

MEMO

STATE OF IDAHO

DEPARTMENT OF WATER RESOURCES

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DATE: APRIL 24, 2009

TO: File

FROM: Mat Weaver *MW*

SUBJECT: 23-11387 ALEIXO REVIEW OF ENGINEERING REPORT AND STREAM
DEPLETION ANALYSIS

INTRODUCTION

At the request of Shelley Keen, Water Rights Section Manager, this memo summarizes my hydrological assessment of the Engineer's Report on stream depletion analysis prepared for water right permit 23-11387. I have reviewed the contents of the Engineer's Report for confirmation that the proposed ground water diversion system will be in conformance with permit condition number six. Condition number six states in part, *"To divert water in connection with this right, the right holder shall use a pump that is installed outside the high water mark of Palisades Creek or installed in a shallow well or sump constructed or excavated outside the high water mark but near enough to Palisades Creek that diversion of water from it cause[s] the flow of Palisades Creek to be diminished by at least 50% of the diversion rate within a 24 hour period."*

WATER PERMIT SUMMARY

On January 25, 2009 the Idaho Department of Water Resources (IDWR) issued an amended permit to appropriate water for irrigation, aesthetic, and recreational uses associated with a proposed lined pond. The amended permit allowed for a surface water **diversion of 0.03 cfs** from Palisades Creek and a storage **volume of 3 acre-feet**. The permit also allowed for the diversion of groundwater from a "shallow well or sump" provided the permit holder submitted a report demonstrating that within 24 hours of initiating pumping, 50% of more of the diverted water would be attributable to stream depletion from Palisades Creek.

ENGINEER'S REPORT EVALUATION

An Engineer's Report prepared by Keller and Associates (Engineer) on March 31, 2009 was submitted to IDWR in conformance with condition number six of the permit. In the report the Engineer summarizes the purpose of the report, project requirements, project soils, and recommendations. The Engineer concludes the Report with the following:

As a result of our site observations and analysis, the proposed location for the sand point well (See Site Map) and current soil conditions, this site offers excellent subsurface hydrology. As such we would expect at least a 50% diversion rate to the proposed shallow well site to be supplied by Palisades Creek Water.

The Engineer presents circumstantial evidence to support their expectations of conformance with permit condition six, but omit any technical justification for this position. Regardless of this omission, I agree with the underlying expectations of the Engineer. To assess the veracity of these expectations I prepared a simple analytical evaluation of stream depletion.

STREAM DEPLETION ANALYSIS

The percentage of water pumped from the proposed shallow well that is supplied by Palisades Creek was estimated using the Glover and Balmer (1954) equation for stream flow depletion. This equation can be used to estimate the amount of flow diverted from a stream at any time after pumping begins (Jenkins, 1968). A constant pumping rate of 0.03 cfs (permitted diversion rate) was assumed for a duration of 24 hours. Published values of average hydraulic conductivity (1417 feet/day, Das 2002) and specific yield (0.20, Fetter 2001) for the soil types described by the Engineer were used in evaluating impacts. A recommended depth of well was not provided by the Engineer, however for the purposes of this analysis a depth of 5 feet below the minimum seasonal water table elevation was assumed. The following table summarizes predicted stream flow depletion characteristics based upon the conditions presented above and in the Engineer's Report.

Table 1 - Summary of Stream Depletion Characteristics Associated w/ Permit 23-11387

Distance from Stream (ft)	Stream Depletion Rate (cfs)	% of Total Diversion Rate	24 Hour Vol. of Water from Stream (ac-ft)	% of Total Diversion Vol.
30	0.028	92	0.05	85

CONCLUSIONS

The analysis of stream water depletion presented above relies on a number of simplifying assumptions. These assumptions are likely not accurate or completely accurate for the situation evaluated, however, they allow the reduction in complexity of the actual system, necessary to analytically evaluate the relationship in question. As such, the estimates provided above represent best guesses for values of stream depletion. Error more than likely exists between the modeled predictions and actual physical values. That being said, the values indicate a strong interconnectedness between Palisades Creek and the proposed shallow well and support the expectations and conclusions of the Engineer.

It is my recommendation that the Engineer's Report be accepted with the modifications listed below, and furthermore, that IDWR grant approval to the permit holder to commence construction of their shallow diversion well system.

- 1. Inclusion of minimum perforation specifications for the concrete well casing.**
- 2. Inclusion of a minimum depth to the top of the pump from the irrigation seasonal low water table elevation.**

REFERENCES

Das, B.M. 2002. Principles of Geotechnical Engineering - Fifth Edition. Brooks/Cole, California.

Fetter, C.W. 2001. Applied Hydrogeology - Fourth Edition Prentice Hall, New Jersey.

Jenkins, C.T., 1968. Book 4 Hydrologic Analysis and Interpretation Chapter D1 Computation of Rate and volume of Stream Depletion by Wells. Techniques of Water-Resources Investigations of the United States Geological Survey.