

**NEVADA DIVISION OF ENVIRONMENTAL PROTECTION**  
**F A C T S H E E T**  
**(Pursuant to NAC 445A.236)**  
**July 2008**

**PERMITTEE NAME:** Silver Oak Development Company, Limited Partnership

**PERMIT NUMBER:** NEV94015

**LOCATION:** Silver Oak Development Company  
1251 Country Club Drive  
Carson City, Nevada 89703

**PUBLIC WATER SUPPLY:** Carson City Utilities

**GENERAL:**

Secondary treated, filtered and disinfected reclaimed water from the Carson City Wastewater Treatment Plant (Permit NEV90008) is reused for landscape irrigation at the approximately 170 acre 18-hole Silver Oak Golf Course (SOGC) in Carson City, Nevada. Reclaimed water is used in accordance with the applicant's existing effluent management plan (EMP), which incorporates spray irrigation, as restricted by the permit currently in effect. The Permittee's EMP dictates reuse water to be applied for landscape irrigation at the consumptive rate, which means that nitrogen compounds are sufficiently used and consumed by natural, biological processes prior to contact with groundwater. Furthermore, specialized and tailored wellhead protection provisions are delineated in the permit to predict, attenuate, and abate potential impacts to groundwater resulting from the controlled reuse of reclaimed water.

Groundwater conditions regularly monitored at fourteen (14) monitoring wells (MW) locations throughout the golf course have remained generally unaffected by the use of reclaimed water for irrigation. However, water samples from monitoring wells MW-1 (Hole - 14) & MW-14 (Hole - 4) have average nitrate levels of approximately 11 mg/L which exceed maximum allowance of 7 mg/L. As a reference, Maximum Contaminant Level (MCL) for drinking water standards is 10 mg/L nitrate as nitrogen. MW-5 (Hole - 9) & MW-12 (Hole - 18) have average nitrate levels near 8 mg/L. Monitoring wells numbers 2, 3, 4, 7, 8, 9, 10, 11 and 13 have remained constant with average nitrate levels fluctuating between 2 mg/L to non-detectable amounts. Monitoring well 6 (MW-6) has remained dry.

MW-1 averaged nitrate levels of about 11 mg/L. SOGC hole - 14 has been irrigated with potable Carson City Utilities water due to its proximity to Carson City Drinking Water Well - 46 (CCW46). CCW46 does not currently produce drinking water for Carson City. MW-1 is located 110 feet from CCW46. Possible nitrate sources for this monitoring well are still under investigation. SOGC Hole - 14 will be irrigated with reclaimed water after the issuance of this permit for a period of at least one (1) calendar year. This will be done to study the possibility of permanent switch of this hole to irrigation with reclaimed water; additional monitoring will be required. Carson City Utilities is in favor of switching the irrigation of this hole from potable to reclaimed water.

High nitrates levels in MW-14 may be explained by the presence of Eagle Valley Children's Home, which until recently, operated a large septic tank as its means for wastewater disposal. It is important to note MW-4 and MW-13 showed consistent nitrate levels of 2 mg/L and below. These monitoring wells are located immediately down gradient from MW-14 with similar static groundwater levels near

20 feet below grade (fbg).

Nitrates levels in MW-12 may be explained by significant reclaimed water leaks recently discovered at the main irrigation pond during maintenance work done in October of 2007. Subsequent water infiltration from this pond likely resulted in direct contamination of the shallow aquifer; MW-12 is in close proximity and down gradient from the leaking irrigation pond. These leaks were corrected. Nitrates levels in MW-5 may be explained by significant accumulation of irrigation water (ponding) that occurred in close proximity to this monitoring well. SOGC corrected this situation by placing a water collection and pumping system which currently keeps this area dry. Significant improvements in water quality are expected for these two monitoring wells as a result of these corrective actions.

**Monitoring Well Information:**

MONITORING WELL	WELL LOCATION	TOTAL DEPTH (FEET bgs)	GROUND WATER DEPTH (FEET bgs)	NITRATE CONCENTRATION (MG/L) <sup>1</sup>
MW-1	Hole - 14	250	40	11
MW-2	Hole - 12	250	45	2
MW-3	Driving Range	250	50	2
MW-4	Hole - 8	250	43	1.1
MW-5	Hole - 9	60	25	8
MW-6	Hole - 1	60	Dry	-
MW-7	Hole -13	250	57	2
MW-8	Hole -15	253	52.5	1
MW-9	Hole -13	165	60	1.1
MW-10	Hole -11	165	48	1.2
MW-11	Hole -10	165	40	Non-Detect
MW-12	Hole -18	165	70	8
MW-13	Hole - 9	165	20	1.6
MW-14	Hole - 4	80	19	11

<sup>1</sup>: Current Data

**Reclaimed Water Characteristics:**

Treatment Facility: Carson City Wastewater Treatment Plant  
 NDEP Permit: NEV90008  
 Facility Address: 3220 East Fifth St.  
 Carson City, NV 89701  
 Treatment Quality: Secondary treatment with filtration and disinfection  
 Fecal Coliform: < 2.2 - 30 day average - <23 Daily Maximum (MPN/100mL)  
 Total Nitrogen: 17 to 35 mg/L – Average 27.4  
 BOD: 9 mg/L  
 TSS: 9 mg/L  
 Disinfection: Chlorine  
 Filtration: Sand filter  
 Water Usage: 600 Acre-Feet per year – Seasonal use.  
 2,000,000 Gallons per day – Daily Maximum  
 Nitrogen Allowance: 180 lbs/acre/year  
 Total Nitrogen: 30,600 lbs/year

**RECEIVING WATER CHARACTERISTICS:**

Shallow groundwater fluctuates between depths of approximately 20 feet to greater than 75 feet below grade surface (bgs) in the vicinity of the subject site. Fluctuations in water table around the SOGC are often exaggerated by seasonal variations in precipitation, snow pack, and drought, which directly affect aquifer characteristics in the foothills of the Sierra Nevada.

Groundwater is generally of good quality, containing relatively low total dissolved solids (TDS) and chloride concentrations. However, due to the historic presence of individual septic systems and heavy agricultural land uses, water quality extending eastward from the foothills may contain elevated nitrate and TDS concentrations. Older communities still using septic systems to the west (presumably up gradient toward the foothills), northeast, and east of the SOGC may contribute a continuing source of nitrate to regional groundwater.

**PROPOSED MONITORING CONDITIONS:**

**Monitoring Wells 1, 5, 12 & 14**

PARAMETERS	GROUNDWATER LIMITATIONS	MONITORING WELL LOCATIONS	MONITORING REQUIREMENTS	
			Measurement Frequency <sup>2</sup>	Sample Type
Depth to Water (feet)	Monitor & Report	Each well	Quarterly	Discrete
Groundwater Elevation (msl)	Monitor & Report	Each well	Quarterly	Discrete
Total Nitrogen as N (mg/L)	7.0 <sup>1</sup>	Each well	Quarterly	Discrete
Nitrate as N (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Total Dissolved Solids (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Chloride (mg/L)	Monitor & Report	Each well	Quarterly	Discrete

<sup>1</sup>: Monitoring Well # 1 (MW-1) and Carson City Well # 46 (CCW46) are monitored weekly by Carson City Utilities.

<sup>2</sup>: Sampling frequency may be modified, in whole or in part, at the discretion of the Division, upon demonstration of groundwater concentrations or conditions which warrant or justify alternative monitoring schedules.

**Monitoring Wells 2, 3, 4, 6, 7, 8, 9, 10, 11, & 13**

PARAMETERS	GROUNDWATER LIMITATIONS	MONITORING WELL LOCATIONS	MONITORING REQUIREMENTS	
			Measurement Frequency <sup>2</sup>	Sample Type
Depth to Water (feet)	Monitor & Report	Each well	4 <sup>th</sup> Quarter Only	Discrete
Groundwater Elevation (msl)	Monitor & Report	Each well	4 <sup>th</sup> Quarter Only	Discrete
Total Nitrogen as N (mg/L)	7.0 <sup>1</sup>	Each well	4 <sup>th</sup> Quarter Only	Discrete
Nitrate as N (mg/L)	Monitor & Report	Each well	4 <sup>th</sup> Quarter Only	Discrete
Total Dissolved Solids (mg/L)	Monitor & Report	Each well	4 <sup>th</sup> Quarter Only	Discrete
Chloride (mg/L)	Monitor & Report	Each well	4 <sup>th</sup> Quarter Only	Discrete

<sup>1</sup>: Per the schedule required under Part I.A.8 of this Permit.

<sup>2</sup>: Sampling frequency may be modified, in whole or in part, at the discretion of the Division, upon demonstration of groundwater concentrations or conditions which warrant or justify alternative monitoring schedules.

The use of reclaimed water to irrigate landscaped areas of the SOGC will be subject to specific monitoring and threshold conditions instituted to avoid subsequent impacts to groundwater. Proposed limitations are designed to verify the constituent composition of reclaimed water discharges, control application and operational parameters to protect groundwater from any further degradation.

Flow is limited by the volume of reclaimed water requested for application, and as long as the nitrogen budgets presented in the approved EMP are observed and annually balanced, the flow rate or volume of water requested can be authorized. This parameter is required to be recorded and reported because it is a variable that is used to calculate the total mass of nitrogen applied to the golf course on a quarterly basis, which is used to reconcile the annual nitrogen balance.

The nitrate concentration in applied reclaimed water is a monitor and report requirement to track this fraction of the total nitrogen mass applied to the site for purposes of evaluating groundwater conditions. Should nitrate concentrations in groundwater begin to exhibit an increasing trend, further examination of nitrate concentrations in effluent and how application rates affect groundwater may be required. The concentration of total nitrogen in reclaimed water used for irrigation is required for purposes of determining mass discharge to irrigated landscape areas. The nitrogen concentration in reclaimed water is a component of the calculation for monthly nitrogen mass application, which is ultimately used to reconcile annual nitrogen budgets.

The total nitrogen as nitrogen (as N) application rate and the annual nitrogen load (balance) are required under the EMP. The cumulative (allowable) total nitrogen applied is calculated as 110% of the total nitrogen maximum uptake/requirement data provided by Resource Concepts Inc. in October 2007. Quarterly reconciliation of the nitrogen is required so that Permittee can assess and optimize irrigation practices to effectively manage and routinely demonstrate projected compliance with the annual nitrogen load (balance) limitation.

**Proposed Determination:** The Division has made the tentative determination to issue the proposed permit, under the provisions prescribed, for a 5-year period. Under NAC 445A.232, this permit is classified as a *Discharge of Treated Effluent for Irrigation - 1,000,000 gallons or more but less than 10,000,000 gallons daily.*

**Procedures for Public Comment:** Notice of the Division's intent to re-issue a modified permit authorizing the facility to discharge to groundwater of the State, subject to the conditions contained within the permit, is being sent to the **Nevada Appeal** for publication. Notice is also mailed to interested persons on our mailing list. Anyone wishing to comment on the proposed permit can do so in writing for a period of 30 days following the date of the public notice, and must be postmarked, faxed, or e-mailed by 5:00 p.m. on **August 10, 2008**. The comment period can be extended at the discretion of the Administrator. A public hearing on the proposed determination can be requested by the Applicant; any affected State; any affected interstate agency; or any interested agency, person, or group of persons. The request must be filed within the comment period, and must indicate the interest of the person filing the request and the reason(s) why a hearing is warranted. Public hearings granted by the Division are conducted in accordance with NAC 445A.238. The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to NRS 445A.605.

The application and proposed permit on file and may be copied or copies may be obtained by writing or by calling Alexi Lanza, Bureau of Water Pollution Control at 775.687.9468; fax: 775.687.4684; or email: [alanza@ndep.nv.gov](mailto:alanza@ndep.nv.gov). This notice and the fact sheet can be viewed at <http://ndep.nv.gov/admin/public.htm>.

Prepared by: Alexi Lanza  
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