BEFORE THE

IDAHO DEPARTMENT OF WATER RESOURCES

IN THE MATTER OF DISTRIBUTION OF WATER TO WATER RIGHT NOS. 36-04103A, 36-04013B AND 36-7148 (Snake River Farm)

(Water District Nos. 130 and 140)

DIRECT TESTIMONY OF TERRY SCANLAN, P.E., P.G.

SUBMITTED ON BEHALF OF:

THE IDAHO GROUND WATER APPROPRIATOR'S INC.
NORTH SNAKE GROUND WATER DISTRICT
MAGIC VALLEY GROUND WATER DISTRICT

SEPTEMBER 11, 2009

LISTS OF SPONSORED EXHIBITS

2000	Snake River Farm Mitigation "Over the Rim" Opening Testimony Report, September 11, 2009, SPF Water Engineering	
2001	AMEC's Original Alignment	
2002	Conceptual Pipeline Layouts	
2003	Conceptual Pipeline Layout	
2004	Conceptual Pipeline Layout	
2005	Not Used	
2006	SPF's Preliminary Design Drawings	
2007	Elevations and Static Pipeline Pressures	
2008	Schematic of Pressure Control & Flow Meter Facility	
2009	Distribution of Pumping Volumes and Durations by Well Groups	
2010	Typical Well Head Detail	
2011	Distribution of Pumping Volumes and Durations by Wells for Alternative A	
2012	Schematic of Well 4 and 4A Facility	
2013	View of SRF from the East Alignment on top of the Rim	
2014	View of Open area at the Base of the Eastern Alignment	
2015	IGC Vault	
2016	IGC Portal and 6-inch Gas Line	
2017	Inside of IGC Pipe Tunnel	
2018	Water Sampling Results - September 1, 2009	
2019	Water Sampling Results - September 9, 2009	

DIRECT TESTIMONY OF TERRY SCANLAN

I. INTRODUCTION

Q STATE YOUR NAME, BUSINESS ADDRESS AND POSITION.

A My name is Terry Scanlan and I am a Principal Engineer and Hydrogeologist with SPF Water Engineering in Boise, Idaho.

Q WHO ARE YOU TESTIFYING FOR?

A I am testifying as an expert witness on behalf of the Idaho Ground Water Appropriators, Inc, ("IGWA") North Snake Ground Water District and Magic Valley Ground Water District (collectively "Ground Water Districts").

Q WHAT IS YOUR AREA OF EXPERTISE?

A I have expertise in hydrogeology, well construction, water system engineering, and water rights with over 22 years of experience in this field of work.

Q PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A I hold Master and Bachelor of Science degrees in Geological Engineering from the University of Idaho.

Q HAVE YOU EVER BEEN QUALIFIED AS AN EXPERT WITNESS BEFORE?

A Yes. I have served as an expert witness in numerous administrative hearings before the Idaho Department of Water Resources related to water right permit and transfer applications. I have served as an expert witness in district court proceedings, primarily related to water right matters in the Snake River Basin Adjudication.

Q DO YOU HAVE ANY PROFESSIONAL REGISTRATIONS?

A I am a licensed professional engineer, a licensed professional geologist, and a certified water rights examiner in Idaho.

Q WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A In conjunction with my retention as an expert witness in this matter, I have investigated the hydrogeology of the portion of the Eastern Snake River Plain Aquifer tapped by irrigation wells proposed for use in the Snake River Farm Over the Rim mitigation plan. This investigation has included review of well driller's reports and published geologic and hydrogeologic reports. I have visited the wells sites and the Snake River Canyon in the area, and participated in sampling of three wells and a spring discharge point on September 1, 2009.

I have also participated in Over the Rim water system design, as described in **Exhibit 2000**. I was the primary author of Section 2 of that report and adopt the information contained therein as my testimony. Section 2 described the proposed pumping system and pump operation.

Q CAN YOU SUMMARIZE YOUR CONCLUSIONS?

A It is my opinion that water produced from the wells proposed for use in the Over the Rim plan is essentially the same water that discharges to the springs supplying Snake River Farm and other springs in the Clear Lakes vicinity. This opinion is based on hydrogeologic, hydraulic, and water chemistry data discussed in the following paragraphs.

1. The proposed wells penetrate Quaternary-age basalt flows. These flows are mapped as the Sand Springs Basalt by Covington and Weaver (1991). The springs that supply Snake River Farm and Clear Lake issue from an aquifer found within the base of the Sand Springs Basalt. The Sand Springs Basalt appears to overlay the upper part of the Banbury basalt. The upper part of the Banbury basalt apparently has low permeability, preventing water from moving downward from the Eastern Snake Plain Aquifer located within the Sand Springs Basalt. Instead, water in the aquifer moves laterally within the Sand Springs Basalt and discharges from the base of the Sand Springs Basalt at springs in the Snake River Canyon. According to Covington and Weaver (1991), "The top of the Banbury Basalt, relative to other more permeable rock units, defines the lower limit of spring emergence along the present canyon". The springs that supply Snake River Farm and Clear Lake discharge at elevations between 3030 and 3070. Therefore the bottom of the aquifer is above 3000 feet elevation.

2. The wells proposed for the Over the Rim project are believed to tap the Sand Springs Basalt (as mapped by Covington and Weaver). Well site elevations range from approximately 3230 at Wells 1 and 8 to 3300 at Well 7. Well depths, based on Well Driller's Reports for wells 1, 2, 4, and 8 ranges from 80 to 144 feet. The bottom of these wells would be at elevations ranging from 3100 to 3120 feet. Well depths of the other wells should be similar or could be slightly deeper, but none are anticipated to be more than 200 feet. These well depths and well site elevations indicate that the wells do not fully penetrate the Sand Springs Basalt. Therefore, the wells draw from

aquifer zones within the same geologic formation as at the springs, and do not tap underlying aquifers within the Banbury Basalt

3. Regional water-table contours and flow lines (Moreland, 1976, Figure 2) indicate a southwesterly flow direction within the aquifer above the springs that supply Snake River Farm. The springs function locally as a drain to the aquifer. As a result, more localized groundwater contours could be expected to show flow lines that converge on the springs. Given the southwesterly aquifer gradient and the likely convergence of flow lines at the springs, wells 2, 4, 5, 6, and 7, can be considered as up-gradient of the springs. Therefore, a significant portion of the groundwater that naturally flows past these wells likely discharges at the springs. Wells 1 and 8 are located north of the springs. Regional flow lines would indicate that groundwater at these wells might flow to springs further west. However, it is also possible that local gradients induced by the springs cause groundwater at the Well 1 and Well 8 sites to flow in a more southerly direction to the springs.

4. Water chemistry results indicate similarities between the water sample collected from the spring above Snake River Farm (i.e., the Fred Nihart fountain) and water samples collected from the three wells proposed for use in the Over-The- Rim mitigation plan. These samples were collected on September 1, 2009. A comparison is provided in the following table, **Exhibit 2018**.

Exhibit **2018**:

Water Sampling Results - September 1, 2009				
	Well 4	Well 7	Well 8	spring
nitrate (mg/L)	13	2.7	1.5	2.6
alkalinity (mg/L as)	190	160	150	160
hardness (mg/L)	330	230	200	280
ammonia (mg/L)	ND	ND	ND	ND
pH (SU)	7.5	7.7	7.4	7.6
orthophosphate (mg/L)	0.039	ND	0.043	ND
TKN (mg/L)	4.7	0.72	0.38	0.79
TDS (mg/L)	530	360	300	360
calcium (mg/L)	70	54	43	54
magnesium (mg/L)	33	22	19	22
potassium (mg/L)	5.7	4.8	4.2	4.8
lab specific conductance (µmhos/cm)	820	580	470	580
field specific conductance (µmhos/cm)	827	577	464	578
field temperature (°C)	14.4	14.3	14.5	14.3

5. Water samples were collected on September 9, 2009 from the other four wells (Wells 1, 2, 5, and 6) and again from the spring above Snake River Farm (i.e., the Fred Nihart fountain). Laboratory results have yet to be obtained on the samples from these four wells and the spring. Temperature and specific conductance measurements are provided in the following table, **Exhibit 2019**.

Water Sampling Results - September 9, 2009					
	Well 1	Well 2	Well 5	Well 6	Spring
field specific conductance (µmhos/cm)	556	879	644	608	578
field temperature (°C)	14.3	14.5	14.4	14.3	14.4

6. Concentration of dissolved ions is most easily measured by specific conductance. As would be expected in any complex aquifer, the chemistry of water from individual wells varies, with some wells having more concentrated water and other wells having less concentrated water when compared with the water discharging from the spring.

The field specific conductance of water from the seven wells varied from 464 μmhos/cm to 879 μmhos/cm; the 627 μmhos/cm average conductance for the seven wells is very similar to the 578 μmhos/cm conductance measured at the spring. The average conductance of the wells should be similar to the conductance of the springs because the springs and the average of the wells each represent a composite of water from the various zones within the Sand Springs Basalt.

7. Water from the wells and the spring all have essentially the same temperature (14.3°C to 14.5°C). Also, comparison of a well (Well 7) that has the same specific conductance as the spring shows that individual ions concentrations in the well water are essentially equal to the ion concentrations in the spring water. Although additional sampling and analysis will provide a more definitive picture of well and spring water chemistry, these limited data indicate that the chemistry of the water tapped by the wells is, on average, similar to or identical to the chemistry of the water discharging from the springs. For purposes of final design and construction of the Over the Rim project, wells of suitable water quality will be selected to meet project water quality requirements.