

MEMORANDUM

October 27, 2004

To: Jeff Peppersack
Reviewed by: ^{RR} Rick Raymondi, Bureau Chief, Technical Services
From: Shane Bendixsen, ^{SP} Technical Hydrogeologist
Subject: **Transfer 71446, Salmon River.**

It is my understanding the above-mentioned transfer involves transferring a surface water right to a ground water right in T11N R18E sec 14 along the Salmon River. IDWR policy states that a surface to ground water transfer can only be approved if there is a direct hydraulic connection between the current and proposed points of diversion. This is defined by a 50 percent depletion from the original source in the first 24 hours of production. The following is a brief hydrologic review.

The well is 120 feet deep, 82 feet from the Salmon River, and has a static water level of 12 feet below land surface. The static water level and the proximity to the river suggest hydraulic connection to the river.

The consulting engineering firm, CH2MILL, used pump test data to estimate aquifer parameters. At a production rate of 450 gpm, drawdown was less than one foot. This again suggests a direct hydraulic connection.

Values for transmissivity ranged from 63,529 to 113,636 ft²/day. Assuming the aquifer thickness of 60 feet (the length of the perforations in the well) this correlates with other published values for hydraulic conductivity for relatively permeable sand and gravels.

A storage coefficient of 20 percent (0.2) was assumed. Based on the well drillers report for the pumped well, sands and gravels were the most common lithology encountered and therefore 20 percent is a reasonable estimate.

Stream depletion was then estimated from a dimensionless chart published by Glover and Balmer (1954). Depletion rates ranged from 82 to 87 percent for the first 24 hours. The method is analytical, not numerical, but with distances of less than 500 feet from the well to the stream, an analytical method is reasonably accurate.

The test was only run for six hours and therefore the lack of response produces unreliable results. Therefore as a further check IDWR staff used a slightly different approach and used published values of hydraulic conductivity that more closely resembled the rock

types that were described by the driller. This produced depletion values in the first 24 hours ranging from approximately 78 to 93 percent (see the attached figure).

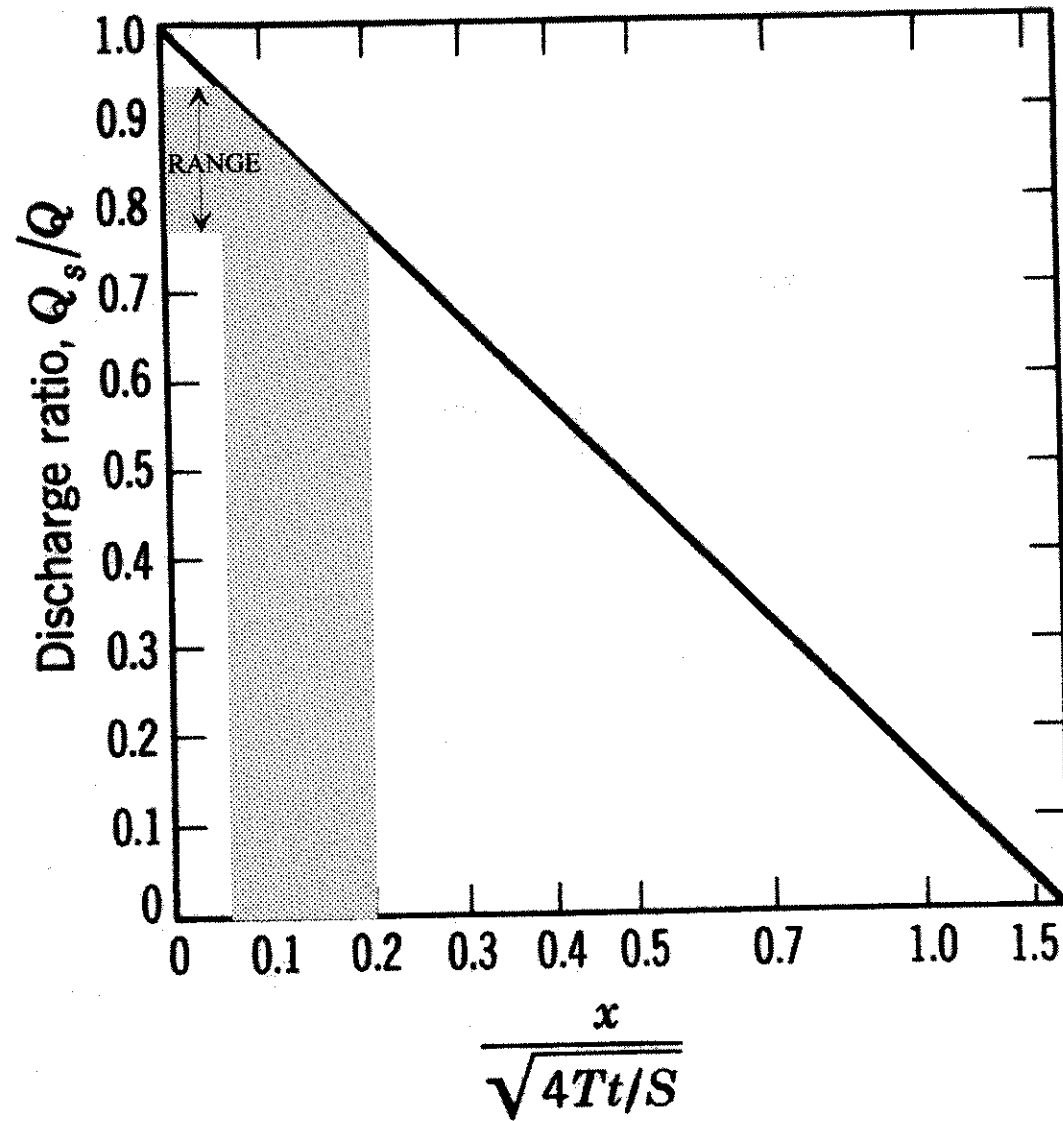
CH2MHILL also used the center of the stream for the distance to the production well. Todd (1980) explains that the "axis of the stream" must be used, but defines the axis as the edge of the stream. Therefore CH2MHILL's calculation is an underestimate.

In closing, basic data from the well drillers report and the pump test suggest a direct hydraulic connection between the stream and the aquifer. An analytical method developed by Glover and Balmer (1954) suggests that stream depletion is greater than 50 percent in the first 24 hours.

REFERENCES

Glover, R.E., and Balmer G.C., River Depletion Resulting from Pumping a Well Near a River, Trans. Amer. Geophysical Union, v. 35 pp 468-470, 1954.

Todd, David Keith, Ground Water Hydrology, Second Edition, John Willey and Sons, 1980.



Adapted from Todd, 1980