



TECHNICAL MEMORANDUM

To: Alex Campbell, Enduring Resources
From: John Shomaker
Date: June 12, 2023
Subject: 100-year depletion of Rio Gallina due to pumping 942 ac-ft/yr from each of Wells SJ-4301 POD2, POD4 and POD 5 for 20 years.

Enduring has State Engineer approval to divert and consume a total 4,710 ac-ft/yr from five Entrada Sandstone wells under File No. SJ-4301 for 20 years, each well limited to 942 ac-ft/yr. Enduring has converted Well SJ-4301 POD3 to a salt-water disposal well (API No. 30-045-38292) and it will no longer be used to divert groundwater. The disposal-well permit was approved by the U.S. Bureau of Land Management on February 7, 2023. Enduring is also planning to convert Well SJ-4301 POD1 to a salt-water disposal well.

The Office of the State Engineer used a groundwater model prepared by Eric Keyes (Keyes, 2018) to estimate the rate of depletion of Rio Gallina flows attributable to the SJ-4301 pumping. For the purpose of this memorandum, the same model was used to estimate the depletion that would be attributable to pumping from the remaining three wells.

The five wells had been in service for about four years. For the first 14 years of pumping from all five wells, the model predicts a Rio Gallina depletion rate of 0.0 ac-ft/yr. For the case of pumping from three wells for 20 years (Figure 1), the model predicts depletion of 0.2 ac-ft/yr at the end of 20 years, 2.9 ac-ft/yr at the end of 40 years, and 12.1 ac-ft/yr at the end of 100 years.

The model is likely to over-predict Rio Gallina depletion, for several reasons. The Keyes model represents the aquifer as a single layer, without leakage from above or below, but the beds above and below are not completely impermeable and other modeling studies show that significant contributions of water from those beds can be expected, so that drawdowns at

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the location of the Rio Gallina would not be as great as predicted. The Entrada Sandstone is cut by significant faulting between the SJ-4301 wells and the Rio Gallina, so that the aquifer is offset against lower-permeability beds, and effects on the side of the fault zone opposite the wells would be less than as predicted by the model, which represents no faulting. Enduring has injected important quantities of water into the same aquifer as part of its oil and gas operations, which would serve to offset part of the drawdown created by pumping from the SJ-4301 wells, and expects to inject still more water into the aquifer through the disposal wells that formerly were SJ-4301 POD1 and POD3.

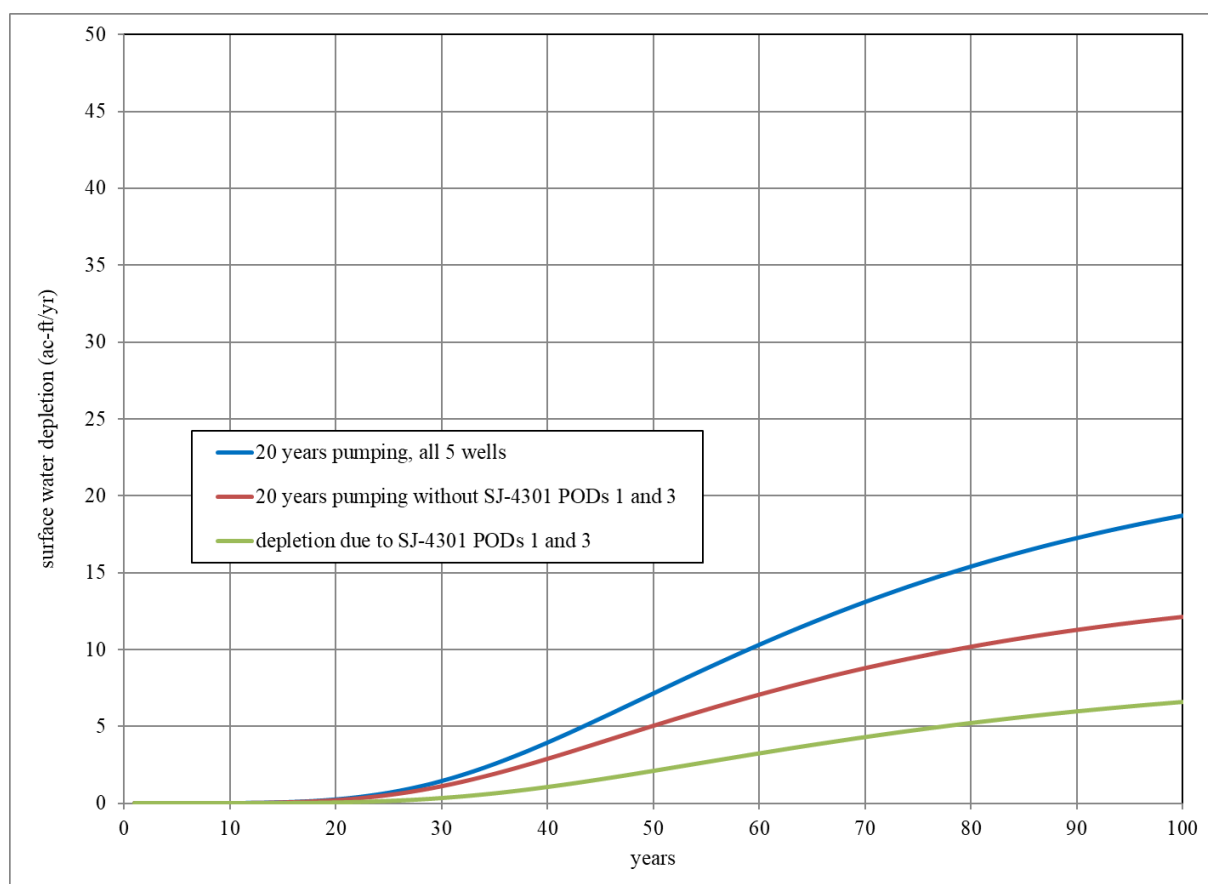


Figure 1. Graph showing rate of streamflow depletion of Rio Gallina due to pumping 942 ac-ft/yr from each of Wells SJ-4301 POD2, POD4, and POD 5 for 20 years (red curve).

REFERENCE CITED

Keyes, E., 2018, SJ-4301 *et al*, evaluation of surface water impacts from Enduring Resources deep pumping of 4710 AFY: N.M. Office of the State Engineer, Technical Memorandum addressed to John Romero, Director, WRAP, dated November 28, 2018, 9 p.

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CONDITIONS

Action 346096

CONDITIONS

Operator: NEW MEXICO ENERGY MINERALS & NATURAL RESOURCE 1220 S St Francis Dr Santa Fe , NM 87504	OGRID: 264235
	Action Number: 346096
	Action Type: [IM-SD] Well File Support Doc (ENG) (IM-AWF)

CONDITIONS

Created By	Condition	Condition Date
pgoetze	None	5/20/2024