge from this operation went on for decades and caused  
25 dramatic increases in spring discharges. But that was incidental recharge.



1 Managed recharge has been done only intermittently and, of course, the more  
2 regularly it is done the more effective it becomes, as the level of storage in the  
3 aquifer above the springs is increased. To see the true long term benefits of a  
4 managed recharge program we have to stick with it. This requires a lot of  
5 continuing cooperation between parties that, unfortunately, are presently at odds  
6 with each other in other water rights matters.

7 **Q. HAVE THE GROUND WATER DISTRICTS MITIGATION ACTIVITIES**  
8 **MET THE REQUIREMENTS OF THE 2005 ORDER?**

9  
10 A. The Director concluded that the Ground Water Districts mitigation activities in  
11 2005 provided more water to Snake River Farm than was required by the Order  
12 for that year. He concluded that their mitigation activities in 2006 left a shortfall  
13 from the requirement, though administration did not occur that year because of  
14 the constitutionality challenge to the Conjunctive Management Rules. The  
15 Director found that the Ground Water Districts mitigation activities in 2007, when  
16 combined with actions of other ground water users, were sufficient to meet the  
17 requirements of that year, thus keeping the Ground Water Districts on track to  
18 meet the ultimate requirements of the 2005 Order.

19 **Q. WHAT ABOUT THE GROUND WATER DISTRICTS 2008 MITIGATION**  
20 **ACTIVITIES?**

21  
22 A. In 2008 the Ground Water Districts continued to provide water delivery to  
23 converted lands on the Plain above the springs at a level similar to previous years.  
24 The CREP program also continued to provide benefits in 2008. It is reasonable to  
25 expect their effects would be similar to those of previous years. **Exhibit 4004**  
26 contains excerpts of the Department's evaluation of the 2007 benefits from

1 conversions and CREP, as carried out by Allan Wylie and described in his  
2 deposition. It indicates that the benefit to Snake River Farm in 2008 from  
3 conversions and CREP is likely to be about 0.7 cfs.

4 The Ground Water Districts contemplated providing managed recharge in 2008,  
5 but have been unable, as I understand it, to reach an acceptable agreement with  
6 North Side Canal Company for the delivery of recharge water. The Department  
7 found that the late season recharge activities in 2007 delivered about .3 cfs to  
8 Snake River Farm.

9 **Q. WHAT OTHER MITIGATION ACTIVITIES ARE PROPOSED IN THE**  
10 **GROUND WATER DISTRICTS 2008 MITIGATION PLAN?**

11  
12 A. The Ground Water Districts recognized that conversions and CREP, even with a  
13 repeat of last year's recharge effort, would not meet the 4th-year requirement of  
14 the 2005 Order. Accordingly, it proposed a new mitigation approach in 2008 that  
15 it hopes will ultimately form the basis of a permanent mitigation plan for Snake  
16 River Farm. This approach relies primarily on the recycling, after suitable  
17 treatment, of return flows from Snake River Farm. If this approach is deemed  
18 unacceptable after formal hearing, the Ground Water Districts propose back-up  
19 alternatives including delivery of water from adjacent springs owned by the Idaho  
20 Department of Fish & Game, and development of new ground water supplies  
21 within the Snake River canyon.

22 **Q. HAVE YOU EVALUATED THESE OTHER APPROACHES?**

23 A. I have evaluated them in a preliminary manner. One of the difficulties is that all  
24 these mitigation alternatives are very costly to plan, design, and implement, At  
25 this point I cannot in good faith recommend to my client that they expend large

1 sums to design them without knowing whether they will be acceptable to the  
2 Department. Determining this acceptability and addressing objections expected to  
3 be raised by Clear Springs Foods, which are presently unknown, are, in my  
4 understanding, the principal purposes of this hearing. I am confident that these  
5 alternatives, either individually or in some combination, can supply the required  
6 amounts of replacement water.

7 **Q. PLEASE DESCRIBE THE PRELIMINARY EVALUATION YOU HAVE**  
8 **MADE OF THESE NEW MITIGATION MEASURES.**

9  
10 A. The recycling of return flows from aquaculture facilities frequently has been  
11 discussed as a potential solution to the water conflict between spring users and  
12 ground water users. Plainly there is enough water available to recycle, as the  
13 mitigation required from ground water users is a very small percentage of the total  
14 flow through most aquaculture facilities. The questions have always been  
15 whether hatchery effluent could be made acceptable for use as hatchery influent  
16 and who would be responsible for paying the cost. I did a preliminary review of  
17 Snake River Farm water quality records from the Idaho Department of  
18 Environmental Quality that suggested this was technically possible. This, and the  
19 difficulty of providing mitigation by other means, are what underlies the Ground  
20 Water District's decision that recycling should be the primary mitigation approach  
21 for Snake River Farm. If it is successful, it could provide the basis for permanent  
22 mitigation for the delivery call by Snake River Farm.

23 I and my staff did a reconnaissance-level investigation of the feasibility of  
24 diverting flows from the Idaho Fish and Game (IDF&G) springs to Snake River  
25 Farm. These springs emerge just to the east of Snake River Farm. The IDF&G

1 springs serve to maintain wetlands that were built as mitigation for wetlands lost  
2 in construction of the Buhl Grade by the Idaho Department of Transportation. We  
3 reasoned that we could provide river or other water to IDF&G to maintain the  
4 wetlands in exchange for delivering their spring water to Snake River Farm. This  
5 alternative still appears viable, although preliminary investigation indicates that  
6 the full mitigation requirement may not be available from current spring  
7 discharges; it may require improvements to the springs themselves to achieve the  
8 quantity available under the water right and to meet the entire mitigation  
9 requirement for Snake River Farm. Hence it is described in the present plan as a  
10 back-up alternative which may meet the requirements in full or in part. A test  
11 well has been designed to help determine if the springs can be improved at their  
12 existing discharges or if it is necessary to utilize wells to secure the full mitigation  
13 requirement.

14 **Q. HAVE THE GROUND WATER DISTRICTS COMPLETED FINAL**  
15 **ENGINEERING DESIGN AND ADDRESSED ALL OF THE DETAILS OF**  
16 **THE VARIOUS MITIGATION PLAN PROPOSALS DISCUSSED IN THE**  
17 **TESTIMONY OF THEIR EXPERTS?**

18  
19 **A.** No, not at this point, but we are prepared to do so immediately as soon as the  
20 Director has provided direction on which approach can be utilized, the conditions  
21 that may be attached to mitigation operation, and the resulting economics of each  
22 option evaluated. It is not practical to do detailed engineering and design work on  
23 these multiple alternatives, as some of it will be entirely unnecessary if the  
24 recycling approach is approved.

25 **Q. HAS CLEAR SPRINGS INDICATED ANY PREFERENCE OR**  
26 **PROVIDED ANY GUIDANCE WITH RESPECT TO THE MITIGATION**  
27 **PLAN ALTERNATIVES?**

1  
2  
3  
4  
5

A. Unfortunately, no. Clear Springs appears to object to every form of mitigation other than curtailment of pumping, which the Ground Water Districts are not proposing.